DOCUMENT

31

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

State of Illinois
Department of Natural Resources
Office of Mines and Minerals; Land Reclamation Division
One Natural Way
Springfield, IL 62702

PERMIT APPLICATION 456
WATER MANAGEMENT PIPELINE

VOLUME I OF II: PARTS I – V

POND CREEK MINE NO. 1
WILLIAMSON COUNTY, IL

Prepared for
WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B17-222-1413
MAY 2017
Re-Submitted July 2018

Beckley, WV
Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA
3 Four Coins Drive, Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of **Natural Resources**

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

July 13, 2018

Carson Pollastro
Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951

Re: Application No. 456
Complete

Dear Mr. Pollastro:

This letter will serve as notice that the proposed permit application for Pond Creek mine, submitted under the Surface Coal Mining Land Conservation and Reclamation Act and the promulgated rules and regulations, is administratively complete for review.

The application number for this submittal, Permit No. 456, shall be included in the newspaper advertisement, and with the County Clerk when filing the application.

As per 62 Ill. Adm. Code 1773.13 (a), the applicant is required to place an advertisement in a local newspaper of general circulation in the locality of the proposed surface coal mining and reclamation operation at least once a week for four consecutive weeks. A certificate of publication must be submitted to the Department no later than four weeks after the last date of publication. The draft copy of the public notice submitted with the application was reviewed and found to be acceptable.

The applicant is required to file two copies of the application with the County Clerk of Williamson and Franklin Counties for public review. Form SCML-1a (copy enclosed) shall be signed by the County Clerk and submitted to the Department.

RECEIVED
JUL 16 2018
IL Environmental Protection Agency
MARION REGIONAL OFFICE

The Department requires five complete copies of the application be forwarded to this office for technical review, one with original signatures and seals. Four of the five copies may be submitted on CD in Adobe.pdf file format with maps in .jpg format. Two additional copies of the application shall be sent to the Illinois Environmental Protection Agency, Mine Pollution Control Program, 2309 West Main Street, Suite 116, Marion, IL 62959.

Pursuant to Operator Memorandum 2018-02, the Department is requesting one additional copy CD complete with .dwg drawings of all maps.

Should you have any questions, please contact this office.

Sincerely,

Nick San Diego, Supervisor
Land Reclamation Division

NSD:JSc
Enclosure
cc: W. Gillespie
Mine Pollution Control Program, IEPA

State of Illinois
Department of Natural Resources
Office of Mines and Minerals; Land Reclamation Division
One Natural Way
Springfield, IL 62702

RECEIVED
AUG 10 2018
SW/WS/IFAS

PERMIT APPLICATION 456
WATER MANAGEMENT PIPELINE

VOLUME I OF II: PARTS I – V

POND CREEK MINE NO. 1
WILLIAMSON COUNTY, IL

Prepared for
WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B17-222-1413
MAY 2017
Re-Submitted July 2018

RECEIVED
JUL 18 2018
IL Environmental Protection Agency
MARION REGIONAL OFFICE

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

June 21, 2018

Project No. B17-222-1413

Mr. Nick San Diego, Supervisor
Illinois Department of
Natural Resources
Land Reclamation Division
One Natural Resources Way
Springfield, IL 62702-1271

Responses to Incomplete Comments
Permit Application 456
Williamson Energy, LLC
Williamson County, Illinois

Dear Mr. San Diego:

On behalf of our client, Williamson Energy LLC, Alliance Consulting, Inc. is submitting a copy with original signatures and one duplicate copy to address the Incomplete Comments dated May 18, 2018 (attached).

Response to Comment 1 - Attachment I.2.A. has been revised. Acreage has been added to the table.

Response to Comment 2 - Parcel 11-32-100-003 has been added to Attachment I.2.A.

Response to Comment 3 - Boring operations will be conducted outside of the 100 feet road right-of-way for all road crossings. All references to trenching through roads have been removed from the Hydrology-Mining Operation Maps (Drawing Nos. B17-222-M13 – M16) and Part I.12.B.4 has been revised to indicate no roads will be closed.

Response to Comment 4 - Boring operations will be conducted outside of the 100 feet road right-of-way for all road crossings. No agreements will be needed from the county highway department.

Response to Comment 5 - The public notice has been revised per the comment.

Response to Comment 6 - The narrative for Part I.12.C.4 has been revised. All references to trenching across the roads have been removed. Boring operations will be conducted outside the 100 feet road buffer zones. A

variance is requested for construction/installation operations for areas adjacent to the public roads.

Response to Comment 7 - Typical cross sections have been included in Attachment IV.7.I.

Response to Comment 8 - All references to "preliminary designs" have been removed.

Response to Comment 9 - Part IV.7.I has been revised to address ephemeral streams.

Response to Comment 10.a. - Refer to the revised Attachment II.8 for the requested information.

Response to Comment 10.b. - Part V.3.B.4 has been revised to include the requested information.

Response to Comment 10.c. - Refer to the revised Attachment II.8 for the requested information.

Response to Comment 11 - Attachment V.1.D.2.b has been revised to include a permanent wetland vegetation species list and reclamation plan.

If you have any questions, or require additional information, please contact us.

Sincerely,

ALLIANCE CONSULTING, INC.

Stephen M. Sutphin
Senior Project Manager

SMS:sms
Enclosures

FILE: 17222-03

ILLINOIS
DEPARTMENT OF
NATURAL
RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

May 18, 2018

Carson Pollastro
Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951

Re: Application No. 456
Response Dated April 2018

Dear Mr. Pollastro:

This letter will serve as notice that the permit application for Pond Creek Mine, submitted in response to the Department's incomplete letter dated November 6, 2017, under the Surface Coal Mining Land Conservation and Reclamation Act and the promulgated rules and regulations, is **not** administratively complete for review.

The following points must be addressed by the applicant for the Department to continue its review process:

1. Response to Part I.2 and I.3, property owners and locations, appears to be incomplete. Attachment I.2.B indicates many property owners have Easements with the applicant and others do not. The applicant is required to provide land owner waiver documents from surface property owners for areas the applicant does not control, for inclusion in the application for an application to be deemed administratively complete. Additionally, the applicant did not provide acreage figures to determine percentage of controlled/uncontrolled property.

2. One parcel ID No. 11-32-100-003, indicated on Identification of Interest Map 4, shows a portion of the proposed boundary from the NW before crossing under Lake Creek Road. This property is not listed in Attachment I.2.B. The applicant shall verify whether this is a mapping error or revise/update Attachment I.2.B.

   Additionally, if this parcel is to be included, the applicant shall provide the required information indicating right of entry or landowner waiver for inclusion in the application.

3. The applicant has provided agreements with the local road authorities for operations within the road right of ways. The agreements indicate all crossings to be bored under. The applicant indicates road crossings will be bored under and trenched through. Road agreements provided from Williamson and Franklin County Highway Departments indicate operations shall be within the right of way of the roads and do not allow trenching. The Hydrology - Mining Operations Maps indicate some areas to be trenched and roads closed. This information conflicts with the road authority agreements and shall require attention.

   Further, Part I.12.B.4 indicates roads will be closed. Review of the road agreements does not indicate the applicant has the authority to close roads. If the applicant is to close roads, the public notice must be revised to indicate an approximate time and duration of the closure for each road to be closed.

4. Review of the Ownership Identification Map Drawings M1, M2, M3 and M4 indicates public roads not discussed in the Franklin County Highway Department agreement. The applicant needs to clarify the crossings and locations of Horseshoe Road, Deason Road, Sandburg Road, Gossage Road Lake Creek Road and Cheatman Road. The Applicant needs to verify whether operations for crossing these roads are within each road's right of way or within 100 feet of the outside right of way.

5. The Department found discrepancies in the locations of the following roads:

   The public notice indicates Deason Road is in the NE/4 T7S, R2E, Section 28 and SW/4 Sec 27. Review of the map indicates Deason Road runs N/S at the corners; Sec28, SE; Sec 27, SW; Sec 34, NW; Sec 33 NE. The applicant will need to revise the notice.

   Similarly, Lake Creek Road is along the north border of Sections 32, 31 and 30; and south borders of Sections 29 and 30. The public notice states the road is in the NE/4 of Section 30.

6. The applicant requests a variance for operations within 100 feet of the right of way of a road, in response to Part I.12.C.4. The operations proposed do not allow for a variance.

7. The applicant failed to provide a cross section depicting stream crossings, as requested per Comment 21 of the Incomplete Letter sent by the Department on November 6, 2017. Pursuant to 62 Ill. Adm. Code 1784.23(b)(6), the applicant shall provide design cross sections of the stream crossings proposed for the perennial stream Pond Creek and the 8 intermittent and the ephemeral streams' crossings. All stream crossings' cross sections shall include details, including but not limited to: the depth at which the waterline will be buried under the streambed, the watershed area that the stream is draining at the point of

construction, and any protection measures to be used on stream crossings to prevent water pollution and damage to public and private property.

8. The applicant provided preliminary engineering design in response to Part IV.5.C.2 and stated that specifics of the waterline hydraulic design such as pipe sizes and location of fittings will be provided before the installation of the pipeline. To ensure compliance with 62 Ill. Adm. Code 1784.30, the applicant shall provide detailed engineering design before the application can be deemed approved after technical review. The applicant shall provide a schedule with the dates when any detailed design plans for the waterline that are not submitted with the general plan will be submitted to the Department. The Department shall have approved, in writing, the detailed design plan for the water pipeline before construction of the structure begins.

9. The applicant has supplied a Wetland and Stream Delineation Report as Attachment II.9 in Part II of the application. The report identified 9 streams categorized as ephemeral to be disturbed. The applicant has failed to provide a justification for any stream characterized as ephemeral based on Department regulations as requested in Comment 10 (b.) of the Incomplete Letter sent by the Department on November 6, 2017. Please refer to Operator Memorandum No. 2017-06 for further explanation regarding ephemeral stream justifications. The names and qualifications of the person(s) making the determination shall be supplied. Should any of the streams not meet the criteria of an ephemeral stream based on Department regulations, a request to be exempt from the 100 ft. buffer requirements should be included.

10. The application indicates a total of 20.1 acres of Wildlife Woody pre-mining land use and the description of this habitat supplied in Part II(9) of the application includes woody species that are suitable summer Indiana bat and northern long-eared bat habitat. The applicant shall supply the following information in **Part V(3)(B)(4)** of the application:

    a. The applicant has included the bat survey results as Attachment V.3.B.4., but has failed to update the response to **Part V(3)(B)(4)** that states the proposed permit area is scheduled to be surveyed for threatened and endangered bat species beginning May 17, 2017.

    b. The applicant has provided an Indiana Bat Protection and Enhancement Plan in Part II of the application but failed to include an Incidental Take authorization request for the Indiana bat meeting the specifications of the "Range-wide Indiana Bat Protection and Enhancement Plan Guidelines" (revised 2013) developed by the U.S. Fish and Wildlife Service and the Office of Surface Mining, or justify why an incidental take authorization request is not required under those guidelines. If needed, the incidental take table provided in the 2013 Guidelines should be included with the PEP.

c. The applicant failed to update Part **V(3)(B)(4)** discussing whether or not the project is consistent with the northern long-eared bat Final 4(d) Rule (January 2016).

11. The applicant has failed to supply a Wildlife Wetland species list or wetland reclamation plan, as requested in Comment 12 of the Incomplete Letter sent by the Department on November 6, 2017. The applicant has supplied a Wetland and Stream Delineation Report as Attachment II.9 in Part II of the application. The report delineated 31 wetlands totaling approximately 6.73 acres to be disturbed. Upon review, Attachment V.1.D.2.b does not include a Wildlife Wetland species list or reclamation plan. The applicant shall provide measures to comply with 62 Ill. Adm. Code 1816.97(f) and include a permanent wetland vegetation species list and reclamation plan that is compatible with the Corp of Engineers Wetland Delineation Manual.

Upon submission of a new application, complete with the above listed information included, the Department will again review the permit application to determine if it is administratively complete.

Should you have any questions, please contact this office.

Sincerely,

Nick San Diego, Supervisor
Land Reclamation Division

NSD:JSc

cc: W. Gillespie

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

April 3, 2018

Project No. B17-222-1413

Mr. Nick San Diego, Supervisor
Illinois Department of
Natural Resources
Land Reclamation Division
One Natural Resources Way
Springfield, IL 62702-1271

Responses to Incomplete Comments
Permit Application 456
Williamson Energy, LLC
Williamson County, Illinois

Dear Mr. San Diego:

On behalf of our client, Williamson Energy LLC, Alliance Consulting, Inc. is submitting a copy with original signatures and one duplicate copy to address the Incomplete Comments dated November 6, 2017 (attached).

Response to Comment 1 - Document information has been added to Attachment I.2.A.

Response to Comment 2 - The Identification of Interests Maps (Drawing Nos. B17-222-E1 through E4) and Attachments I.2.A & B have been revised per Williamson and Franklin Counties GIS property database.

Response to Comment 3 - Refer to the revised Ownership and Control information being submitted.

Response to Comment 4 - The public notice has been revised to address mining activities within 100 feet the right of way of roads.

Response to Comment 5 - The public notice refers to activities around "Horseshoe Road along the northeast quarter of Township 7 South, Range 2 East, Section 34 and the southwest quarter of Township 7 South, Range 2 East, Section 34". The public notice has been revised to reference activities around "Horseshoe Road along the northeast quarter of Township 7 South, Range 2 East, Section 34 and the ***northwest*** quarter of Township 7 South, Range 2 East, Section 34". No reference was found for activities around Horseshoe Road and southwest quarter of Section *28* and 34.

124 Philpott Lane ☐ Raleigh County Airport Industrial Park ☐ Beaver, WV 25813-9502 ☐ TELE: (304) 255-0491 ☐ FAX (304) 255-4232

Response to Comment 6 - Refer to Attachment I.12.B.4 – Illinois Department of Transportation for additional information concerning the road utility permits.

Response to Comment 7 - Part I.12.C.1 has been revised. The reference to 1761.14(d) has been corrected and the narrative now refers to Section 1761.14(b).

Response to Comment 8 - Refer to the revised narrative in Part III.2.A.1. for the clarification.

Response to Comment 9 - Part II.13.D has been revised per the comment.

Response to Comment 10.a. – f. - Refer to the revised Attachment II.8 for the requested information.

Response to Comment 11.a. – c. - Refer to the revised Attachment V.3.B.4 for the requested information.

Response to Comment 12 - Attachment V.1.D.2.b has been revised to include a permanent wetland vegetation species list and reclamation plan.

Response to Comment 13.a - The map legend has been corrected.

Response to Comment 13.b - The Cumulative Impact Area drainage area has been added to the CIA map (Drawing No. B17-222-E2). A drainage area for the pipeline installation was not delineated because of the short-term disturbance associated with the pipeline installation. The map legend has been corrected.

Response to Comment 14 - The six stream monitoring points, which are existing, are utilized for the existing cumulative impact area (mine area) and not for the proposed Water Management Pipeline. Per a conference call on July 15, 2017 with the IDNR hydrologist, it was discussed and agreed that the pipeline would not affect the currently approved CIA because the pipeline would not impact the surface and groundwater systems. Part III.2.D.1.a. states that the pipeline will not change the surface water and groundwater systems, drainage patterns and storm water runoff characteristics. This statement has been added to the narrative located under the Cumulative Hydrologic Impact Area section of Part III.2.D.1.a. – Water Management. The narrative in Part III.2.D.1.a. – Surface Water Sampling Points has been revised to indicate that Sites PC-1 and

PC-2 will be the only surface water sites associated with the Water Management Pipeline.

Response to Comment 15 - Per the comment, Part I.1.G has been revised to indicate the pipeline is a Support Facility and Part IV.5.B. have been revised to indicate the pipeline is a Mine Support Area.

Response to Comment 16 - A signed Engineering Certification has been included.

Response to Comment 17 - Copies of the Franklin County road agreements are included.

Response to Comment 18 - Part II.1 has been revised per the comment.

Response to Comment 19.a - Refer to the revised Attachment IV.1, which addresses installation of the pipeline crossing railroads

Response to Comment 19.b - Refer to Attachment IV.1 for information concerning the location of the gas line.

Response to Comment 20.a - A small soil storage area has been shown on the Hydrologic/Mining Operations Map – Sheet 4 (Drawing No. B17-222-M16). Refer to Attachment IV.1 under the narrative for the Big Muddy River for additional information.

Response to Comment 20.b - A proposed power line will be located within the permit boundary and will run from the intersection of Lake Creek Road to the proposed maintenance building/pump house. The power line has been added to the Hydrologic/Mining Operations Map – Sheet 4 (Drawing No. B17-222-M16). Refer to Attachment IV.1 under the narrative for the Big Muddy River for additional information.

Response to Comment 21 - Refer to Part IV.7.I for information on measures to be taken to prevent erosion, water pollution and stream channel stability.

Response to Comment 22 - Part IV.7.K.2 has been revised and contact will be made with IDNR-OWR for the Pond Creek crossing.

Response to Comment 23.a - Refer to Part IV.5.C.2 for additional information concerning the installation Water Control Structure at the Diffuser site

Response to Comment 23.b - Refer to the revised Part IV.5.C.2 narrative for additional information. Use word "wyes" has been removed and replaced with the word "elbows". At this time no wyes are proposed.

Refer to Attachment IV.5.C.2 for a description of the design for the pipeline and diffuser site.

If you have any questions, or require additional information, please contact us.

Sincerely,

ALLIANCE CONSULTING, INC.

Stephen M. Sutphin
Senior Project Manager

SMS:sms
Enclosures

cc: Will Gillespie

FILE: 17222-02

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

November 6, 2017

Carson Pollastro
Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951

Re: Application No. 456, Incomplete

Dear Mr. Pollastro:

This letter will serve as notice that the permit application for Pond Creek Mine, submitted under the Surface Coal Mining Land Conservation and Reclamation Act and the promulgated rules and regulations, is **not** administratively complete for review.

The following points must be addressed by the applicant in order for the Department to continue its review process:

1. The applicant, in its response to Part I.2.A, Property Ownership within the proposed boundary, did not provide the acreage for each of the surface owners, type of document conveying right of entry or landowner waiver to have the property included in the application. The applicant shall update Attachment I.2.A to include each property owner's acreage in the proposed area, the date of, and type of document that allows the applicant to enter and operate as proposed, and if no agreement has been reached with a property owner, a waiver allowing the applicant to include the property in the application.

2. Upon review of the Ownership Identification Map Drawings in conjunction with Attachment I.2.A, the reviewer finds several parcels listed on the maps that are not included in the list. Conversely, review indicates listings in Attachment I.2.A that cannot be located on the maps; one parcel located on Map 4 is listed as two different property owners. The list and maps must be updated to reflect correct information for location and property ownership.

3. The applicant, in response to Part I.9 has provided lists of violations for companies owned/controlled by the applicant and owners/controllers of the applicant. Review of the lists indicates several violations that are not marked "terminated" or "abated" and have no documentation whether the violations are being corrected in good faith with the issuing agency. The applicant shall, for all active violations listed (those not indicated as

"terminated" or "abated") provide current documentation to indicate the company is working with the issuing agency to resolve the issue.

During completeness review the Department finds a cessation order issued to Maple Creek Mining, Inc. which has links with the ownership of the applicant. Although this violation occurred after the submittal of your application, the Department is notifying you this violation will be included in technical review if it has not been abated.

4. The applicant indicates roads may be temporarily closed, in response to Part I.12.B.4. Upon review of the Hydrology – Mining Operations Map and public notice submitted, the reviewer finds the public notice inadequate as it does not indicate specific operations within 100 feet of the outside right of way of each road.

Further, the public notice provided indicates activities around Horseshoe Road in the SW/4 of Sec 28 and 34, T7S, R2E. Hydrology – Mining Operations Map does not indicate the proposed area in this location.

Public notice will be reviewed for compliance upon receipt of all changes outlined in this letter.

6. The applicant indicates copies of road agreements shall be provided upon execution with the road authorities. Agreements were received from the Williamson County Highway Department and Illinois Department of Transportation. Agreements with the Illinois Department of Transportation indicate operations shall be completed within 180 days of approval or agreements are null and void. Agreements were signed February of 2017.

7. The applicant, in response to Part I.12.C.1 indicates, "Variance of Section 1761.14(d) is requested." This is not a valid regulation and shall be corrected.

8. Pursuant to 62 Ill. Adm. Code 1783.12, Attachment II.10.A must be modified to reflect any updates to the status of the Cultural and historical survey.

9. Pursuant to 62 Ill. Adm. Code 1783.21, Part II.13.D, page II-7 must be modified to agree with the topsoil removal thickness handling procedure outlined in Part IV.2.B.3, page IV-2.

10. The response to Part II.8 of the application references Attachment II.8. The applicant is required to provide information on site specific resources such as threatened and endangered species, other protected species, and potential habitats of high value. An EcoCAT Consultation has been provided as part of this application in Attachment II.8. This document only provides locality data for recorded occurrences. The applicant is required to update Part II.8 of the application with, at minimum, the following information:

a. For Wildlife Wetland Pre-Mining Land Use located within the proposed permit area, discuss how these areas will be avoided or replaced, and enhanced where applicable and provide general information on the steps taken to comply with the Section 404 of the Clean Water Act (1784.13(b)(9)). In addition, any wetland assessments conducted should be included in the application.
b. Based on aerial maps, the proposed pipeline appears to cross several streams/surface water bodies. The applicant shall characterize each of these streams using the definitions of ephemeral, intermittent, and perennial streams found in Appendix A Section 1701 of the Department regulations. Further, for any stream characterized as ephemeral a justification must be supplied for this determination based on Department regulations. The names and qualifications of the person(s) making the determination shall be supplied. If an ephemeral stream justification is applicable, please refer to Operator Memorandum No. 2017-06 for further explanation.
c. Should any of the streams meet the criteria of intermittent or perennial all applicable parts of the application shall be completed. This includes, but is but not limited to, adherence to or request to be exempt from the 100 ft. buffer requirements and Part 6 of the application regarding stream diversions/relocations.
d. Provide a complete threatened and endangered species list for both state and federally listed species that are known to occur within the county(ies) of the proposed permit area and each adjacent county. This information may have been submitted as part of previous approved permit applications. Referencing this material is acceptable, however the materials must be provided for Department review and evaluation per Operator Memorandum No. 90-08. The following resource is also suggested; https://www.dnr.illinois.gov/ESPB/Documents/ET_by_County.pdf
e. For each threatened and endangered species listed provide a determination based on species habitat requirements regarding the likelihood that the species may occur within the proposed permit and adjacent half mile area. In addition, provide the rationale justifying the determination. The names and qualifications of the person(s) making the determination shall be supplied.
f. For any state or federally listed threatened or endangered species deemed likely to occur in the permit or adjacent area provide a Protection and Enhancement Plan or justify why one is not necessary (not including the Indiana bat and northern-long eared bat as these species are handled in Part V of the application).

11. The application indicates a total of 20.1 acres of Wildlife Woody pre-mining land use and the description of this habitat supplied in Part II.9 of the application includes woody species that are suitable summer Indiana bat and northern long-eared bat habitat. The applicant shall supply the following information in Part V.3.B.4 of the application:

a. The response to Part V.3.B.4 states that the proposed permit area is scheduled to be surveyed for threatened and endangered bat species beginning May 17, 2017. The applicant shall update this response to include any results from these surveys.
b. Provide a Protection and Enhancement Plan and an Incidental Take authorization request for the Indiana bat meeting the specifications of the "Range-wide Indiana Bat

Protection and Enhancement Plan Guidelines" (revised 2013) developed by the U.S. Fish and Wildlife Service and the Office of Surface Mining, or justify why a Protection and Enhancement Plan and Incidental Take authorization request are not required under those guidelines.

c. Discuss whether or not the project is consistent with the northern long-eared bat Final 4(d) Rule (January 2016), and if not then provide a Protection and Enhancement Plan and Incidental Take authorization request that is consistent with the 2013 Indiana bat guidelines referenced above.

12. Attachment V.1.D.2.b does not include a Wildlife Wetland species list or reclamation plan. Should the applicant plan to disturb wetland habitat, a permanent wetland vegetation species list and reclamation plan that is compatible with the Corp of Engineers Wetland Delineation Manual shall be supplied.

13. The following concern the response to Part III.2.D.1.a:

a. On page 6, the applicant labeled Permit 417 as "Area No. 4", however, on the Cumulative Impacts Area Map, the area is labeled as "Area No. 3". Pursuant to 62 Ill. Adm. Code 1783.25 the applicant shall correct this discrepancy.

b. The applicant describes the cumulative impact area as the currently permitted area, the proposed pipeline, **and** the upstream drainage area of the unnamed tributary to Pond Creek as well as the downstream watershed areas leading to stream monitoring point PC-2. The cumulative impact area map only shows the currently permitted area and the pipeline as the cumulative impact area. Pursuant to 62 Ill. Adm. Code 1784.14(c) the applicant shall address this discrepancy.

14. The applicant has proposed to utilize six stream monitoring points in the vicinity of Permit No. 375. Pursuant to 62 Ill. Adm. Code 1784.14(i)(2) the applicant shall discuss how these stream monitoring points will be used to determine the impacts of the proposed pipeline.

15. In response to Part I.1.G, the applicant indicated the type of disturbance proposed is "other" and associated acreage for this type of disturbance to be 70.7 acres. Also, in response to Part IV.5.B, the applicant indicates that the type of support facility of the proposed waterline is "other". Pursuant 62 Ill. Adm. Code 1761.16(b)(1)(D), the applicant shall revise the response in Part I.1.G to define the proposed acreage to be affected by the installation of a water pipeline as a "Support Facility" type of disturbance. The applicant shall also revise response in Part IV.5.B to described proposed operations as construction of a "Mine Support Area".

16. Pursuant 62 Ill. Adm. Code 1783.25(b), the engineering certification shall include the signature and seal of a qualified registered professional engineer.

17. The applicant has provided road and highway authority agreements for operations within 100 feet of the ROW of Interstate 57, State Route 37 and Williamson County roads. However, an agreement with the Franklin County Road Authority was not included. Pursuant 62 Ill. Adm. Code 1761.14(b)(2), the applicant shall provide an agreement with the Franklin County Road Authority for operations within 100 feet of the ROW of Horseshoe Road, County Highway 6, Deason Road, Sandburg Road, Freeman Spur road, Gossage Road Lake Creek Road and Cheatman Road.

18. Pursuant 62 Ill. Adm. Code 1817.11, response in Part II.1 shall be revised to explain how the permit area perimeter will be marked and how perimeter markers will be set along it.

19. To ensure compliance with 62 Ill. Adm. Code 1817.180, the applicant shall address the following items:

    a. The Hydrology/Mining Operations maps show that the proposed water pipeline will cross two railroad tracks, one about 500 feet north of the Johnston City limits, and another railroad track about 770 feet west of Deason Rd, northwest of Freeman Spur. The applicant shall expand the narrative in response to Part IV.1 to provide details on how the waterline will pass through the railroads and what provisions will be taken to minimize damage or destruction to the railroad tracks and to minimize or prevent disruption of the railroad services.
    b. The Hydrology/Mining Operations maps also show a gas line that seems to be right next to, or in some sections, overlapping with the proposed water pipeline at different locations. Describe measures that will be taken to minimize damage or destruction to the gas line, prevent disruption of the gas line service and protect the public and the environment from any gas line rupture.

20. Drawing M16 shows a plan view of the 'Diffuser Site'. The applicant shall address the following items:

    a. The applicant has failed to provide a narrative in response to Part IV.2.B on how topsoil and subsoil from the area of the Diffuser Site will be removed and stored. To ensure compliance with 62 Ill. Adm. Code 1784.13(b)(4), the applicant shall explain how it will handle the soil material on the Diffuser Site and show location of topsoil and subsoil stockpiles on the plan view of the area.
    b. Power lines and power poles are depicted on the plan view of the 'Diffuser Site'. The power lines and power poles seem to continue along the water pipeline from the Diffuser Site to the east. The applicant shall clarify if power lines and power poles will be installed along the entire extent of the water line in response to Part IV.1. If power lines and power poles will be installed, this construction operation needs to be described and, power line and power poles along the water pipeline shall be depicted on the Mining Operations maps.

21. Response in Part IV.7.I states the water pipeline will be bored under Pond Creek and that there will be other crossings of ephemeral streams. Pursuant 62 Ill. Adm. Code 1784.30, the applicant shall provide details on how the water pipeline will cross Pond Creek and all the other ephemeral streams that are anticipated to be crossed. Details should be provided in the narrative in response to Part IV.1 about measures that will be taken to prevent erosion, water pollution and stream channel stability when boring under the streams. Appropriate cross sections of the stream crossings shall also be provided.

22. The point at which the applicant is proposing to cross Pond Creek serves an area of approximately 36 square miles. The applicant shall revise the response in Part IV.7.K.2 to answer positively. The applicant shall also contact the Office of Water Resources to discuss the need of obtaining a permit for the proposed construction activities under Pond Creek.

23. Pursuant 62 Ill. Adm. Code 1784.11(b)(6), the applicant shall provide more specifications on the operation of the proposed water pipeline. Details shall be provided on:

    a. Water control structure that are necessary for the operations of the Water Management Pipeline as mentioned on Page 3 of Attachment IV.1 and that will be installed at the Diffuser Site.
    b. Engineering design of pumping and piping system including location and design of anticipated provisions stated by the application in response to Part IV.5.C.2 such as air valves, joints, thrust blocks and wyes.

Upon submission of a new application complete with the above listed information included, the Department will again review the permit application to determine if it is administratively complete.

Should you have any questions, please contact this office.

Sincerely,

Scott K. Fowler, Supervisor
Land Reclamation Division

SKF:JSc

cc: W. Gillespie

Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

Mr. Nick San Diego, Supervisor
Illinois Department of
Natural Resources
One Natural Resources Way
Springfield, IL 62702-1271

Re: Williamson Energy, LLC - Permit Application 456 for Water Management Pipeline

Dear Mr. San Diego:

This letter authorizes Alliance Consulting, Inc. (Alliance), and its representatives, permission to perform work on, receive comments and submit corrections on the above referenced permit application. Please send copies of any comments to Alliance Consulting, Inc. at 124 Philpott Lane, Beaver, WV 25813, as well as Williamson Energy, LLC at the above address.

Thank you for your cooperation.

Sincerely,

WILLIAMSON ENERGY, LLC

Mark Schuerger
Authorized Agent

PART I

State of Illinois
Department of Natural Resources
Office of Mines and Minerals
Land Reclamation Division
One Natural Resources Way
Springfield, IL 62702-1271

APPLICATIOPN FOR SURFACE COAL MINING AND RECLAMATION OPERATIONS
PERMIT – UNDERGROUND OPERATIONS
UCM-1

PART I

(Application to be submitted 120 days (180 days for NPDES) prior to the desired effective date of the permit)

DATE: 7-13-18

NOTICE
This state agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Ill. Rev. Stat. 1989, ch. 96 1/2, par. 7901 et seq. Disclosure of this information is voluntary, however failure to comply may result in this form not being processed. This form has been approved by the Forms Management Center.

1) A) General Information

(~~I~~) (~~We~~) (The) **Williamson Energy, LLC**
(Name of Company, Corporation, Partnership or Individual)
P. O. Box 99, Johnson City, IL 62951 **(618) 983-3020**
(Address) (Telephone Number)

hereby submit application # 456 for a permit to mine during a permit term of 5 years.

Type of Application:

[X] Underground Mining
[ ] Revision No. _____ to Permit No. _____
[ ] Shadow Area Addition
[ ] Renewal No._____ to Permit No. _____
[ ] Transfer of Permit No. _____
[ ] Acres to be added under renewal

Applicant's Social Security No. _____ (Voluntary) and/or Federal Employer Identification No. **20-0888529**.

Name of Mine **Pond Creek 1 (Mach #1 Mine)**,

MSHA ID No. **11-03141(Mine);**
IL08-03141-02 (Refuse Facility No. 2) & IL08-03141-03 (Refuse Facility No. 3)
List the Mine Safety and Health Administration (MSHA) number(s) for all mine associated structures that require MSHA approval.

I, **Mark Schuerger** _____ **Authorized Person**
Name Signature Title

under penalties of perjury declare that I have examined this application, including accompanying statements and documents and to the best of my knowledge it is true, and correct. (Signee must be at least a vice president or duly authorized representative for NPDES 35 Ill. Adm. Code 309.103(e))

This application is also to be used to apply for a:

IEPA Subtitle D (State) Permit Yes _____ No X NPDES Yes _____ No X

New _____
Renewal No. _____ Date: _____
Renewal No. _____ Date: _____
Modification No. _____ Date: _____
Modification No. _____ Date: _____

If this is an application for a NPDES permit, the Consolidated Permits Program - Application Form 2C (renewal), Form 2D (new), or Form 2E (sanitary) must be completed.

B) I _____
(vice president or his duly authorized representative)

hereby waive my right of the 90-day permit issuance deadline as required by the Illinois Environmental Protection Act, Section 39(a)(4) and the Illinois Pollution Control Board Rules and Regulations, 35 Ill. Adm. Code 309.225(c).

C) Who will be the operator of the permit site?
Name **Mach Mining, LLC**

Pursuant to 62 Ill. Adm. Code 1701.5 an operator is any person engaged in coal mining who removes or intends to remove more than 250 tons of coal.

If the operator is different from the applicant, provide the following information.

1) Operator's address **P. O. Box 300**
Johnston City, IL 62951

2) Operator's telephone No. **(618) 983-3020**

3) Operator's Social Security No.
(voluntary) and/or Federal Employer Identification No. **73-1734826**.

D) Who will extract coal under this permit?
Name **Mach Mining, LLC**

If different from applicant or operator provide the following:

1) Address **N/A**

2) Telephone No. _____
3) Social Security No. (Voluntary) and/or federal employer Identification No. _____

E) Who will pay abandoned mine land reclamation fees?
Name **Williamson Energy, LLC**

If the person paying the abandoned mine land reclamation fee is different from the applicant, provide the following information.

1) Address _____

2) Telephone No. _____

3) Payee's Social Security No. _____
(voluntary) and/or Federal Employer Identification No. _____

F) The permittee requests a permit on the following area as shown on the permit map.

				Location		
Mine Address	Pit No. or Name	Acres to be Permitted	Sec.	Twp.	Range	County
16468 Liberty School Road, Marion, IL 62959	**Water Management Pipeline**	**4.5**	**1**	**T8S**	**R2E**	**Williamson**
		4.7	**2**	**T8S**	**R2E**	
		3.0	**12**	**T8S**	**R2E**	
		6.4	**7**	**T8S**	**R3E**	
		3.4	**8**	**T8S**	**R3E**	
		4.9	**9**	**T8S**	**R3E**	
		2.1	**11**	**T8S**	**R3E**	
		4.1	**14**	**T8S**	**R3E**	
		6.3	**15**	**T8S**	**R3E**	
		0.9	**16**	**T8S**	**R3E**	
		4.0	**17**	**T8S**	**R3E**	
		1.9	**27**	**T7S**	**R2E**	**Franklin**
		6.2	**28**	**T7S**	**R2E**	
		3.7	**29**	**T7S**	**R2E**	
		0.1	**30**	**T7S**	**R2E**	
		4.9	**31**	**T7S**	**R2E**	
		0.4	**32**	**T7S**	**R2E**	
		5.6	**34**	**T7S**	**R2E**	
		3.6	**35**	**T7S**	**R2E**	

Total Acres **70.7**

G. Indicate the type of disturbance and associated acreage.

Acres		Type of Disturbance
0.0		Deep Mine Entries, Ventilation, Air Shafts
0.0		Mine Waste Areas
70.7		Processing Areas & Support Facilities
0.0		Access, Haul Roads, & Transport Facilities
0.0		Soil Storage Areas
0.0		Diversions
0.0		Other
0.0		Not to be Disturbed

H) For each phase (permit) of the proposed surface coal mining and reclamation operation over the life of the mine provide the anticipated or actual starting and termination date and the anticipated number of acres to

be affected. Designate the boundaries of each phase on the pre-mining land use map or other designated map.

Phases (Permits)	Starting Date	Termination Date	Acres to be Affected
Water Management Pipeline	**06/18**	**End of Mining**	**70.7**

2) A) Provide name and address of every legal or equitable owner of record of the permit area, and the mineral property to be mined.

RESPONSE: **Refer to Attachment I.2.A. for a list of surface owners. No mineral will be removed and no mineral owners are listed.**

B) Provide name and address of the owner of record for all surface and subsurface areas contiguous to any part of the proposed permit area.

RESPONSE: **Refer to Attachment I.2.B. for a list of contiguous surface owners. No mineral will be removed and no mineral owners are listed.**

C) Show location of owners of record of those lands, both surface and subsurface, included in or contiguous to the permit area on premining land use map or another map, if necessary.

RESPONSE: **Refer to the Ownership Identification map (Drawing Nos. B17-222-M1, M2, M3 and M4).**

3) A) Provide name and address of any holder of record of leasehold interest for the permit area, and the mineral property to be mined.

RESPONSE: **Mineral property will not be disturbed. This application addresses the surface facilities associated with the adjacent Permit 375 site.**

B) Provide a statement of all lands, interest in lands, options or pending bids on interest held or made by the applicant for lands, which are contiguous to the permit area.

RESPONSE: **N/A**

4) Provide name and address of any purchaser of record under a real estate contract of the property for the permit area.

RESPONSE: **N/A.**

5) A) The applicant is: ____X____ corporation, _____ partnership, _____ single proprietorship, _____association or other business entity.

B) For the resident agent who will accept service of process for the applicant provide the following information.

1) Name of resident agent **Illinois Corporation Service Company**.

2) Address **801 Adlai Stevenson Drive, Springfield, IL 62703**

3) Telephone No. **(800) 877-2556**

4) Social Security No. _____(voluntary) and/or Federal Employer Identification No. **81-0669143**.

6) OWNERSHIP AND CONTROL INFORMATION

Ownership and control is evidenced by being the permittee of a surface coal mining operation, or by being the owner of record of 50 percent or more of an entity controlling a surface coal mining operation or by having any relationship, which gives direct or indirect authority over an entity controlling a surface coal mining operation.

Ownership and control is presumed if an entity is an officer or director; is an operator of a surface coal mining operation; has the authority to commit the financial or real property assets or working resources of an entity; is the owner of record of ten (10) through fifty (50) percent of an entity; is a general partner of a partnership; owns or controls coal to be mined by another entity and has the right to receive that coal after mining; or has the authority to determine how the surface coal mining operations will be conducted.

For an entity to refute a presumed ownership and control relationship, the entity must demonstrate to the satisfaction of the Department that the entity subject to the presumption does not have the authority directly or indirectly to determine the manner in which the relevant surface coal mining operation is conducted.

A) For each entity who owns or controls the applicant provide the following information.

1) Name of entity _____.

2) Address _____
_____

3) Social Security No. _____ (voluntary) and/or Federal Employer Identification No._____.

4) The entity's specific ownership and control relationship with the applicant _____

If more than one ownership and control relationship exists, list each relationship separately under this part providing all information requested.

a) Percentage of ownership if any _____.

b) Location in organizational structure _____
_____.

c) Position title _____.

i) Date position was assumed _____.

ii) Date of departure from position _____.

RESPONSE: **Refer to Attachment Part I; Item 6.A. for the ownership and control information.**

B) For each surface coal mining and reclamation operation in the United States either presently owned or controlled or owned or controlled within the five (5) years preceding the date of the application by the entity listed in (A) above provide the following information.

RESPONSE: **Refer to Attachment Part I; Item 6.A. for the list of coal mining and reclamation operations owned and/or controlled within the last 5 years.**

1) Name _____.

2) Address _____.

3) Name of regulatory authority _____.

4) Identification number.

a) Social security No. _____ (voluntary) and/or federal employer identification No. _____.

b) Federal permit No. _____.

c) State permit No. _____.

d) MSHA No. _____ and date of issuance _____.

7) For each surface coal mining operation in the United States owned or controlled by the applicant provide the following information.

RESPONSE: **Refer to Attachment Part I; Item 6.A. for the list of coal mining operations owned or controlled by the applicant.**

a) Name of Operation _____.

b) Address of Operation _____.
_____.

c) Name of regulatory authority _____.

d) Identification number:
i) Social Security No. _____ (voluntary)
and/or Federal Employer Identification No. _____.

ii) Federal permit No. _____.

iii) State Permit No. _____.

iv) MSHA No. _____ and date of issuance _____.

8) A) Has the applicant, any subsidiary, affiliate or entity controlled by or under common control with the applicant had:

1) A State or Federal coal mining permit suspended or revoked in the five (5) years prior to the date of submission of the application?
Yes _____ No X

2) A forfeiture of a performance bond under a coal mining permit?
Yes _____ No X

B) If the response to A)1) or 2) was yes, provide the following information:

1) Provide the identification number of the permit.

2) Provide the date of permit issuance.

3) Provide the date of permit suspension or revocation and/or the date of bond forfeiture.

4) Provide the name of regulatory authority who suspended or revoked the permit and/or forfeited the bond.

5) Provide a statement of the reason for the suspension, revocation and/or forfeiture action.

6) Provide the current status of the permit and/or bond.

7) For any administrative or judicial proceedings initiated concerning the suspension, revocation, and/or forfeiture provide the following:

a) Date of proceeding,

b) Location of proceeding, and

c) Current status of proceedings.

C) If the response to A)2) was yes, provide information on the applicant's present financial condition to provide assurances satisfactory to the Department that forfeiture will not again be necessary.

9) Violation history

A) For the three (3) year period preceding the date of submission of the application, provide a listing of Notices of Violation received for any provision of the Federal Act or any Federal State law, rule, or regulation pertaining to air or water environmental protection incurred in connection with any surface coal mining operations. The listing shall include the following:

1) Notice of violation number or other identifier.

2) Date of NOV issuance.

3) Permit identification number.

4) MSHA number.

5) Name of entity to whom NOV was written.

6) Name of regulatory authority or agency which issued the NOV.

7) A brief description of the alleged violation.

8) For any administrative or judicial proceedings initiated concerning the violation, provide the following:

a) Type of proceedings.

b) Date of proceedings

c) Location of proceedings.

d) Current status of proceedings.

9) Actions, if any, to abate the alleged violation.

RESPONSE: **Refer to Attachment Part I; Item 6.A. for the 3-year violation history.**

B) For any unabated cessation orders or unabated air and water quality violation notices received prior to the date of submission of the application for any surface coal mining and reclamation operation owned or controlled by the applicant or by any entity which owns or controls the applicant, provide a listing of the unabated cessation orders or violation notices which include the following:

1) Cessation order or notice of violation number or other identifier.

2) Date of CO or NOV issuance.

3) Permit identification number.

4) MSHA number

5) Name of entity to whom CO or NOV was written

6) Name of regulatory authority or agency which issued the CO or NOV.

7) A brief description of the alleged cessation order or violation.

8) For any administrative or judicial proceedings initiated concerning the cessation order or violation, provide the following:

a) Type of proceedings.

b) Date of proceedings

c) Location of proceedings

d) Current status of proceedings.

9) Actions, if any, to abate the alleged cessation order or violation.

RESPONSE: **N/A. There have been no unabated cessation orders or unabated air and water quality violation notices.**

10) Affidavits, Certifications, Insurance Certificate

A) Complete affidavit regarding applicant's legal right to enter and begin surface coal mining and reclamation operations in the permit area and whether that right is the subject of pending litigation. Identify the documents upon which affidavit is based by type and date of execution and identify specific lands to which each document pertains and explain the legal rights claimed by the applicant (Section 1778.15(a)). If the private mineral estate to be mined has been severed from the private surface estate, provide copies of the documents required under Section 1778.15(B)(1)-(3). On the permit map or other designated map show the boundaries of land within the permit area upon which the applicant has the legal right to enter and begin mining activities.

RESPONSE: **Refer to Attachment Part I.10.A**

B) Complete certification for engineering aspects of the application. In addition to the general certification, three specific certifications are included which are applicable only if the box in front of each is marked. The first two cover special permit requirements and should be marked only when they occur for the proposed permit. The third certification covers the Illinois Environmental Protection Agency permit requirements. In most cases, an Illinois registered engineer will be required to certify I.E.P.A. permit requirements. Except a otherwise provided all maps, plans and cross-sections included in the permit application shall be prepared by, or under the direction of, and sealed by a qualified registered professional

engineer licensed under the Illinois Professional Engineering Act, a qualified registered structural engineer licensed under the Illinois Structural Engineering Act or if authorized by state law, a qualified registered professional land surveyor licensed under the Illinois Land Surveyors Act with assistance from experts in related fields.

RESPONSE: Refer to Attachment Part I.10.B

C) A certificate of liability insurance or evidence that the applicant is self-insured is required prior to permit issuance. The certificate may be submitted with the application or when fee and bond are submitted. Minimum insurance coverage required is for bodily injury $300,000 for each occurrence, and $500,000 aggregate and for property damage $300,000 each occurrence, and $500,000 aggregate.

RESPONSE: Refer to Attachment Part I.10.C

11) Provide a draft copy of proposed newspaper notice, and the name of local newspaper of general circulation in which advertisement of the application will be published. Certificate of publication is to be submitted not later than four weeks after the last date of publication.

RESPONSE: Refer to Attachment Part I.11

12) Areas Designated Unsuitable for Mining

A) Does proposed permit area include and/or shadow area include --

Areas designated unsuitable for surface coal mining and reclamation operations, or under study for designation in an administrative proceeding as unsuitable for surface coal mining and reclamation operations? (Sections 1762 and 1764)

Yes _____ No ___X___

B) Does proposed permit area include and/or shadow area include --

1) Lands within boundaries of the National Park System, National Wildlife Refuge System, the National System of Trails, the National Wilderness Preservation System, the Wild and Scenic Rivers System, and National Recreation Areas, etc. (Section 1761.11(a))?

Yes _____ No ___X___

2) National Forest land?
Yes _____ No ___X___

3) Any land which will adversely affect any publicly-owned park or places included in the National Register of Historic Places, etc. (per Sections 1761.11(c))?

Yes _____ No ___X___

If yes, complete Part II, Section 10, B) and C).

4) Any public roads, which are to be removed, relocated or temporarily closed?

Yes _____ No ___X___

Indicate on the pre-mining land use map or other designated map the location of the public roads and attach a copy of the written agreement from the appropriate authority authorizing the

relocation, removal or temporary closure. Describe the measures to be used to insure that the interest of the public and land owners affected will be protected.

RESPONSE: **The locations of the crossings are shown on the Hydrology - Mining Operations Map (Drawing No. B17-222-M13 through M16). Indicated on this map are proposed locations where the waterline will be bored under the roads. Prior to any construction for boring beneath State Route 37 and Interstate 57, valid IDOT permits will be renewed and copies will be submitted to the Department. Installation and construction activities will be within 100 feet of public roads, but will be completed over a short period of time. Beginning and ending boring operations will be conducted outside of the public road right of way. Once completed, there will be no further construction activities. During construction/ installation activities, no equipment will be allowed to endanger the public or the landowner. Traffic control signage will be used when work is in progress, as needed.**

C) Within the proposed permit area will Surface Coal Mining and Reclamation operations be located --

1) Within 100 feet of the right-of-way line of any public road?

Yes ___X___ No _____

If yes, explain proposed procedures for complying with regulation Section 1761.14(b), including request for variance, if relevant. Provide location of public roads on pre-mining land use map or other designated map. Describe the measures to be used to insure that the interest of the public and land owners affected will be protected.

RESPONSE: **Disturbance for the installation of the Water Management Pipeline is proposed within 100 feet of several public roads as shown on the Hydrology - Mining Operations Map (Drawing No's B17-222-M13 and B17-222-M16). Disturbance within 100 feet of the right of way of all public roads will be associated with the boring under each road for the installation of the proposed waterline. A variance of Section 1761.14(b) is requested for being within 100 feet of a public road right of way. Construction activities will be within 100 feet of the road right of way, however, beginning and ending boring operations will be conducted outside of the public road right of way. Installation and construction activities will be completed over a short period of time. Once completed, there will be no further construction activities. During construction and installation activities, no equipment will be allowed to endanger the public or the landowner. Traffic control signage will be used when work is in progress, as needed.**

The public notice will provide for a public hearing in accordance with Section 1761.14. Refer to Attachment I.11 for the public notice.

2) Within 300 feet measured horizontally from any occupied dwelling?
Yes ___X___ No _____

If so, is waiver provided meeting requirements of Section 1761.15(d)?

RESPONSE: **The proposed permit boundary will be within 300 feet of occupied dwellings. The 300 foot buffer zones are shown on the Hydrology - Mining Operations Map (Drawing No. B17-222-M13 through M16). Refer to Attachment I.12.C.2 for a list of the waivers.**

3) Within 300 feet measured horizontally of any public building, school, church, community or institutional building or public park?
Yes _____ No ___X_____

4) Within 100 feet measured horizontally of a cemetery?
Yes _____ No ___X_____

D) Are valid existing rights claimed for any part of the permit area?
Yes _____ No _____X_____

If yes, provide documentation to substantiate claim.

PART I ATTACHMENT I.2.A
SURFACE OWNERSHIP

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.2.A - SURFACE LAND OWNER INFORMATION

PIN (MAP #)	SURFACE OWNER	MAILING ADDRESS	CITY	STATE	ZIP CODE	RIGHT OF ENTRY DOCUMENT	DATE EXECUTED	ACRES
03-11-400-008	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.4
03-11-400-007	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.8
03-14-200-006	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.9
03-14-100-005	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.5
03-14-100-001	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.5
03-15-200-001	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	3.2
03-15-100-001	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	3.1
03-16-200-007	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.4
03-09-400-006	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.1
03-09-400-004	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.4
03-09-300-015	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.4
03-09-300-013	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.1
03-16-100-011	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.4
03-17-200-023	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	3.2
03-17-100-016	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.9
03-08-327-003	COBB, JACK L & SHIRLEY	16699 OLD FRANKFORT ROAD	JOHNSTON CITY	IL	62951	EASEMENT	01/13/2017	0.4
03-08-327-004	COBB, JACK L	16699 OLD FRANKFORT ROAD	JOHNSTON CITY	IL	62951	EASEMENT	01/13/2017	0.4
03-08-326-009	COBB, JACK L	16699 OLD FRANKFORT ROAD	JOHNSTON CITY	IL	62951	EASEMENT	01/13/2017	0.8
03-08-300-022	COBB, JACKIE L & SHIRLEY J	16699 OLD FRANKFORT ROAD	JOHNSTON CITY	IL	62951	EASEMENT	01/13/2017	0.1
03-08-300-008	BISHOP, BENJAMIN T II & BROWN, L. B	13801 GERMAN CHURCH ROAD	WEST FRANKFORT	IL	62896	EASEMENT	02/07/2017	0.2
03-08-300-024	RICHARD, WINIFRED J ETAL	13715 GERMAN CHURCH ROAD	WEST FRANKFORT	IL	62896	EASEMENT	01/13/2017	0.6
03-08-300-003	RICHARD, WINIFRED J ETAL	13715 GERMAN CHURCH ROAD	WEST FRANKFORT	IL	62896	EASEMENT	01/13/2017	0.4
03-08-300-035	GRANT, LINDELL D JR & PAMELA	13503 GERMAN CHURCH ROAD	WEST FRANKFORT	IL	62896	EASEMENT	01/17/2017	0.4
03-07-400-026	GRANT, LINDELL D JR & PAMELA	13503 GERMAN CHURCH ROAD	WEST FRANKFORT	IL	62896	EASEMENT	01/17/2017	0.8
03-07-400-027	TROUT REVOCABLE TRUSTS	302 INDIAN DR.	JOHNSTON CITY	IL	62951	SURFACE USE AGREEMENT	11/14/2016	2.4
03-07-326-006	BYERS, FLOSSIE & PAYNE, LEAH	16783 DUNCAN ROAD	JOHNSTON CITY	IL	62951	EASEMENT	11/28/2016	0.1
03-07-500-004	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.2
03-07-326-011	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.3

NOTE: Railroad construction permits will be executed 30 days prior to construtution.

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.2.A - SURFACE LAND OWNER INFORMATION

PIN (MAP #)	SURFACE OWNER	MAILING ADDRESS	CITY	STATE	ZIP CODE	RIGHT OF ENTRY DOCUMENT	DATE EXECUTED	ACRES
03-07-100-010	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	1.4
03-07-100-011	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410	EASEMENT	01/17/2017	0.2
03-07-505-002	UNION PACIFIC RAILROAD	1400 DOUGLAS ST.	OMAHA	NE	68179	EASEMENT	see note	0.1
02-12-505-001	UNION PACIFIC RAILROAD	1400 DOUGLAS ST.	OMAHA	NE	68179	EASEMENT	see note	0.1
02-12-200-038	HIGHWAY 37 NORTH WATER DIST.	PO BOX 268	JOHNSTON CITY	IL	62951	EASEMENT	03/08/2017	0.6
02-12-200-032	THREE ANGELS BROADCASTING, INC.	PO BOX 220	WEST FRANKFORT	IL	62896	EASEMENT	01/26/2017	1.1
02-12-200-027	DUNSTON, JAMES R TRUST 1/2 INT DUNSTON, JUDITH LYNN TRUST 1/2 INT	106 E OAK STREET	WEST FRANKFORT	IL	62896	EASEMENT	01/23/2017	1.3
02-01-300-009	DUNSTON, JAMES R TRUST 1/2 INT DUNSTON, JUDITH LYNN TRUST 1/2 INT	106 E OAK STREET	WEST FRANKFORT	IL	62896	EASEMENT	01/23/2017	2.9
02-01-300-002	DUNSTON, JAMES R TRUST 1/2 INT DUNSTON, JUDITH LYNN TRUST 1/2 INT	106 E OAK STREET	WEST FRANKFORT	IL	62896	EASEMENT	11/17/2016	0.3
02-01-300-011	LIVINGSTON, STEVE C	18094 COLLINS RD	WEST FRANKFORT	IL	62896	EASEMENT	01/09/2017	1.2
02-02-200-006	GRIZZELL, DALLAS D., MILDRED	18097 COLLINS RD	WEST FRANKFORT	IL	62896	EASEMENT	01/12/2017	4.8
11-35-300-002	SCHRODER, HOWARD	PO BOX 393	HERRIN	IL	62948	EASEMENT	02/03/2017	3.5
11-34-400-011 (was 11-34-400-007)	MCDANIEL, KEVIN & COLLEEN	112 FOX CREEK RD	BELLEVILLE	IL	62223	EASEMENT	02/03/2017	2.0
11-34-200-010	PARKER, CLYDE A	10579 HORSESHOE ROAD	WEST FRANKFORT	IL	62896	EASEMENT	07/20/2016	2.1
11-34-100-009	JACKANICZ, ANDREW	2391 JACKANICZ ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/14/2017	1.5
11-27-300-011	JACKANICZ, ANDREW & MARY JANE	2391 JACKANICZ ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/14/2017	0.4
11-27-300-002	JACKANICZ FAMILY TRUST	2257 JACKANICZ ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/14/2017	1.5
11-28-400-008	JACKANICZ FAMILY TRUST	2257 JACKANICZ ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/14/2017	0.8
11-28-501-002	BNSF RAILWAY COMPANY	2650 LOU MENK DRIVE	FORT WORTH	TX	76131	EASEMENT	see note	0.1
11-28-400-007	JACKANICZ, CHARLEY W	8715 ST HWY 149	WEST FRANKFORT	IL	62896	EASEMENT	10/17/2016	0.1
11-33-200-001	JACKANICZ, CHARLEY W	8715 ST HWY 149	WEST FRANKFORT	IL	62896	EASEMENT	10/17/2016	2.2
11-33-100-012	JACKANICZ, CHARLEY W	8715 ST HWY 149	WEST FRANKFORT	IL	62896	EASEMENT	10/17/2016	0.2
11-33-100-013	FITCH, LARRY & LINDA	7029 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/07/2016	1.4
11-33-100-009	HUMERICKHOUSE, CYNTHIA & MICHAEL	953 SANDBURG ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/10/2016	0.8
11-33-100-001	MITCHELL, BRADLEY & RAINEE	511 SANDBURG ROAD	WEST FRANKFORT	IL	62896	EASEMENT	05/18/2016	0.8

NOTE: Railroad construction permits will be executed 30 days prior to construtions.

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.2.A - SURFACE LAND OWNER INFORMATION

PIN (MAP #)	SURFACE OWNER	MAILING ADDRESS	CITY	STATE	ZIP CODE	RIGHT OF ENTRY DOCUMENT	DATE EXECUTED	ACRES
11-32-200-011 (was 11-32-200-009)	RIDGEWAY, LINDA	701 W. CRAFT	ROBINSON	IL	62454	EASEMENT	05/24/2016	1.1
11-32-200-012 (was 11-32-200-009)	KYLE MARTIN & STACEY MICHELLE FODOR	306 CANDY CANE LANE	WEST FRANKFORT	IL	62896	EASEMENT	05/24/2016	0.4
11-32-200-001	GAYER, BILL T.	7802 PARRISH CIRCLE	WEST FRANKFORT	IL	62896	EASEMENT	07/11/2016	0.9
11-32-100-009	RICH, MAHLON L. & SANDRA	7550 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896	EASEMENT	05/18/2016	0.3
11-29-300-007	LASWELL, JOSEPH, L.	7635 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896	EASEMENT	08/29/2016	0.6
11-29-300-003	FITCH, WARREN D.	7357 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/07/2016	0.3
11-29-300-009	FITCH, WARREN D. & PEGGY	7357 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/07/2016	0.1
11-32-100-003	FITCH, JAMES	7232 LAKE CREEK RD	WEST FRANKFORT	IL	62896	SURFACE WAIVER & CONSENT	08/16/2016	0.01
11-32-100-001	CHEATHAM, WILLIE R.	7149 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/07/2016	0.4
11-31-200-002	JACKANICZ FAMILY TRUST	2257 JACKANICZ ROAD	WEST FRANKFORT	IL	62896	EASEMENT	06/14/2017	0.8
11-31-200-001	JACKANICZ FAMILY TRUST	2257 JACKANICZ ROAD	WEST FRANKFORT	IL	62896	SURFACE USE AGREEMENT	06/14/2017	4.0

TOTAL ACRES 70.7

NOTE: Railroad construction permits will be executed 30 days prior to construtions.

PART I ATTACHMENT I.2.B
CONTIGUOUS OWNERS

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.2.B - CONTIGUOUS SURFACE LAND OWNER INFORMATION

PIN (MAP #)	SURFACE OWNER	MAILING ADDRESS	CITY	STATE	ZIP CODE
03-12-300-004	WILLIAMSON ENERGY, LLC	PO BOX 99	JOHNSTON CITY	IL	62951
03-11-400-011	ANDERSON, PHILIP S & KAREN TRS	16234 WILLIAMS PRAIRIE RD.	JOHNSTON CITY	IL	62951
03-14-200-002	ANDERSON, CARL L & MERILEE TRS	302 CIRCLE DR	SALEM	IL	62881
03-11-400-005	ANDERSON, CARL L & MERILEE TRS	302 CIRCLE DR	SALEM	IL	62881
03-14-200-001	ANDERSON, CARL L & MERILEE TRS	302 CIRCLE DR	SALEM	IL	62881
03-11-300-006	ANDERSON, CARL L & MERILEE TRS	302 CIRCLE DR	SALEM	IL	62881
03-14-100-002	ANDERSON, PHILIP S & KAREN TRS	16234 WILLIAMS PRAIRIE RD.	JOHNSTON CITY	IL	62951
03-14-100-003	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410
03-10-400-001	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410
03-15-200-002	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410
03-10-400-002	ANDERSON, CARL L & MERILEE TRS	302 CIRCLE DR	SALEM	IL	62881
03-10-300-004	ANDERSON, CARL L & MERILEE TRS	302 CIRCLE DR	SALEM	IL	62881
03-15-100-002	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410
03-09-400-008	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-09-400-009	FLEENER, JOHN K & SARAH J	P. O. BOX 102	JOHNSTON CITY	IL	62951
03-16-200-010	FLEENER, JOHN K & SARAH J	P. O. BOX 102	JOHNSTON CITY	IL	62951
03-09-400-001	RAINEY, DONALD M TRUSTEE	15247 GERMAN CHURCH ROAD	JOHNSTON CITY	IL	62951
03-09-400-005	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-09-300-016	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-16-100-002	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-16-100-010	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-09-300-014	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-08-400-008	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410
03-17-200-010	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-17-200-028	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-17-100-020	DAVIX, WILLIAM D & JULIE L SHAW, WILLIAM TYLER	312 S. ODLE STREET	WEST FRANKFORT	IL	62896
03-08-400-009	BARWICK, DEAN E	635 E CRISAFULLI RD	MERRITT ISLAND	FL	32953
03-17-200-030	MID-CONTINENTAL FUELS, INC.	16070 MID-CONTINENTAL FUELS RD	JOHNSTON CITY	IL	62951
03-08-400-006	BARWICK, MARK A.	16545 OLD BEN ROAD	JOHNSTON CITY	IL	62951
03-08-328-003	BLADES, SHIRLEY A	16442 OLD FRANKFORT RD	JOHNSTON CITY	IL	62951
03-17-100-016	NEW RIVER ROYALTY, LLC	3801 PGA BLVD., SUITE 903	PALM BEACH GARDENS	FL	33410
03-08-326-004	LAYNE, STEVEN L & RHONDA S	13872 EBERHARDT RD	JOHNSTON CITY	IL	62951

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.2.B - CONTIGUOUS SURFACE LAND OWNER INFORMATION

PIN (MAP #)	SURFACE OWNER	MAILING ADDRESS	CITY	STATE	ZIP CODE
03-08-300-029	EBERHARDT, EARL RAY & MERLINA	13193 EBERHARDT RD	JOHNSTON CITY	IL	62951
03-07-400-023	EBERHARDT, EARL RAY & MERLINA	13193 EBERHARDT RD	JOHNSTON CITY	IL	62951
03-07-401-003	TROUT REVOCABLE TRUSTS	302 INDIAN DR.	JOHNSTON CITY	IL	62951
03-07-326-013	DAVIS, CHRISTOPHER & DARLA	16746 MONROE ROAD	WEST FRANKFORT	IL	62896
03-07-326-012	ELLIS, DONNA LYNN	12933 GERMAN CHURCH ROAD	JOHNSTON CITY	IL	62951
03-07-326-002	BALL, PAULA JEAN	16830 MONROE RD	WEST FRANKFORT	IL	62896
03-07-326-003	RICHISON, RONALD	16786 MONROE ROAD	WEST FRANKFORT	IL	62896
03-07-300-022	MARRS, PATSY ETAL	16875 MONROE RD	WEST FRANKFORT	IL	62896
03-07-300-023	MARRS, RYAN D & CELESTIA N	16843 MONROE ROAD	JOHNSTON CITY	IL	62951
03-07-100-003	MARGELLI, ALBERT C	17317 MONROE RD	JOHNSTON CITY	IL	62951
02-12-200-046	REDEMPTION CHURCH JOHNSTON CITY	17466 NORTH RT 37	JOHNSTON CITY	IL	62951
02-12-200-044	SULLIVAN, ROSS W	14263 FOWLER SCHOOL ROAD	MARION	IL	62959
02-12-200-031	THREE ANGELS BROADCASTING, INC.	PO BOX 220	WEST FRANKFORT	IL	62896
02-12-200-009	KEYROCK ENERGY LLC	207 E. MAIN STREET	JOHNSON CITY	TN	37605
02-12-200-011	MEUTH, STEVEN E & JANE ANN	17026 ROUTE 37	JOHNSTON CITY	IL	62951
02-12-200-008	MENCKOWSKI, RICKY F & SAYLOR, BRITTANI A	17060 ROUTE 37	JOHNSTON CITY	IL	62951
02-12-200-007	WIEGAND, ERIC & KATHERINE	1613 E ST LOUIS ST	WEST FRANKFORT	IL	62896
02-12-200-005	MC VEY, TERRY L	17529 RT 37 NORTH	JOHNSTON CITY	IL	62951
02-12-200-004	MC VEY, TERRY L	17529 RT 37 NORTH	JOHNSTON CITY	IL	62951
02-12-200-037	MENCKOWSKI, RICKY F & SAYLOR, BRITTANI A	17060 ROUTE 37	JOHNSTON CITY	IL	62951
02-12-200-034	CROWN BATTERY MANUF. COMPANY	1445 MAJESTIC DR.	FREMONT	OH	43420
02-12-200-033	KEMP, CHARLES & BEULAH TRS	11972 STIRITZ RD	WEST FRANKFORT	IL	62896
02-12-200-002	MURPHY, JUDITH ANN	STATE ROUTE 37	JOHNSTON CITY	IL	62951
02-12-200-035	KEMP, CHARLES & BEULAH TRS	11972 STIRITZ RD	WEST FRANKFORT	IL	62896
02-01-300-013	KEYROCK ENERGY LLC	207 E. MAIN STREET	JOHNSON CITY	TN	37605
02-01-400-029	BUNDY, PATRICK & ALLEGRA	17445 ROUTE 37	JOHNSTON CITY	IL	62951
02-01-400-032	WOODHALL, DEBBIE & ETAL	17375 ROUTE 37	JOHNSTON CITY	IL	62951
02-01-300-012	KEMP, CHARLES & BEULAH TRS	11972 STIRITZ RD	WEST FRANKFORT	IL	62896
02-01-300-001	RICHMOND, KENNETH	613 S. LOCUST	WEST FRANKFORT	IL	62896
02-01-300-006	LIVINGSTON, STEVE C	18094 COLLINS RD	WEST FRANKFORT	IL	62896
02-01-100-004	ABBA, ANGELO TONY & ET AL	14165 ALLEN RD.	CARTERVILLE	IL	62918
02-02-400-002	JOHNSON, PAUL & MELISSA J	14936 GERMAN CHURCH RD.	JOHNSTON CITY	IL	62951
02-02-200-005	GRIZZELL, GARY G & ALFREDA L	3390 STATE RT 13 & 127	PICKNEYVILLE	IL	62274

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.2.B - CONTIGUOUS SURFACE LAND OWNER INFORMATION

PIN (MAP #)	SURFACE OWNER	MAILING ADDRESS	CITY	STATE	ZIP CODE
02-02-200-004	GRIZZELL, DALLAS DEAN & MILDRED	18097 COLLINS RD	WEST FRANKFORT	IL	62896
02-02-100-002	GRIZZELL, DALLAS DEAN & MILDRED	18097 COLLINS RD	WEST FRANKFORT	IL	62896
02-02-100-003	JAJ LTD PARTNERSHIP & BASS VENTURES, LLC	5885 N. STATE RT 159	EDWARDSVILLE	IL	62025
11-35-300-003	SCHRODER, HOWARD	PO BOX 393	HERRIN	IL	62948
11-35-300-007	SCHWARTZ, WILLIAM	7030 N STATE RT 159	MORO	IL	62067
11-35-300-005	BASS VENTURES LLC	5885 N. STATE RT 159	EDWARDSVILLE	IL	62025
11-35-300-006	BASS VENTURES LLC	5885 N. STATE RT 159	EDWARDSVILLE	IL	62025
	JAJ LIMITED PARTNERSHIP	7030 N STATE RT 159	MORO	IL	62067
11-35-300-008	KEYROCK ENERGY LLC	207 E. MAIN STREET	JOHNSON CITY	TN	37605
11-34-400-002	SCHRODER, HOWARD	PO BOX 393	HERRIN	IL	62948
11-34-200-008	GLODICH, MIKE	209 W MAIN	WEST FRANKFORT	IL	62896
11-34-200-006	HAMPTON, SUZANNE	10477 HORSESHOE RD	WEST FRANKFORT	IL	62896
11-34-200-005	PARKER, CLYDE A	10579 HORSESHOE ROAD	WEST FRANKFORT	IL	62896
11-34-200-002	BARTONI, CHARLES	9806 FREEMAN SPUR BLKTOP	WEST FRANKFORT	IL	62896
11-34-100-011	RIDINGS, ROBERT	2055 STATE HWY 14	MULKEYTOWN	IL	62865
11-34-100-001	JACKANICZ FAMILY TRUST	2257 JACKANICZ ROAD	WEST FRANKFORT	IL	62896
11-33-200-002	JACKANICZ FAMILY TRUST	2257 JACKANICZ ROAD	WEST FRANKFORT	IL	62896
11-28-400-003	JACKANICZ, CHARLEY W	8715 ST HWY 149	WEST FRANKFORT	IL	62896
11-28-300-002	JACKANICZ, CHARLEY W	8715 ST HWY 149	WEST FRANKFORT	IL	62896
11-28-300-021	FITCH, LARRY & LINDA	7029 LAKE CREEK ROAD	WEST FRANKFORT	IL	62896
11-28-300-014	SABRE INVESTMENTS LLC	PO BOX 3074	CARBONDALE	IL	62902
11-29-400-012	TACKETT, VERLIN	PO BOX 1809	MARION	IL	62959
11-29-400-004	SURGALSKI, VIRGINIA	PO BOX 103	FREEMAN SPUR	IL	62841
11-29-400-005	SURGALSKI, KENDRA	7727 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-32-100-008	COLYER, PEARL	7528 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-32-100-007	CLARK, KENNETH	7434 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-32-100-006	CLARK, KENNETH	7434 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-32-100-005	CLARK, KENNETH	7434 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-32-100-004	SUMMERS, KEVIN	7414 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-32-100-003	FITCH, JAMES	7322 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-29-300-014	SMITH, JOSHUA	7145 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-30-400-004	BEARDEN, BRIAN	7059 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-30-400-006	FITCH, LINDELL	6931 LAKE CREEK RD	WEST FRANKFORT	IL	62896
11-31-100-001	KIRCHNER FARMS LLC	1411 SWITCH BACK RD	MULKEYTOWN	IL	62865
11-30-300-001	KIRCHNER FARMS LLC	1411 SWITCH BACK RD	MULKEYTOWN	IL	62865
11-30-400-001	KIRCHNER FARMS LLC	1411 SWITCH BACK RD	MULKEYTOWN	IL	62865

PART I ATTACHMENT I.6. ADDRESSES THE FOLLOWING:

PART I ATTACHMENT I.6.A & B
OWNERSHIP & CONTROL INFORMATION,

PART I ATTACHMENT I.7
OWNED OR CONTROLLED MINING OPERATIONS,

AND

PART I ATTACHMENT I.9.A
VIOLATION HISTORY

TABLE 1.4.1 - Williamson Energy, LLC
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizational Structure	Date Position Assumed	Termination Date
Foresight Energy LLC	211 N. Broadway, Suite 2600, St. Louis, MO 63102	27-3135321	Member	100%	-	8/12/2010	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	5/31/2015	-
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Senior Vice President	-	-	9/12/2011	7/23/2017
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	General Counsel	-	-	9/12/2011	7/23/2017
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Secretary	-	-	9/12/2011	7/23/2017
James T. Murphy	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Vice President	-	-	9/1/2015	9/30/2017
Cody E. Nett	46226 National Road, St. Clairsville, Ohio 43950	-	Corporate Secretary	-	-	7/21/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Accounting Officer	-	-	9/30/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Principal Accounting Officer	-	-	9/30/2017	-

TABLE 1.4.1 - Foresight Energy, LLC
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizationnl Structure	Date Position Assumed	Termination Date
Foresight Energy LP	211 N. Broadway, Suite 2600, St. Louis, MO 63102	80-0778894	Member	100%	-	6/10/2014	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	5/31/2015	-
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Senior Vice President	-	-	10/31/2012	7/23/2017
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	General Counsel	-	-	9/12/2011	7/23/2017
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Secretary	-	-	10/31/2012	7/23/2017
Cody E. Nett	46226 National Road, St. Clairsville, Ohio 43950	-	Corporate Secretary	-	-	7/21/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Accounting Officer	-	-	9/30/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Principal Accounting Officer	-	-	9/30/2017	-

TABLE 1.4.1 - Foresight Energy, LP
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizational Structure	Date Position Assumed	Termination Date
Murray Energy Corporation	46226 National Road, St. Clairsville, Ohio 43950	31-1956752	Shareholder	53%	-	3/28/2017	-
Foresight Energy GP LLC	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	General Partner	-	-	-	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	5/31/2015	-
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Senior Vice President	-	-	11/5/2015	7/23/2017
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	General Counsel	-	-	11/5/2015	7/23/2017
Rashda M. Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Secretary	-	-	11/5/2015	7/23/2017
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Accounting Officer			9/30/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Principal Accounting Officer	-	-	9/30/2017	-
Cody Nett	46226 National Road, St. Clairsville, Ohio 43950	-	Corporate Secretary			7/21/2017	-
John F Dickinson	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-		12/31/2015
E Hunter Harrison	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-		9/10/2015
E Bartow Jones	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-		1/30/2015
Chris Cline	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Chairman of the Board	-	-		3/28/2017
Chris Cline	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Corporate Officer	-	-		3/28/2017

TABLE 1.4.1 - Foresight Energy GP, LLC
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizational Structure	Date Position Assumed	Termination Date
Murray Energy Corporation	46226 National Road, St. Clairsville, Ohio 43950	31-1956752	Shareholder	80%	-	4/16/2015	-
Foresight Reserves LP	211 N. Broadway, Suite 2600, St. Louis, MO 63102		Shareholder	20%	-	4/16/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chairman	-	-	3/28/2017	-
Daniel Hermann	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-	9/15/2014	-
Paul Vining	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-	1/1/2016	-
Brian Sullivan	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-	8/10/2016	-
Rashad Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Senior Vice President	-	-	6/17/2014	7/23/2017
Rashad Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	General Counsel	-	-	6/17/2014	7/23/2017
Rashad Buttar	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Secretary	-	-	6/17/2014	7/23/2017
G Casey	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Director	-	-	9/10/2015	-
James Murphy	211 N. Broadway, Suite 2600, St. Louis, MO 63102	-	Corporate Officer	-	-	6/10/2015	9/30/2017
Robert Edward Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	3/28/2017	-
Cody E. Nett	46226 National Road, St. Clairsville, Ohio 43950	-	Corporate Secretary	-	-	7/21/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Accounting Officer	-	-	9/30/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Principal Financial Officer	-	-	9/30/2017	-

TABLE 1.4.1 - Murray Energy Corporation
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizational Structure	Date Position Assumed	Termination Date
Murray Energy Holdings Company	46226 National Road, St. Clairsville, Ohio 43950	20-0100463	Owner	100%	-	10/21/2003	-
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	2/23/2001	-
Henry W. Fayne	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	1/28/2005	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	4/23/2007	-
Richard L. Lawson	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	1/28/2005	-
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer	-	-	2/23/2001	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Executive V.P.	-	-	8/15/2012	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Financial Officer	-	-	8/15/2012	-
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Chairman of the Board	-	-	2/23/2001	-
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	2/23/2001	-
Michael O. McKown	46226 National Road, St. Clairsville, Ohio 43950	-	Secretary	-	-	2/24/2001	-
Michael D Loiacono	46226 National Road, St. Clairsville, Ohio 43950	-	Treasurer	-	-	2/23/2001	-
B. J. Cornelius	46226 National Road, St. Clairsville, Ohio 43950	-	Sr. VP – Marketing & Sales	-	-	8/15/2012	-
Roy A. Heidelbach	46226 National Road, St. Clairsville, Ohio 43950	-	Asst. Vice President-Operations	-	-	9/11/2007	-
Ryan Michael Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Vice President-Operateions	-	-	9/11/2007	-
Michael O. Mckown	46226 National Road, St. Clairsville, Ohio 43950	-	Senior VP – Law & Admin	-	-	8/15/2012	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Operating Officer	-	-	8/15/2012	-
Michael T.W. Carey	46226 National Road, St. Clairsville, Ohio 43950	-	VP – Govt. Relations	-	-	6/1/2012	-
Robert Edward Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Executive VP - Marketing and Sales	-	-	1/30/2015	-
Jason D. Witt	46226 National Road, St. Clairsville, Ohio 43950	-	Assistant Secretary	-	-	4/30/2013	-
Paul B. Piccolini	46226 National Road, St. Clairsville, Ohio 43950	-	VP - H.R. & Employee Relations	-	-	1/4/2014	-
Anthony C. Vcelka, II	46226 National Road, St. Clairsville, Ohio 43950	-	Assistant Treasurer	-	-	7/29/2014	-
James R. Turner, Jr.	46226 National Road, St. Clairsville, Ohio 43950	-	Senior Vice President	-	-	8/14/2015	-
Eric S. Grimm	46226 National Road, St. Clairsville, Ohio 43950	-	Assistant VP of Operations	-	-	5/21/2017	-
John R. Forrelli	46226 National Road, St. Clairsville, Ohio 43950	-	Senior Vice President	-	-	11/1/2010	4/1/2016
Robert Edward Murray	46226 National Road, St. Clairsville, Ohio 43950	-	VP – External Affairs	-	-	8/15/2012	7/29/2014
Robert Edward Murray	46226 National Road, St. Clairsville, Ohio 43950	-	VP – Marketing & Sales	-	-	8/15/2012	9/29/2014

TABLE 1.4.1 - Murray Energy Holdings Company
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizational Structure	Date Position Assumed	Termination Date
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	10/21/2003	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	2/23/2001	-
Michael O. McKown	46226 National Road, St. Clairsville, Ohio 43950	-	Director	-	-	6/30/2003	-
Michael D Loiacono	46226 National Road, St. Clairsville, Ohio 43950	-	Treasurer	-	-	4/23/2007	-
Michael O. McKown	46226 National Road, St. Clairsville, Ohio 43950	-	Secretary	-	-	1/28/2005	-
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	2/23/2001	-
Robert Eugene Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer &Chair	-	-	8/15/2012	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Financial Officer	-	-	8/15/2012	-
Murray, Robert Eugene Trustee, (REM Family Trust)	46226 National Road, St. Clairsville, Ohio 43950	-	Shareholder - 20% Class B Non-Voting Stock	-	-	5/10/2010	-
Robert Edward Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Shareholder - 20% Class B Non-Voting Stock	-	-	6/30/2003	-
Ryan Michael Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Shareholder - 20% Class B Non-Voting Stock	-	-	6/30/2003	-
Fifth Third Bank of NE Ohio - Trustee (Murray 2003 Trust)	46226 National Road, St. Clairsville, Ohio 43950	-	Shareholder - 20% Class B Non-Voting Stock	-	-	10/13/2003	-
Jonathan Robert Murray	46226 National Road, St. Clairsville, Ohio 43950	-	Shareholder - 20% Class B Non-Voting Stock	-	-	6/30/2003	-
Murray, Robert Eugene Trustee, (REM Family Trust)	46226 National Road, St. Clairsville, Ohio 43950	-	Shareholder	100% Class A Voting Stock	-	2/23/2001	-

TABLE 1.4.1 - Mach Mining LLC (Operator)
Owners and Controllers of the Applicant

Name	Address	SSN (voluntary)/EIN	Ownership or Control Relationship to the Applicant/ Position- Title	Ownership Percentage	Location in Organizational Structure	Date Position Assumed	Termination Date
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Executive Officer	-	-	5/31/2015	-
Robert D. Moore	46226 National Road, St. Clairsville, Ohio 43950	-	President	-	-	5/31/2015	-
Cody E. Nett	46226 National Road, St. Clairsville, Ohio 43950	-	Corporate Secretary	-	-	7/21/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Chief Accounting Officer	-	-	9/30/2017	-
Jeremy J. Harrison	46226 National Road, St. Clairsville, Ohio 43950	-	Principal Accounting Officer	-	-	9/30/2017	-

TABLE 1.4.2
Ownership and Control Information for Other Permitted U.S. Surface Coal Mining and Reclamation Operations

Owner/Entity from Table 1.4.1	Permittee/Company Name of Operation in U.S. Individual has been Associated with for the Previous 5 Years.	Position Title to Company	Company EIN	Federal or State Permit Number	State	Name of Regulatory Authority	MSHA Number with Date of Issuance
Foresight Energy LLC	Hillsoboro Energy LLC	Member	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
Foresight Energy LLC	Macoupin Energy LLC	Member	26-2809005	56, 209, 265, 291, 302, 419	IL	IDNR	IL08-00726: 2/26/90
Foresight Energy LLC	Sugar Camp Energy LLC	Member	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12
Foresight Energy LLC	Williamson Energy LLC	Member	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10
Cody E. Nett	Energy Resources, Inc.	Assistant Secretary	31-1044044	17930120, 24880103	PA	PADEP	3602695: 5/25/1988
Cody E. Nett	Energy Resources, Inc.	Vice President	31-1044044	17930120, 24880103	PA	PADEP	3602695: 5/25/1988
James T. Murphy	Hillsoboro Energy LLC	Vice President	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
James T. Murphy	Macoupin Energy LLC	Vice President	26-2809005	56, 209, 265, 291, 302, 419	IL	IDNR	IL08-00726: 2/26/90
James T. Murphy	Sugar Camp Energy LLC	Vice President	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12
James T. Murphy	Williamson Energy LLC	Vice President	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10
Rashda M. Buttar	Hillsoboro Energy LLC	General Counsel	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
Rashda M. Buttar	Hillsoboro Energy LLC	Secretary	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
Rashda M. Buttar	Hillsoboro Energy LLC	Senior Vice President	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
Rashda M. Buttar	Macoupin Energy LLC	Secretary	26-2809005	56, 209, 265, 291, 302, 419	IL	IDNR	IL08-00726: 2/26/90
Rashda M. Buttar	Macoupin Energy LLC	Senior Vice President	26-2809005	56, 209, 265, 291, 302, 419	IL	IDNR	IL08-00726: 2/26/90
Rashda M. Buttar	Sugar Camp Energy LLC	General Counsel	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12
Rashda M. Buttar	Sugar Camp Energy LLC	Secretary	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12
Rashda M. Buttar	Sugar Camp Energy LLC	Senior Vice President	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12

TABLE 1.4.2
Ownership and Control Information for Other Permitted U.S. Surface Coal Mining and Reclamation Operations

Owner/Entity from Table 1.4.1	Permittee/Company Name of Operation in U.S. Individual has been Associated with for the Previous 5 Years.	Position Title to Company	Company EIN	Federal or State Permit Number	State	Name of Regulatory Authority	MSHA Number with Date of Issuance
Rashda M. Buttar	Williamson Energy LLC	General Counsel	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10
Rashda M. Buttar	Williamson Energy LLC	Secretary	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10
Rashda M. Buttar	Williamson Energy LLC	Senior Vice President	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10
Robert D. Moore	American Energy Corp	Assistant Secretary	31-1550443	D-0425, D-1159	OH	ODNR	3301070: 11/6/2000; 3302122: Unk
Robert D. Moore	Andalex Resources Inc	Treasurer	61-0931325	C0070019, C0070033	UT	UT-DOGM	4202233: 8/9/2006; 4201864: 6/20/2011
Robert D. Moore	Canterbury Coal Co	President	25-1127473	3950701, 3900115, 3743701, 3841302	PA	PADEP	3608544: 2/1/1996
Robert D. Moore	Canterbury Coal Co	Treasurer	25-1127473	3950701, 3900115, 3743701, 3841302	PA	PADEP	3608544: 2/1/1996
Robert D. Moore	Eighty Four Mining Co	Vice President	25-1695903	63743702, 63831302	PA	PADEP	3600958: 9/30/1998
Robert D. Moore	Energy Resources Inc.	Director	31-1044044	17930120, 24880103	PA	PADEP	3602695: 5/25/1988
Robert D. Moore	Genwal Resource Inc	Treasurer	87-0533099	C015032	UT	UT-DOGM	4202356-4201715: 1/1/1981
Robert D. Moore	Hillsoboro Energy LLC	Chief Executive Officer	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
Robert D. Moore	Hillsoboro Energy LLC	President	20-5231639	399, 424	IL	IDNR	IL08-1211: 1/30/12; IL08-03216-03: 1/15/14
Robert D. Moore	KenAmerican Resources Inc	Assistant Treasurer	61-1264385	8895009, 8895011, 8899044, 8890147	KY	DSMRE	
Robert D. Moore	Macoupin Energy LLC	Chief Executive Officer	26-2809005	56, 209, 265, 291, 302, 419	IL	IDNR	IL08-00726: 2/26/90

TABLE 1.4.2
Ownership and Control Information for Other Permitted U.S. Surface Coal Mining and Reclamation Operations

Owner/Entity from Table 1.4.1	Permittee/Company Name of Operation in U.S. Individual has been Associated with for the Previous 5 Years.	Position Title to Company	Company EIN	Federal or State Permit Number	State	Name of Regulatory Authority	MSHA Number with Date of Issuance
Robert D. Moore	Macoupin Energy LLC	President	26-2809005	56, 209, 265, 291, 302, 419	IL	IDNR	IL08-00726: 2/26/90
Robert D. Moore	Murray American Energy Inc	President	46-4091556	U010083, U007083, U043100, U019183, U004584, U005383, U008683; 30841319, 30743702	WV;PA	WVDEP;PADEP	
Robert D. Moore	Murray Keystone Preocessing Inc	Vice President	46-4068709	3951601	PA	PADEP	3608540: 9/22/1998
Robert D. Moore	OhioAmerican Energy Inc.	President	20-3044610	D-2180, D-2291, D-2304, D-2312, D-2362, D-2382, D-2411	OH	ODNR	
Robert D. Moore	Sugar Camp Energy LLC	Chief Executive Officer	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12
Robert D. Moore	Sugar Camp Energy LLC	President	41-2178049	382, 434	IL	IDNR	IL08-03189-03: 1/6/12
Robert D. Moore	The American Coal Company	Treasurer	73-1543124	2, 255, 257, 306, 352, 344, 401	IL	IDNR	1102752: 11/7/1983; 1103232: 9/23/2010
Robert D. Moore	The Franklin County Coal Company	Vice President	46-4797001	202, 274, 43, 281	IL	IDNR	1100601: 11/14/1986
Robert D. Moore	The Harrison County Coal Company	Vice President	46-4067631	U010483, U102592	WV	WVDEP	4601318: Unk
Robert D. Moore	The Marion County Coal Company	Vice President	46-4067755	U007883, O104491	WV	WVDEP	4601433: Unk
Robert D. Moore	The Marshall County Coal Company	Vice President	46-4064123	U102692, O102392, U003383, U200707, O200211	WV	WVDEP	4601437: Unk
Robert D. Moore	The Monongalia County Coal Company	Vice President	46-4067864	U004684, O101193; 30841312, 30950701	WV;PA	WVDEP;PADEP	4601968: unk

TABLE 1.4.2
Ownership and Control Information for Other Permitted U.S. Surface Coal Mining and Reclamation Operations

Owner/Entity from Table 1.4.1	Permittee/Company Name of Operation in U.S. Individual has been Associated with for the Previous 5 Years.	Position Title to Company	Company EIN	Federal or State Permit Number	State	Name of Regulatory Authority	MSHA Number with Date of Issuance
Robert D. Moore	The Ohio County Coal Company	Vice President	46-4054000	U102591, U104591, U200306, O100100, O200706, O201806; 63981301	WV;PA	WVDEP;PADEP	4601436: Unk
Robert D. Moore	UtahAmerican Energy Inc	Treasurer	34-1874726	ACT007013	UT	UT-DOGM	4202241: 2/24/1999
Robert D. Moore	West Ridge Resources Inc	Treasurer	87-0585129	C007041	UT	UT-DOGM	4202233: 8/9/2006
Robert D. Moore	Williamson Energy LLC	Chief Executive Officer	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10
Robert D. Moore	Williamson Energy LLC	President	81-0669143	375, 417	IL	IDNR	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10

TABLE 1.4.3
Pending Permit Applications Associated with a Table 1.4.2 Operations of Owners and Controllers

Name of Owner/Controller from Table 1.4.2	Name of Applicant Company	Position Title	State	Name of Regulatory Authority	Permit Application Number or other Identifier	Date of Permit Application
Williamson Energy, LLC	Williamson Energy	N/A	IL	IDNR	456	5/25/2017

TABLE 1.4.4
Surface Coal Mining Operations Owned or Controlled by the Applicant

Name of Surface Coal Mining Operation (Company)	Address	EIN	Applicant's Relationship to Company (Including Percentage of Ownership and Location in Organizational Structure)	State	Name of Regulatory Authority	Federal or Sate Permit Number	MSHA Number and Date of Issuance
Williamson Energy, LLC	211 N. Broadway, Suite 2600, St. Louis, MO 63102	81-0669143		IL	IDNR	375, 417	IL08-03141-01: 6/26/07; IL-08-03141-02: 12/3/10

TABLE I.5
Revocation/Suspension and Forfeiture History

Enforcement				Permit Information					Appeal Information			
Entity /Permittee	Suspension, Revocation, or Bond Forfeiture	Date of Enforcement	Reason of Enforcement	Permit No.	State and Regulatory Authority	Permit Issue Date	Bond Amount (Forfeiture)	Current Status of Permit, Bond, or Similar Security Involved	Type of Appeal (Administrative, Judicial)	Date	Location of Proceeding	Status

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
IDNR	IL0061727	NOV 58-04-15	6/29/2015	TACC	Failure to meet effluent limits at Outfall 002 with pH of 4.97 (below 6.0 minimum) and chlorides of 5834.1 mg/L (above 2000 maximum).		Abated	Treatment ongoing at Pond 002.
DOGM	ACT007041	NOV #21156	9/10/2015	UEI	Permittee failed to follow the required monitoring plan during the mining of longwall panels #18, #20, and #21. Immediately implement monitoring.		Abated	
IDNR	257	NOV 58-01-16	2/18/2016	TACC	Slurry uncontrollably deposited to unauthorized areas within and outside of the permitted area.		Abated	
IDNR	43	NOV 67-3-16	3/30/2016	Consolidation CC	Items from the 2015 reclamation schedule were not completed on time. NOV 67-3-16 issued for not meeting the March 1, 2016 deadline.		Abated	A plan with reasonable deadlines set in 2015, 2016, 2017, 2018, and 2019 has been established to complete the reclamation requirements associated with NOV 67-3-16.
IEPA	A-2016-00017	A-2016-00017	4/4/2016	TACC	CAAPP permit requirements were not met and a complete updated CAAPP permit application to include a railcar loadout operation must be submitted.		Abated	
DOGM	ACT015032	NOV #21175	4/19/2016	UEI	Failure to submit and receive approval from UDOGM for the installation of a metal/chain-link fence around the warehouse (as well as update MRP).		Abated	Abated with submittal and approval by UDOGM.
IDNR	IL0036021	CO 01-16	7/6/2016	Consolidation CC	Failure to abate NOV 67-3-16 within extension time granted. CO 01-16 abatement actions are required by August 8, 2016.		Abated	De-watering requirement began. A plan with reasonable deadlines was established to complete the reclamation requirements associated with NOV 67-3-16. CO 01-16 abated.
IDNR	255, 257, 352	NOV 58-02-16	10/4/2016	TACC	Failure to submit the renewal applications in a timely manner. The notification system that IDNR uses to alert permit holders of their permit expiration dates failed to send the "180 day letters" to us		Abated	This NOV will be vacated as soon as the signed and sealed copies from the Saline County courthouse reach the IDNR office. NOV abated 10/21/16
IDNR	2	58-1-17	2/21/2017	TACC	Failure to include flow from Sediment Basin 002E from the quarterly reports for October, November, and November.		Abated	Discharge monitoring reports for the basin must be submitted by March 21, 2017.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
IDNR	399	38-01-17	3/3/2017	Hillsboro	Failure to report flow from Sediment Basin 002 (NPDES Outfall 002) for the month of November 2016 in the quarterly discharge monitoring reports. (The Department docuented flow during the Nov. 10, 2016 inspection.)		Abated	
IDNR	56	72-1-17	3/7/2017	Macoupin	Failure to report flow from Smith Reservoir (NPDES Outfall 007) for the month of November 2016 in the quarterly discharge monitoring reports. (The Department docuented flow during the Nov. 7, 2016 inspection.)		Abated	
IDNR	202	67-1-17	5/8/2017	Consolidation CC	Failue to complete final grading, seeding, and mulching required on former Pond 005		Abated	Final grade, seeding, and mulching must occur by June 1, 2017.
IDNR	401	58-2-17	5/8/2017	TACC	Coal waste was deposited in unauthorized area in an uncontrolled manner impacting an adjacent ephemeral stream diversion and receiving stream.		Abated	Remove all coal refuse from diversion ditch, remove material downstream, provide a summary of events that contributed to the receiving of NOV,and provide a plan to the department detailing the construction practicesto ensure downstream slopes will be maintained by June 1, 2017. Regreade and shape the downstream slope of the bunkhouse according to the plan by July 1, 2017.
IDNR	401	58-3-17	6/8/2017	TACC	permit renewal application for IDNR permit 401 was not submitted 180 days before expiration		Abated	
KDMRE	875-0030		1/30/2015	MCLEAN	An unpermitted haul road was used to haul in topsoil for reclamation purposes. Extended to allow time to obtain permit revision for affected area.		Abated	Obtaining permit revision to permit the affected area.
KDMRE	889-9004		3/17/2015	KRI	Data for CYP-8 and CYP-9 sites were not submitted in surface and groundwater monitoring reports. NNC 13-0942 issued for failure to report.		Abated	Abated.
KDMRE	889-9004		3/17/2015	KRI	Sediment basin #2 discharging water at pH 2.88. NNC 13-0943 issued for failure to maintain effluent limits.		Abated	Abated as discharged was stopped.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
KDMRE	889-9004		4/21/2015	KRI	1st Quarter 2015 Gob Pile Certification received late (was due: 4/14, received 4/15). NNC #13-0945 as KDMRE "non-correctable", but effectively is abated.		Abated	Report was submitted, but one day late. KDMRE files missing deadlines as "non-correctable", but the report has been received, and is effectively "abated."
KDMRE	889-5009		5/6/2015	KRI	Sediment basin KY-M-269 was discharging at pH of 4.47 into receiving wetlands and there is therefore no up- or downstream measurments.		Abated	Discharge stopped, violation abated.
KDEP	KYG045591		6/1/2015	KRI	Various water quality exceedances and unheeded monitoring requirements noted.		Abated	Agency "non-remedial" is effectively abated with payment of penalty.
KDEP	KY0105562		6/1/2015	KRI	Various water quality exceedances and unheeded monitoring requirements noted.		Abated	Agency "non-remedial" is effectively abated with payment of penalty.
KDMRE	889-9004		7/13/2015	KRI	Failure to pass all surface drainage through sediment control structures with water escaping the permit area with iron greater than 10mg/L.		Abated	Discharge contained
KDMRE	889-5009		8/17/2015	KRI	Permittee has mined coal on 5 unpermitted cemetary tracts. NNC #13-0966 issued. Revise the permit to include the undermined cemetaries.		Abated	Extended with provisions to add areas to permit boundary. Permitting process is lengthly, extension granted. Abated on 8/22/2016
KDMRE	889-5009		8/24/2015	KRI	Failure to submit groundwater monitoring point data for 8003-1725 on 2nd quarter monitoring. Agency "Non-correctable" (effectively abated).		Abated	Corrected report sent. Agency "non-correctable" (effectively abated).
KDMRE	889-9004		8/24/2015	KRI	Failure to submit groundwater monitoring points 24 and 24A on 2nd quarter monitoring. Corrected report sent. Agency "non-correctable (effectively abated)		Abated	Corrected report sent. Agency "non-correctable" (effectively abated).
KDMRE	889-5011		8/24/2015	KRI	Failure to submit groundwater well data for 8003-1725 on 2nd quarter monitoring. Agency "Non-correctable" (effectively abated).		Abated	Corrected report sent. Agency "non-correctable" (effectively abated).
KDMRE	KY0105562		8/28/2015	KRI	Various water quality exceedances and unheeded monitoring requirements noted. Same issues as noted above with 2015001 violations issued June 1, 2015.		Abated	Agency "non-remedial" is effectively abated. Working to combine this violation with the previous violation 2015001 issued on June 1, 2015. May still require additional payment.
KDMRE	889-9004		11/12/2015	KRI	Water discharging from sediment basin SB-1 with a pH of 4.49.		Abated	

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
KDMRE	889-9004		11/12/2015	KRI	Drainage bypassing approved sediment control structure. Water leaving the soututhern edge of the permit with iron concentration greater than 10 mg/L.		Abated	
KDMRE	889-5009		11/16/2015	KRI	Well 8003-1725 reported dry for three (3) consecutive quarters. Within 30 days, well must be rehabilitated or must submit an application to replace well.		Abated	
KDMRE	889-5011		11/16/2015	KRI	Well 8003-1725 reported dry for three (3) consecutive quarters. Within 30 days, well must be rehabilitated or must submit an application to replace well.		Abated	
KDMRE	889-9004		3/24/2016	KRI	Substandard water flowing off-permit from the southern dam of CFD-1. Also, Gullies were present on the southern face of the gob pile. NNC 13-1434 issued.		Abated	Dozer work completed on the souther dam of CFD-1 and the seep is no longer flowing. Abatement of NNC 13-1434.
KDMRE	889-0147		3/29/2016	KRI	Water discharging from sediment basin #2 with a pH of 9.6, and diversion ditches DD1 and DD3 have been eroded and no longer meet specifications.		Abated	Remedial work has been completed per KDMRE inspection report on 5/27. NNC 13-1435 abated.
KDMRE	889-9004		6/1/2016	KRI	Failure to submit annual certifications of maintenance for slurry impoundments CFD-1 and CFD-2. Written as NNC 13-1437 on the insp. rpt. but is actually 13-1438.		Abated	Paperwork submitted.
KDMRE	889-5011		10/26/2016	KRI	Permittee has failed to maintain sediment structure SB-5. The primary spillway has blown out.		Abated	Principle spillway portion of dam was washed out and we have until 11/28/16 to repair it. Mike sent contractor to site 10/27/16.
KDMRE	889-9004		11/9/2016	KRI	Permittee has failed to operate CFD-1 according to the plan approved in permit. Permitee overfilled south end of CFD-1 with slurry and placed a berm across the spillway which stoped the discharge.		Abated	Permitee must cease the pumping of slurry into the south end of CFD-1. Permitee must either remove the alteration to the spillway or obtain a permit revisionto approve alterations made.
KDMRE	889-5009		11/21/2016	KRI	Permittee has failed to submit surface and groundwater 3rd quarter reports, GW-4 reports, and AM-02 monitoring reports withing the required deadline.		Abated	Monitoring reports were submitted. See Violation sheet.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
KDMRE	889-9004		11/23/2016	KRI	Permittee has failed to begin seeding sites SB#2, the non-toxic material pile near CRD-1, the outslopes of CRD-1, and areas on CRD-1 where erosion was repaired within the 7 days given to do so.		Abated	Permittee must seed, mulch, and maintain around areas SB#2, the non-toxic material pile near CRD-1, the outslopes of CRD-1, and areas on CRD-1 where erosion was repaired. Permittee must then reseed in the spring of next year.
KDMRE	889-5009		2/2/2017	KRI	Permitee has allowed the accumulation of mud and coal dust to occurr in the right of way of hwy 181 and the associated road ditches.		Abated	Permittee has 30 days to remove and dispose of all material from permit that has accumulated. KRI is continueing work. The agency extended till April 6, 2017.
ODNR	D-0360	NOV #29963	9/30/2015	TOVCC	Water flowing from coal stockpile down to area below SR 148 bridge. Required remedial action: clean up material, install sumps, reinstall silt fence / build dyke.		Abated	Abated with completion of remedial actions.
ODNR	2382	29435	4/5/2016	OAEI	Water discharging through the embankment beneath the principal spillway pipe of structure 005.		Abated	Abated with repairs.
ODNR	D-0360	29971	12/19/2016	TOVCC	pH of pond was 3.0 when it should be between 6.5-9.0.		Abated	Pond must be treated to a pH of 6.5-9.0 prior to discharge by 12/27/16. Water from pond must not be discharged until effluent limits are met.
ODNR	D-0425	CO I-13083	6/14/2017	AEC	Drilling fluid was discharged beyond the permit limits and sediment was found in unnamed tributaryand Jakes Run stream on the Wharton and Bettinazzi property		Abated	Cease all mining activities beyond permit limits, including drilling activity causing off site discharges. Take all measures necessary to stop discharge of sediment into the stream.
PADEP	3841302	N/A	2/2/2015	Canterbury CC	Complaince Order: October DMRs self-report		Abated	
PADEP	30841312 / PA0013790	C.O. 151023A	5/11/2015	Consolidation CC	Outlet 022 discharging with Aluminum concentration of 3.189 mg/L, exceeding the 1.1 mg/L limit. Compliance Order (C.O.) docket # 151023A issued. Amended to fix information on 5/22.		Abated	

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
PADEP	30841312 / PA0013790	NOV 06/30/15	6/30/2015	Consolidation CC	Monthly average and instant maximum aluminum concentration at outfall 005 was exceeded on first quarter DMRs. NOV issued and lifted.		Abated	Lifted immediately after issued.
PADEP	30841312 / PA0013790	NOV 8/27/15	8/27/2015	Consolidation CC	DMRs showed a no-flow at Outfall 022 in April and at 005 in June, conflicting with inspector sampling data (sometimes finds it flowing when we do not).		Abated	NOV issued and lifted.
PADEP	30841312 / PA0013790	NOV 10/27/15	10/27/2015	Consolidation CC			Abated	
PADEP	30841312 / PA0013790	NOV 4/29/16	4/29/2016	The Monongalia County Coal	Effluent characterization for special condition requirements of Part B of the NPDES permit, required 2 years after NPDES issuance, was not submitted.		Abated	Required effluent characterization has been provided to PADEP.
PADEP	63743702 / PA0214248	NOV 4/29/16	4/29/2016	The Washington County Coal	Effluent characterization for special condition requirements of Part B of the NPDES permit, required 2 years after NPDES issuance, was not submitted.		Abated	Data had been previously submitted to the department. NOV abated (should probably technically have been withdrawn).
PADEP	03743701	NOV 5/5/16	5/5/2016	Canterbury CC	Operator has not begun desludging the sediment basins as noted in previous inspection reports. NOV issued to require desludging by 5/12.		Abated	Abated with the start of the desludging process.
PADEP	03951601	NOV 5/18/16	5/18/2016	MKPI	Impoundment certifications expired 5/4/16. NOV cited requiring the submission of the annual impoundment certifications by 6/17/16.		Abated	Abated with the submission of the certifications.
PADEP	03841302	NOV 6/28/16	6/28/2016	Canterbury CC	Sample collected on 6/2/16 showed a manganese concentration of 2.867 mg/L, over the limit of 2.5		Abated	Abated with manganese concentration returning to compliant levels.
PADEP	03841302	NOV 8/3/16	8/3/2016	Canterbury CC	NOV issued for exceeding manganese limit at Outfall 001 on sample collected 6/15. Immediately lifted as compliant sample was taken 6/28.		Abated	Compliant sample collected 6//28 shows Manganese limits were being met. NOV lifted.
PADEP	30841312 / PA0013790	NOV 8/24/16	8/24/2016	The Monongalia County Coal	Effluent limits on outfall 023 were not reported when the HMR/DMR's were submitted for the second qtr 2016.		Abated	
PADEP	03951601	NOV 9/23/16	9/23/2016	MKPI	requires operator to submit a request for temporary cessation.		Abated	submitted temporary cessation
PADEP	03841302	CO 12/20/16	12/20/2016	Canterbury CC	NOV issued for exceeding manganese limit at Outfall 001 on sample collected 12/20/16		Abated	
PADEP	03841302	C.O. 161067	1/9/2017	Canterbury CC	Manganese concentraionat outfall 001 was recorded at 3.635 mg/L when the effluent limit is 2.5 mg/L.		Abated	Operator must provide proper treatmentto ensure discharges are meeting effluent standards.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
PADEP	30841312 / PA0013790	CO #171012	3/3/2017	The Monongalia County Coal	CO issued for reporting No Flow when the inspector found a flow.		Abated	
PADEP	30841312 / PA0013790	CO #171013	3/3/2017	The Monongalia County Coal	Water exceeded effluent limits at outfall 022 with an aluminum concentration of 2.6 mg when, and an aluminum concentraition of 2.06 mg when the limit is 1.1mg. Water exceedded effluent limit at outfall 023 with an aluminum concentration of 5.9mg and 1.46mg when the limit is set at 1.3mg		Abated	
PADEP	03841302	C.O. 171025	6/6/2017	Canterbury CC	Outfall 001 was discharging water with an aluminum concentration of 1.449 mg/L which exceeds the limit of 0.78mg/L. Sample collected on 4/17/17.		Satisfactory Progress	Operator must provide proper treatmentto ensure discharges are meeting effluent standards.
PADEP	03841302	C.O. 171028	6/20/2017	Canterbury CC	Outfall 001 discharging with an aluminum concentration of 1.524 mg/L which exceeds the limit of 0.75 mg/L.		Satisfactory Progress	Operator must provide proper treatmentto ensure discharges are meeting effluent standards.
PADEP	30841312 / PA0013790	C.O. 171029	6/26/2017	The Monongalia County Coal	Outfall 023 discharged water with an aluminum concentration of 3.758 mg?l when the effluent limit is 1.3 mg/L.		Abated	
PADEP	30841312 / PA0013791	CO #171029	6/26/2017	The Monongalia County Coal	Outfall 023 exceeded the aluminum concentration of 1.3 mg/L with a concentration of 3.758 mg/L.		Abated	
PADEP	63733706	CO #171030	7/11/2017	MCMI	Failure to have an approved reclamation plan.		Terminated	
PADEP	03951601	C.O. 171032	8/8/2017	MKPI	Discharged water from an area disturbed by mining did not meet effluent limits with a Iron concentration of 42.582 mg/L when the limit is 7.0 mg/L, and a Manganese concentration of 11.119 mg/L which exceeds the limit of 5.0 mg/L.		Abated	Operator must provide proper treatment to ensure discharges are meeting effluent standards.
WVDEP	U007883	U007883 (52)	1/12/2015	Consolidation CC	Black water / coal fines discharging into Paw Paw Creek, discoloring water, disturbing hydrologic balance		Abated	Coal fine discharge stopped, no longer causing hydrologic balance. Abatement period extended to allow for a written plan to minimize potential for a repeat event.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
WVDEP	U004684	U004684 (36)	1/22/2015	Consolidation CC	Outfall 002 pH 9.7 (limit is 9.0)		Withdrawn	Follow-up inspection 002 was not discharging. Operator submitted justification to DEP outlining how access to the pond had been restricted and pump malfunctioned. Resolved
WVDEP	P203514	P203514 (1)	1/26/2015	AMEI	Prospect permit: Hole P-01 caused degredation of groundwater quality from a nearby landowner water well.		Abated	Extended with permittee checking and purging the well, waiting for it to clear.
WVDEP	U007883	IHCO #53	2/10/2015	Consolidation CC	Contractor spill at 1-D borehole construction site. IHCO #53 issued for excessive contribution of suspended solids into tributary. Modified to NOV #55.		Abated	Abated with stopped discharge from the site and no remaining water with high solids was located. "Slug" has dissipated. Abated
WVDEP	U007883	NOV #55	2/10/2015	Consolidation CC	Contractor spill at 1-D borehole construction site. IHCO #53 issued for excessive contribution of suspended solids into tributary. Modified to NOV #55.		Abated	Abated with stopped discharge from the site and no remaining water with high solids was located. "Slug" has dissipated. Abated
WVDEP	U007883	NOV #54	2/10/2015	Consolidation CC	Contractor spill at 1-D borehole construction site. NOV #52 issued for failure to install proper temporary E&S controls.		Abated	Abated with installation of adequate sediment control for the site.
WVDEP	U043100	NOV #7	2/13/2015	Consolidation CC	RO break flowed off-permit allowing chlorides to enter an unnamed tributary of Campbell Run. NOV #7 issued for disturbance to hydrologic balance.		Abated	Discharged to Campbell Run was stopped. Pipeline break was temporariliy repaired. A more permanent repair will occur when weather permits.
WVDEP	O102392	NOV #28	3/4/2015	Consolidation CC	Outlet 006 discharging at pH of 3.85 (below the minimum limit), and Iron at 5.0 (above maximum limit). NOV #28 issued for failure to maintain effluent limits.		Abated	Outlet 006 was pumped down to stop discharge. NOV extended until lab results are received.
WVDEP	O100100	NOV #12	3/4/2015	Consolidation CC	Outlet 020 discharging iron at 3.5 mg/L. NOV#12 issued for exceeding effluent limit.		Abated	Outlet 020 was pumped down to stop discharge. Inspector sample lab data received, NOV terminated.
WVDEP	U102591	NOV #51	3/9/2015	Consolidation CC	Emergency Warning Plan for Brown's Run Slurry Impoundment expired 3/8/2015. NOV #51 issued for failure to submit and obtain approval for new plan.		Abated	EWP was submitted but WVDEP requires a filing fee with submission, extended. Abated with fee submission and plan is now being reviewed by WVDEP.
WVDEP	U010483	NOV #88	3/16/2015	Consolidation CC	Pipe burst released water & material into Robinson Run. NOV #88 issued for failure to minimize disturbance to hydrologic balance.		Abated	Line was repaired. NOV terminated.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
WVDEP	U010483	NOV #89	3/25/2015	Consolidation CC	Outlet 032 discharging muddy water into and discoloring Sam's Run and the South Fork of Fish Creek. NOV #89 issued.		Abated	Filtration system installed; extended. Abated with filtration & floc treatment.
WVDEP	U007083	NOV #43	4/8/2015	Consolidation CC	Power to pmp was interrupted, sump overflowed, untreated mine water left permit area and stained ditch leading to UNT of Dent's Run. NOV #43 issued.		Abated	When power was restored, our pump was unable to keep up with accumulated water, so we installed a bigger pump.
WVDEP	U004684	NOV #37	4/22/2015	Consolidation CC	Failure to stabilize refuse benches in that a large "erosion gully" (actually a temp. ditchline) developed above the new flume ditch. NOV #37 issued.		Abated	Repaired, abated.
WVDEP	U004684	NOV #38	4/22/2015	Consolidation CC	Failure to spread and compact refuse material in layers not exceeding two feet (top of refuse not spread/compacted due to mine idle). NOV #38 issued.		Withdrawn	Spread and compacted, abated.
WVDEP	U004684	NOV #39	4/22/2015	Consolidation CC	Unapproved materials (some combustible debris, some noncombustible) were disposed of in refuse pile. Needs removed. NOV #39 issued.		Abated	Materials removed. Abated.
WVDEP	U102591	NOV #52	6/13/2015	Consolidation CC	Pump failed and drainage sump discharged black water from outlet 015 into Ohio River. NOV #52 issued.		Withdrawn	Abated with cleanup and pump restoration. NOV withdrawn as it is essentially the same as NOV 53.
WVDEP	U102591	NOV #53	6/13/2015	Consolidation CC	Pump failure allowed black water discharge from outlet 015 into Ohio River. NOV #53 issued for conditions not allowable in waters of the state.		Abated	Abated with cleanup and pump restoration.
WVDEP	U003383	NOV #72	7/22/2015	Consolidation CC	Outlet 005 discharging with TSS at 228.0 (above 70 maximum) and total aluminum at 2.20 mg/L (above 0.75 maximum) due to water line rupture disrupting treatment.		Abated	The line has been replaced and the line will be inspected during pond cleanings to prevent non-compliant discharge.
WVDEP	U102692	NOV #6	8/12/2015	Consolidation CC	Outlet 030 discharge exceeding maximum aluminum concentration.		Abated	Laboratory report of subsequent sample shows compliance is being met. Violation abated.
WVDEP	U200707	NOV #1	8/24/2015	Consolidation CC	Air Blast exceeded maximum decibel level of 133 dB (at 134.4 dB).		Abated	Abated with reoccurance provention plan submittal and with subsequent air blasts shown to be within decibel limits. (Contractor responsibility)
WVDEP	O201806	NOV #5	9/4/2015	Consolidation CC	Filtration socks were removed by a storm drain, allowing sediment laden water during washdown procedure to drain into Boggs Run and discolor the stream.		Abated	Sediment control socks reinstalled around the drain grates. Violation abated.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
WVDEP	O102591	NOV #54	12/1/2015	Consolidation CC	Outlet 015 and 023 discharges exceeding their respective aluminum concentration limits. NOV #54 issued.		Abated	
WVDEP	U010483	NOV #90	12/7/2015	Consolidation CC	Water line break caused orange staining in the unnamed tributary of Quaker Fork. NOV issued for causing conditions not allowable in state waters.		Abated	
WVDEP	U102692	NOV #7	12/8/2015	Consolidation CC	Outlet 415 discharge had an amonia/nitrogen level of 20.23 mg/L, exceeding the limit of 6 mg/L. NOV #7 issued.		Abated	
WVDEP	U003383	NOV #73	12/17/2015	Consolidation CC	Outlet 029 discharging with aluminum concentration of 1.27 mg/L, exceeding the limit of 0.75 mg/L. NOV #73 issued.		Abated	
WVDEP	O200706	NOV #1	12/21/2015	Consolidation CC	Contractor pushed coal fines into a perimeter ditch resulting in unallowable discharge to US waters. NOV #1 issued. Contractor to reimburse penalty.		Abated	
WVDEP	O102392	NOV #29	12/30/2015	Consolidation CC	Discharge at Outlet 419 B.O.D. was 12.2 mg/L, exceeding the limit of 10 mg/L. NOV #29 issued.		Abated	
WVDEP	U003383	NOV #74	1/26/2016	Consolidation CC	Pump failure caused Outlet 005 to discharge water with iron concentration greater than 5.00 mg/L. NOV #74 issued.		Abated	A new pump was installed and discharge from 005 ceased. NOV #74 abated.
WVDEP	U010483	IHCO #91	3/23/2016	The Harrison County Coal Co	Freshwater contaminated with dust suppressant flowed into UNT of Bartholomew creek. Foam present. Cease discharge Immediately.		Abated	Discharge was ceased. New valve was installed on the end of the pipe preventing the occurrence of accidental discharges in the future.
WVDEP	AIR PERMIT	AIR QUALITY 4/7/16	4/7/2016	The Ohio County Coal Co.	Failure to inspect facility for asbestos prior to demolition. Failure to notify the WVDEP Division of Air Quality at least ten days prior to demolition.		Abated	Letter has been sent to DAQ. Awaiting response/abatement. DAQ response email no further actions needed
WVDEP	WV0004201	NOV #1	5/3/2016	The Ohio County Coal Co.	Outlet 003 was sampled and lab analysis returned a chloride concentration of 607 mg/L, although the field testing kit showed much less.		Withdrawn	Re-run of sample showed a level of 56.9 mg/L, well under permitted limit. It is likely there was a decimal placement error in the original laboratory analysis. Agency withdrawn.
WVDEP	U003383	NOV #75	7/12/2016	The Marshall County Coal Co	Failure to obtain approval to subside tract 3-16-2 prior to mining in excess of 60% extraction within 30° angle of draw of a cemetery.		Abated	Abated with submission of legal right to subside tract 3-16-2 and obtained approval from WVDEP.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
WVDEP	U010483	NOV #1	7/18/2016	The Harrison County Coal Co	AMD line break caused mine water to flow to an UNT of Quaker Fork. Orange staining on ground and creek, some vegetation killed. NOV #1 issued.		Abated	Permittee has repaired the pipeline break, has regraded, seeded, and mulched the eroded area due to pipeline break. NOV #1 terminated.
WVDEP	U003383 / WV0020834	NOV #2	7/22/2016	The Harrison County Coal Co	NOV #2 issued for conditions not allowable in state waters in that seeps from the impoundment were discharging black water into Cunningham Run.		Abated	Abated as diversion and sump were installed to collect water and pump water back to the slurry cell. Slurry cell is being pumped down to eliinate the source of black water.
WVDEP	O104491	IHCO #5 / NOV #6	7/26/2016	The Marion County Coal Co.	IHCO #5 issued for discharge from Outlet 002 resulting in fish kill in Sugar Run and Paw Paw Creek.		Abated	Ponds pumped down to eliminate the source of discharge. IHCO #5 was converted to NOV #6, and NOV #6 was terminated.
WVDEP	WV0004201	NOV #2	8/4/2016	The Ohio County Coal Co.	Brown's run impoundment (Outlet 009) is discharging orange water, field tested to be greater than 10 mg/L. NOV #2 issued.		Abated	Installed a control system to control discharging from outlet 009. NOV#2 was terminated.
WVDEP	U004684	NOV #40	8/11/2016	The Monongalia County Coal	Failed to maintain sediment capacity in ponds one and two.		Abated	Ponds one and two were cleaned and brought back to sediment capacity.
WVDEP	O104491	NOV #2	9/2/2016	The Marion County Coal Co.	NOV #2 issued for high conductivity and chloride seepage from 1st treatment pond at St. leo.		Abated	Fixed sump collection system at St Leo. Conductivity & Chlorides have decreased in the UNT of south fork. NOV #2 abated on 10/3/16
WVDEP	WV1017799	NOV #1	10/24/2016	The Ohio County Coal Co.	NOV 1 issued. Sediment found in Bogg's Run stream and on stream bottom.		Abated	
WVDEP	WV0004201	11/01/55	11/1/2016	The Ohio County Coal Co.	Outlet 401 was out of compliance for BOD 5 day.		Abated	NOV Abated 12/13/16
WVDEP	U0102392 / WV0020834	NOV #31	1/20/2017	Marshall County Coal Compa	IHCO modified to NOV. Black residue fond in ditch and delta of Fish Creek.		Extended	
WVDEP	U0102392 / WV0020834	NOV #32	1/24/2017	Marshall County Coal Compa	Failed to maintain effluent limitations from outfall 035. blackwater discharging		Abated	
WVDEP	U003383 / WV0020834	NOV #76	1/30/2017	Marshall County Coal Compa	Failed to maintain proper drainage of pond 4 (associated with outlet 017).		Abated	The pipe will be removed and an open channel spillway will be constructed.
WVDEP	U007883	NOV #56	2/23/2017	Consolidation CC	Failed to minimize disturbance to prevailing hydrologic balance at mine site and associated off site areas. Harvey 1 impoundment was contributing tp grey black solid material in Harvey Run.		Abated	Reduced suspended solids to be within effluent limit.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
WVDEP	O102392	NOV #34	3/2/2017	Marshall County Coal Compa	Failed to maintain effluent limit at Conner Run outlet 006.		Abated	Stop discharging water non-compliant water out of outlet 006.
WVDEP	O102392	NOV #33	3/15/2017	Marshall County Coal Compa	Failed to maintain hydrologic balance in Conner Run with black water discharging into Conner Run from outlet 035.		Abated	Remove black water and residue from Conner Run.
WVDEP	O102591	NOV #56	4/18/2017	The Ohio County Coal Co.	Did not meet Effluent limits at outlet 017. TSS was 117mg the limit is 70mg.		Abated	
WVDEP	O102592	NOV# 57	4/18/2017	The Ohio County Coal Co.	Did not meet Effluent limits at outlet 017. Total Aluminum was 0.82 mg the limit is 0.75mg.		Abated	
WVDEP	U003383	NOV #77	5/22/2017	Marshall County Coal Compa	A large slip formed below the shaft pad. Material from the slip partially blocked the right hand sediment ditchfor 10 feet and completely blocked the ditch for another 10 feet.		Abated	Ditch must be cleaned out and slip must be repaired.
WVDEP	U003383	NOV #78	5/22/2017	Marshall County Coal Compa	NOV issued for not installing proper sediment control.		Abated	
WVDEP	U003383	NOV #79	5/22/2017	Marshall County Coal Compa	NOV issued for not stabilizing slopes to prevent erosion.		Abated	
WVDEP		NOV #35	5/23/2017	Marshall County Coal Compa	Sediment left the permitted area and entered a wetland area. 1/4 of the wetland has been impacted.		Abated	
WVDEP	O200211	NOV #1	6/1/2017	Marshall County Coal Compa	Permittee failed to certify an approved drainage system, and construction of the sediment pond and drainage ditches prior to the commencement of mining operations.		Abated	Submit and obtain approval for the certifications of the drainage and control structure for this permit.
WVDEP	O200211	NOV #2	6/1/2017	Marshall County Coal Compa	Permitee failed to monitor the article 3 surface surface water monitoring point DGR. This point was not monitored for Acidity and alkalinity as required by section U-1 of the SMA premit.		Abated	
WVDEP	U004684	NOV #41	6/23/2017	The Monongalia County Coal	Unapproved material on course refuse pile.		Abated	
WVDEP	U010483	NOV #92	7/11/2017	The Harrison County Coal Co	TSS score of disharge from sediment pond 001 did not meet the effluent limit.		Abated	
WVDEP	U010483	NOV #93	7/21/2017	The Harrison County Coal Co	Discharge at pond 001 did not meet effluent limits.		Abated	
WVDEP	U0102392 / WV0020834	NOV #36	8/3/2017	Marshall County Coal Compa	Failed to maintain effluent limitations from outfall 035. blackwater discharging		Abated	Stop the discharge from outlet 035 and clean the spillway to prevent additional sediment from entering conners run.
WVDEP	U007083 / WV0038288	NOV #44	8/3/2017	Arkwright	Failure to maintain hydrologic Balance in Little Indian Creek located north of pump #24.		Abated	Pump must be repaired before operations can continue.

TABLE 1.5.3
List of Violations by Applicant the Past 3 Years

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions
WVDEP	U0102392 / WV0020834	NOV #36	8/22/2017	Marshall County Coal Compa	failed to submit a certification for the quarterly inspection of the ireland refuse area for the 2nd QTR of 2017		Terminated	
WVDEP	U004684	NOV #42	8/23/2017	The Monongalia County Coal	Coal slurry leaked into WV fork of Dunkard Creek from outlet 002.		Terminated	
WVDEP	U003383 / WV0020834	NOV #80	8/30/2017	Marshall County Coal Compa	water with suspended solids overtopped the thickener tank and exited the permit via a storm drain and eventually discharged into the ohio river without passing through an approved sediment control system.		Terminated	Provide report detailing what parts of the system failed and repair all faulty parts.

TABLE 1.5.4
Violation History for Surface Coal Mining Operations Owned/Controlled by Applicant

Issuing Agency	State and Permit No. or MSHA Number	State Violation No. or MSHA Violation No.	Issue Date	Name of Company or Person to Whom Violation Issued	Description of the Violation	Date, Location and Type of Administrative or Judicial Proceeding	Violation Status	Abatement Actions

PART I ATTACHMENT I.10.A
AFFIDAVIT OF LEGAL RIGHT TO ENTER

(I) (~~We~~) Mark Schuerger under penalties of perjury declare on behalf of the applicant,
(Individual or Individuals)

Williamson Energy, LLC that said applicant has valid documents which bestow upon the applicant a legal right to enter and commence surface coal mining and reclamation operations upon lands contained in the proposed permit area, and such legal right is not in any way the subject of pending court litigation.

Dated this 13 day of July, 2018.

Signature

Authorized Person
Title

Sworn to and subscribed before me

this 13 day of July, 2018.

Notary Public

OFFICIAL SEAL
STACI R LOWRY
Notary Public - State of Illinois
My Commission Expires Jan 14, 2019

My commission expires: Jan 14, 2019

PART I ATTACHMENT I.10.B
ENGINEERING CERTIFICATION

ENGINEERING CERTIFICATION

I hereby certify the engineering design used in preparation of this application, attachments, and supplements were done by me or under my direct supervision.

I certify that I am familiar with all of the plans, specifications, reports, and maps submitted as part of this application and that said information is accurate.

I certify to the best of my knowledge all such design is in accordance with all applicable local, state and federal laws, rules and regulations.

I further certify that all applicable maps and/or drawings have been individually sealed in accordance with the Professional Engineering Act, 225 ILCS 325/15.

INDIVIDUAL P.E. CERTIFICATION

Claudio E. Yon
Name

062-050632
Illinois Registration Number (Seal)

CLAUDIO ELI YON
062-050632
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Alliance Consulting, Inc.
Firm

124 Philpott Lane,

Beaver, WV 25813

Address

Claudio E. Yon
Signature

304-255-0491
Phone Number

6/21/18
Date

PROFESSIONAL DESIGN FIRM CERTIFICATION

Complete if applicable. If not, respond N/A.

☒ As an employee of a "professional design firm" as defined by the Illinois Department of Financial and Professional Regulation, I certify that the professional design firm is registered and in good standing with the Illinois Department of Financial and Professional Regulation.

Alliance Consulting of West Virginia, Inc.
Professional Design Firm Name

184.006236
Professional Design Firm Number

PART I ATTACHMENT I.10.C
CERTIFICATES OF LIABILITY INSURANCE

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 05/31/2018

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	**CONTACT NAME:** Karen Williams
Reschini Agency, Inc. 922 Philadelphia Street P.O. Box 449 Indiana PA 15701	**PHONE (A/C, No, Ext):** (724)349-1300 **FAX (A/C, No):** (724)349-1446 **E-MAIL ADDRESS:** kwilliams@reschini.com
INSURED Foresight Energy, LLC: Williamson Energy, LLC Murray Energy Corporation 46226 National Road St. Clairsville OH 43950	**INSURER(S) AFFORDING COVERAGE** — **NAIC #** **INSURER A:** Certain Underwriters at Lloyds (Apollo Liab Consortium) — AA-1120106 **INSURER B:** **INSURER C:** **INSURER D:** **INSURER E:** **INSURER F:**

COVERAGES **CERTIFICATE NUMBER:** 18 Foresight/Williamson **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [X] LOC [ ] OTHER:			PC304000M	06/01/2018	06/01/2019	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 1,000,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
	AUTOMOBILE LIABILITY [ ] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ $ $ $
	[ ] UMBRELLA LIAB [ ] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [ ] RETENTION $						EACH OCCURRENCE AGGREGATE	$ $
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [ ] N/A If yes, describe under DESCRIPTION OF OPERATIONS below						[ ] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ $ $

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Coverage for blasting subsidence is included in the above referenced policy.

CERTIFICATE HOLDER

IL Dept of Natural Resources Land Reclamation Div
Office of Mines & Minerals
One Natural Resources Way
Springfield IL 62702-1273

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Karen Williams

© 1988-2015 ACORD CORPORATION. All rights reserved.

The ACORD name and logo are registered marks of ACORD

PART I ATTACHMENT I.12.B.4
HIGHWAY AUTHORITY AGREEMENTS

Attachment I.12.B.4

The two attached utility permits from the Illinois Department of Transportation were granted to Adena Resources, LLC, which is a land/utility company for Foresight Energy, LLC.

Adena Resources, LLC and Williamson Energy, LLC are subsidiaries of Foresight Energy, LLC. Adena Resources provides support services to mining companies operating under Foresight Energy, such as Williamson Energy.

WILLIAMSON COUNTY HIGHWAY DEPARTMENT AGREEMENT

Williamson Energy, LLC
PO Box 99
Johnston City, Illinois 62959
Office: 618-983-3020 Fax: 618-983-3017

January 26, 2017

Gregory S. Smothers, County Engineering
County of Williamson, State of Illinois
1817 North Court Street
Marion, Illinois 62959

RE: County Highway Permit To Install Waterlines
Dated 18th day of January, 2017 ("Permit")
By and Between:
Williamson Energy LLC ("Williamson Energy"), and,
Williamson County Highway Department ("County Highway Department")
(collectively the "Parties")

Dear Mr. Smothers and County Officials:

Pursuant to the subject referenced Permit, Williamson Energy and the County Highway Department desire to reach further mutual understanding and agreement corresponding to certain matters set forth therein. Accordingly, and Parties desire to enter into this Letter Agreement to amend said Permit as follows.

For and in consideration of the mutual benefits to be derived herefrom, Williamson Energy and County Highway Department amend the Permit as follows:

1. Page 2, 1st Paragraph reads as follows:
"It is anticipated that these utilities will be operated for a period of up to 10 years from the date of this permit. Once these utilizes are no longer being used, it is anticipated that they will be removed from the roadway right of ways within the following year."

   The Parties hereby amend Page 2, 1st Paragraph to read as follows:
"The term of the Permit shall be in force and have effect for a period of 10 years from the date of this Permit, and as long thereafter as mining operations continue to be conducted by Williamson Energy, its successor and assigns, under IDNR Permit #375. Upon termination and abandonment of the utilities operated by Williamson Energy under the Permit; Williamson Energy shall either remove its utilities, or alternatively, transfers and assigns to the County Highway Department all rights, title and interest in and to the utilities to the County Highway Department corresponding to only those areas said County owns in and to its rights of ways under the Permit, as directed by the County Highway Department."

2. Page 3, Item No. 10. reads as follows:
"A performance bond in the amount of $150,000 will be kept on file with the Williamson County Highway Department throughout the life of the installation and operation activities of these permitted utilities. Once the utilities are abandoned and removed, the bond will be returned to Williamson Energy."

The Parties hereby amend Page 3, Item No. 10. to read as follows:
The Parties hereby state that the performance bond in the amount of $150,000.00 under that certain agreement titled, ***Agreement Between the County of Williamson, State of Illinois and Williamson Energy LLC Authorizing Subsidence of County Roads and Highways by Williamson Energy, LLC****, dated the 22nd day of January, 2008, shall be held by the County Highway Department for the life of the installation and operations activities of the Permit.*

Williamson Energy and the County Highway Department acknowledge that the Permit is currently in effect, and, except as amended herein, that the Permit shall remain in full force and effect according to its terms.

Williamson Energy greatly appreciates your continued cooperation with respects to all matters to satisfy this undertaking.

Thank you.

Very truly yours,
WILLIAMSON ENERGY, LLC

encl.

By: Lu M. Landow

Its: Authorized Person

Acknowledged and Agreed to by:

Gregory S. Smothers

Its: County Engineer, Williamson County Highway Department

GREGORY S. SMOTHERS
COUNTY ENGINEER

SCOTT BARGER
DESIGN ENGINEER

YVONNE RICHERT
OFFICE MANAGER

WILLIAMSON COUNTY
HIGHWAY DEPARTMENT
MARION, ILLINOIS 62959

1817 NORTH COURT ST.
MARION, ILLINOIS 62959

TELEPHONE 618-998-2145

COUNTY HIGHWAY PERMIT TO INSTALL WATERLINES

WHEREAS, **Williamson Energy**, has requested permission to construct/install and operate a new 18" - 24" water line across **Liberty School Road, (TR 548), Williams Prairie Road (TR 550), Harris School Road (TR 556), Old Ben Road (TR 340), Old Frankfort Road (TR 344), Eberhardt Road (TR 041), Duncan Road (TR 334), Monroe Road (TR 332) and Collins Road (TR 318)** in Williamson County which is subject to the jurisdiction and authority of said County and its officers.

WHEREAS, the proposed construction consists of installation of new 18" - 24" waterline to be placed along and/or under the following roadway under jurisdiction of the Williamson County Highway Department **Liberty School Rd, Williams Prairie Rd, Harris School Rd, Old Ben Rd, Old Frankfort Rd, Eberhardt Rd, Duncan Rd, Monroe Rd and Collins Rd in Williamson County**

The locations are as follows:

- **Site 1** – Liberty School Road in the SW¼ of the SW¼ of Section 12, T8S, R3E (Lake Creek Township) and the SE¼ of the SE¼ of Section 11, T8S, R3E (Lake Creek Township)
  - Proposed Road Bore
- **Site 2** – Williams Prairie Road in the NE¼ of the NW¼ of Section 14, T8S, R3E (Lake Creek Township)
  - Proposed Road Bore
- **Site 3** – Harris School Road in the NW¼ of the NW¼ of Section 15, T8S, R3E (Lake Creek Township) and the NE¼ of the NE¼ of Section 16, T8S, R3E (Lake Creek Township)
  - Proposed Road Bore
- **Site 4** – Old Ben Road in the NW¼ of the NE¼ of Section 17, T8S, R3E (Lake Creek Township)
  - Proposed Road Bore
- **Site 5** – Old Frankfurt Road in the NE¼ of the NW¼ of Section 17, T8S, R3E (Lake Creek Township)
  - Proposed Road Bore
- **Site 6** – Eberhardt Road in the SE¼ of the SW¼ of Section 8, T8S, R3E (Lake Creek Township)
  - Proposed Road Bore

- **Site 7** – Duncan Road in the NE¼ of the SW¼ of Section 7, T8S, R3E (Lake Creek Township)
    - Proposed Road Bore
- **Site 8** – Monroe Road in the NW¼ of the SW¼ of Section 7, T8S, R3E (Lake Creek Township)
    - Proposed Road Bore
- **Site 9** – Collins Road in the NW¼ of the SW¼ of Section 1, T8S, R2E (Herrin Township) and the NE¼ of the SE¼ of Section 2, T8S, R2E (Herrin Township)
    - Proposed Road Bore

It is anticipated that these utilities will be operated for a period of up to 10 years from the date of this permit. Once these utilizes are no longer being used, it is anticipated that they will be removed from the roadway right of ways within the following year.

THEREFORE, be it permitted and granted by the County Engineer of Williamson County, Illinois, that permission be granted to proceed with said construction and operations, subject to the following conditions:

1. That the petitioner shall furnish all materials, do all work and pay all costs of such work.

2. That one-way traffic be maintained during the period of construction and adequate protection for the safety of the public be provided. This includes all necessary signing, flagmen or other traffic control.

3. That the petitioner or his assigns shall assume all risks and liability for accidents and damages that may occur to persons or property on account of said work and utilities.

4. That this permit is effective insofar only as the County has jurisdiction and does not presume to release the petitioner from compliance with the provisions of any existing statute relative to the work involved.

5. That the said work shall be constructed to the satisfaction of the County Engineer.

6. That the work shall be performed so as not to permanently impair the existing road, and that any damage to the said road that might be done during the time of construction shall be repaired to the satisfaction of the County Engineer.

7. That the water line shall be a minimum of four (4) feet below the present grade of the road and four (4) feet below the existing ground line if located outside of the roadbed but within the R.O.W.

8. That the water line shall be relocated at no expense to the County if such a move is needed for future maintenance or construction work on the subject road.

9. Crossings under all nine of the roadway crossings must be made utilizing directional bore and the waterline must be encased in steel conduit.

10. A performance bond in the amount of **$150,000** will be kept on file with the Williamson County Highway Department throughout the life of the installation and operation activities of these permitted utilities. Once the utilities are abandoned and removed, the bond will be returned to Williamson Energy.

11. All trenching or open cuts made within county right of way must be repaired/restored to its prior condition or better. This includes but is not limited to restoring damage to any drainage ways, entrances, roads, signs, shoulders, slopes, culverts, silting, as well as seeding and mulching these disturbed areas to restore proper ground cover.

12. Care must be taken to prevent damage to drainage structures/pipes resulting from trenching or direct boring operations. Open cuts must be a narrow as possible (no greater than 2') to limit damages to surrounding features.

13. Any future damages to these roads resulting from the operation of these utilities on the right of ways will be the responsibility of Williamson Energy to repair to restore the roadway to its previous condition.

PERMIT REQUESTED BY: Lu M. Lander
Williamson Energy, LLC

IN WITNESS WHEREOF, I have hereunto set my hand and seal as the County Engineer of Williamson County, Illinois, this 18TH day of January, 2017

Gregory S. Smothers
County Engineer
Williamson County Highway Dept.

FRANKLIN COUNTY HIGHWAY DEPARTMENT AGREEMENT

PETITION

WHEREAS, Williamson Energy, LLC , in the County of Franklin and State of Illinois, their successors and assigns, under the laws of the State of Illinois hereinafter termed "The Petitioner" request permission and authority to locate, construct, operate and maintain a water management pipeline on and across Franklin County Right-of-Way in Franklin County, State of Illinois, described as follows:

- **A 22" HDPE DR13.5 water management pipeline to be installed across Freeman Spur Blacktop and Freeman Spur Road.**

WHEREAS, it is understood that the cost of construction, location, operation and maintaining of said water management pipeline will be borne by the Petitioner.

NOW THEREFORE BE IT RESOLVED, by the Franklin County Engineer, who is authorized to grant said Petitioner, their successors and assigns, permission and authority to locate, construct, operate and maintain a water management pipeline on and across the roads on Franklin County Right-of-Way, in accordance with Section 561 of the "Standard Specifications for Road and Bridge Construction" adopted January 1, 2016. This permission is given accordingly to the stipulations set forth by the County Board to all utilities, subject to the following conditions and restrictions:

FIRST: That said water management pipeline be located as close to the R.O.W. lines as conditions will permit, it being understood that the location and construction of said water management pipeline shall be satisfactory to the Franklin County Engineer.

SECOND: That said Petitioner shall assume all risks and liabilities for accidents and damages that may accrue to persons or property during the prosecution of the work and at

any time during the life of the working permit by reasons of the locations, construction, operation or maintenance of said water management pipeline.

THIRD: That should it be necessary to damage any roads in Franklin County mentioned above, then the said Petitioner shall make such repairs to the road and will restore substantially to the same condition as it was formerly, or pay to the County the actual cost of repairs for damages done to the roads, it being understood that this repair work will be satisfactory to the Franklin County Engineer.

FOURTH: That if it be necessary to relocate or adjust said water management pipeline due to road improvements; said Petitioner shall relocate the water management pipeline promptly at the expense of the Petitioner.

FIFTH: It is specified that a working permit substantially in the form set forth in "Exhibit A" attached and made a part hereof be issued for each individual installation and must bear the approval of the Franklin County Engineer. Working Permit shall be signed by the Superintendent of Williamson Energy, LLC.

SIXTH: All water management pipeline road crossings shall be installed by the simultaneous boring and jacking methods with protective casing and no open trenches will be allowed. The length of the casing should go from ditchline to ditchline.

SEVENTH: When final inspection of work is made by the Petitioner and the Contractor, the Franklin County Engineer shall be notified of the time and place of final inspection, so that they can go along to make sure all items of work pertaining to the County can be inspected and approved by said Franklin County Engineer.

EIGHTH: Petitioner shall be a member of J.U.L.I.E.

NINTH: That one-ay traffic be maintained during the period of construction when possible and adequate protection for the safety of the traveling public be maintained at all times. IDOT Local Road traffic standards shall be used if road closures are necessary.

TENTH: It being understood that this permission is given only insofar as the Franklin County Engineer have jurisdiction over said County Roads.

Permission is hereby granted this 7th day of March, 2018

Franklin County Engineer

ACCEPTED:

Williamson Energy, LLC. - Authorized Person

EXHIBIT "A"

Work Permit

Williamson Energy, LLC, Johnson City, ILLINOIS

February 5, 2018

Mr. Mike Rolla, Franklin County Engineer

Dear Sir:

Subject to the conditions and restrictions of the petition granted by the Franklin County Engineer dated March 7, 2018 permission is hereby requested to perform the following work on Franklin County Highway Right-of-Way.

To locate, construct, operate and maintain a water management pipeline across the above mentioned road.

Work to be started about _____June 1st_____, 2018.

Williamson Energy, LLC. - Authorized Person

Permission given this 7th Day of March, 2018, on condition that the work be completed within 90 days of permit issuance by IDNR; otherwise the permit becomes null and void.

Franklin County Engineer

ILLINOIS DEPARTMENT OF TRANSPORTATION

The following IDOT permits are provided as information only. These permits were good for 180 days from the approval date of February 22, 2017. Therefore, these permits have expired.

Upon approval of Application 456 and prior to any construction for boring beneath State Route 37 and Interstate 57, valid IDOT permits will be renewed and copies will be submitted to the Department.

ILLINOIS DEPARTMENT OF TRANSPORTATION
INTERSTATE 57 UTILITY PERMIT &
STATE ROUTE 37 UTILITY PERMIT

R06997

Illinois Department of Transportation

Utility Permit

Public Improvement ☐ Yes ☒ No
IDOT Permit No. 9U-2609-17
Utility Reference No. _____

I (We) Adena Resources, LLC (Name of Applicant), PO Box 99 (Mailing Address)
Johnston City (City), Il (State & Zip), hereinafter termed the Permittee,
request permission and authority to occupy, and to do certain work herein described on, the right-of-way of the State highway
known as FAI 57(Interstate 57) . Section (X1-4) 1 T8S R2E .
from 36+31 to _____ in Williamson County.
The work is described in detail below and/or on the attached sketch or plans.

Jack and Bore 22" diameter casing with 18" diameter HDPE SDR-17 carrying pipe (non-potable water) under FAI Route 57 at or near station in Williamson County. Location is approximately 2.4 miles north of the Johnston City interchange (Exit 59).
Proposed installation shall be shown on the attached Plan and Profile detail.
Access from through travel lanes for installing or servicint of utility facilities will not be allowed.
Applicant will utilize a Licensed Professional Engineer to ensure the proper placement and construction of the proposed water main.

This permit covers the operation and presence of specified equipment, material or facility on the right-of-way that may be related to the authorized work. A copy of this permit must be present when crews or equipment occupy highway right-of way. Failure to comply may result in the cessation of all construction.

This permit is subject to conditions and restrictions of Part 530 of Title 92 of the Illinois Administrative Code, Accommodation of Utilities on Right-of-Way of the Illinois State Highway System. The removal, relocation or modification of facilities permitted to occupy the right-of-way is governed by Section 9-113 of the Illinois Highway Code, as amended by Public Act 92-0470. The Permittee agrees to comply with the requirements of these laws and with all terms and conditions established by this permit. This permit is subject to revocation by the Department on violation of the terms and conditions governing its use.

_____ 2/15/17
Signature of Agent for Permittee — Date

INFORMATION ONLY

Adena Resources, LLC
Name of Permittee (Print or Type)

PO Box 99
Mailing Address

Johnston City (City) Il (State) 62951 (Zip)

The work authorized by this permit shall be completed by _____ or within 180 days after the date of approval by the Department, otherwise the permit will be considered null and void.

Public Improvement Projects only: The anticipated letting date is _____

This permit allowing occupancy and work on state right-of-way is approved. The Utility Coordination Council established by the Department in the area covered by this permit is _____

Jeffrey L Keirn — Department of Transportation — 2/22/17 — Date

Printed 2/14/2017

OPER 1113 (Rev. 08/07)

This permit is subject to the conditions and restrictions established in accordance with the Illinois Highway Code and Part 530 of Title 92 of the Illinois Administrative Code including but not limited to the following:

(1) The applicant represents all parties in interest and shall furnish material, do all work, pay all costs and shall in a reasonable length of time restore the damaged portions of the highway to a condition similar or equal to that existing before the commencement of the described work, including any landscape restoration necessary. (See Section 530.250 of Title 92).

(2) The proposed work shall be located and constructed to the satisfaction of the Regional Engineer or his duly authorized representative. No revisions or additions shall be made to the proposed work on the right-of-way without the written permission of the Regional Engineer or his duly authorized representative (See Section 530.200 of Title 92). In certain circumstances the Department may require that the construction plans and/or the as-built documents be sealed by an Illinois Registered Professional Engineer. Typical of such projects would be petroleum or gas pipelines.

(3) The applicant shall at all times conduct the work in such a manner as to minimize hazards to vehicular and pedestrian traffic. All signs, barricades, flaggers, etc., required for traffic control shall be furnished by the applicant. (See Section 530.240 of Title 92).

(4) The applicant must ascertain the presence of Highway Authority Agreements established in accordance with 35 Ill. Admin. Code Section 742.1020 in the path of its proposed installation and take precautions to protect its workers, human health and the environment in those areas. (See Section 530.240 of Title 92). Where contamination is encountered through excavation in the ROW, it should be managed offsite and IDOT's generator number for the appropriate county may be used.

(5) The applicant shall not trim, cut or in any way disturb any trees or shrubbery along the highway without the approval of the Regional Engineer or his duly authorized representative. (See Section 530.600 of Title 92).

(6) The facilities authorized to occupy the right-of-way by this permit are subject to removal, relocation or modification by the permittee at no expense to the State on notice given by the Department in accordance with Section 9-113 of the Illinois Highway Code, as amended. Participation by the permittee in the UTILITY Coordination Council identified on page one of this permit is required as a condition of this permit. Permittee shall cooperate with the Department with the scheduling of any removal, relocation or modification deemed necessary for highway or highway safety purposes, and, if Utility Coordination Council participation is required by this permit, with the activities of the council identified on the first page of this permit. (See Section 9-113 of the Illinois Highway Code.) Use of and compliance with current IDOT Traffic Control Standards will be required.

(7) If the applicant and the District cannot agree either on whether the permit should be issued or on what conditions would be appropriate, the applicant may, within 30 days of the issuance of written notice of the District's position, appeal the District's determination to the Chief of the Department's Central Bureau of Operations. (See Section 530.900 of Title 92).

(8) The permittee agrees to fully comply with the following legal obligations in advance of entering and while upon any Right-of-way within the Illinois State Highway System.

a) Only a permit issued by the Department under this Part will satisfy the "written consent" requirement of Section 9-113 of the Illinois Highway Code (the Code).
b) A permit from the Department grants a license only to undertake certain activities in accordance with this Part on a State right-of-way, and does not create a property right or grant authority to the permittee to impinge on the rights of others who may have an interest in the right-of-way. Such others might include an owner of an underlying fee simple interest if the right-of-way is owned as an easement or dedication of right of way, an owner of an easement, or another permittee.
c) It shall be the responsibility of the permittee to ascertain the presence and location of existing above-ground or underground facilities on the highway right-of-way to be occupied by their proposed facilities. The Department will make its permit records available to a permittee for the purpose of identifying possible facilities. When notified of an excavation or when requested by the Department, a permittee shall locate, physically mark, and indicate the depth of its underground facilities within 48 hours excluding weekends and holidays.
d) The permittee shall avoid conflicts with any existing underground or above-ground facilities on or near the highway right-of-way. Both the Department and J.U.L.I.E. are to be contacted for assistance during the application process.
e) The permittee shall comply with all other applicable laws relating to the placement of utility lines.
f) The issuance of a utility permit by the Department does not excuse the permittee from complying with any existing statutes, local regulations or requirements of other Department (e.g., oversize and overweight vehicles) or the requirements of other State agencies including, but not limited to, the following:

Illinois Commerce Commission, Illinois Department of Agriculture
Illinois Department of Natural Resources, Illinois Department of Mines and Minerals
Illinois Environmental Protection Agency, Illinois Historic Preservation Agency

g) Rights of abutting and underlying property owners are protected by common law and Sections 9-113 and 9-127 of the Code. The permittee will address these rights prior to initiating activities on State right-of-way. The Department will not be a party in any negotiations between the utility and abutting property owners.
h) In no case shall the permit give or be construed to give an entity any easement, leasehold or other property interest of any kind in, upon, under, above or along the State highway right-of-way.
i) Each person responsible for a utility, in place on the effective date of this Part, on a State highway right-of-way shall notify the Department in writing, if that facility does not comply with this Part. The Department shall treat such a notice as a request for a variance under Section 530.130. Until informed that a variance will not be granted, a person responsible for a pre-existing utility will not be in violation of this Part. The failure to provide such notice constitutes a violation of this Part and of the utility accommodation permit (if any) and would justify the imposition of the sanctions set forth in Section 530.810.

Work to be coordinated with Department Representatives:

_____ Phone ( ) _____

_____ Phone ( ) _____

Utility Contact Person: _____ Phone ( ) _____

Work to be done by:

Contractor: _____

Daytime Phone: ( ) _____ Emergency Phone: ( ) _____

Traffic control operation:

Number of lane closures: _____ Time of closures: _____

INFORMATION ONLY

R06999

N

PROPOSED 10'X20' CATCH PIT

PROPOSED 10'X20' BORE PIT

ROW

0+00 0+50 1+00 1+50 2+00 2+50 3+00 3+50 3+80

90

SOUTHBOUND INTERSTATE 57

NORTHBOUND INTERSTATE 57

PROPOSED 380' -22" STEEL CASING (WITH 18" HDPE SDR-17 CARRIER PIPE (JACK AND BORED) W/SPACERS AND END SEALS

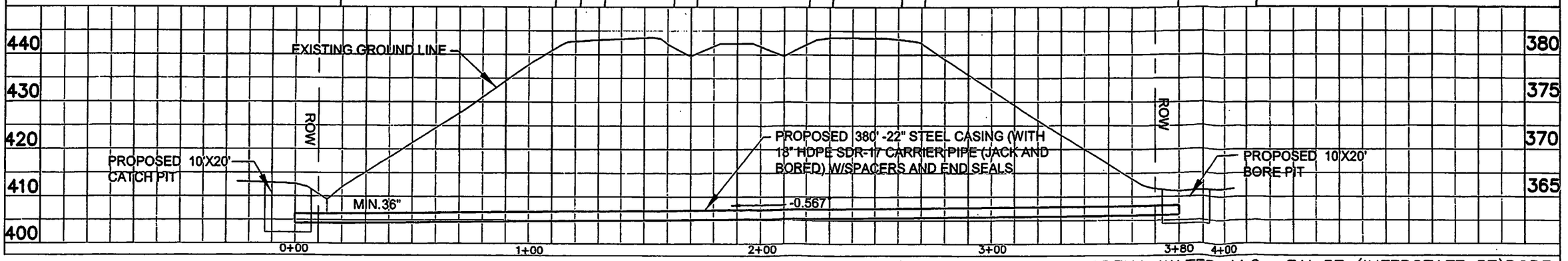
JOSEPH K. LOVERY
056270
REGISTERED PROFESSIONAL ENGINEER
OF
ILLINOIS

2-14-17

INFORMATION ONLY

LEGEND

- EDGE ASPHALT SURFACE
- GUARDRAIL
- EDGE OF TRAVEL LANE
- TREES OR BRUSH



ADENA WATER, LLC– FAI 57 (INTERSTATE 57)BORE

SHEET 1

Illinois Department of Transportation

Utility Permit

Public Improvement ☐ Yes ☒ No
IDOT Permit No. 9U-2610-17
Utility Reference No. _____

I (We) Adena Resources, LLC (Name of Applicant), PO Box 99 (Mailing Address)

Johnston City (City), Il (State & Zip), hereinafter termed the Permittee.

request permission and authority to occupy, and to do certain work herein described on, the right-of-way of the State highway

known as State Rte 37 (SRT 37), Section (12) 12 T8S R2E.

from 519+55 to _____ in Williamson County.

The work is described in detail below and/or on the attached sketch or plans.

Jack and Bore 22" diameter casing with 18" diameter HDPE SDR-17 carrying pipe (non-potable water) under State Route 37 at or near station in Williamson County. Location is approximately 2.4 miles north of the Johnston City interchange (Exit 59).. Proposed installation shall be shown on the attached Plan and Profile detail.
Access from through travel lanes for installing or servicint of utility facilities will not be allowed.
Applicant will utilize a Licensed Professional Engineer to ensure the proper placement and construction of the proposed water main.

This permit covers the operation and presence of specified equipment, material or facility on the right-of-way that may be related to the authorized work. A copy of this permit must be present when crews or equipment occupy highway right-of way. Failure to comply may result in the cessation of all construction.

This permit is subject to conditions and restrictions of Part 530 of Title 92 of the Illinois Administrative Code, Accommodation of Utilities on Right-of-Way of the Illinois State Highway System. The removal, relocation or modification of facilities permitted to occupy the right-of-way is governed by Section 9-113 of the Illinois Highway Code, as amended by Public Act 92-0470. The Permittee agrees to comply with the requirements of these laws and with all terms and conditions established by this permit. This permit is subject to revocation by the Department on violation of the terms and conditions governing its use.

2/15/17
Signature of Agent for Permittee — Date

INFORMATION ONLY

Adena Resources, LLC
Name of Permittee (Print or Type)

PO Box 99
Mailing Address

Johnston City (City) Il (State) 62951 (Zip)

The work authorized by this permit shall be completed by _____ or within 180 days after the date of approval by the Department, otherwise the permit will be considered null and void.

Public Improvement Projects only: The anticipated letting date is _____

This permit allowing occupancy and work on state right-of-way is approved. The Utility Coordination Council established by the Department in the area covered by this permit is _____

Jeffrey L Keirn — Department of Transportation
2/22/17 — Date

This permit is subject to the conditions and restrictions established in accordance with the Illinois Highway Code and Part 530 of Title 92 of the Illinois Administrative Code including but not limited to the following:

(1) The applicant represents all parties in interest and shall furnish material, do all work, pay all costs and shall in a reasonable length of time restore the damaged portions of the highway to a condition similar or equal to that existing before the commencement of the described work, including any landscape restoration necessary. (See Section 530.250 of Title 92).

(2) The proposed work shall be located and constructed to the satisfaction of the Regional Engineer or his duly authorized representative. No revisions or additions shall be made to the proposed work on the right-of-way without the written permission of the Regional Engineer or his duly authorized representative (See Section 530.200 of Title 92). **In certain circumstances the Department may require that the construction plans and/or the as-built documents be sealed by an Illinois Registered Professional Engineer.** Typical of such projects would be petroleum or gas pipelines.

(3) The applicant shall at all times conduct the work in such a manner as to minimize hazards to vehicular and pedestrian traffic. All signs, barricades, flaggers, etc., required for traffic control shall be furnished by the applicant. (See Section 530.240 of Title 92).

(4) The applicant must ascertain the presence of Highway Authority Agreements established in accordance with 35 Ill. Admin. Code Section 742.1020 in the path of its proposed installation and take precautions to protect its workers, human health and the environment in those areas. (See Section 530.240 of Title 92). Where contamination is encountered through excavation in the ROW, it should be managed offsite and IDOT's generator number for the appropriate county may be used.

(5) The applicant shall not trim, cut or in any way disturb any trees or shrubbery along the highway without the approval of the Regional Engineer or his duly authorized representative. (See Section 530.600 of Title 92).

(6) The facilities authorized to occupy the right-of-way by this permit are subject to removal, relocation or modification by the permittee at no expense to the State on notice given by the Department in accordance with Section 9-113 of the Illinois Highway Code, as amended. Participation by the permittee in the UTILITY Coordination Council identified on page one of this permit is required as a condition of this permit. Permittee shall cooperate with the Department with the scheduling of any removal, relocation or modification deemed necessary for highway or highway safety purposes, and, if Utility Coordination Council participation is required by this permit, with the activities of the council identified on the first page of this permit. (See Section 9-113 of the Illinois Highway Code.) Use of and compliance with current IDOT Traffic Control Standards will be required.

(7) If the applicant and the District cannot agree either on whether the permit should be issued or on what conditions would be appropriate, the applicant may, within 30 days of the issuance of written notice of the District's position, appeal the District's determination to the Chief of the Department's Central Bureau of Operations. (See Section 530.900 of Title 92).

(8) The permittee agrees to fully comply with the following legal obligations in advance of entering and while upon any Right-of-way within the Illinois State Highway System.

a) Only a permit issued by the Department under this Part will satisfy the "written consent" requirement of Section 9-113 of the Illinois Highway Code (the Code).
b) A permit from the Department grants a license only to undertake certain activities in accordance with this Part on a State right-of-way, and does not create a property right or grant authority to the permittee to impinge on the rights of others who may have an interest in the right-of-way. Such others might include an owner of an underlying fee simple interest if the right-of-way is owned as an easement or dedication of right of way, an owner of an easement, or another permittee.
c) It shall be the responsibility of the permittee to ascertain the presence and location of existing above-ground or underground facilities on the highway right-of-way to be occupied by their proposed facilities. The Department will make its permit records available to a permittee for the purpose of identifying possible facilities. When notified of an excavation or when requested by the Department, a permittee shall locate, physically mark, and indicate the depth of its underground facilities within 48 hours excluding weekends and holidays.
d) The permittee shall avoid conflicts with any existing underground or above-ground facilities on or near the highway right-of-way. Both the Department and J.U.L.I.E. are to be contacted for assistance during the application process.
e) The permittee shall comply with all other applicable laws relating to the placement of utility lines.
f) The issuance of a utility permit by the Department does not excuse the permittee from complying with any existing statutes, local regulations or requirements of other Department (e.g., oversize and overweight vehicles) or the requirements of other State agencies including, but not limited to, the following:

Illinois Commerce Commission, Illinois Department of Agriculture
Illinois Department of Natural Resources, Illinois Department of Mines and Minerals
Illinois Environmental Protection Agency, Illinois Historic Preservation Agency

g) Rights of abutting and underlying property owners are protected by common law and Sections 9-113 and 9-127 of the Code. The permittee will address these rights prior to initiating activities on State right-of-way. The Department will not be a party in any negotiations between the utility and abutting property owners.
h) In no case shall the permit give or be construed to give an entity any easement, leasehold or other property interest of any kind in, upon, under, above or along the State highway right-of-way.
i) Each person responsible for a utility, in place on the effective date of this Part, on a State highway right-of-way shall notify the Department in writing, if that facility does not comply with this Part. The Department shall treat such a notice as a request for a variance under Section 530.130. Until informed that a variance will not be granted, a person responsible for a pre-existing utility will not be in violation of this Part. The failure to provide such notice constitutes a violation of this Part and of the utility accommodation permit (if any) and would justify the imposition of the sanctions set forth in Section 530.810.

Work to be coordinated with Department Representatives:

_____ Phone ( ) _____

_____ Phone ( ) _____

Utility Contact Person: _____ Phone ( ) _____

Work to be done by:

Contractor: _____

Daytime Phone: ( ) _____ Emergency Phone: ( ) _____

Traffic control operation:

Number of lane closures: _____ Time of closures: _____

INFORMATION ONLY

R07002

EXISTING EASEMENT

AGG PARKING

EXISTING EASEMENT

CATCH PIT (10'X20')

0+00

0+20

0+40

0+60

0+80

1+00

1+20

1+40

1+68.27 AGG

61°

AGG ENTRANCE

IL ST HWY 37

W

ROW

FO

N

BUILDING

ASPHALT PARKING

LEGEND

-POWER POLE
-WATER METER
-UTILITY PEDASTAL
-GATE VALVE
-FIRE HYDRANT
W -WATER MAIN
FO -UNDERGROUND FIBER
ROW -RIGHT OF WAY

JOSEPH K. LONDRA
056270
REGISTERED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

2-14-17

PROPOSED 130' BORE(22" STEEL CASING, 18" HDPE SDR-17 CARRIER PIPE

BORE PIT (10'X20')

CATCH PIT (10'X20')

EXIST GROUND LINE

BORE PIT (10'X20')

MIN.36"

PROPOSED 130' BORE(22" STEEL CASING, 18" HDPE SDR-17 CARRIER PIPE

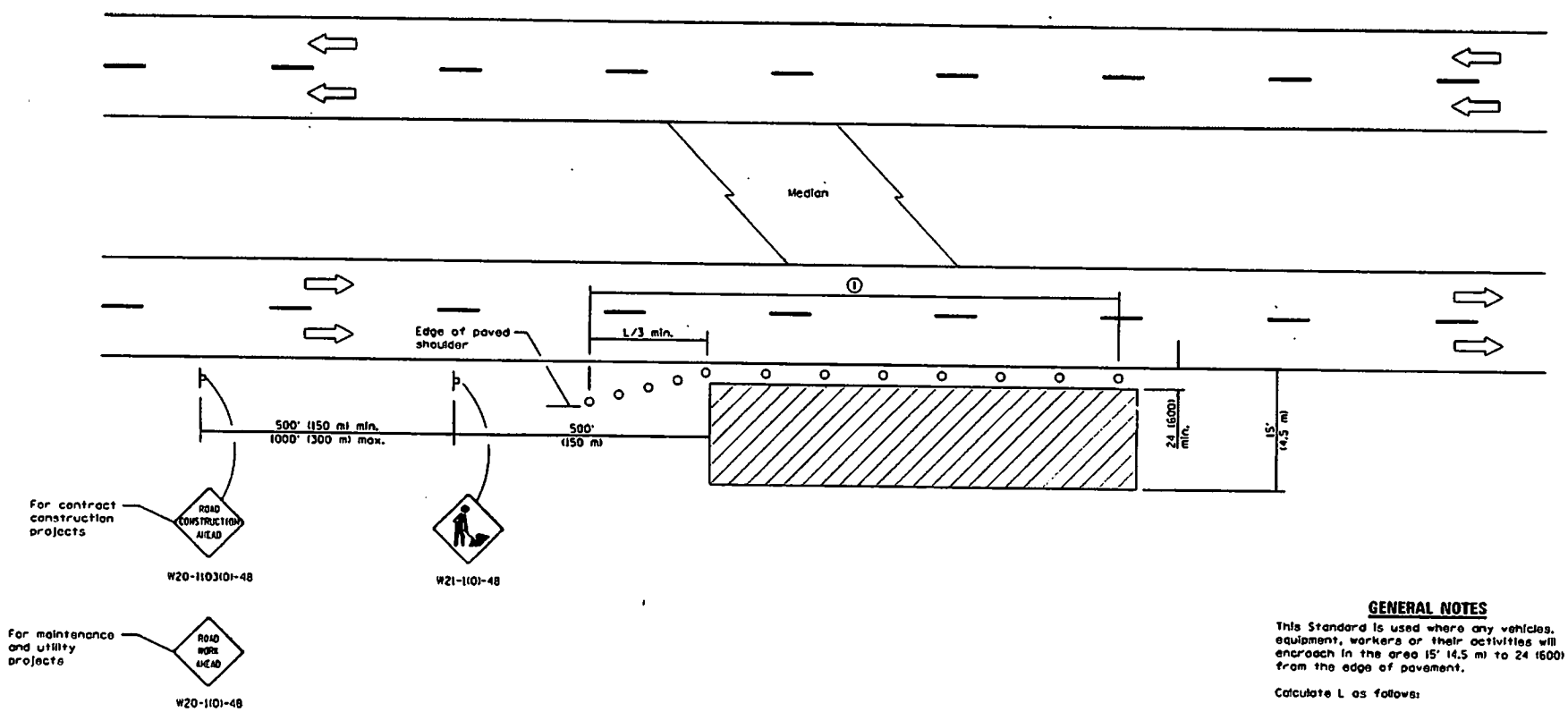
440
435
430
425

0+00
0+50
1+00
1+50
1+63
2+00

INFORMATION ONLY

ADENA WATER, LLC- IL ST RTE 37 Bore

R07003



TYPICAL APPLICATIONS

Utility operations
Culvert extensions
Side slope changes
Guardrail installation and maintenance
Delineator installation
Landscaping operations
Shoulder repair
Sign installation and maintenance

① When the work operation exceeds one hour, cones, drums or barricades shall be placed at 25' (8 m) centers for L/3 distance, and at 50' (15 m) centers through the remainder of the work area.

SYMBOLS

Work area
Sign
Cone, drum or barricade

GENERAL NOTES

This Standard is used where any vehicles, equipment, workers or their activities will encroach in the area 15' (4.5 m) to 24 (600) from the edge of pavement.

Calculate L as follows:

SPEED LIMIT	FORMULAS English	FORMULAS (Metric)
40 mph (70 km/h) or less:	$L = \frac{WS^2}{60}$	$L = \frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(W)(S)

W = Width of offset in feet (meters).

S = Normal posted speed mph (km/h).

All dimensions are in inches (millimeters) unless otherwise shown.

Illinois Department of Transportation

APPROVED April 1, 2016
ENGINEER OF SAFETY ENGINEERING

APPROVED April 1, 2016
ENGINEER OF DESIGN AND ENVIRONMENT

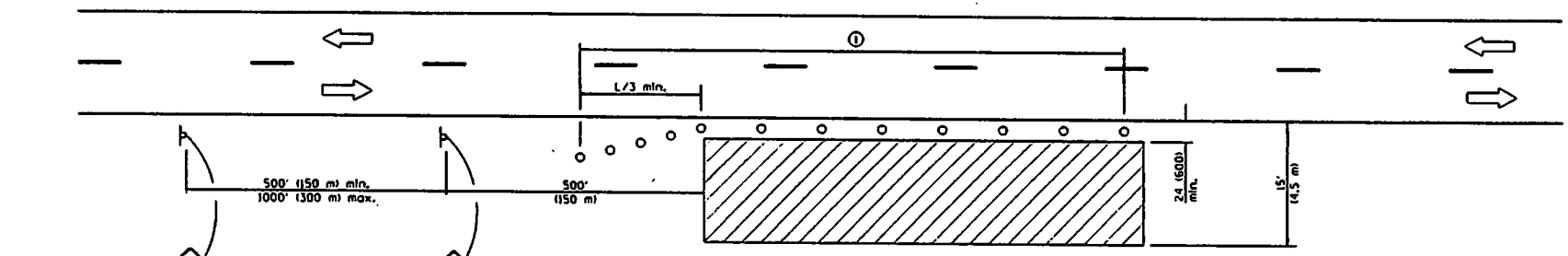
15-1-1 CJDSS

DATE	REVISIONS
4-1-16	Corrected type in title.
1-1-14	Revised workers sign number to agree with current MUTCD.

OFF-RD OPERATIONS, MULTILANE, 15' (4.5 m) TO 24" (600 mm) FROM PAVEMENT EDGE

STANDARD 701101-05

INFORMATION ONLY



For contract construction projects



W20-1103(01)-48



W21-1(01)-48

For maintenance and utility projects



W20-1(01)-48

TYPICAL APPLICATIONS

Utility operations
Culvert extensions
Side slope changes
Guardrail installation and maintenance
Delineator installation
Landscaping operations
Shoulder repair
Sign installation and maintenance

SYMBOLS

Work area

Sign

Cone, drum or barricade

① When the work operation exceeds one hour, cones, drums or barricades shall be placed at 25' (8 m) centers for L/3 distance, and at 50' (15 m) centers through the remainder of the work area.

GENERAL NOTES

This Standard is used where any vehicles, equipment, workers or their activities will encroach in the area 15' (4.5 m) to 24 (600) from the edge of pavement.

Calculate L as follows:

SPEED LIMIT	FORMULAS	
	English	(Metric)
40 mph (70 km/h) or less:	$L=\frac{WS^2}{60}$	$L=\frac{WS^2}{150}$
45 mph (80 km/h) or greater:	L=(W)(S)	L=0.65(W)(S)

W = Width of offset in feet (meters).

S = Normal posted speed mph (km/h).

All dimensions are in inches (millimeters) unless otherwise shown.

Illinois Department of Transportation
APPROVED _____ January 1, 2014
ENGINEER OF STATE TRAFFIC ENGINEERING
APPROVED _____ January 1, 2014
ENGINEER OF BUREAU OF TRAFFIC
ISSUED: 1-1-14

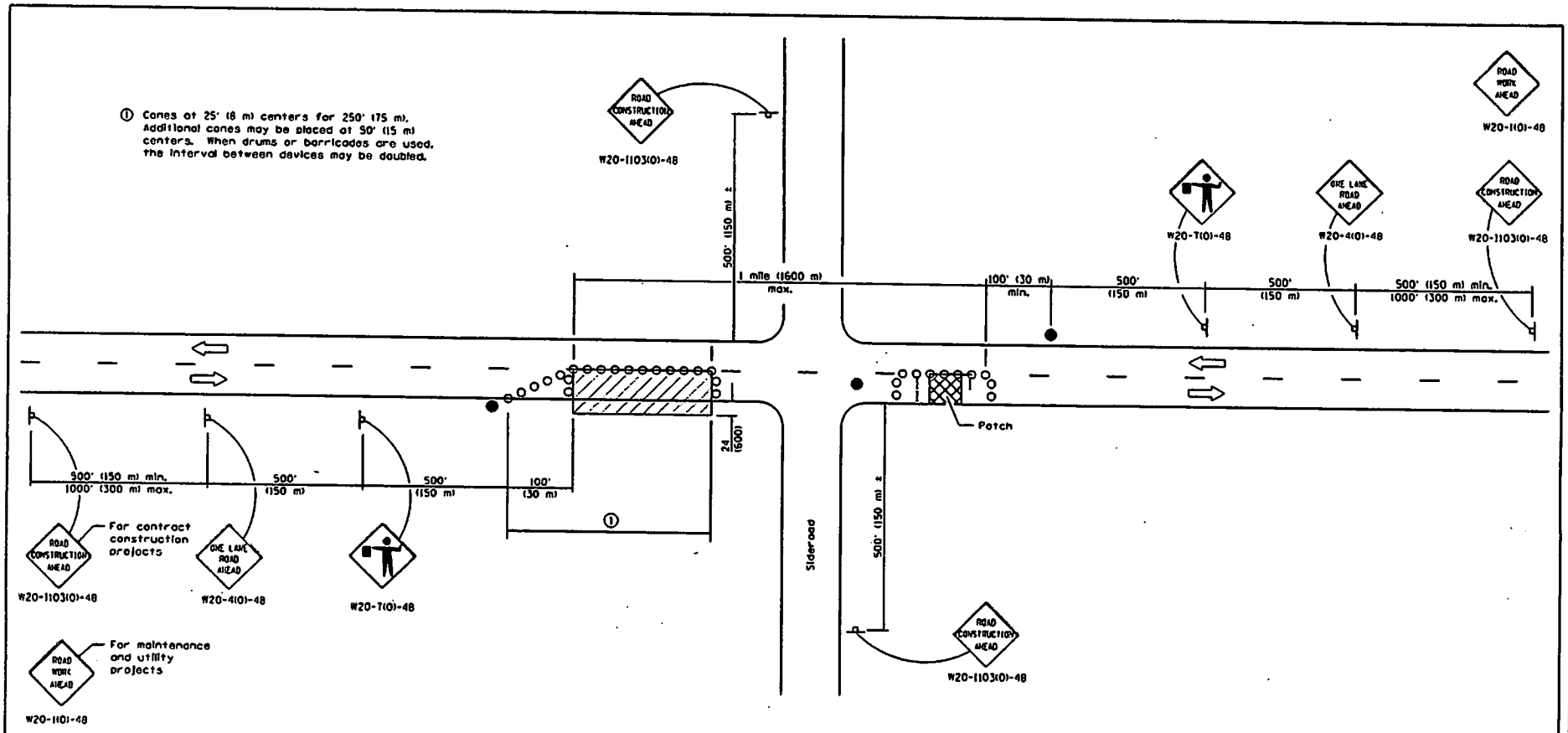
DATE	REVISIONS
1-1-14	Revised workers sign
	number to agree with
	current MUTCD.
1-1-13	Omitted text "WORKERS"
	sign.

OFF-RD OPERATIONS, 2L, 2W, 15' (4.5 m) TO 24" (600 mm) FROM PAVEMENT EDGE

STANDARD 701006-05

INFORMATION ONLY

R07005



SYMBOLS

- Work area
- Sign
- Barricade or drum
- Cone, drum or barricade
- Flagger with traffic control sign

TYPICAL APPLICATIONS

Isolated patching
Utility operations
Storm sewer
Culverts
Cable placement

GENERAL NOTES

This Standard is used where at any time, any vehicles, equipment, workers or their activities will encroach in the area between the center line and a line 24 (600) outside the edge of pavement for daylight operation.

When the distance between successive work areas exceeds 2000' (600 m), additional warning signs, flaggers, and taper shall be placed as shown.

All dimensions are in inches (millimeters) unless otherwise shown.

Illinois Department of Transportation

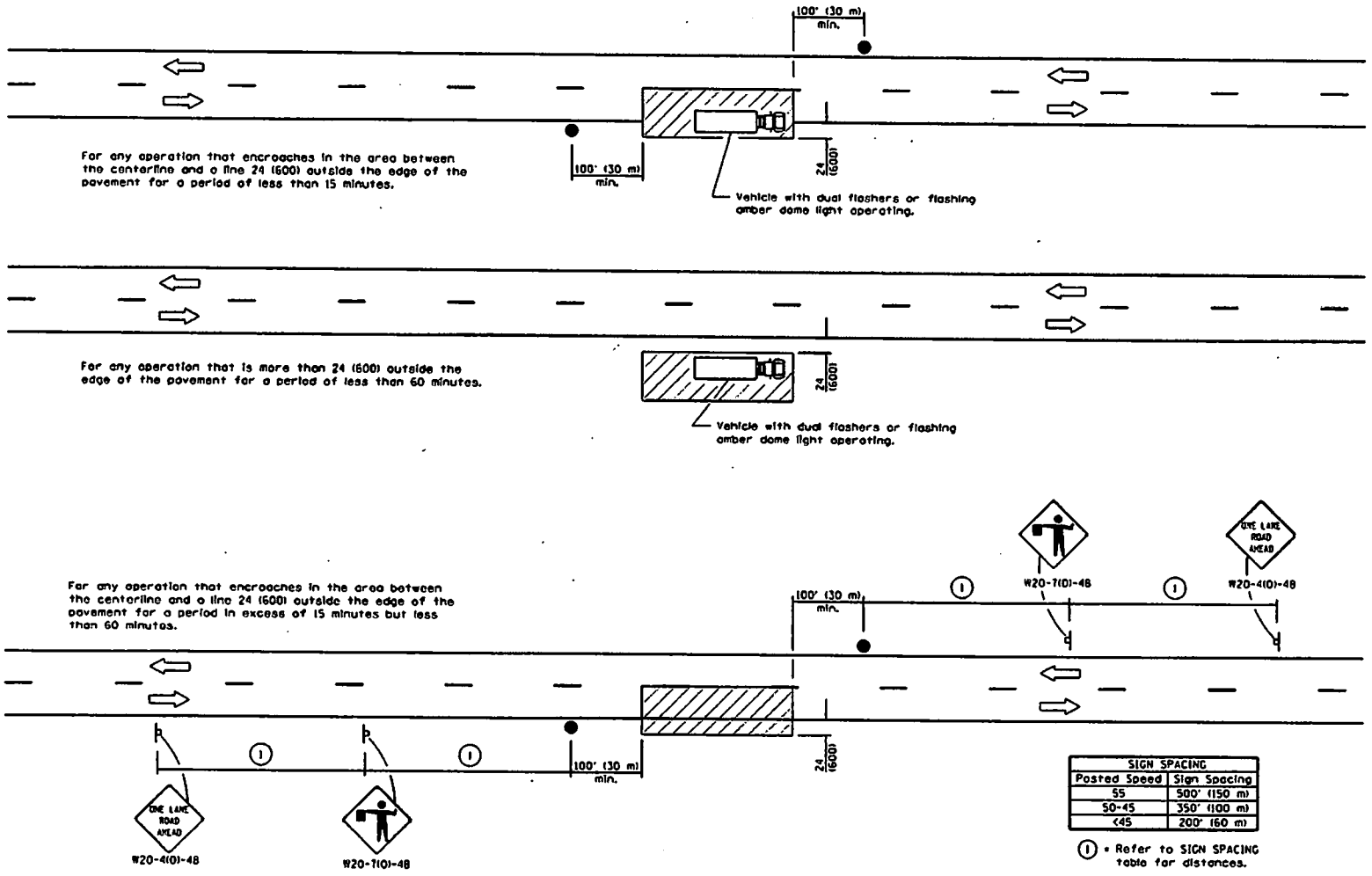
APPROVED January 1, 2011
ENGINEER OF SAFETY ENGINEERING
APPROVED January 1, 2011
ENGINEER OF DESIGN AND ENVIRONMENT

DATE	REVISIONS
1-1-11	Revised flagger sign.
1-1-09	Switched units to
	English (metric).
	Corrected sign No.'s.

LANE CLOSURE, 2L, 2W, DAY ONLY, FOR SPEEDS ≥ 45 MPH

STANDARD 701201-04

INFORMATION ONLY



SIGN SPACING	
Posted Speed	Sign Spacing
55	500' (150 m)
50-45	350' (100 m)
<45	200' (60 m)

(1) = Refer to SIGN SPACING table for distances.

TYPICAL APPLICATIONS

Marking patches
Field survey
String line
Utility operations
Cleaning up debris on pavement

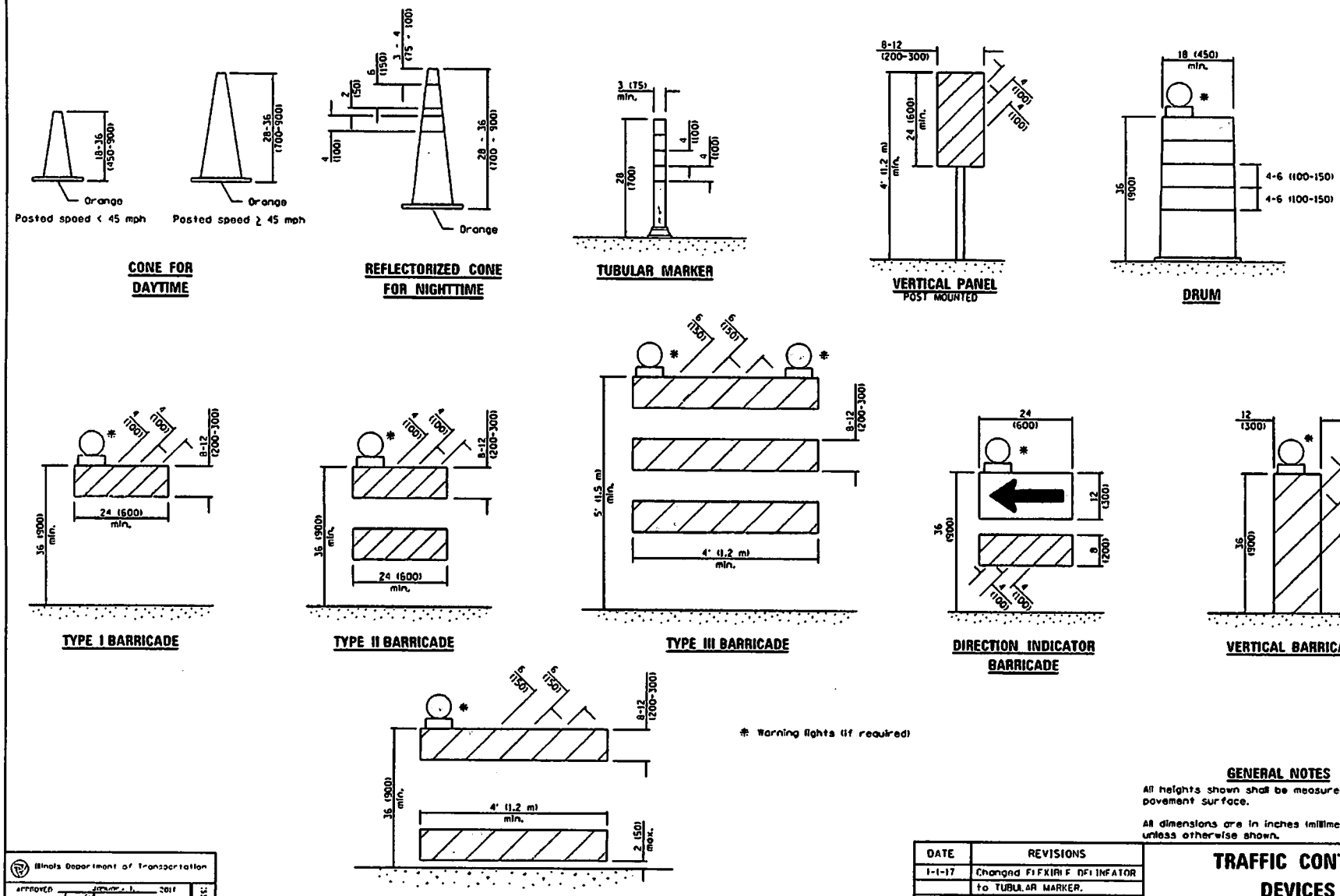
SYMBOLS

Work area
Sign on portable or permanent support
Flagger with traffic control sign

All dimensions are in inches (millimeters) unless otherwise shown.

Illinois Department of Transportation
Bureau of Safety Engineering
Bureau of Highway Maintenance
APPROVED January 1, 2011
APPROVED January 1, 2011
Effective January 1, 2011
Effective January 1, 2011
Effective

R07007



* Warning lights (if required)

GENERAL NOTES

All heights shown shall be measured above the pavement surface.

All dimensions are in inches (millimeters) unless otherwise shown.

DATE	REVISIONS
1-1-17	Changed FLEXIBLE DELINEATOR to TUBULAR MARKER.
4-1-16	Add dim's to barricades. Rev. note for post mnt. signs. Rev. cone dis. Add W12-1103.

TRAFFIC CONTROL DEVICES

(Sheet 1 of 3)

STANDARD 701901-06

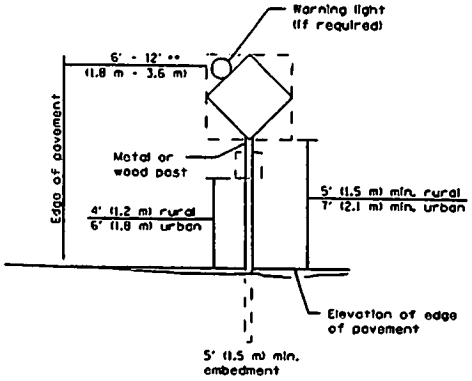
Illinois Department of Transportation

APPROVED January 1, 2017
ENGINEER OF OPERATIONS

APPROVED January 1, 2017
ENGINEER OF DESIGN AND ENVIRONMENT

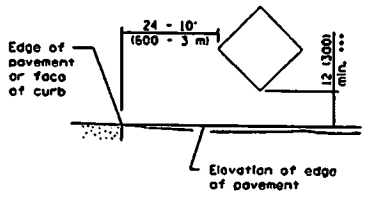
16-1-1 CEDSC

INFORMATION ONLY



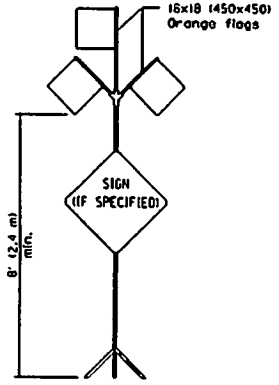
POST MOUNTED SIGNS

** When curb or paved shoulder are present this dimension shall be 24 (600) to the face of curb or 6' (1.8 m) to the outside edge of the paved shoulder.

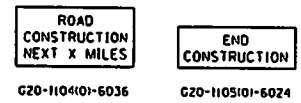


SIGNS ON TEMPORARY SUPPORTS

*** When work operations exceed four days, this dimension shall be 5' (1.5 m) min. If located behind other devices, the height shall be sufficient to be seen completely above the devices.



HIGH LEVEL WARNING DEVICE



G20-1104(0)-6036 G20-1105(0)-6024

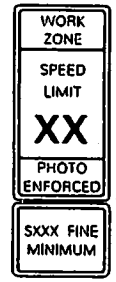
This signing is required for all projects 2 miles (3200 m) or more in length.

ROAD CONSTRUCTION NEXT X MILES sign shall be placed 500' (150 m) in advance of project limits.

END CONSTRUCTION sign shall be erected at the end of the job unless another job is within 2 miles (3200 m).

Dual sign displays shall be utilized on multi-lane highways.

WORK LIMIT SIGNING



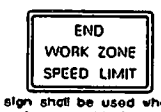
W21-1105(0)-3618

R2-1-3648

R10-1108p-3618 ****

R2-1106p-3618

Sign assembly as shown on Standards or as allowed by District Operations.

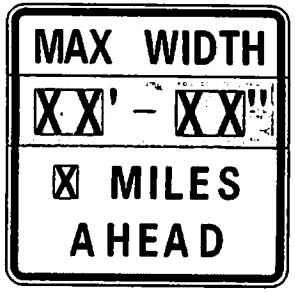


G20-1103(0)-6036

This sign shall be used when the above sign assembly is used.

HIGHWAY CONSTRUCTION SPEED ZONE SIGNS

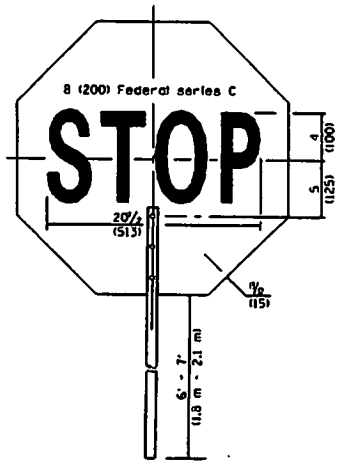
**** R10-1108p shall only be used along roadways under the juristiction of the State.



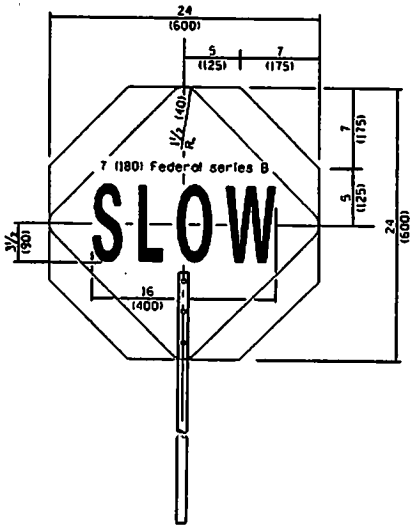
W12-1103-4848

WIDTH RESTRICTION SIGN

XX'-XX" width and X miles are variable.



FRONT SIDE



REVERSE SIDE

FLAGGER TRAFFIC CONTROL SIGN

Illinois Department of Transportation

APPROVED January 1, 2017
ENGINEER OF OPERATIONS

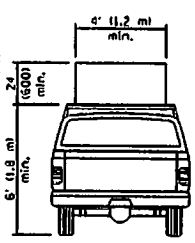
APPROVED January 1, 2017
ENGINEER OF DESIGN AND ENVIRONMENT

TRAFFIC CONTROL DEVICES

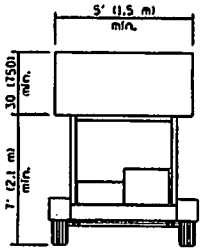
(Sheet 2 of 3)

STANDARD 701901-06

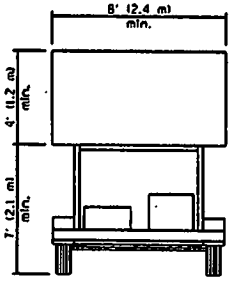
INFORMATION ONLY



TYPE A
ROOF
MOUNTED

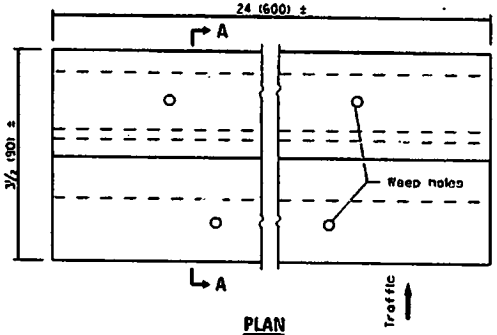


TYPE B
ROOF OR TRAILER
MOUNTED

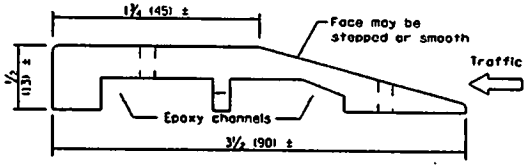


TYPE C
TRAILER
MOUNTED

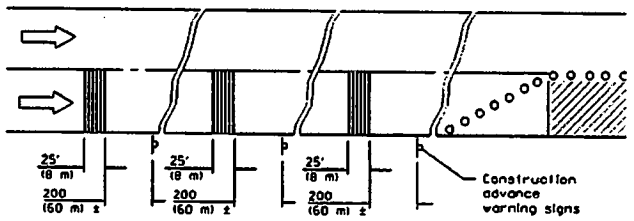
ARROW BOARDS

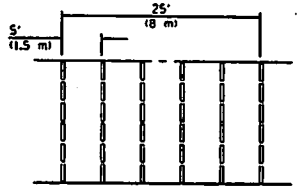


PLAN



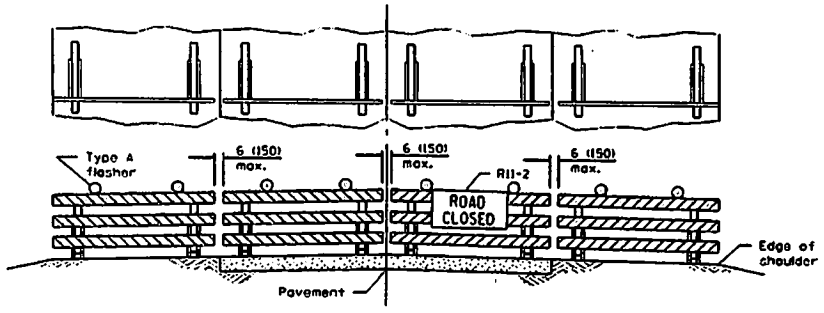
SECTION A-A





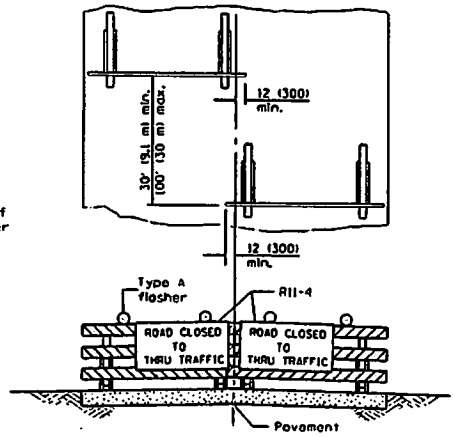
TYPICAL INSTALLATION

TEMPORARY RUMBLE STRIPS



ROAD CLOSED TO ALL TRAFFIC

Reflectorized striping may be omitted on the back side of the barricades. If a Type III barricade with an attached sign panel which meets NCHRP 350 is not available, the sign may be mounted on an NCHRP 350 temporary sign support directly in front of the barricade.



ROAD CLOSED TO THRU TRAFFIC

Reflectorized striping shall appear on both sides of the barricades. If a Type III barricade with an attached sign panel which meets NCHRP 350 is not available, the signs may be mounted on NCHRP 350 temporary sign supports directly in front of the barricade.

TYPICAL APPLICATIONS OF
TYPE III BARRICADES CLOSING A ROAD

Illinois Department of Transportation

APPROVED _____ 2017
ENGINEER OF OPERATIONS

APPROVED _____ 2017
ENGINEER OF DESIGN AND ENVIRONMENT

IDOT

TRAFFIC CONTROL DEVICES

(Sheet 3 of 3)

STANDARD 701901-06

INFORMATION ONLY

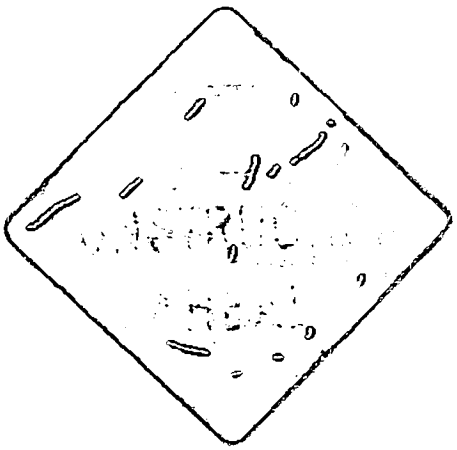
Acceptable - This is an example of an **acceptable** sign. It may be new, or in new condition. There are abrasions on the surface but very little loss of lettering. There has been no touch-up of the lettering.



Marginal - This is an example of a sign with **marginal** acceptability. Of the many surface abrasions throughout the sign face, many are within the individual letters of the message. The sign surface is free of any residue. Although some color fading is evident, the background color and reflectivity are still apparent at night.



Unacceptable - This is an example of an **unacceptable** sign. Signs with asphalt splatter and/or cement slurry or any combination of missing and/or covered reflective material similar in area presented make a sign **unacceptable**. Some letters have a loss of more than 50 percent. There is noticeable color fading.



Please Note: Orange work zone signs shall be fluorescent orange in color. Signs shall have retroreflective sheeting. Signs with bends and dents that alter the size and/or shape of the sign are unacceptable. These photos are examples of the condition of the sheeting.

INFORMATION ONLY

Verify this is the current version by checking IDOT's website www.dot.il.gov/workzone/wztcd2010.pdf

PART I ATTACHMENT I.12.C.2
LIST OF OCCUPIED DWELLING WAIVERS

WILLIAMSON ENERGY, LLC - WATER MANAGEMENT FACILITY
ATTACHMENT I.12.C.2 - 300 FT OCCUPIED DWELLING WAIVERS

PIN (MAP #)	GRANTOR	MAILING ADDRESS	TYPE	DATE SIGNED
11-30-400-004	BEARDEN, BRIAN & LINDA	7059 LAKE CREEK ROAD, WEST FRANKFORT, IL 62896	WAIVER	06/17/2016
11-32-100-009	RICH, MAHLON L. & SANDRA	7550 LAKE CREEK ROAD, WEST FRANKFORT, IL 62896	WAIVER	05/20/2016
11-29-300-007	LASWELL, JOSEPH L.	7635 LAKE CREEK ROAD, WEST FRANKFORT, IL 62896	WAIVER	08/29/2016
11-29-300-003	FITCH, WARREN D.	7357 LAKE CREEK ROAD, WEST FRANKFORT, IL 62896	WAIVER	06/07/2016
11-29-300-014	SMITH, WILLIAM D & CONNIE J	7145 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/04/2016
11-32-100-003	FITCH, JAMES & PEGGY	7322 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/12/2016
11-32-100-003	BURNETT, CHRISTINE	7322 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/12/2016
11-32-100-004	SUMMERS, KEVIN J	7414 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/01/2016
11-32-100-005	CLARK, KENNETH L & JANE L	7434 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/01/2016
11-32-100-007	CLARK, STEVE	7434 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/01/2016
11-32-100-008	COLYER, PEARL	7528 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/01/2016
11-29-400-005	SURGALSKI, LARRY B & KENDRA SUE	7727 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/01/2016
11-30-400-006	FITCH, LINDELL	6931 LAKE CREEK RD, WEST FRANKFORT, IL 62896	WAIVER	08/01/2016
11-33-100-009	HUMERICKHOUSE, CYNTHIA & MICHAEL	953 SANDBURG RD, WEST FRANKFORT, IL 62896	WAIVER	06/13/2016
11-34-200-005	PARKER, CLYDE	10579 HORSESHOE ROAD, WEST FRANKFORT, IL 62896	WAIVER	07/20/2016
02-02-200-006	GRIZZELL, DALLAS D.	18097 COLLINS RD, WEST FRANKFORT, IL 62896	WAIVER	10/04/2016
02-12-200-004	MCVEY, TERRY L.	17259 RT 37 NORTH, JOHNSTON CITY, IL 62951	WAIVER	09/19/2016
02-12-200-005	MCVEY, TERRY L.	17259 RT 37 NORTH, JOHNSTON CITY, IL 62951	WAIVER	09/19/2016
03-07-300-022	MAHAN, EVELYN ETAL	16875 MONROE ROAD, WEST FRANKFORT, IL 62896	WAIVER	10/18/2016
03-07-326-006	BYERS & PAYNE, FLOSSIE & LEAH	16873 DUNCAN ROAD, JOHNSTON CITY, IL 62951	WAIVER	11/28/2016
03-08-328-003	BLADES, SHIRLEY ANN	16442 OLD FRANKFORT ROAD, JOHNSTON CITY, IL 62951	WAIVER	09/12/2016
03-08-326-002	SMITH, MATTHEW	P.O. BOX 128, 404 S. LOGAN, WEST FRANKFORT, IL 62896	WAIVER	09/23/2016
03-08-326-003	LAYNE, ZACKERY D. & VIVIAN L.	77 ORCHARD DRIVE, HERRIN, IL 62948	WAIVER	09/21/2016
03-08-326-004	LAYNE, STEVEN & RHONDA	13872 EBERHARDT RD, JOHNSTON CITY, IL 62951	WAIVER	09/21/2016
02-12-200-002	MURPHY, JUDITH ANN	STATE ROUTE 37, JOHNSTON CITY, IL 62951	WAIVER	09/21/2016
03-07-326-002	BALL, PAULA JEAN	16830 MONROE RD, WEST FRANKFORT, IL 62896	WAIVER	09/29/2016

PART I ATTACHMENT I.11
PUBLIC NOTICE

Williamson Energy, LLC
Attachment I.11.

PUBLIC NOTICE

Pursuant to the Surface Coal Mining Land Conservation and Reclamation Act (PA-81-1015, as amended) and the Rules and Regulations of the Act, Williamson Energy LLC, P. O. Box 300, Johnston City, IL 62951, hereby gives notice that on _____ 2018, a permit application (Permit 456) was determined to be complete by the Illinois Department of Natural Resources, Office of Mines and Minerals, to construct a water management facility.

The permit areas are located in:

Williamson County, Township 8 South, Range 2 East, Sections 1, 2 & 12; Township 8 South, Range 3 East, Sections 7, 8, 9, 11, 14, 15, 16 & 17 and Franklin County, Township 7 South, Range 2 East, Sections 27, 28, 29, 30, 31, 32, 34 & 35.

Approval is also requested to operate within 100 feet of the outside right-of-way of public roads which are located as follows:

Liberty School Road along the southeast side of Township 8 South, Range 3 East, Section 11; Williams Prairie Road along the northwest quarter of Township 8 South, Range 3 East, Section 14; Harris School Road along the northwest quarter of Township 8 South, Range 3 East, Section 15 and northeast quarter of Township 8 South, Range 3 East, Section 16; Old Ben Road along the northeast quarter of Township 8 South, Range 3 East, Section 17; Intersection of Old Frankfort Road and Eberhardt Road along the northwest quarter of Township 8 South, Range 4 East, Section 17; Eberhardt Road along the northwest quarter of Township 8 South, Range 3 East, Section 8; Duncan Road and Monroe Road in the southwest quarter of Township 8 South, Range 3 East, Section 7; State Route 37 along the northeast quarter of Township 8 South, Range 2 East, Section 12; Interstate 57 in the southwest quarter of Township 8 South, Range 2 East, Section 1; Collin Road in the southwest quarter of Township 8 South, Range 2 East, Section 1 and northeast quarter of Township 8 South, Range 2 East, Section 2; Horseshoe Road along the northeast quarter of Township 7 South, Range 2 East, Section 34 and the northwest quarter of Township 7 South, Range 2 East, Section 34; State Route 6 along the northwest quarter of Township 7 South, Range 2 East, Section 34; Deason Road runs north/south at the corners of southeast quarter of Township 7 South, Range 2 East, Section 28, southwest quarter of Township 7 South, Range 2 East, Section 27, northwest quarter of Township 7 South, Range 2 East, Section 34 and the northeast quarter of Township 7 South, Range 2 East, Section 33; Sandburg Road in the southwest quarter of Township 7 South, Range 2 East, Section 28 and the northwest quarter of Township 7 South, Range 2 East, Section 33; Intersection of Freeman Spur Road and Lake Creek Road in the southeast quarter of Township 7 South, Range 2 East, Section 29 and the northeast quarter of Township 7 South, Range 2 East, Section 32; Intersection of Gossage Road and Lake Creek Road in the southeast quarter of Township 7 South, Range 2 East, Section 29 and the northeast quarter of Township 7 South, Range 2 East, Section 32; Lake Creek Road runs along the south border of Township 7 South, Range 2 East, Section 29 & 30 and the north border Township 7 South, Range 2 East, Sections 31 and 32; Intersection of Cheatman Road and Lake Creek Road in the southwest quarter of Township 7 South, Range 2 East, Sections 29, the southeast quarter of Township 7 South, Range 2 East, Sections 30, northeast quarter of Township 7 South, Range 2 East, Sections 31 and the northwest quarter of Township 7 South, Range 2 East, Section 32

Activities to be conducted within 100 feet of the outside right-of-way of public roads can include, but not be limited to, the construction/installation of a pipeline. Construction activities will include the boring beneath roads, trenching adjacent to roads, laying pipeline, backfilling trenches and vegetating disturbances.

Copies of the application for this permit request are available for inspection at the following locations:

Williamson County Clerk's Office, Marion, IL 62959, Franklin County Clerk's Office, 100 Public Square, Benton, IL and Illinois Department of Natural Resources, Office of Mines and Minerals, Land Reclamation Division, One Natural Resources Way, Springfield, Illinois 62702-1271.

Written comments, objections, request for informal conferences, or request for public hearings may be submitted to the Department at the above addresses.

Note: The above public notice is to be published in the Marion Daily Republican newspaper and Benton Evening News.

R07015

PART II

Part II

PREMINING INFORMATION

Premining information is to be displayed on premining land use map unless otherwise indicated.

1) Describe how the permit area perimeter will be marked and discuss the method or system employed to locate permit area perimeter and set markers along it. Designate a reference point outside the permit area. Provide a description of the reference point and a sketch relating the reference point to the permit area perimeter.

RESPONSE: **The permit reference point can be located at the intersection of Permit 375 and Liberty School Road, approximately 5,392 feet due north of the intersection of Liberty School Road and Corinth Road. The permit boundary will be marked using PVC or metal posts, the posts will be within eye sight of each other and the top of each post will be painted blue. The reference point location is noted on the Hydrology - Mining Operation Maps Drawing Nos. B17-222-M13, M14, M15 & M16).**

From a point approximately 3 miles from Permit 375 west permit boundary, the Williamson Water Management Waterline project area will follow the abandoned Illinois Central railroad grade to the intersection of Old Frankfort Road. At the Old Frankfort Road intersection, the waterline project area will follow the gas transmission line right-of-way until it crosses Duncan Road. At Duncan Road the waterline project area will follow the abandoned Illinois Central railroad grade to approximately 0.4 miles southeast of the intersection with the active BNSF railroad. The waterline project area ties back into the abandoned Illinois Central railroad grade at the end of Lake Creek Road and ends at the Big Muddy River diffuser site. Refer to the General Location Map & Drawings Sheets Index (Drawing No. B17-222-E1).

2) Provide slope measurements to represent existing land surface configuration of proposed permit area. A soils map of medium intensity prepared to NRCS specifications or a contoured aerial photo may be submitted to meet this requirement.

RESPONSE: **Refer to the Soils Maps (Drawing Nos. B17-222-M9, M10, M11 & M12) and Attachment II.13.A – Custom Soil Resource Report for the soils information and the slope classifications for the individual map units within the permit area.**

3) A) Has previous mining activity occurred within the permit area and/or adjacent areas?

Yes X No _____

If yes, provide the following information, if available:

1) Type of mining, surface, underground, or both?

RESPONSE: **Underground mining and loadout facility**

2) What coal seam or other mineral(s) were extracted?

RESPONSE: **Herrin No. 6**

3) What was the extent of coal or other mineral(s) removed? Delineate on the pre-mining land use map, or other designated map, the areas disturbed by previous mining activities, including active, inactive or abandoned underground mine work along with any mine opening to the surface.

Identify for each area the type of mining and the approximate date of extraction.

RESPONSE: No surface coal mining has occurred. The deep mining associated with the adjacent Permit 375 is on-going. Refer to the Hydrology - Mining Operation Maps Drawing Nos. B17-222-M13, M14, M15 & M16) adjacent surface facilities associated with the deep mine.

4) Identify on all maps submitted with the application areas where surface coal mining operations were conducted prior to August 3, 1977; after August 3, 1977 and prior to May 3, 1978; after May 3, 1978 and prior to February 1, 1983; and any permanent regulatory program permit issued after February 1, 1983.

RESPONSE: Refer to the Hydrology - Mining Operation Maps Drawing Nos. B17-222-M13, M14, M15 & M16) adjacent surface facilities associated with the deep mine.

5) Identify the land uses preceding mining.

RESPONSE: Refer to the Pre & Post Mining Land Use Maps (Drawing Nos. B17-222-M5, M6, M7 & M8).

4) Give the acreage of each land use within the proposed permit area, employing land use categories of Section 1701.5 listed below, and delineate on premining land use map existing land uses in the proposed permit area and within 1,000 feet adjacent to it. Include on the premining land use map the location of all buildings and identify the current use of these buildings.

Pre-Mining Land Use	Permit Area Acreage	Percent Coverage	Within 1,000 Feet Buffer Acreage	Percent Coverage	Permit/Buffer Total Acreage
Cropland	23.0	32.5%	1516.8	50.3%	1,537.7
Pasture Land	0.0	0.0%	0.0	0.0%	0.0
Residential	0.1	0.1%	108.3	3.6%	108.4
Industrial/Commercial	8.2	11.6%	103.6	3.4%	111.9
Recreation	0.0	0.0%	0.0	0.0%	0.0
Fish & Wildlife – Woody	18.6	26.3%	816.5	27.1%	835.0
Fish & Wildlife - Herbaceous	16.8	23.7%	294.1	9.7%	310.9
Fish & Wildlife - Water	0.4	0.6%	62.4	2.1%	62.8
Fish & Wildlife - Wetland	0.4	0.5%	114.0	3.8%	114.3
Fish & Wildlife – Delineated Wetland	3.3	4.7%	2.6	0.1%	5.9
Developed Water Resources	0.0	0.0%	0.0	0.0%	0.0
Undeveloped Land	0.0	0.0%	0.0	0.0%	0.0
Total	70.7	100.0%	3,018.3	100.0%	3,089.0

5) Have any of the land uses changed within the last five years?

Yes _____ No X

If yes, indicate the acreage and changes of land uses.

6) A) Provide a narrative of land capability and productivity of the proposed permit area prior to mining which shall provide an analysis of:

1) The capability of the land to support a variety of uses, giving consideration to soil and foundation characteristics, topography, vegetative cover and hydrology;

RESPONSE: **In general terms, the proposed permit area currently is capable of supporting a variety of uses, considering the soil and foundation characteristics, topography, vegetative cover, and hydrology. See Attachment II.13.A – Custom Soil Resource Report generated from the NRCS Web Soil Survey.**

2) The productivity of the total area expressed as average yield of food, fiber, forage, or wood products under high level management.

RESPONSE: **Refer to Attachment II.6.A.2 and Attachment II.13.A – Custom Soil Resource Report**

B) Where the narrative of land capability and productivity employs the U.S.D.A Natural Resources Conservation Service (NRCS) Land-Capability Classification (Agriculture Handbook No. 210) in conjunction with the soil information provided under Part II 12) of this part, soil interpretation sheets or published soil survey or complete soil information chart for productivity from Circular 1156 are to be submitted for each soil type occurring in the permit area.

RESPONSE: **See Attachment II.13.A – Custom Soil Resource Report**

7) Provide a description of the existing land uses and land classifications under local law, if any, for the proposed permit and adjacent areas.

RESPONSE: **Currently there are no known local laws pertaining to land use and land.**

8) Provide fish and wildlife resource information for the proposed permit area and any adjacent areas. Prior to initiation of studies to obtain fish and wildlife resource information, the applicant must contact the Department for a determination of what fish and wildlife resources information will be required. Pursuant to 62 Ill. Adm. Code 1784.21(a)(1) and (2), the Department will determine the level of detail and the areas of study. Site-specific resource information will be required by the Department if either the permit area or adjacent area is likely to include threatened or endangered species or their critical habitats or habitats of unusually high value for fish and wildlife.

The applicant should complete the description of plant communities within the permit area and adjacent area, requested in Part II 9), below, prior to contacting the Department for a determination of the fish and wildlife resource information.

RESPONSE: **Refer to Attachment II.8; IDNR EcoCAT Report.**

No overhead electrical line installations are proposed by this permit application. However, if overhead lines are installed, the applicant will utilize raptor safe suspension configurations and maintain at least 60" of clearance between lines, as well as raptor safe insulators and, if necessary, utilize perch guards on poles.

It is important to note that existing electrical lines currently crosses the proposed permit area and no raptor fatalities are known to have occurred.

Refer to the response for Item 9 below for the description of plant communities.

9) Give a description of the plant communities within the proposed permit area and delineate on a vegetation map the vegetative types occurring within the proposed permit area and within any proposed reference area. Where a map or aerial photograph is required provide coverage of sufficient adjacent areas to allow evaluation of vegetation as important habitat for fish and wildlife for those species of fish and wildlife identified under Section 1784.21. The description shall include information adequate to predict the potential for reestablishing vegetation.

RESPONSE: **The plant communities present within and adjacent to the proposed permit area can be categorized into five main types: cropland, woody, herbaceous, wetland and industrial/commercial habitats.**

Cropland

Cropland, nearly 33% of the habitat present within and adjacent to the proposed permit areas (see Pre & Post Mining Land Use Maps B17-222-M5, M6, M7 and M8), consists mainly of soybean (Glycine max) and corn (Zea mays). These two crops are plentiful and provide an adequate food source for wildlife. Often times the croplands experience multiple plantings within one calendar year, providing a food source for the majority of the year. Additionally these crops are planted in rotation which provides a varying food source for wildlife.

Woody

Woody vegetation, a little over one quarter of the habitat present (see Pre & Post Mining Land Use Maps B17-222-M5, M6, M7 and M8), consists predominantly of deciduous hardwood species such as white ash (Fraxinus americana), white oak (Quercus alba), southern red oak (Quercus falcata), pin oak (Quercus palustris), shagbark hickory (Carya ovata), silver maple (Acer saccharinum), river birch (Betula nigra), and sycamore (Platanus occidentalis). These hardwood tree species provide habitat and annual mast as an adequate food source for resident wildlife.

Herbaceous

Herbaceous vegetation, roughly 24% of the present vegetation (see Pre & Post Mining Land Use Maps B17-222-M5, M6, M7 and M8), consists predominantly of grass species such as shallow sedge (Carex lurida), yellow nutsedge (Cyperus esculentus), seedbox (Ludwigia alternifolia), dock, (Rumex spp.), and late boneset (Eupatorium serotinum). These species provide an adequate source of cover and food for many species of wildlife.

Wetland

Wetlands and the subsequent vegetation, approximately 11% of the vegetation (see Pre & Post Mining Land Use Maps B17-222-M5, M6, M7 and M8), consists predominantly of facultative wetland and wetland obligate grass species such as shallow sedge (Carex lurida), yellow nutsedge (Cyperus esculentus), seedbox (Ludwigia alternifolia), and cattail (Typha spp.). In rare cases where surface water is present, aquatic species such as duckweed (Lemna minor) are present. These species provide an adequate source of food and habitat for wildlife species both aquatic and terrestrial.

Industrial/Commercial

Industrial and commercial habitats, a little over 5% of the vegetation type present (see Pre & Post Mining Land Use Maps B17-222-M5, M6, M7 and M8), consists predominantly of weedy invasive species such as Fuller's teasel (Dipsacus fullonum), common reed (Phragmites australis), garlic mustard (Allaria petiolata), and Japanese knotweed (Polygonum cuspidatum). The industrial/commercial areas are predominantly a result of an existing natural gas pipeline along the proposed permit area. Also, there is a decommissioned railroad bed that briefly follows the proposed permit area and in some cases goes into the adjacent areas. The railroad bed coupled with the natural gas pipeline results in a highly disturbed area that offers a perfect habitat for invasive plant species. In several cases the proposed permit area and the adjacent area crosses county roads and interstate 57 (See Pre & Post Mining Land Use Map B17-222-M7). These roadside areas are highly disturbed and offer ideal conditions for invasive species. Invasive species offer little to no nutritional value for wildlife and choke out beneficial native plant species.

The aforementioned areas including the natural gas pipeline often times cross county roads, State Route 6 and 37 and Interstate 57. These areas and the proposed areas are currently permitted by Permit 375.

10) A) Pursuant to 62 Ill. Adm. Code 1783.12(a), provide a description of the cultural, archeological and historic resources listed or eligible for listing on the National Register of Historic Places and any known archeological features within the proposed permit, adjacent areas, and shadow area (for planned subsidence). The description of the cultural, historic and archeological resources occurring within the permit area and adjacent areas shall be based upon available data, including data of State and local archeological, historical and cultural preservation agencies.

RESPONSE: Refer to Attachment II.10.A – Cultural, Archeological and Historical Resources Report.

B) 1) Pursuant to 62 Ill. Adm. Code 1783.12(b):

a) State whether there is a substantial likelihood of currently unknown resources which would be eligible for the National Register of Historic places within the proposed permit, or adjacent areas or shadow area (for planned subsidence).

RESPONSE: Refer to Attachment II.10.A – Cultural, Archeological and Historical Resources Report.

b) Provide a plan detailing the manner in which additional information will be gathered by the applicant to enable the Department to identify and evaluate such resources.

RESPONSE: Refer to Attachment II.10.A – Cultural, Archeological and Historical Resources Report.

2) Please Note: If the Department determines that the Part II 10)A) resource information is not adequate to make the required finding under 62 Ill. Adm. Code 1773.15(c)(12) because information available to the Department indicates a substantial likelihood of currently unknown resources within the permit area or adjacent areas which would be eligible for the National Register of Historic Places, the Department will require the applicant to submit additional information to enable the Department to identify and evaluate the potential resources. Such information might include the results of field investigations of the permit area and adjacent area if it is determined by the Department, in consultation with the Illinois State Historic Preservation Agency, that the field investigation will provide the information required under Part II 10)A).

RESPONSE: **Refer to Attachment II.10.A – Cultural, Archeological and Historical Resources Report.**

C) For the permit area and/or shadow area (for planned subsidence) locate on the vegetation map or the land use map the following:

The boundaries of any publicly owned parks, locations of any cultural resources, historical resources listed or eligible for listing on the National Register of Historic Places.

RESPONSE: **N/A. No known publicly owned parks, locations of any cultural resources, historical resources listed or eligible for listing on the National Register of Historic Places exist within the proposed permit area.**

D) Provide a map showing the location of know/Archeological site(s) listed on or eligible for listing on the National Register of Historic Places. Provide identifying field markings to be employed to insure that the site(s) will not be disturbed by surface coal mining and reclamation operations. The map is to be submitted in separate cover from the rest of the application. The Department will hold the map as a confidential document.

RESPONSE: **N/A. No known archeological sites listed or eligible for listing on the National Register of Historic Places exist within the proposed permit area.**

E) Provide a plan for publicly owned park(s), or place(s) identified above in paragraph(c) that may be adversely affected by the proposed operation describing the measures to be employed:

RESPONSE: **N/A. No known publicly owned parks or places exist within the proposed permit area.**

1) To prevent adverse impacts caused by underground mining related activities including, but not limited to, loss or destruction of historic artifacts and damage to historic structures or property; or

RESPONSE: **N/A. No underground mining is proposed by this permit application.**

2) If valid existing rights exist or joint agency approval is to be obtained under 62 Ill. Adm. Code 1761.12(e), to minimize adverse impacts.

RESPONSE: **N/A. No underground mining is proposed by this permit application.**

11) For the permit area and/or shadow area (for planned subsidence) locate on the vegetation map or land use map the boundaries of any public or private cemeteries or Indian burial grounds.

RESPONSE: **N/A. No known public or private cemeteries or Indian burial grounds are present within or adjacent to the proposed permit area.**

12) A) Provide the location of surface and subsurface man-made features within, passing through, or passing over the proposed permit and shadow areas on the pre-mining land use map or other designated map.

RESPONSE: **Refer to General Location Map (Drawing No. B17-222-E1) and the Hydrology - Mining Operation Maps Drawing Nos. B17-222-M13, M14, M15 & M16).**

Such features should include but are not limited to major electric transmission lines, pipelines, agricultural drainage tile fields, gas and oil wells, and water wells. For gas, oil and water wells provide the depth, if available, of the well.

RESPONSE: **There are no active oil or gas wells in the area. There are no known water well locations within ½ mile of the Water Management Pipeline. Because of the minimal disturbance associated with the water management pipeline, no water well survey was conducted.**

Refer to the Hydrology - Mining Operation Maps Drawing Nos. B17-222-M13, M14, M15 & M16) for the location of existing major electric transmission lines and pipelines.

B) Provide the elevation and location of all monitoring stations used to gather data for water quality and quantity, fish and wildlife, and air in preparation of the application.

RESPONSE: **There are no known water wells or stream monitoring sites in the vicinity of the proposed permit area.**

13) Soils Information Map

A) Does the submitted soils map represent a map developed by the Natural Resources Conservation Service?

Yes ___X___ No _____

If no, explain. If SCS map has been modified, explain (Example - photographically enlarged; soil map units recorrelated; area affected after initial mapping). Soil map scale must be 1" = 400' unless otherwise approved by the Department.

RESPONSE: **The Soils Maps (Drawing Nos. B17-222-M9, M10, M11 & M12) were prepared using information from the NRCS Custom Soils Resource Report for Franklin and Williamson Counties within and adjacent to the proposed permit area.**

B) Are any of the identified map units correlated as prime farmland by SCS criteria?

Yes ___X___ No _____

If yes, provide acreage by completing soil information chart.

RESPONSE: **Refer to the chart on the Soils Maps (Drawing Nos. B17-222-M9, M10, M11 & M12) and the NRCS Custom Soils Resource Report contained in Attachment II.13.A.**

C) Submit, by completing soils information chart, acreage totals of each map unit (soil type and slope classification) and land use capability classes in the permit area and the percent slope range of each lettered slope classification used on the soil map.

RESPONSE: **Refer to the chart on the Soils Maps (Drawing Nos. B17-222-M9, M10, M11 & M12) and the NRCS Custom Soils Resource Report contained in Attachment II.13.A.**

D) Indicate the average topsoil thickness of each of the soil map units to be affected. Locate on soils map the test holes for soil horizon thickness sampling. The topsoil replacement thickness (inches) will be _(see below) inches_.

RESPONSE: **Water Management Pipeline – Topsoil will be removed from the pipeline alignment trench and temporarily stockpiles on site. The installation will consist of excavating a trench, installing the pipeline, backfilling the trench, spreading the soil stockpiles and**

trench, installing the pipeline, backfilling the trench, spreading the soil stockpiles and seeding/mulching the site. For topsoil removal in agricultural areas, refer to Part IV.2.B.3.

In the area of the Water Control Structure, topsoil thickness ranges from 3.5" to 4.0". Topsoil will be removed from areas to be disturbed for the construction of the Water Control Structure, Water Management Pipeline and the diffuser site. Topsoil and subsoil will be stored in separate stockpile areas. Each stockpile will be protected from contaminants and compaction. Quick growing vegetation will be established to protect the stockpiles from wind and water erosion. Upon the completion of mining, the subsoil and topsoil will be re-distributed and vegetated per the approved vegetation plan.

E) List the soil types and acreages of areas that will require the B and/or portions of the C horizon to be removed and replaced in order to establish the root medium necessary to achieve soil productivity consistent with the proposed post-mining land use.

Alternatively, a narrative description explaining why specific soil type acres information for reclamation plan achievement is not necessary may be provided instead.

RESPONSE: **N/A. No B or C horizons will be removed or replaced.**

F) Are selected overburden materials proposed to be used in lieu of or as a supplement to the A-horizon?

Yes__X__ No _____

If yes, provide the appropriate information required under Section 1785.21(b). Also, identify source of the substitute materials and the topsoils to be substituted away from on a separate soils map unless the Department grants permission to describe the area in narrative form or to use the soils map provided in Part II 13(A). Explain why the proposed plan will provide the best available material of equal or better quality than present topsoil or surface existing material. This section must be addressed when reaffecting previously disturbed areas.

RESPONSE: **The topsoil will be segregated for use in final reclamation. Bottomland alluvium for the Belknap, Bluford and Wynoose series will be used to provide supplemental topsoil for use in reclamation. Rooting media will consist of B/C mix of subsoil, loess, and glacial till obtained on the upland areas for use as Custom Soil Resource Report (Attachment II.13.A) for information on the soil properties.**

PART II ATTACHMENT II.6.A.1
SOIL INFORMATION CHART

Soil Information Chart								
Soil Map Unit Symbol	**Soil Unit Name**	**Slope**	**Land Capability Class**	**Prime Farmland Ac.**	**Negative Determine Ac.**	**High Capability Ac.**	**NonCrop Capability Ac.**	**Total Ac.**
10C	Plumfield silty loam	5 - 10	4e				6.5	6.5
10D	Plumfield silty loam	10 - 18	6e				2.3	2.3
12A	Wynoose silt loam	0 - 2	3w			0.9		0.9
13A	Bluford silt loam	0 - 2	2w	1.3	0.2			1.5
13B	Bluford silt loam	2 - 5	2e	1.9	1.2			3.1
13B2	Bluford silt loam	2 - 5	2e	3.1	2.6			5.7
14B	Ava silt loam	2 - 5	2e	4.2	5.0			9.2
14B2	Ava silt loam	2 - 5	2e		0.9			0.9
14C2	Ava silt loam	5 - 10	3e			3.7		3.7
14C3	Ava silt loam	5 - 10	4e				3.6	3.6
84A	Okaw silt loam	0 - 2	3w			5.5		5.5
109A	Racoon silt loam	0 - 2	3w	0.6	2.2			2.8
338A	Hurst silt loam	0 - 2	3w			1.8		1.8
518B	Rend silt loam	2 - 5	2e	0.0	1.1			1.1
518C2	Rend silt loam	5 - 10	3e			1.2		1.2
518C3	Rend silt loam	5 - 10	4e				0.1	0.1
640A	Bluford silt loam	0 - 2	2w		2.3			2.3
640B	Bluford silt loam	2 - 5	2w		2.0			2.0
640B2	Bluford silt loam	2 - 5	2e	1.0	0.6			1.6
802B	Orthents loamy	0 - 5	2e				1.7	1.7
871B	Lenzburg gravelly silty loam	2 - 7	2s				3.1	3.1
871D	Lenzburg gravelly silty loam	7 - 20	6s				0.6	0.6
908F	Hickory-Kell silt loam	18 - 35	6e				1.5	1.5
3108A	Bonnie silt loam	0 - 2	3w	0.6	1.3			1.9
3382A	Belknap silt loam	0 - 2	3w	1.1	4.8			5.9
3420A	Poipolis silty loam	0 - 2	3w		0.1			0.1
W	Water	-	8w				0.1	0.1
TOTAL				13.8	24.3	13.1	19.5	70.7

PART II ATTACHMENT II.6.A.2
PRODUCTIVITY YIELD DATA

SOIL PRODUCTIVITY AND SOIL PROPERTIES FOR FRANKLIN AND WILLIAMSON COUNTIES, ILLINOIS

							Corn		Soybeans		Wheat		Hay		Land Classification	
Symbol	Name	Slope %	Acres	Percent	Subsoil rooting	Table S3 adjustment	B8111 OMY bu/ac	Weighted OMY bu/ac	B8111 OMY bu/ac	Weighted OMY bu/ac	B8111 OMY bu/ac	Weighted OMY bu/ac	B8111 OMY tons/ac	Weighted OMY tons/ac		
10C	Plumfield silty clay loam	5 - 10	6.5	9.2	UNF	0.96	102.7	944.4	33.6	308.9	39.4	361.9	41.77	384.0	Non-Crop	4e
10D	Plumfield silty clay loam	10 - 18	2.3	3.3	UNF	0.78	83.5	271.5	27.3	88.8	32.0	104.0	33.94	110.4	Non-Crop	6e
12A	Wynoose silt loam	0 - 2	0.9	1.3	FAV	1.00	128.0	162.9	42.0	53.5	51.0	64.9	4.26	5.4	Farmland of Statewide Importance	3w
13A	Bluford silt loam	0 - 2	1.5	2.1	FAV	1.00	136.0	288.5	44.0	93.4	55.0	116.7	3.39	7.2	Prime Farmland if drained	2w
13B	Bluford silt loam	2 - 5	3.1	4.4	FAV	0.99	134.6	590.4	43.6	191.0	54.5	238.7	3.36	14.7	Prime Farmland	2e
13B2	Bluford silt loam	2 - 5	5.7	8.1	FAV	0.95	129.2	1041.6	41.8	337.0	52.3	421.3	3.22	26.0	Prime Farmland	2e
14B	Ava silt loam	2 - 5	9.2	13.0	UNF	1.00	135.0	1756.7	44.0	572.6	55.0	715.7	3.26	42.4	Prime Farmland	2e
14B2	Ava silt loam	2 - 5	0.9	1.3	UNF	0.99	133.7	170.1	43.6	55.5	54.5	69.3	3.23	4.1	Prime Farmland	2e
14C2	Ava silt loam	5 - 10	3.7	5.2	UNF	0.96	129.6	678.2	42.2	221.1	52.8	276.3	3.13	16.4	Farmland of Statewide Importance	3e
14C3	Ava silt loam	5 - 10	3.6	5.1	UNF	0.74	99.9	508.7	32.6	165.8	40.7	207.2	2.41	12.3	Farmland of Statewide Importance	4e
84A	Okaw silt loam	0 - 2	5.5	7.8	FAV	1.00	129.0	1003.5	42.0	326.7	55.0	427.9	3.76	29.3	Farmland of Statewide Importance	3w
109A	Racoon silt loam	0 - 2	2.8	4.0	FAV	1.00	144.0	570.3	46.0	128.8	56.0	221.8	3.89	15.4	Prime Farmland if drained	3w
338A	Hurst silt loam	0 - 2	1.8	2.5	UNF	1.00	134.0	341.2	44.0	79.2	55.0	140.0	4.14	10.5	Farmland of Statewide Importance	3w
518B	Rend silt loam	2 - 5	1.1	1.6	UNF	0.99	140.6	218.7	43.6	47.9	55.4	86.3	3.73	5.8	Prime Farmland	2e
518C2	Rend silt loam	5 - 10	1.2	1.7	UNF	0.90	127.8	216.9	39.6	47.5	50.4	85.5	3.39	5.8	Farmland of Statewide Importance	3e
518C3	Rend silt loam	5 - 10	0.1	0.1	UNF	0.74	105.1	14.9	32.6	3.3	41.4	5.9	2.79	0.4	Non-Crop	4e
640A	Bluford silt loam	0 - 2	2.3	3.3	FAV	1.00	136.0	442.4	44.0	101.2	55.0	178.9	3.39	11.0	Prime Farmland if drained	2w
640B	Bluford silt loam	2 - 5	2.0	2.8	FAV	0.99	134.6	380.9	43.6	87.1	54.5	154.0	3.36	9.5	Prime Farmland	2w
640B2	Bluford silt loam	2 - 5	1.6	2.3	FAV	0.95	129.2	292.4	41.8	66.9	52.3	118.2	3.22	7.3	Prime Farmland	2e
802B	Orthents loamy	0 - 5	1.7	2.4	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	Non-Crop	
871B	Lenzburg gravelly silty loam	2 - 7	3.1	4.4	FAV	0.99	118.8	520.9	39.6	122.8	44.6	195.3	3.97	17.4	Non-Crop	2s
871D	Lenzburg gravelly silty loam	7 - 20	0.6	0.8	FAV	0.75	90.0	76.4	30.0	18.0	33.8	28.6	3.01	2.6	Non-Crop	6s
908F	Hickory-Kell silt loam	18 - 35	1.5	2.1	FAV	0.59	72.0	152.7	24.2	36.3	28.3	60.1	2.34	5.0	Non-Crop	6e
3108A (108)	Bonnie silt loam	0 - 2	1.9	2.7	FAV	1.00	149.0	400.4	49.0	93.1	59.0	158.6	4.64	12.5	Prime Farmland if drained & either protected from flooding or not frequently flooded during growing season.	3w
3382A (382)	Belknap silt loam	0 - 2	5.9	8.3	FAV	1.00	156.0	1301.8	52.0	306.8	63.0	525.7	4.89	40.8	Prime Farmland if drained & either protected from flooding or not frequently flooded during growing season.	3w
3420A (420)	Poipolis silty loam	0 - 2	0.1	0.1	FAV	1.00	142.0	20.1	48.0	4.8	59.0	8.3	4.39	0.6	Prime Farmland if drained & either protected from flooding or not frequently flooded during growing season.	3w
W	Water	-	0.1	0.1	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	Non-Crop	8w
			Total	Total			Average	Total	Average	Total	Average	Total	Average	Total		
			70.7	100.0			123.6	5904.5	40.2	1921.6	49.6	2368.9	11.06	610.6		

NOTE: Bullentin 811; Table S2rev. (1/2/2012) used. Productivity adjusted using Table S3 - Favorable/Unfavorable subsoils.

Attachment II.6.A.2

1/2/2012 Amended Table S2 for B811 **Table S2rev. Productivity of Illinois Soils Under Optimum Management, Slightly Eroded, 0 to 2 Percent Slopes**

The crop yields have been updated to reflect growing conditions from 2000 to 2009. *This table replaces the Table S2 in B811.*

table S2rev B811kro2012.xls

Acknowledgment

From 1996 to present, the Illinois crop yield estimates and productivity indices by soil type were created by an UIUC, ACES task force of soil scientists, agronomists, crop scientists, and agricultural economists under the direction of Dr. Kenneth R. Olson, Professor of Soil Science in the Department of NRES. The year 2011 crop yields and productivity indices for optimum management (B811) are maintained at the following NRES web site: http://soilproductivity.nres.illinois.edu. If you have an Illinois soil type symbol that is not in this Table or have other soil productivity questions please contact Dr. Kenneth R. Olson at the following e-mail address: krolson@illinois.edu

IL map symbol	Soil type name	Subsoil rooting [a]	Corn Bu/A	Soybeans Bu/A	Wheat Bu/A	Oats Bu/A [b]	Sorghum [c] Bu/A	Alfalfa [d] hay, T/A	Grass-legume [e] hay, T/A	Crop productivity index for optimum management	IL map symbol
10	Plumfield silty clay loam	UNF	107	35	41	0	90	0.00	3.51	81	10
12	Wynoose silt loam	FAV	128	42	51	0	108	0.00	4.26	97	12
13	Bluford silt loam	FAV	136	44	55	0	110	0.00	3.39	101	13
14	Ava silt loam	UNF	135	44	55	0	107	3.26	0	100	14
84	Okaw silt loam	FAV	129	42	55	66	0	0.00	.3.46	96	84
109	Racoon silt loam	FAV	144	46	56	0	114	3.89	0	106	109
338	Hurst silt loam	UNF	134	44	55	68	0	0.00	4.14	100	338
518	Rend silt loam	UNF	142	44	56	0	107	3.77	0	105	518
640	Bluford silt loam, bench	FAV	136	44	55	0	110	3.39	0	101	640
802	Orthents, loamy	Crop yield data not available									
871	Lenzburg	FAV	120	40	45	49	0	0.00	4.01	90	871
908	Hickory-Kell silt loams	FAV	122	41	48	0	108	0.00	3.96	94	908
3108	Bonnie silt loam	FAV	149	49	59	0	117	0.00	4.64	111	3108
3382	Belknap silt loam	FAV	156	52	63	75	0	0.00	4.89	117	3382
3420	Piopolis silty clay loam	FAV	142	48	59	68	0	0.00	4.39	108	3420
W	Water	Crop yield data not available									

Table S3. Decimal Adjustments in Crop Yields and Productivity Indices Under an Optimum Level of Management for Various Slope Groups and Erosion Phases

Slope class %	Optimum management Favorable subsoils			Optimum management Unfavorable subsoils		
	Slightly eroded	Moderately eroded	Severely eroded	Slightly eroded	Moderately eroded	Severely eroded
0-2	1.00	0.96	0.89	1.00	0.94	0.79
2-5	0.99	0.95	0.88	0.99	0.93	0.78
5-10	0.97	0.93	0.86	0.96	0.90	0.74
10-15	0.93	0.89	0.81	0.91	0.84	0.69
15-20	0.87	0.82	0.75	0.85	0.78	0.63
20-25	0.80	0.75	0.68	0.77	0.71	0.56
25-30	0.71	0.66	0.59	0.68	0.62	0.47
30-35	0.60	0.55	0.48	0.57	0.51	0.36
35-40	0.52	0.48	0.40	0.49	0.43	0.28
43+	0.48	0.44	0.36	0.45	0.39	0.24

PART II ATTACHMENT II.8
ENDANGERED OR THREATENED SPECIES

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

THREATENED AND ENDANGERED SPECIES PROJECT ASSESSMENT

WATER MANAGEMENT PIPELINE

WILLIAMSON ENERGY, LLC
MACH WATER LINE
FRANKLIN AND WILLIAMSON COUNTIES, ILLINOIS

Prepared for

WILLIAMSON ENERGY LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B16-454-1413
NOVEMBER 2017

Charleston, WV
928 Cross Lanes Drive, Suite 300
Charleston, WV 25313
Telephone: (681) 217-2090
Fax: (681) 217-2092

Beckley, WV
Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA
3 Four Coins Drive, Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

WATER MANAGEMENT PIPELINE
PERMIT NO. 434
THREATENED AND ENDANGERED SPECIES PROJECT ASSESSMENT

INTRODUCTION

Williamson Energy, LLC (Williamson), has proposed to permit an area for a water line. The proposed area is necessary to construct the surface facilities associated with a water line. The Water Management Pipeline will carry water from the Pond Creek No. 1 Mine to the proposed diffuser at the Big Muddy River.

SITE LOCATION

The Water Management Pipeline is located two miles north of Johnston City in Franklin County, Illinois, has its approximate center at Latitude 37.823196 and Longitude -88.93574 (Figures, Drawing No. B16-454-B1). The permit area is located in Township 8 South and Range 2 East, Sections 1, 2, and 12 in Williamson County. In Franklin County it is located in Township 7 South and Range 2 East, Sections 27, 28, 29, 30, 31, 32, 34, and 35. The proposed permit area is approximately 72.7 acres in size of which all 72.7 acres will be impacted by the proposed project (Drawing No. B16-454-B1).

Watershed Information

The permit area is situated within the Cambon Lake – Big Muddy River, town of Chittyville – Pond Creek, Lake Creek, and the town of West Frankfort Pond Creek HUC 12 watersheds (071401060704, 071401060503, 071401060502, and 071401060501, respectively), all of which are situated in the Upper Mississippi Region HUC 8 watershed (07140106) (Drawing No. B16-454-B8). Drainage of the study area occurs primarily by way of several ephemeral and intermittent streams that drain to Pond Creek, a traditional navigable water (TNW). Pond Creek is a perennial water which flows to the Big Muddy River, a perennial water, which flows into the Mississippi River (TNW). The project area is partially situated inside of the 100 year floodplain in several areas (Figures, Drawing No. B16-454-B15).

The Illinois Department of Natural Resources Office of Mines and Minerals (Department) has identified a list of 31 threatened and endangered species that are known to occur in Franklin and Williamson Counties. The bald eagle is not on the Illinois threatened and endangered species list; however, it is still protected under the Migratory Bird Treaty Act, as well as the Bald and Golden Eagle Protection Act, therefore, this species was also reviewed within this report. Williamson obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions at the proposed project area as well as survey for and determine the likelihood of occurrence of the listed species at the permit area and adjacent areas. A field survey was completed by Alliance to conduct an assessment of the potential occurrence of threatened and endangered species at the proposed Water Management Pipeline located in Franklin and Williamson Counties, Illinois.

The purpose of the study was to survey the proposed water line permit area for the presence

and/or probable absence of listed threatened and species within the proposed permit area and document the occurrence of the preferred or potential habitat for each of these species.

QUALIFICATIONS

The following report was prepared by Alliance environmental scientists Alex Patterson and Braden Hoffman. Mr. Patterson has a Wildlife and Fisheries degree from Frostburg State University. Mr. Patterson has been employed with Alliance for two years and has conducted evaluations across multiple states. Braden Hoffman has a bachelor's degree in Environmental Science from Allegheny College and a master's in business from West Virginia University. Mr. Hoffman has been employed with Alliance for 16 years and has been conducting ecological surveys for the last 16 years. Mr. Hoffman has been conducting ecological and other endangered species surveys in Illinois annually since 2004. Mr. Hoffman is a State and Federal Scientific collection permit holder for endangered bat surveying.

SURVEY METHODS

State Listed Threatened and Endangered Species

The Illinois Natural Heritage database (February 2018) lists 10 species as threatened or endangered for Franklin County and 21 for Williamson County. Those species are listed in Table 1a (Franklin County) and Table 1b (Williamson County). Alliance conducted aerial and field surveys to determine if suitable or preferred habitat for listed threatened and endangered species occurred within the project limits. A GIS shapefile of all known threatened and endangered species location in Franklin and Williamson Counties was obtained from the Illinois Natural Heritage Database, (February 2018). This data was utilized to help determine the habitat types and extent or occurrence of each threatened and endangered species.

Table 1a. Listed Threatened and Endangered Species for Franklin County, Illinois

Scientific Name	Common Name	State Protection *	Number of Occurrences	Last Observed
Cimicifuga racemosa	False bugbane	LE	1	2001-08-08
Egretta caerulea	Little blue heron	LE	1	1998-07-27
Moxostoma carinatum	River redhorse	LT	1	1988-08-17
Myotis septentrionalis	Northern long-eared myotis	LT	2	2012-07-28
Myotis sodalis	Indiana bat	LE	1	2017-08-04
Potamogeton pulcher	Spotted pondweed	LE	1	1952-10-02
Pseudemys concinna	River cooter	LE	1	1985-04-28
Terrapene ornata	Ornate box turtle	LT	1	2005-04-28
Trillium viride	Green trillium	LE	1	1982-04-30
Tyto alba	Barn owl	LT	4	2014-07-20

*LE – Listed Endangered
*LT – Listed Threatened

Table 1b. Listed Threatened and Endangered Species for Williamson County, Illinois

Scientific Name	Common Name	State Protection *	Number of Occurrences	Last Observed
Asplenium bradleyi	Bradley's Spleenwort	LE	1	1994-09
Bartramia longicauda	Upland Sandpiper	LE	1	1987
Antrostomus carolinensis	Chuck-will's-widow	LT	1	2015-06-03
Carex physorhyncha	Bellows Beak Sedge	LE	1	1983-04-19
Crotalus horridus	Timber Rattlesnake	LT	2	1993-06-07
Dodecatheon frenchii	French's Shootingstar	LT	1	2015-05-22
Eryngium prostratum	Eryngo	LE	2	2013-07-06
Ixobrychus exilis	Least Bittern	LT	1	1993-06-30
Lampetra aepyptera	Least Brook Lamprey	LT	1	2010-10-08
Matelea decipiens	Climbing Milkweed	LE	2	2013-08-08
Myotis septentrionalis	Northern long-eared myotis	LT	1	1989-08-22
Myotis sodalis	Indiana bat	LE	2	2017-05-20
Nyctanassa violacea	Yellow-crowned Night Heron	LE	2	2014-04
Orconectes indianesis	Indiana Crayfish	LE	8	2017-05-17
Pinus echinata	Shortleaf Pine	LE	1	1984-04-29
Rhexia mariana	Dull Meadow Beauty	LE	5	2013-08-05
Scleria pauciflora	Carolina Whipgrass	LE	1	1983-07-04
Spiranthes vernalis	Spring Ladies' Tresses	LE	2	2013-07-06
Thryomanes bewickii	Bewick's Wren	LE	1	1987-06-24
Trillium viride	Green Trillium	LE	1	1987-04-27
Tyto alba	Barn Owl	LT	5	2016-06-14

*LE – Listed Endangered
*LT – Listed Threatened

Species Habitat Requirement Review

A detailed literature review was conducted to confirm the preferred habitat requirements, growth habits, and known occurrences of each threatened and endangered species.

In Office GIS survey

Alliance utilized Arc GIS Desktop to examine current and historic aerial photographs, USDA

soils data, National Wetlands Inventory (NWI) data, and land cover data within and adjacent to the project area. This data was then compared to documented species occurrences for comparison to habitats within the project area.

Natural Divisions Discussion and Examination

A review of the Illinois Natural Division was conducted to assist in determining if each species is likely to occur on or adjacent to the proposed project area. Illinois is divided into 14 natural divisions that divide the Illinois landscape based upon difference in topography, glacial history, bedrock, soils and the distribution of native plants and animals (Schwegman 1973). Each natural division contains similar landscapes, climates and substrate features like bedrock and soils that support similar ecology such as vegetation and wildlife. Two distinct divisions occur within the review counties for this project, including the Southern Till Plains and the Shawnee Hills. However, only one of these natural divisions, the Southern Till Plain, occurs within the proposed project area and adjacent areas.

The Southern Till Plain is located in southern Illinois and is a glacial till plain from the Illinoisan and Kansan age. Historically this area consisted of open woodlands with prairie on level uplands. Today, most of the area has been converted to agricultural production, with small forested areas remaining on steep hillsides and riparian areas only. (Schwegman 1973)

EcoCAT Survey

The web-based Illinois Department of Natural Resources EcoCAT assessment tool was also utilized to determine the occurrence of potential threatened or endangered species near the proposed permit area.

Vegetation Survey

Alliance conducted a field survey from November 8 - 14, 2016 and January 19, 2017 to identify general habitat types located within the permit area. General habitat types were described and mapped with approximate acreage determined through GIS analysis.

Wildlife Survey

Alliance conducted a field survey from November 8 - 14, 2016 and January 19, 2017 to identify bird and animal species occurring within the permit area. Bird and animal species observed within the permit area were documented.

Alliance conducted aerial and field surveys to determine if suitable or preferred habitat for listed threatened and endangered species occurred within the project limits. Additionally, an absence/presence survey was completed for those areas that potentially could contain listed threatened and endangered plants.

"Adjacent Area" Defined

As defined in 62 Ill. Adm. Code Section 1701. Appendix A, "adjacent area means the area

located outside of the permit area, or shadow area, where a resource or resources, determined according to the context in which adjacent area is used, are or reasonably could be expected to adversely impacted by proposed mining operations".

IMPACTS

Impacts of Construction Operations to Noise

During construction of the Water Management Pipeline, noise will temporarily increase within the permit area and adjacent areas.

Impacts of Construction to Forested Habitat

Development of the proposed facilities will result in limited forest clearing as large sections of the line have been collocated within an existing gas line right of way. The project area and adjacent areas are already fragmented by agricultural habitat (row crops). The majority of the proposed forest to be cleared is isolated woodlots surrounded on 4 sides by agricultural activities or small areas of expansion along the existing right of way. Therefore, the proposed clearing will have a very minimal effect on habitat fragmentation and increased edge affect.

Impacts of Construction to Water Quality and Quantity

Surface disturbances will include the installation of silt fences and installation of the water line. Impacts to the water quality and quantity are expected to be temporarily increased due to runoff and erosion during the initial periods of construction because of decreased vegetative cover. However, silt fences will be installed where needed. This will limit offsite water quality and quantity impacts. Upon installation of the silt fence, the water quality and quantity should return to near-normal levels.

Where necessary, surface facilities will pass through a sediment control structure unless otherwise noted in the permit application. The silt fence for the water line area will be used in order to prevent sedimentation from impacting streams.

Impacts at Adjacent Areas Defined for Different Groups of Species

The adjacent areas for different groups of species as analyzed in this document have been defined below.

Plants

Plants located immediately adjacent to the permit boundary line may be impacted by tree clearing or other disturbance associated with the project. The project may result in changing sun and/or wind exposure in adjacent areas. As a result, adjacent areas for plant species are defined as 1,000 feet from the permit area or area of disturbance.

Birds

Birds located adjacent to the permit area may be impacted by increased noise during construction within the project area. Noise can distract and alarm foraging or nesting birds and cause birds to abandon their nests. Utilizing the national Bald Eagle Management Guidelines as an informal guidance the buffer distance suggested for blasting activities or other extremely loud noises is ½ mile. These guidelines were determined to be the best available information and appropriate for other nesting and/or foraging birds. The adjacent areas for birds are defined as ½ mile from the permit area line or area of disturbance.

Terrestrial Reptiles

Terrestrial reptiles located immediately adjacent to the permit boundary line may be impacted by tree clearing or other disturbance associated with the project. The project may result in changing sun and/or wind exposure in adjacent areas. As a result, adjacent areas for terrestrial reptiles are defined as 1,000 feet from the permit area or area of disturbance.

Aquatic Organisms

Given the applicant's sediment and erosion control plans and the compliance requirements that will be in place through the applicant's NPDES permits it is unlikely there will be any substantial water quality or quantity changes within aquatic resources outside of the permit area.

Mammals

Mammals living adjacent to the project area could be affected by noise and vegetation changes that will occur on the project. An adjacent area of ½ mile will be used for mammals. Additionally, the Indiana bat and northern long-eared bat (NLEB) has been addressed in a separate report entitled "Mach Water Line Mist Net Survey Report" completed by Alliance and submitted under separate cover.

RESULTS

EcoCAT Assessment

The Illinois Department of Natural Resources EcoCAT assessment tool was utilized for project planning purposes. The EcoCAT assessment listed three species that could possibly be in the vicinity of the project. The three species that could be found are the chuck-will's-widow (*Antrostomus carolinensis*), false bugbane (*Cimicifuga racemosa*), and the river redhorse (*Moxostoma carinatum*). The EcoCAT results are enclosed in Appendix A.

Site Specific Vegetation Survey

Nine habitat types were identified as occurring within and adjacent to the permit limits: open water, developed open space, developed low intensity, developed medium intensity, deciduous forest, grassland/ herbaceous, pasture/hay, cultivated crops, and woody wetlands. The permit area predominately consists of pasture and haylands followed by deciduous forests.

Row Crops (RC)

The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)

The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)

The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)

The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)

The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)

The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)

The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)

The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)

The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation

A stream and wetland delineation of the project area was completed by Alliance in November of 2016, and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional wetlands and non-jurisdictional wetlands were also identified within the project area. At the time of writing this report, a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers had not been received.

Wildlife Survey

The majority of species encountered during the wildlife survey were common for southern Illinois with the exclusion of the Indiana bat, which is a federally endangered species, and considered rare throughout its range. Species were observed either by direct sighting, call, print, or scat. Observed species are listed in Tables 3 and 4. Vegetative community references can be found in the site specific vegetation survey of this report.

Table 3. Mammal Species Observed within the Proposed Water Management Pipeline Area

Scientific Name	Common Name	Federally Listed	State Listed	Location Vegetative Community
Odocoileus virginianus	White-tailed deer	Not listed	Not listed	DF, RC, PH
Sciurus carolinensis	Gray squirrel	Not listed	Not listed	DF
Sylvilagus floridanus	Eastern Cottontail	Not Listed	Not Listed	RC, GH, PH
Myotis sodalis	Indiana bat	Endangered	Endangered	DF, PH
Myotis lucifugus	Little brown bat	Not listed	Not listed	DF, PH
Lasiurus borealis	Eastern red bat	Not Listed	Not Listed	RC, DF, PH

****Summer survey for the Indiana bat and northern long-eared bat was completed in May 2017***

Table 4. Bird Species Observed within the Proposed Water Management Pipeline Area

Scientific Name	Common Name	Typical Illinois Range	Federally Listed	State Listed	Location Vegetative Community
Buteo jamaicenis	Red-tailed hawk	Year-Round Resident	Not Listed	Not Listed	RC,GH
Cardinalis cardinalis	Northern cardinal	Year-Round Resident	Not Listed	Not Listed	DF, PH
Dumetella carolinensis	Gray catbird	Year-Round Resident	Not Listed	Not Listed	DF, RC, PH
Hirundo rustica	Barn swallow	Summer Breeding	Not Listed	Not Listed	RC,GH
Cathartes aura	Turkey vulture	Year-Round Resident	Not Listed	Not Listed	RC,GH, PH
Meleagris gallopavo	Wild turkey	Year-Round Resident	Not Listed	Not Listed	DF, GH, PH
Cardinalis cardinalis	Northern cardinal	Year-Round Resident	Not Listed	Not Listed	GH, DF, PH

Scientific Name	Common Name	Typical Illinois Range	Federally Listed	State Listed	Location Vegetative Community
Passerina cyanea	Indigo bunting	Summer Breeding	Not Listed	Not Listed	GH, DF, PH
Colinus virginianus	Northern bobwhite	Year-Round Resident	Not Listed	Not Listed	GH, DF, PH
Passer domesticus	House sparrow	Year-Round Resident	Not Listed	Not Listed	GH, DF, PH
Scolopax minor	American woodcock	Year-Round Resident	Not Listed	Not Listed	GH, OF, RC
Corvus brachyrhynchos	American crow	Year-Round Resident	Not Listed	Not Listed	GH, DF, RC, PH
Cyanocitta cristat	Blue jay	Year-Round Resident	Not Listed	Not Listed	DF, GH, PH
Sayornis phoebe	Eastern phoebe	Summer Breeding	Not Listed	Not Listed	RC, DF, GH, PH
Zenaida macroura	Mourning dove	Year-Round Resident	Not Listed	Not Listed	RC, GH, DF, PH

Summer survey for the Indiana bat and northern long-eared bat was completed in May 2017

State Listed Threatened and Endangered Species Surveys

A mist net survey for the Indiana bat was completed for the proposed Water Management Pipeline Project. The Indiana Bat Survey utilized the 2017 Indiana Bat Summer Survey Guidance from U.S. Fish and Wildlife Service. The report document, titled "A Summer Survey for the Federally Endangered Indiana Bat (*Myotis sodalis*) and the Threatened Northern Long-Eared Bat (*Myotis septentrionalis*)". This survey was completed in May 2017 and has been submitted.

From May 18 to June 1, 2017, Alliance conducted an Indiana bat (*Myotis sodalis*) NLEB (*Myotis septentrionalis*) mist net survey at the proposed Water Management Pipeline Area located in Franklin and Williamson Counties, Illinois. A total of 18 net nights were

completed within the project area. During the mist net survey a total of 39 bats representing three (3) species were captured and identified. One (1) Indiana bat was captured during the survey. The Indiana bat was captured, fitted with a transmitter, and tracked for 12 days. Throughout the duration of the tracking efforts the bat was located in a roost approximately two (2) miles from its capture location. It is important to note that the southeastern myotis (*Myotis austroriparius*), grey bat (*Myotis grisescens*), NLEB (*Myotis septentrionalis*), or the Rafinesques's big-eared bat (*Corynorhinus rafinesquii)* were not identified within the project area and therefore in accordance with current U.S. Fish and Wildlife Service Protocol are not present within the project area.

State Listed Threatened and Endangered Species Assessments

The following lists include threatened and endangered species that were identified as potentially occurring within the project area (Franklin and Williamson Counties) by the Illinois Natural Heritage Database. All species identified within the adjacent counties were evaluated as well, and a complete list of the T/E species has been provided in Appendix B.

Plants

Bradley's Spleenwort (*Asplenium bradleyi*)

Bradley's spleenwort is a perennial fern from the *Asclepiadaceae* family (USDA). Roots of this plant grow slowly (FNAA). Its stems are short and occasionally branched (FNAA). Leaf blades have a reddish or purplish brown stalk 1-10 cm and are narrow, oblong shaped (FNAA). Leaflets are broad and rounded with serrated margins and have tapered tips that occur in 5-15 pairs that are 6-40 x 3-10 mm (FNAA). Veins on leaflets are scarcely to be seen (FNAA). Three or more sori are found per leaflet (FNAA). Bradley's Spleenwort is found on acidic rocks, typically on steep ledges (FNAA). It is considered endangered in Illinois (INHS). This species has been found 19 miles from the project area along Devil's Kitchen Lake in Union County (INHS). Bradley's spleenwort is not likely to occur on the permit area due to distance to known occurrences, and the lack of steep ledge habitat within the project area.

Bellows Beak Sedge (*Carex physorhyncha*)

Bellows beak sedge is a perennial monocot of the family *Cyperaceae*. This sedge has tufts of leaves, terminal staminate spike, and an achene enclosed in a beaked perigynium. The achene is trigonous, 1.3-1.5 mm long and 1 mm wide, dark brown, apiculate; 3 stigmas, pale red-brown (Mohlenbrock*)*. The spikes are slender and clustered towards the tips of the culm (INHS). The culms are up to 40 cm tall, slender, ascending, triangular, reddish near the base with old leaves persisting and about as long as the leaves. The leaves are 4-8 per culm, 1.5-3.0 mm wide, ascending, flat, pale green, scabrous along the margins. Bellows beak sedge flowers during late April and early May and is found in rocky forest, particularly in chert (Mohlenbrock*)*. It is listed as endangered in the state of Illinois (INHS). Bellows beak sedge is known to occur in Union County 19 miles from the project area along Devil's Kitchen Lake (INHS). Bellows beak sedge is not likely to

occur on the permit area due to distance to known occurrence and the lack of rocky forest within the project area.

False Bugbane (*Cimicifuga racemosa*)

False Bugbane, also known as black cohosh or black bugbane is a perennial herb of the *Ranunculaceae* family (USDA). It is a tall plant at 3-8 feet in height; the stem is glabrous and usually not grooved. It has alternate compound leaves with a serrate margin and oblong to ovate in shape. The flower is one to several racemes 6 inches or more long. The flower is white and appears to be all stamens since the petals are small. It blooms from June to July. The species prefers wooded areas. This species has one known occurrence 1.3 miles from the project area in south central Franklin County (INHS). False bugbane could possibly occur in the permit area based on the distance to known occurrence and because of the amount of deciduous forest present in the project area; therefore a protection and enhancement plan has been prepared.

French's Shootingstar (*Dodecatheon frenchii*)

French's shootingstar is a hairless perennial herb of the *Primulaceae* family. It lacks a leafy stem but had 4-10 basal, simple, entire, broadly ovate, soft-fleshy, and abruptly contracted to a narrow petiole-like base. The inflorescence is a bracteates umbel at the top of smooth, unbranched hollow stalk that ranges from 20-60 cm long. The flowers are individually stalked, pendulous, the petals are white or less often tinted pale rose to lilac, 2.0-2.5 cm long and strongly bent backwards. The petals are fused at the bases and are marked with a dark purple ring at the base. The plants grow in linear colonies in thin sandy soil in shade directly below the outer edges of prominently extending and overhanging sandstone (large or small) ledges that are exposed along or near streams (Hill). French's shootingstar is listed as state threatened for Illinois and has twelve known occurrences in Jackson County all in the Shawnee National Forest the closest being 18.5 miles from the project area in the Little Grand Canyon-Cedar Creek Natural Area. It has five locations in Pope County in the Shawnee National Forest. It has 13 occurrences in Johnson County, all within the Shawnee National Forest. There are six occurrences in Union County, all of which are in the Shawnee National Forest (INHS). Although the French's shootingstar is locally abundant, it is not likely to occur on the permit area due to distance to known occurrences and the lack of sandstone cliffs within the project area.

Eryngo (*Eryngium prostratum*)

Eryngo is a perennial dicot of the family *Apiaceae* (USDA). The stems can grow 40 cm long or longer and creep along the ground. The stems are hairless and ribbed. Leaves vary in shape in size, but are around 2 cm long and are oval and elliptic shaped. Some leaves are 3-lobed and all are hairless and have serrated margins. The inflorescence is 7-8 mm x 4mm and contains abundant clusters flowers that occur spring-fall. The flowers each measure .8-1 mm x .3 mm and have five hairless purple to blue petals. The habitat of eryngo consists of low wet woods, borders of swamps and ponds, and moist prairies (Tenaglia). It is considered endangered in the state of Illinois (INHS). This species has been found 10.3 miles from the project area in Saline County area and at two locations in

Williamson County along Crab Orchard Lake. They occur 11.7 miles and 11.9 miles away from the project area (INHS). Eryngo could potentially occur in the permit area due to distance to known occurrences and abundance of deciduous forest; therefore a protection and enhancement plan has been prepared.

Climbing Milkweed *(Matelea decipiens)*

Climbing milkweed is of the *Aslepiadaceae* family. Climbing milkweed is a perennial vine with a complete regular flower that is violet with a brownish-purple corolla. Leaves are opposite, simple, entire and ovate to cordate in shape. Climbing milkweed typically grows in valleys and thickets along streams, open woods, and upland thickets. It is listed as state threatened for Illinois and has one known occurrence in Jackson County that is 19.5 miles from the project area in the Riverside Park and three known occurrences in Williamson County 3.4 miles and 3.6 miles from the project area, located on the Big Muddy River. The third occurrence is 18.9 miles away located along Devil's Kitchen Lake. There is also one occurrence in Johnson County 22.6 miles away in the Shawnee National Forest (INHS). Climbing milkweed was not identified during the field survey; however, habitat exists that could be utilized by this species. Therefore, presence is assumed and a protection and enhancement plan has been prepared.

Shortleaf Pine *(Pinus echinata)*

Shortleaf pine is a perennial gymnosperm of the family *Pinaceae*. This is a large tree with a broad, open crown, ranging at 50-100 foot in height. It has short spreading branches that open up with age. Needles of this pine are bright green, 5 inch tufts while the trunks of the trees have broad, flat, reddish plates. Growing conditions of shortleaf pine include partially shaded areas within dry sandy soils (NPIN). This species is considered endangered within the state of Illinois (INHS). This species is known to occur in two places in Jackson County 22.5 miles and 19.2 miles from the project area in the Shawnee National Forest. It also occurs in two places in Williamson County 16.4 miles away and 17.8 miles away along Devil's Kitchen Lake. It occurs in two placed n Pope County in the Shawnee National Forest 23.4 miles away and 27.3 miles away from the project area (INHS). The shortleaf pine is not likely to occur in the project area due to distance to known occurrences and the lack of appropriate dry sandy soils within the project area.

Spotted Pondweed *(Potamogeton pulcher)*

Spotted pondweed is an aquatic perennial in the family *Potamogetonaceae*. This plant has 5-18 submerged leaves that are oblong to lanceolate or linear. This plant is present from June through September (Weakly and others 1337). It has one occurrence in Jackson County 8.5 miles away in Campbell Lake (INHS). Due to the lack of submerged vegetation area in the project area, it is unlikely that spotted pondweed occurs.

Dull Meadow Beauty *(Rhexia mariana)*

Dull meadow beauty is a perennial dicot of the family *Melastomataceae* (USDA). The leaves of this plant are simple, opposite, and the edge of the leaf blade is entire. The

flower of the dull meadow beauty possesses four petals and is purple in color with bright yellow stamens. This species' interpreting wetland status within the Midwest is obligate (OBL), meaning that it only grows with wetland habitats, shores of rivers or lakes, and sandplains/barrens (Go Botany). This species is considered endangered within the state of Illinois (INHS).This species has one known occurrence in Jackson County that is 11.1 miles from the project area, one occurrence in Saline County that is 15 miles from the project area, and seven known occurrences in Williamson County, the closest being 3.4 miles from the project area (INHS). Dull meadow beauty is not likely to occur in the project area due to distance to known occurrences; however, habitat exists within and around the permit area that could be utilized by this species. Therefore, presence is assumed and a protection and enhancement plan has been prepared.

Carolina Whipgrass *(Scleria pauciflora)*

Carolina whipgrass is a perennial monocot of the *Cyperaceae* family (USDA). It has an inflorescence that is mostly composed of small terminal clusters. Leaves are simple, entire and linear in shape. Carolina whipgrass is typically found on exposed sandstone ledges, chert, or granite of glades and barrens; open woodlands and prairies, and bluff edges (Gleason). This species is considered endangered within the state of Illinois (INHS). This species is known to occur in Williamson County 19.0 miles from the project area in the Crab Orchard National Wildlife Refuge. There is one known occurrence in Johnson County 23.5 miles away and seven occurrences in Pope County, the closest being 26.3 miles away (INHS). Carolina whipgrass is not likely to occur in the project area due to distance to known occurrences and the lack of preferred habitat for this species within the project area.

Spring Ladies' Tresses (*Spiranthes vernalis*)

Spring ladies' tresses is a perennial monocot of the family *Orchidaceae* (USDA). This plant grows 20-65 cm tall and has several spreading roots 1 cm diameter. It has 4-5 basal leaves and then sheathing bracts on up the stem. Inflorescence spikes are spiraled typically 3-7 flowers per spiral cycle. Flowers are white or cream and are nodding or slightly ascending. Flowers occur in the fall. The habitat for spring ladies' tresses is dry to moist meadows, dune hollows, prairies, old fields, roadsides, cemeteries, and lawns (FNAA). It is considered endangered in the state of Illinois (INHS). This species has been found 23.4 miles from the project area in Saline County in a protected natural area. It has been found 11.7 and 17.5 miles from the project area in Williamson County in the drainage of Crab Orchard Lake, and 22.9 miles from the project area in Jackson County in a protected natural area (INHS). Spring ladies' tresses are not likely to occur in the project area due to distance to known occurrences. Also, the majority of the project area is active cropland, with blocks of dense canopy covered forest, both of which are not suitable habitat for this species.

Green Trillium (*Trillium viride*)

Green trillium is a perennial monocot in the *Liliaceae* family (USDA). This plant had bluish-green mottled lance shaped leaves. It produces a green-yellow erect flower in the spring

whose petals are sometimes streaked with purple. It is found in rich woods, bluffs, rocky hillsides with limestone outcrops, in woodsy, humus rich soil over a stiff clay substrate (FNAA). Green trillium is considered endangered in Illinois (INHS). This species has been found 5.0 miles from the project area in Franklin County and 8.5 miles from the project area in Williamson County (INHS). Green trillium was not identified during the field survey; however, habitat is present that could be utilized by the species. Therefore, presence is assumed and a protection and enhancement plan has been prepared.

Fish

Least Brook Lamprey (*Lampetra aepyptera*)

The least brook lamprey is one of seven lamprey species in the family *Petromyzontidae*. It occurs in clean gravely riffles of creeks. They are silvery gray to almost black above and lighter gray below. This species of lamprey differs from all other species of Ichthyomyzon because of its bilobed dorsal fin (Smith 2002). It is unlikely that this species occurs in the project area are due to limited habitat with only two stream impacts of sufficient size (Pond Creek and Big Muddy River) to potentially affect the lamprey.

The lamprey was only recently discovered to occur in south eastern Illinois; however, all documented occurrences occur within the Ohio River drainage basin, including the Williamson County record, which is 15 miles away from the project area (Smith 2002). Given that all stream impacts are occurring within the Mississippi River drainage basin, it is unlikely that that lamprey occurs within or adjacent to the project area.

River Redhorse (*Moxostoma carinatum*)

The river redhorse is a species of redhorse in the family *Catostomidae*. It has a slightly compressed body with a red tail with dark spots on the scale bases of the back and sides. This species large head, squarish snout, large eye, and moliform teeth distinguish this species from the greater red horse. The river redhorse prefers deep, swift, gravely riffles of small and medium sized rivers. The river redhorse has one occurrence in Franklin County 1.2 miles away in the Bug Muddy River and three occurrences in Jackson County (INHS). Although unlikely, this species could occur within the project area due to its close proximity to the project and therefore presence has been assumed and a protection and enhancement plan has been prepared.

Reptiles

Timber Rattlesnake (*Crotalus horridus*)

The timber rattle snake is a venomous snake in the *Viperidae* family (INHS; IUCN). This snake can grow up to 180 cm long and colors vary from grey, yellow, and greenish-white. Across its back are 20-25 black marks ending in a black tail with a rattle. Its belly is pink, white, cream, or gray with dark stripes on the sides. The head is larger than the neck and the eyes have an oval shaped pupil. The timber rattlesnake feeds on small mammals and mates in the summer having 6-10 offspring born late summer-fall the next year. This snake is found in heavy forests along rocky outcrops and bluffs spring-fall. Most deaths

that occur to the adult timber rattlesnake are of vehicles and humans. This snake is considered threatened in the state of Illinois (INHS). This species closest occurrence to the project area is 13.4 miles in Williamson County in the Crab Orchard National Wildlife Refuge. It has also been found in Jackson, Union, Saline, Alexander, Johnson, Pope, Gallatin, Hardin , Randolph, and Perry Counties. The timber rattlesnake is not likely to occur on the permit area due to distance to known occurrences and lack of preferred habitat for the species within the project and adjacent areas.

River Cooter (*Pseudemys concinna*)

The river cooter is a large reptile of the *Emydidae* family. It is up to 32 cm long with a striped head. It has an intricately patterned olive to dark brown carapace and an unpatterned or sparsely patterned plastron. The patterns are yellow or orange lines or swirls. There are no dark smudges on plastral scutes. The river cooter is a turtle found in the east from Maryland to northern Florida west to Oklahoma and Kansas, and north to southern Illinois and Indiana (NatureServe). The river cooter is found in backwaters and oxbow lakes of large rivers and reservoirs (NatureServe). This species has been found 11.2 miles from the project area in Franklin County (INHS). Considering the distance to known occurrences the river cooter could potentially occur in the project area within the Bug Muddy River and/or Pond Creek. Therefore, a protection and enhancement plan has been prepared.

Ornate Box Turtle (*Terrapene ornata*)

The ornate box turtle is a small reptile of the *Emydidae* family. It has a moderately high dark brown carapace that is flattened along the yellow midline and is without a keel. It has a hinged plastron patterned with yellow lines radiating from the center of each scute. It ranges up to 13cm and the head is sometimes spotted. The ornate box turtle can be found from South Dakota to Texas with the Mississippi Valley on the most eastern edge of its territory (NatureServe). The habitat of the turtle includes prairies and open fields in former prairies to open woodlands (NatureServe). This species has been found 15.9 miles from the project area in Franklin County in Wayne Fitzgerrell State Park along Rend Lake. Due to the distance to known occurrences the ornate box turtle could potentially occur in the project area, and therefore a protection and enhancement plan has been provided.

Birds

Chuck-Will's-Widow (*Caprimulgus carolinensis*)

The chuck-will's-widow is a ground nesting bird in the *Caprimulgidae* family. It can be found in southern Illinois during its breeding season from mid to late April through September. They are best identified by their voice, but also by their cryptic coloration. They have a mottled brown and buff body with rufous overall, pale brown to buff throat with a white "necklace", dark breast, and long rounded tail. Their primary habitat is upland woods often near or in pine plantations. It eats primarily insects, but occasionally eats small birds (DeVare et al 2004). This species is considered to be state threatened in

Illinois (INHS). There are 10 occurrences for this species in Williamson County, the closest being one mile from the project area. It also occurs in Jackson, Union, Johnson, and Pope Counties. Due to the close proximity, it is possible that the chuck-will's-widow could occur within the project area; therefore, a protection and enhancement plan has been prepared.

Upland Sandpiper (*Bartramia longicauda*)

The upland sandpiper is a medium sized sandpiper of the *Scolopacidae* family. The upland sandpiper has a small head with dark prominent eyes on a long skinny neck. The body is brown mottled on the back; lightly streaked on the chest, sides and flanks and white on the belly and undertail. It has bright yellow legs and a two-toned bill. The upland sandpiper is a rare to uncommon migrant from early April to late May and from mid-July to mid-September in Illinois. The upland sandpiper prefers low prairie, low pasture, or dense medium-height grassy areas; often near airports, school, or roadsides. It is an uncommon migrant and summer resident with a statewide range in Illinois. It is listed as endangered in the state of Illinois (INHS). The upland sandpiper has only one known occurrence in Williamson County that is 7.7 miles from the project area (INHS). The upland sandpiper is not likely to occur on the permit area due to distance to known occurrences. The Permit Area does not contain suitable preferred habitat, it is unlikely to occur within the Permit Area or adjacent area and therefore no adverse effect is expected.

Little Blue Heron (*Egretta caerulea*)

Little blue herons range from New England south to Florida along the Gulf Coast and north to Illinois (CLO). The little blue heron winters on the Gulf and the Atlantic Coasts north to New Jersey and can also be found in the tropics (CLO). This animal makes its home in freshwater swamps, lagoons, coastal thickets, and islands; where its diet consists primarily of fish, but will supplement its diet with crustaceans, amphibians, and other insects. This species occurs 17.5 miles from the project area in Franklin County along Rend Lake (INHS). It is possible the little blue heron could occur in the permit area due to the distance to known occurrence in perhaps two locations, along the big Muddy River and potentially along Pond Creek, as well. Therefore, presence has been assumed and a protection and enhancement plan prepared.

Least Bittern (*Ixobrychus exilis*)

The least bittern is the smallest heron and is of the *Ardeidae* family (INHS). It has buff wing patches with a dark crown and back and a wingspan of only 41-46 cm. Its sides are orange and the front of its neck and chest have orange and white stripes (INHS; CLO). The least bittern feeds on small fish and insects and nests on the ground. It makes a platform and canopy for the nest from vegetation and lays 2-7 eggs. Its habitat is in freshwater or brackish marshes with tall vegetation (CLO). It is considered endangered in Illinois (INHS). This species has been found 14.5 miles from the project area in Saline County, 26.7 miles from the project area in Jackson County, and 28.2 miles from project area in Perry County. The least bittern was not identified during the field survey of the site; however, habitat exists within the project area that could be used by this species in

and around the Big Muddy River and Pond Creek. Therefore, presence has been assumed and a protection and enhancement plan prepared.

Yellow-Crowned Night Heron *(Nyctanassa violacea)*

The yellow-crowned night heron is a nocturnal member of the family *Ardeidae*. This heron is medium in size and stocky. The body is primarily gray with yellow legs. The face and bill of the heron is black, cheeks are white, and the crown is marked with a bright yellowish stripe. Preferred habitat of the yellow-crowned night heron is within or near wetlands, on the coast along islands, mangroves, and barrier beaches; farther inland in wooded swamps, forested uplands, and lakes and rivers, sometimes near residential areas. Nesting usually occurs in small colonies, even with other wading birds. Primary prey for this species includes crustaceans and aquatic insects. This species is considered endangered within the state of Illinois (INHS). This species is known to occur in Williamson County 2.6 miles and 13.5 miles from the project area. It also occurs 28.0 miles away in Johnson County. The yellow-crowned night heron was not identified during the field survey of the site; however, habitat exists within the project area that could be used by this species along the Big Muddy River and Pond Creek. Therefore, presence has been assumed and a protection and enhancement plan prepared.

Bewick's Wren *(Thryomanes bewickii)*

The Bewick's wren is a perching bird of the *Troglodytidae* family. It can be found within most of western North America but has virtually disappeared from the East coast. This medium sized wren has a slender body with long tail feathers that are held upright. They are generally brown and gray with a single long white stripe over the eye. The back and wings are generally plain brown with its under-parts being both gray and white. The tail has a barred black appearance and is usually tipped with white spots. Both males and females have the same appearance. The bills of the Bewick's wren are long, slender, and down-curved. These birds favor brushy, thicket habitat types in open country/woodlands near streams and rivers. They are primarily insectivores and nest in cavities of trees and human made structures (DeVore et al 2004). This species is considered endangered within the state of Illinois (INHS). This species is known to occur in Williamson County 6.1 miles from the project area, as well as in Johnson and Pope Counties in the Shawnee National Forest. The Bewick's wren could potentially occur within the permit area due to distance to known occurrences and the presence of brushy thick habitat favored by this species within the project area, therefore a protection and enhancement plan has been prepared.

Barn Owl (*Tyto alba*)

The barn owl is a medium sized raptor of the *Tytonidae* family. It is listed as state endangered for Williamson, Franklin, Saline, Union, Jackson, Johnson, Pope, Perry, Jefferson, and Hamilton Counties (INHS). The barn owl has a heart-shaped, white facial disk; dark eyes and pale bill. It is rusty brown above with white underparts. Barn owls inhabit open areas, including agricultural fields, grasslands and marshes (CLO). Their diet is dominated by voles and other small mammals (CLO). Barn owls nest and roost in

a variety of places including hollows or natural cavities in trees, manmade structures, caves, and cliffs (CLO). Populations are stable in some parts of their range, but in the Unites States seven Midwestern states, including Illinois, list barn owls as threatened or endangered (CLO). As agriculture has increased in scale and modern farming techniques have been implemented many farm buildings have disappeared from the landscape, rows of trees have been removed, and production has shifted from cover crops such as oats and hay to row crops like corn. This species has five known occurrences in Williamson County, the closest being 2.2 miles from the project area. The barn owl also has five occurrences in Franklin County, the closest begin 4.1 miles away. It also occurs in Jefferson, Hamilton, Saline, Pope, Johnson, Union, Jackson, and Perry Counties. The barn owl was not identified during the field survey of the site; however, habitat exists within the project area that could be used by this species. Therefore, presence has been assumed and a protection and enhancement plan prepared.

Invertebrates

Indiana Crayfish (*Orconectes indianensis*)

The Indiana crayfish is of the family *Cambaridae* (ILDNR). The mouth parts are long and wide and the acumen is one third-one half the length and is triangular. The upper section of the shell has spines and a deep grove near the head region. The shell is spotted. The ridges below the shell are also grooved and end in spines. Their bodies are covered with hair. The abdomen is a little longer or the same size of the head and throat area. This area is narrower in the male than the female. In the spring the female has eggs and in late spring the eggs hatch (USFWS). The Indiana crayfish is found in rocky riffles and pools of small-medium freshwater streams (ILDNR). This crayfish is considered endangered in the state of Illinois (INHS). This species has been found 11.0 miles from the project area in the Saline River, which is in the Ohio River drainage area, in Williamson County. It has also been found in Saline, Johnson, and Pope Counties. The Indiana crayfish is not likely to occur on the permit area due to distance to known occurrences, and the lack of rocky stream habitat preferred by this species. Additionally, all occurrences within the state of Illinois are within the Ohio River drainage basin, which is not within or adjacent to the project area.

Mammals

Indiana Bat (*Myotis sodalis*)

The Indiana bat (*Myotis sodalis*) is a small bat of the family *Vespertilionidae* and the genus myotis. They are native to 24 states including Illinois. They have been listed as endangered since 1967 due to large numbers of deaths associated with human disturbances. Indiana bats have dark brown to black fur and only weigh between 5-9 grams, with a wingspan of 9-1 inches (IUCN). According to the 2017 range-wide population estimate, Illinois has the fourth largest Indiana bat population in the United States with an estimated 52,354 bats (USFWS). Also, as noted earlier in this report, an Indiana bat was captured in the project area during a mist net survey in 2017, and a protection and enhancement plan has been provided for the portion of the permit within a

two and a half mile buffer of the identified roost location.

Northern Long-Eared Bat (*Myotis septentrionalis*)

The northern long-eared bat (*Myotis septentrionalis*) is a wide ranging bat species found in 37 states including Illinois. They belong to the family *Vespertilionidae* and the genus Myotis. They have a body length of 3-3.7 inches and a wingspan of 9-10 inches. Their fur can be dark brown on the back and tawny to pale brown on the underside. This species can be distinguished by its long ears which are much larger than compared to other bats of the Myotis genus (USFWS). The NLEB has one occurrence in Williamson County, 13.0 miles from the project area, and five occurrences in Franklin County, the closest being 3.8 miles away. This species also has multiple occurrences in Jackson, Union, Alexander, Johnson, Pope, and Saline Counties. No NLEB were captured during the mist net survey in 2017, and therefore the project has probably absence for the NLEB.

LITERATURE CITED

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Press Kentucky, Lexington. 286 pp.

Brack, W., Jr., and R.K. LaVal. 1985. Food habits of the Indiana bat in Missouri. Journal of Mammalogy. 66:308-315.

CLO (The Cornell Lab of Ornithology). All About Birds. [Internet]. The Cornell Lab of Ornithology. [cited 2018 March 18]. Available from http://www.allaboutbirds.org/guide/search.aspx

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRue. 1979. Classifications of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-79/31.

CPC (Center for Plant Conservation). National Collection of Imperiled Plants. [Internet]. Missour Botanical Garden. [cited 2018 March 16]. Available from http://www.centerforplantconservation.org/Collection/NationalCollection.asp

DeVore, S., S.D Bailey, G. Kennedy. 2004. Birds of Illinois. Edmonton: Lone Pine Publishers. P. 192.

FNAA (Flora of North America Association). Flora of North America. [Internet]. [cited 2018 March 16]. Available from http://www.efloras.org/flora_page.aspx?flora_id=1

Gardner and Cook. 2002. Seasonal and geographic distribution and quantification of potential summer habitat. Bat Conservation International. Austin, Texas.

Gleason, H.A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada; 2nd edition. The New York Botanical Garden Press. Bronx, NY.

Go Botany. Simple Key for Plant Identification. [Internet]. 201-2013. New England Wild Flower Society. [cited 2018 March 16]. Available from https://gobotany.newenglandwild.org/simple/

Godfrey, Robert K. and Jean W. Wooten. 1981. Aquatic and Wetland Plants of Southeastern United States, Dicotyledons. University of Georgia Press. Athens, GA.

Hill, Steven R. 2002. Conservation Assessment for French's Shootingstar (Dodecatheon frenchii). Technical Report 2002 (27). Illinois Natural History Survey. Chanpaign, IL.

Hoffman, J. E., and J. E. Gardner. 1992. A radiotelemetric study of home range size and dispersal of the marsh rice rat (Oryzomys palustris) in southern Illinois: progress report.

Division of Natural Heritage, Illinois Department of Conservation and Bureau of Environment, Illinois Department of Transportation.

Hoffmeister, D. F. 2002. Mammals of Illinois. University of Illinois Press. 384 pp.

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. < http://dnr.state.il.us/ORC/list_tande_bycounty.pdf> Accessed 19 March 2018.

Illinois Natural History Survey (INHS). 2018. Ornate Box Turtle Species Bio available at www.inhs.illinois.edu/animals_plants/herps/species/te_ornata.html. Accessed 8/28/14.

Illinois Natural History Survey (INHS). 2018. River Cooter Turtle Species Bio available at http://www.inhs.illinois.edu/animals_plants/herps/species/ps_concinn.html. Accessed 9/4/14.

Illinois Natural History Survey (ILHS). Yellow-crowned Night Heron Species Bio-Accessed - 3/16/18. Available at http://wwx.inhs.illinois.edu/collections/birds/ilbirds/77/.

INHS (Illinois Natural History Survey). INHS Biological Collections. [Internet]. 2018. University of Illinois Board of Trustees. [cited 2018 March 16]. Available from http://wwx.inhs.illinois.edu/collections

IUCN (International Union for Conservation of Nature and Natural Resources). The IUCN Red List of Threatened Species. [Internet]. 2018. International Union for Conservation of Nature and Natural Resources. [cited 2018 March 16]. Available from http://www.iucnredlist.org/

Mohlenbrock, Robert H. 1999. The Illustrated Flora of Illinois Sedges: Carex. Southern Illinois University.

Mohlenbrock, R. H. and J. W. Voigt. 1959. a Flora of Southern Illinois. Southern Illinois University Press. Carbondale and Edwardsville, IL.

NatureServe. 2017. NatureServe Explorer: An Online Encyclopedia of Life [web application] Version 7.1, NatureServe, Arlington, Virginia. Available: http://explorer.natureserve.org. Accessed March 20, 2018.

Nyboer, R. W., J. R. Herkert, and J. E. Ebinger, editors. 2004. Endangered and threatened species of Illinois: status and distribution. Volume 2: Animals. Illinois Endangered Species Protection Board.

Redder, A.J., C.K. Dodd, Jr., and D. Keinath. (2006, May 16). Ornate Box Turtle (Terrapene ornate ornate): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/preojects/scp/assessments/ornateboxturtle.pdf [March 2018].

Robinson, 1997. Birds of Southern Illinois. Southern Illinois University Press, Carbondale, IL

Sibley, D. A. 2003. The Sibley Field Guide to Birds of Eastern North America. Alfred A. Knopf. NY.

Schwegman, J. E. 1973. Comprehensive plan for the Illinois nature preserves system. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois. 32 pp. + map.

Solymar, B. Dand J. D. McCracken. 2002. Draft National Recovery Plan for the Barn Owl and its Habitat.

Tenaglia, Dan. Eryngium prostratum. [Internet]. February 8, 2007. [cited 2018 March 20]. Available from http://www.missouriplants.com/Blueopp/Eryngium_prostratum_page.html

USDA (United States Department of Agriculture). Plants Database. [Internet]. July 30, 2014. [cited 2018 March 16]. Available from http://plants.usda.gov/java/

U.S. Department of Agriculture. 1996. Barn Owl Nest Box ftp://ftp-fc.sc. egov.usda.gov/CA/news/Publications/wild habitat/owl nest.pdf. Accessed January 30, 2012.

U.S. Fish and Wildlife Service (USFWS). 1999. Agency Draft: Indiana Bat (Myotis sodalis) Revised Recovery Plan. Region 3 U.S. Fish and Wildlife Service, Ft. Snelling, Minnesota. March 1999.

U.S. Fish and Wildlife Service (USFWS). 2007. Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision. Region 3 U.S. Fish and Wildlife Service. Fort Snelling, Minnesota. 258 pp.

U.S. Fish and Wildlife Service (USFWS). 2002. Indiana bat (Myotis sodalis) revised recovery plan, Agency Draft. Ft. Snelling, Minnesota. 69 pp.

U.S. Fish and Wildlife Service (USFWS). 2011. Fish and Wildlife Service Unveils National Plan to Combat Deadly White-Nose Syndrome in Bats. http://www.fws.gov/WhiteNoseSyndrome/

U.S. Fish and Wildlife Service (USFWS). 2009 (Revised 2013). Range-wide Indiana Bat Protection and Enhancement Plan Guidelines.

UWSP (University of Wisconsin Stevens Point). Robert W. Freckman Herbarium. [Internet]. 2012. [cited 2018 March 20]. Available from http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=TOMAUR

Wisconsin Department of Natural Resources. 2006. Common Barn Owl (Tyto alba). http://www.dnr.state.wi.us/org/LAND/er/factsheets/birds/BARNOWL.HTM. Accessed March 20, 2018.

Weakley, A. S., J. C. Ludwig, J. F. Townsend. 2012. Flora of Virginia. Bland Crowder, ed. Foundation of the Flora of Virginia Project Inc., Richmond. Fort Worth: Botanical Research Institute of Texas Press.

Smith, P. W. 1979. The Fishes of Illinois. Urbana and Chicago. University of Illinois Press. P. 159-160.

Smith, P. W. 1979. The Fishes of Illinois. Urbana and Chicago. University of Illinois Press. P. 6.

APPENDIX A

EcoCAT
Ecological Compliance Assessment Tool

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Applicant: Williamson Energy
Contact: Braden Hoffman
Address: PO Box 99
Johnston City, IL 62951

IDNR Project Number: 1710672
Date: 05/09/2017

Project: WATER MANAGEMENT PIPELINE
Address: Liberty School Road, Marion

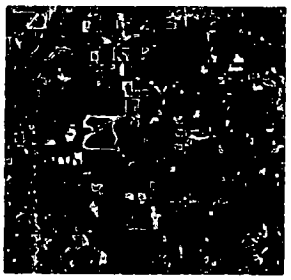
Description: WATERLINE FROM MACH MINE TO THE BIG MUDDY RIVER

Natural Resource Review Results

This project was submitted for information only. It is not a consultation under Part 1075.

The Illinois Natural Heritage Database shows the following protected resources may be in the vicinity of the project location:

Chuck-Will's-Widow *(Caprimulgus carolinensis)*
False Bugbane *(Cimicifuga racemosa)*
River Redhorse *(Moxostoma carinatum)*



Location

The applicant is responsible for the accuracy of the location submitted for the project.

County: Franklin	*County:* Williamson
Township, Range, Section:	*Township, Range, Section:*
7S, 2E, 26	, ,
7S, 2E, 27	, ,
7S, 2E, 28	, ,
7S, 2E, 29	, ,
7S, 2E, 30	, ,
7S, 2E, 31	, ,
7S, 2E, 32	, ,
7S, 2E, 33	, ,
7S, 2E, 34	, ,
7S, 2E, 35	, ,
7S, 2E, 36	, ,
7S, 3E, 31	, ,
, ,	8S, 2E, 1
, ,	8S, 2E, 2
, ,	8S, 2E, 3
, ,	8S, 2E, 4
, ,	8S, 2E, 11
, ,	8S, 2E, 12
, ,	8S, 3E, 4
, ,	8S, 3E, 5
, ,	8S, 3E, 6
, ,	8S, 3E, 7

IDNR Project Number: 1710672

IDNR Project Number: 1710672

, ,	8S, 3E, 8
, ,	8S, 3E, 9
, ,	8S, 3E, 10
, ,	8S, 3E, 11
, ,	8S, 3E, 12
, ,	8S, 3E, 13
, ,	8S, 3E, 14
, ,	8S, 3E, 15
, ,	8S, 3E, 16
, ,	8S, 3E, 17
, ,	8S, 3E, 18

IL Department of Natural Resources
Contact
Impact Assessment Section
217-785-5500
Division of Ecosystems & Environment

Disclaimer

The Illinois Natural Heritage Database cannot provide a conclusive statement on the presence, absence, or condition of natural resources in Illinois. This review reflects the information existing in the Database at the time of this inquiry, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during the project's implementation, compliance with applicable statutes and regulations is required.

Terms of Use

By using this website, you acknowledge that you have read and agree to these terms. These terms may be revised by IDNR as necessary. If you continue to use the EcoCAT application after we post changes to these terms, it will mean that you accept such changes. If at any time you do not accept the Terms of Use, you may not continue to use the website.

1. The IDNR EcoCAT website was developed so that units of local government, state agencies and the public could request information or begin natural resource consultations on-line for the Illinois Endangered Species Protection Act, Illinois Natural Areas Preservation Act, and Illinois Interagency Wetland Policy Act. EcoCAT uses databases, Geographic Information System mapping, and a set of programmed decision rules to determine if proposed actions are in the vicinity of protected natural resources. By indicating your agreement to the Terms of Use for this application, you warrant that you will not use this web site for any other purpose.

2. Unauthorized attempts to upload, download, or change information on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act.

3. IDNR reserves the right to enhance, modify, alter, or suspend the website at any time without notice, or to terminate or restrict access.

Security

EcoCAT operates on a state of Illinois computer system. We may use software to monitor traffic and to identify unauthorized attempts to upload, download, or change information, to cause harm or otherwise to damage this site. Unauthorized attempts to upload, download, or change information on this server is strictly prohibited by law.

Unauthorized use, tampering with or modification of this system, including supporting hardware or software, may subject the violator to criminal and civil penalties. In the event of unauthorized intrusion, all relevant information regarding possible violation of law may be provided to law enforcement officials.

Privacy

EcoCAT generates a public record subject to disclosure under the Freedom of Information Act. Otherwise, IDNR uses the information submitted to EcoCAT solely for internal tracking purposes.

APPENDIX B

Scientific Name	Common Name	State Protection	Franklin County	Jackson County	Johnson County	Pope County	Saline County	Union County	Williamson County	Perry County	Jefferson County	Hamilton County
			Present									
Agalinis skinneriana	Pale False Foxglove	LT						Yes				
Ammocrypta clarum	Western Sand Darter	LE		Yes				Yes				
Amorpha nitens	Smooth False Indigo	LE				Yes	Yes					
Anguilla rostrate	American Eel	LT		Yes		Yes		Yes				
Apalone mutica	Smooth Softshell	LE		Yes		Yes						
Asclepias meadii	Mead's Milkweed	LE			Yes		Yes					
Asio flammeus	Short-eared Owl	LE					Yes			Yes		
Asplenium bradleyi	Bradley's Spleenwort	LE		Yes		Yes	Yes	Yes	Yes			
Asplenium resiliens	Black Spleenwort	LE						Yes				
Bartonia paniculata	Screwstem	LE				Yes						
Bartramia longicauda	Upland Sandpiper	LE							Yes			
Berchemia scandens	Supple-jack	LT				Yes						
Botrychium biternatum	Southern Grape Fern	LT		Yes	Yes	Yes	Yes	Yes				
Botaurus lentiginoisus	American Bittern	LE								Yes		
Buchnera americana	Blue Hearts					Yes						
Calmagrostis insperata	Bluejoint Grass	LE				Yes						
Caprimulgus carolinensis	Chuck-wills's-widow			Yes	Yes	Yes		Yes	Yes			
Carex alata	Winged Sedge	LE		Yes		Yes						
Carex arkansana	Arkansas Sedge	LE		Yes			Yes					
Carex atlantica	Sedge	LT				Yes						
Carex bromides	Sedge	LT			Yes	Yes						
Carex communis	Fibrous-rooted Sedge	LT				Yes	Yes					
Carex decomposita	Cypress-knee Sedge	LE			Yes	Yes		Yes				
Carex gigantea	Large Sedge	LE			Yes			Yes				
Carex intumescens	Swollen Sedge	LT			Yes	Yes	Yes					
Carex nigromarginata	Black-edged Sedge	LE				Yes		Yes				
Carex oxylepis	Sharp-scaled Sedge	LT			Yes	Yes	Yes	Yes				
Carex prasina	Drooping Sedge	LT		Yes		Yes						
Carex physorhyncha	Bellows Beak Sedge	LE		Yes		Yes		Yes	Yes			
Carex plantaginea	Plantain-leaved Sedge	LE		Yes								
Carex willdenowii	Willendow's Sedge	LT		Yes	Yes	Yes	Yes	Yes				
Carya aquatica	Water Hickory	LT			Yes		Yes	Yes				
Carya pallida	Pale Hickory	LE						Yes				
Chamaelirium luteum	Fairy Wand	LE				Yes						
Chimaphila maculata	Spotted Wintergreen	LE				Yes						
Cimicifuga racemosa	False Bugbane	LE	Yes									
Cimicifuga rubifolia	Black Cohosh	LT		Yes	Yes	Yes	Yes					

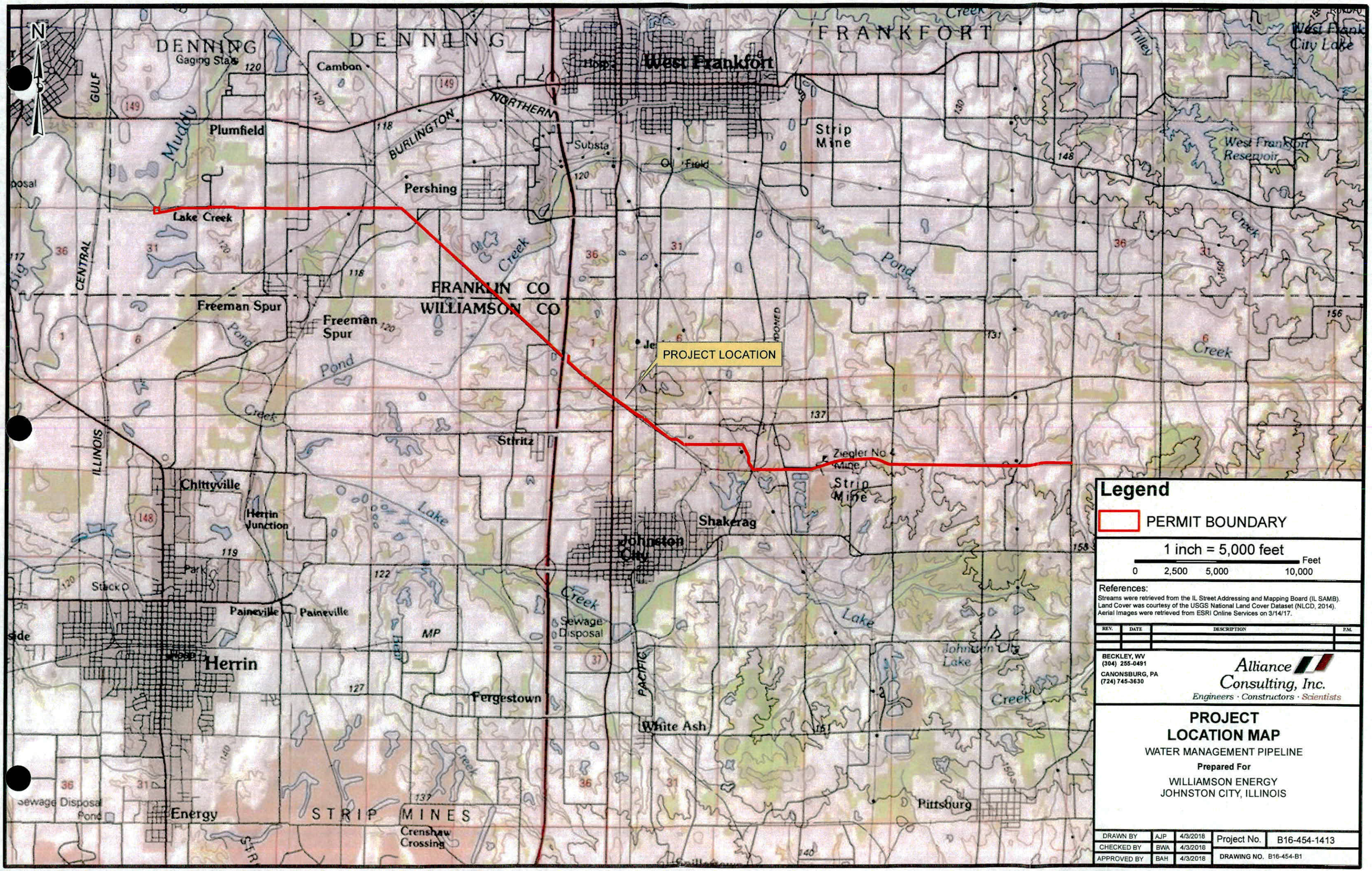
Scientific Name	Common Name	State Protection	Franklin County	Jackson County	Johnson County	Pope County	Saline County	Union County	Williamson County	Perry County	Jefferson County	Hamilton County
			Present									
Circus cyaneus	Northern Harrier	LE			Yes	Yes	Yes			Yes		
Clematis crispa	Blue Jasmine	LE			Yes							
Clematis viorna	Leatherflower	LE			Yes							
Corydalis halei	Hale's Corydalis	LE				Yes						
Coryrhinus rafinesquii	Rafinesque's Big-eared Bat	LE		Yes	Yes	Yes		Yes				
Crangonyx amalus	Amalous Spring Amphipod	LE				Yes						
Crangonyx packardi	Packard's Cave Amphipod	LE			Yes	Yes	Yes	Yes				
Crotalus horridus	Timber Rattlesnake	LT		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Cynosciadium digitatum	Cynosciadium	LE		Yes								
Cyperus lancastriensis	Galingale	LT				Yes						
Cypripedium parviflorum	Small Yellow Lady's Slipper	LE			Yes							
Dendroica cerulea	Cerulean Warbler	LT		Yes				Yes				
Dennstaedtia punctilobula	Hay-scented Fern	LE			Yes	Yes						
Demognathus conanti	Spotted Dusky Salamander	LE			Yes							
Dichanthelium joorii	Panic Grass	LE			Yes			Yes				
Dichanthelium yadkinense	Panic Grass	LE				Yes						
Dodecatheon frenchii	French's Shootingstar	LT		Yes	Yes	Yes		Yes	Yes			
Dryopteris celsa	Log Fern	LE			Yes							
Egretta caerulea	Little Blue Heron	LE	Yes									
Eryngium prostratum	Eryngo	LE				Yes	Yes		Yes			
Euonyymus americanus	American Strawberry Bush	LE			Yes	Yes		Yes				
Eupatorium hyssopifolium	Hyssopleaf Thoroughwort	LE				Yes						
Fundulus dispar	Starhead Topminnow	LT						Yes				
Fusconaia ebena	Ebonyshell	LT				Yes						
Gallinula galeata	Common Gallinule	LE		Yes				Yes		Yes		
Gastrophryne carolinensis	Eastern Narrowmouth Toad	LT		Yes		Yes		Yes				
Glyceria arkansana	Manna Grass	LE		Yes				Yes				
Halesia Carolina	Silverbell Tree	LE		Yes								
Helianthus angustifolius	Narrow-leaved Sunflower	LT				Yes						
Hesperiaa metea	Cobweb Skipper	LT				Yes						
Heteranthera reniformis	Mud Plantain	LE				Yes		Yes				
Hexalectris spicata	Crested Coralroot Orchid	LE		Yes								
Huperzia porophila	Cliff Clubmoss	LT		Yes	Yes	Yes						
Hybognathus hayi	Cypress Minnow	LE			Yes			Yes			Yes	
Hydrolea uniflora	One-flowered Hydrolea	LE		Yes	Yes			Yes				
Hyla avivoca	Bird-voiced Treefrog	LT		Yes	Yes	Yes		Yes				
Ictinia mississippiensis	Mississippi Kite	LT		Yes	Yes			Yes				

Scientific Name	Common Name	State Protection	Franklin County	Jackson County	Johnson County	Pope County	Saline County	Union County	Williamson County	Perry County	Jefferson County	Hamilton County
			Present									
Isotia verticillata	Whorled Pogonia	LE				Yes						
Ixobrychus exilis	Least Bittern	LT		Yes			Yes	Yes	Yes	Yes		
Lampetra aepyptera	Least Brook Lamprey	LT			Yes	Yes			Yes			
Lanius ludovicianus	Loggerhead Shrike	LE		Yes	Yes	Yes	Yes	Yes		Yes	Yes	
Lepomis miniatus	Redspotted Sunfish	LE				Yes		Yes				
Lepomis symmeticus	Bantam Sunfish	LT			Yes			Yes				
Ligumia recta	Black Sandshell					Yes						
Limthlypis swainsonii	Swainson's Warbler	LE		Yes	Yes							
Lonicera dioica var. glaucescens	Red Honeysuckle	LE		Yes								
Lonicera flava	Yellow Honeysuckle	LE		Yes		Yes						
Lysimachia radicans	Creeping Loosestrife	LE			Yes							
Macrhybopsis gelida	Sturgeon Chub	LE		Yes								
Macrochelys temminckii	Alligator Snapping Turtle	LE						Yes				
Malus angustifolia	Narrow-leaved Crabapple	LE				Yes						
Matelea decipiens	Climbing Milkweed	LE		Yes	Yes			Yes	Yes			
Melanthium virginicum	Bunchflower	LT		Yes								
Melothria pendula	Squirting Cucumber	LT		Yes	Yes	Yes		Yes				
Moxostoma carinatum	River Redhorse	LT	Yes	Yes				Yes				
Myotis austroriparius	Southeastern Myotis	LE			Yes	Yes	Yes	Yes				
Myotis grisescens	Gray Bat	LE		Yes	Yes	Yes						
Myotis leibii	Eastern Small Footed Bat	LT			Yes	Yes						
Myotis septentrionalis	Northern Long Ear Myotis	LT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Myotis sodalis	Indiana Bat	LE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Necturus maclulosus	Mudpuppy	LT						Yes				
Neotoma floridana	Eastern Wood Rat	LE		Yes	Yes	Yes	Yes	Yes				
Nerodia cyclopion	Mississippi Green Watersnake	LT						Yes				
Nerodia erythrogaster neglecta	Copperbelly Water Snake											
Notropis agenus	Pugnose Shiner	LE				Yes					Yes	
Notropis boops	Bigeye Shiner	LE		Yes				Yes				
Notropis texanus	Weed Shiner	LE						Yes				
Nyctanassa violacea	Yellow-crowned Night Heron	LE			Yes				Yes			
Orconectes indianesis	Indiana Crayfish	LE			Yes	Yes	Yes		Yes			
Orconectes placidus	Bigclaw Crayfish	LE		Yes		Yes						
Oxalis illiensis	Illinois Wood Sorrel	LE		Yes		Yes						
Pandion haliaetus	Osprey	LE				Yes					Yes	
Phaeophyscia leana	Lea's Bog Lichen	LT				Yes						
Pinus echinata	Shortleaf Pine	LE		Yes		Yes		Yes	Yes			

Scientific Name	Common Name	State Protection	Franklin County	Jackson County	Johnson County	Pope County	Saline County	Union County	Williamson County	Perry County	Jefferson County	Hamilton County
			Present									
Planera aquatica	Water Elm	LT			Yes	Yes						
Plantago cordata	Heart-leaved Plantain	LE		Yes	Yes	Yes	Yes					
Plantanthera clavellata	Wood Orchid	LE				Yes						
Plantanthera flava var. herbiola	Tubercled Orchid	LT			Yes	Yes				Yes		
Poa alsodes	Grove Bluegrass	LE		Yes		Yes						
Poa wolfii	Wolf's Bluegrass	LE					Yes					
Polygala incarnata	Pink Milkwort	LE				Yes						
Potamilus capax	Fat pocketbook	LE				Yes						
Potamogeeton pulcher	Spotted Pondweed	LE	Yes	Yes								
Prostoia completa	Central Forestfly	LE						Yes				
Pseudemys concinna	River Cooter	LE	Yes								Yes	
Ptillimnium nuttallii	Mock Bishop's Weed	LE		Yes								
Quercus montana	Rock Chestnut Oak	LT		Yes			Yes	Yes				
Quercus phellos	Willow Oak	LT			Yes			Yes				
Rallus elegans	King Rail	LE								Yes		
Rhexia mariana	Dull Meadow Beauty	LE		Yes		Yes	Yes		Yes			
Rhynchospora glomerta	Clustered Beaked Rush	LE			Yes	Yes						
Saggitaria australis	Arrowhead	LE				Yes						
Salvia azurea ssp. Pitcheri	Blue Sage	LT			Yes	Yes						
Scaphirhynchus albus	Pallid Sturgeon	LE						Yes				
Scirpus polyyphyllus	Bulrush	LT				Yes						
Scleria pauciflora	Carolina Whipgrass	LE			Yes	Yes			Yes			
Sedum telephioides	American Orpine	LT				Yes	Yes					
Spiranthes vernalis	Spring Ladies' Tresses	LE		Yes	Yes	Yes	Yes		Yes			
Stellaria pubera	Great Chickweed	LE				Yes						
Stenanthium gramineum	Grass-leaved Lily	LE			Yes	Yes						
Styrax americana	Storax	LT			Yes	Yes		Yes				Yes
Synandra hispidula	Hairy Synandra	LE		Yes								
Talinum parviflorum	Small Flower-of-an-hour	LT			Yes	Yes		Yes				
Tantilla gracilis	Flathead Snake	LT						Yes				
Terrapene ornata	Ornate Box Turtle	LT	Yes							Yes	Yes	
Thamphis sauritus	Eastern Ribbon Snake	LT			Yes	Yes						
Thelypteris veboracensis	New York Fern	LE				Yes						
Thryomanes bewickii	Bewick's Wren	LE			Yes	Yes			Yes			
Tomanthera auriculata	Ear-leafed Foxglove	LT										
Torreyochloa pallida	Grass	LE		Yes				Yes				
Toxolasma lividus	Purple Lilliput	LE				Yes						

Scientific Name	Common Name	State Protection	Franklin County	Jackson County	Johnson County	Pope County	Saline County	Union County	Williamson County	Perry County	Jefferson County	Hamilton County
			Present									
Trichomanes boschianum	Filmy Fern	LE			Yes	Yes						
Trifolium reflexum	Buffalo Clover	LT		Yes								
Trillium viride	Green Trillium	LE	Yes					Yes	Yes			
Tyto alba	Barn Owl	LE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Urtica chamaedryoides	Nettle	LT		Yes				Yes				
Vaccinium stamineum	Deerberry	LE				Yes						
Villosa liesa	Little Spectaclecase	LT				Yes		Yes				

FIGURES



Legend

PERMIT BOUNDARY

1 inch = 5,000 feet

0 2,500 5,000 10,000 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/14/17.

REV.	DATE	DESCRIPTION	P.M.

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

PROJECT LOCATION MAP

WATER MANAGEMENT PIPELINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	4/3/2018	Project No.	B16-454-1413
CHECKED BY	BWA	4/3/2018		
APPROVED BY	BAH	4/3/2018	DRAWING NO.	B16-454-B1

N

Legend

- SAMB STREAMS
- 100 FLOOD PLAIN
- PERMIT BOUNDARY
- NWI WETLANDS

1 inch = 5,000 feet

0 2,500 5,000 10,000 Feet

References:

Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/15/17.

REV.	DATE	DESCRIPTION	P.M.

BECKLEY, WV
(304) 255-0491

CANONSBURG, PA
(724) 745-3630

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

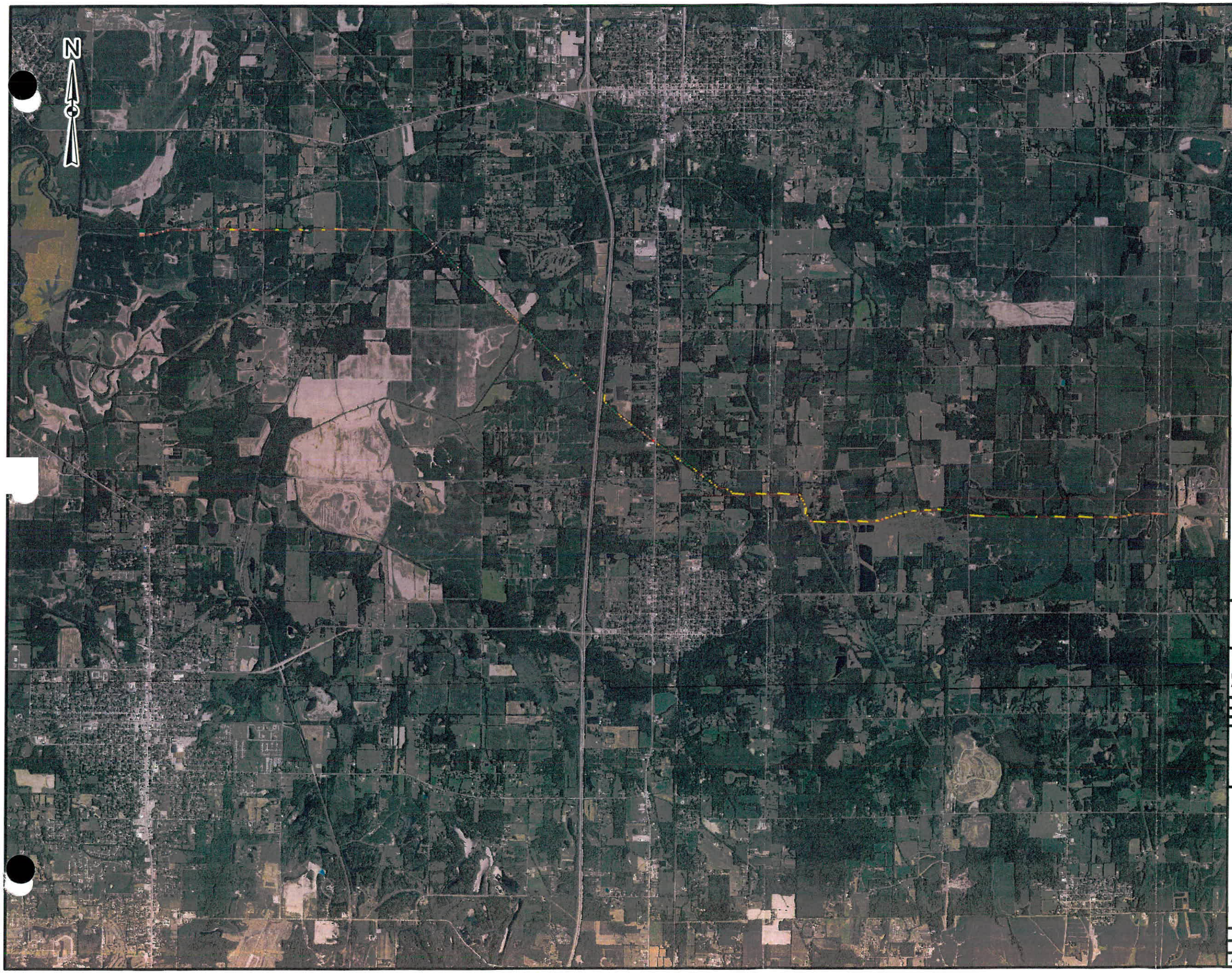
AQUATIC RESOURCES MAP

WATER MANAGEMENT PIPELINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	4/3/2018	Project No.	B16-454-1413
CHECKED BY	BWA	4/3/2018		
APPROVED BY	BAH	4/3/2018	DRAWING NO. B16-454-B15	



Legend

- PERMIT BOUNDARY
- OPEN WATER - .22 AC.
- DEVELOPED, OPEN SPACE - 3.33 AC.
- DEVELOPED, LOW INTENSITY - 2.44 AC.
- DEVELOPED, MEDIUM INTENSITY - .22 AC.
- DECIDUOUS FOREST - 23.12 AC.
- GRASSLAND/HERBACEOUS - .44 AC.
- PASTURE/HAY - 30.02 AC.
- CULTIVATED CROPS - 12.67 AC.
- WOODY WETLANDS - .22 AC.

1 inch = 5,000 feet

0 2,500 5,000 10,000 Feet

References:

Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial Images were retrieved from ESRI Online Services on 1/2/2018.

REV.	DATE	DESCRIPTION	P.M.

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
CHARLESTON, WV
618-217-2090

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

LAND COVER MAP
PROJECT AREA

WATER MANAGEMENT PIPELINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, IL

DRAWN BY	AJP	4/3/2018	Project No.	B16-454-1414
CHECKED BY	BWA	4/3/2016		
APPROVED BY	BAH	4/3/2018	DRAWING NO. B16-454-B44	

Site Specific Resource Information and Protection and Enhancement Plan

Barn Owl *(Tyto alba)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1 - Protection Measures 3
3.1.1 Avoid habitat impacts 4
3.2 Objective 2 - Enhancement Measures 4
3.2.1 Post construction land use 4
3.2.2 Specialized Habitat Features 4
4.0 LITERATURE CITED 5

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1784.21(a)(2)(A) and 1784.21(b)(2), the Illinois Department of Natural Resources (Department) requires an assessment of threatened and endangered species and protection and enhancement plans for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted and the barn owl was not identified. However, the habitat survey completed by Alliance determined that the barn owl *(Tyto alba)* could occur on the proposed permit area and adjacent area. Therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for the barn owl using the best available resources and current technology.

1.2 Species Description

The barn owl is one of the most widespread vertebrate species on Earth, occurring on every continent except Antarctica (WDNR 2006). In southern Illinois, the barn owl is considered a rare year round resident. Barn owls inhabit open areas, including agricultural fields, grasslands and marshes. Their diet is dominated by voles and other small mammals (WDNR 2006). Barn owls nest and roost in a variety of places including hollows or natural cavities in trees, manmade structures, caves, and cliffs. Barn owl populations have five documented occurrences within Franklin County, the closest begin 4.1 miles from the project area. It also occurs in Jackson County, Johnson County, Pope County, Saline County, Union County, Hamilton County, Perry County, and five occurrences in Williamson County, the closest being 2.2 miles from the project area.

Populations are stable in some parts of their range, but in the United States seven Midwestern states, including Illinois, list barn owls as threatened or endangered. The most often cited cause of these declines has been the loss of nesting, roosting, and foraging sites resulting from changing agricultural practices and urbanization (WDNR 2006). As agriculture has increased in scale and modern farming techniques have been implemented many farm buildings have disappeared from the landscape, rows of trees have been removed, and production has shifted from mixed grain and forage such as oats and hay to row crop monocultures dominated by com and soybeans.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site

predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the vegetation survey included: Birds of Illinois, 2004; and Peterson Field Guide to Mammals of North America, 4th edition, 2016.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

The two dominant habitat types, pasture/hay and deciduous forest, are both primary roosting and foraging habitat for the barn owl. These two habitats amount of 75.16% of the total habitat within the project area. Surrounding areas are comprised of similar habitat that will not be impacted. By utilizing the active gas line and railroad right-of-way, Williamson is decreasing the impact to habitat by the nest means available.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-operation phase to develop appropriate habitat for the species.

3.1 Objective 1- Protection Measures

The first objective of the protection and enhancement plan is to provide protective measures during the operation that will help the operator minimize disturbances to the barn owl and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation.

3.2 Objective 2-Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the barn owl in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

3.2.2 Specialized Habitat Features

Barn owls may use alternate structures such as barns, silos, and abandoned buildings that have an appropriately-sized cavity (USDA 1996). Constructing barn owl nest boxes near areas of foraging habitat may be an effective management strategy (Matteson and Petersen 1988, Schneider and Pence 1992). In order to enhance potential habitat for the barn owl, barn owl boxes will be incorporated into the post-construction reclamation plan. One (1) barn owl box will be erected on the permit area after reclamation has occurred.

The USDA (1996) reports that wooded areas or open fields and meadows with few trees can provide appropriate conditions for owl nest box sites. Oaks *(Quercus spp.)* and the American sycamore *(Platanus occidentalis)* are ideal tree species. The barn owl nest boxes can face any direction and should be hung 3 feet below a stout tree limb suspended by cables or mounted on poles 15 to 30 feet above the ground. The entrance should be unobstructed and boxes should be positioned so they do not attract human attention. USDA (1996) recommends placing approximately 6 boxes per square mile. Boxes mounted high in barns or abandoned buildings also are readily occupied by owls. If the nest box is placed on a post, special caution should be taken by wrapping the post with an 18-inch metal, conical predator guard.

4.0 LITERATURE CITED

Solymar, B. Dand J. D. McCracken. 2002. Draft National Recovery Plan for the Barn Owl and its Habitat.

U.S. Department of Agriculture. 1996. Barn Owl Nest Box ftp://ftp-fc.sc. egov.usda.gov/CA/news/Publications/wild_habitat/owl_nest.pdf. Accessed January 30, 2012.

Wisconsin Department of Natural Resources. 2006. Common Barn Owl (Tyto alba). http://www.dnr.state.wi.us/org/LAND/er/factsheets/birds/BARNOWL.HTM. Accessed September 22, 2008.

EXAMPLE NEST BOX DESIGN

Example Barn Owl Nest Box Design

BARN OWL NEST BOX

Plans and Instructions

United States Department of Agriculture

Natural Resources Conservation Service
Davis, CA 95618



The barn owl (Tyto alba) is one of the most beneficial owls in the world. Farmers who know the merits of the barn owl strive to keep this "cat with wings" around their crops. One of the common resident owls, the barn owl has, a white heart-shaped face and is distinguished by whitish or pale cinnamon underparts (that look ghostly at night) and buffy or rusty upper plumage. Average barn owls weigh about 1 pound, and are approximately 15 inches long with a wingspan of about 40 inches.

Barn owls frequently are seen near roads, vacant fields, and wooded areas at night. Their call is a long, raspy scream. They hunt from perched or flying positions. Velvety feathers with soft fringes allow them to silently approach their prey, which they can find in total darkness. A barn owl's diet consists mainly of rodents, such as gophers, ground squirrels, and meadow mice.

The female lays 1 to 11 white eggs between November and July. Incubation is about 30 days. One to two broods are reared during the season with the young leaving the nest after about 8 weeks.

NESTING SITES

Barn owls do not build nests but lay eggs in holes in rotted trees, rocky cliffs, or bluffs. Alternatively, they may use structures with an appropriate cavity, including barns, silos, and abandoned buildings. You can encourage barn owls by building a nesting box and by establishing perching sites.

PICKING A NEST SITE

Good locations for barn owl nest boxes are wooded areas or in open fields and meadows with a few trees. Oak and sycamore are ideal tree species. The box can face any direction and should be hung 3 feet below a stout tree limb suspended by cables or mounted on poles 15 to 30 feet above the ground. The entrance should be unobstructed and the box positioned so it does not attract human attention. Place about 6 boxes per square mile. Boxes mounted high in barns or abandoned buildings also are readily occupied by owls. If the nest box is placed on a post, the post should be wrapped with an 18-inch metal, conical predator guard.

IMPORTANT FACTS TO CONSIDER

Honey bees frequently take over barn owl nest boxes, making them useless for nesting. About one fourth of the nest boxes in coastal southern California are used by honey bees.

About 85 percent of barn owl nesting attempts produce fledging young. Reasons for mortality include human disturbance, limb breakage, and attacks by raccoons, opossums, skunks, and bobcats.

Summer is the best time to erect a barn owl nest box. Boxes should not be disturbed during the nesting season or owls may desert them.

Barn owl nest boxes can be especially useful on farms and ranches where rodent control is desired.

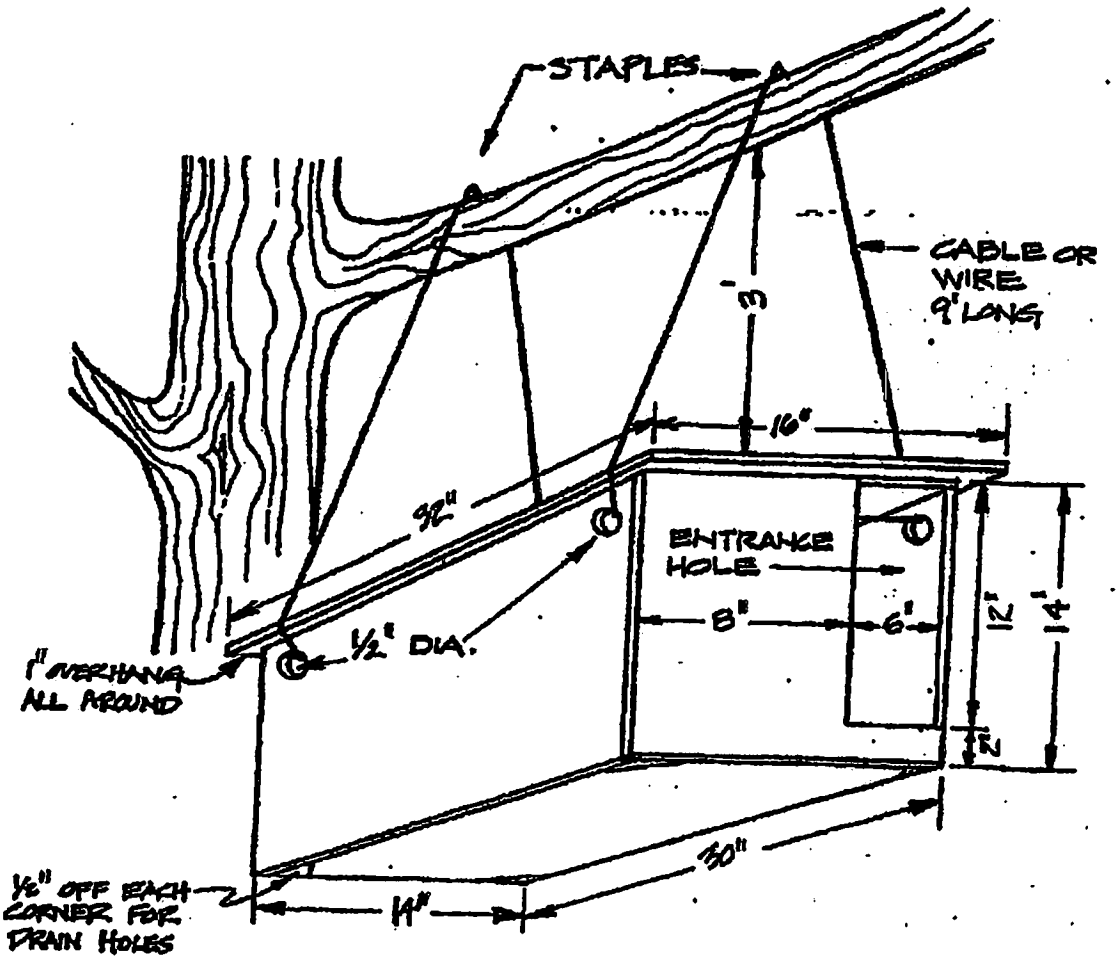
BUILDING A NEST BOX

Barn owl nest boxes are easy to build. Ideal material is 3/8-inch or 1/2-inch plywood. Nest boxes should be painted using a camouflage pattern or drab green, black, and brown to minimize human disturbance. Painting also helps prevent warping. Place a 2-inch layer of sawdust or wood chips in the bottom of the box and replace each year.

GUIDE

1. Make the entrance hole 6 inches wide by 12 inches high.
2. Hang or mount the box 15 to 30 feet above the ground and, if in a tree, 3 feet below a sturdy branch.
3. Use scrap exterior grade 3/8-inch or 1/2-inch ply wood.
4. Use #4 or #5 galvanized hot dipped box nails.
5. Use a marine grade plastic resin or exterior wood glue for assembly.
6. Make the roof 16 inches by 26 inches to give a 1-inch overhang all around.
7. Use wire staples to keep the cable from moving on the branch.
8. Use at least a 9-foot long piece of wire to hang boxes.

BARN OWL NEST BOX
Plans



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Site Specific Resource Information and Protection and Enhancement Plan

Bewick's Wren (*Thryomanes bewickii*)

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed waterline and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The survey completed by Alliance determined that the Bewick's wren did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to the Bewick's wren occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a PEP has been prepared for the Bewick's wren using the best available resources and current technology.

1.2 Species Description

The Bewick's wren is a perching bird in the *Troglodytidae* family. This medium sized wren has a slender body with long tail feathers that are held upright. They are generally brown and gray with a single long white stripe over the eye. The back and wings are generally plain brown with its underparts being both gray and white. The tail has a barred black appearance and is usually tipped with white spots. Both males and females have the same appearance. Their bills are long, slender, and down curved. These birds favor brushy, thicket habitat types in open country/ woodlands (DeVore et al 2004). They are primarily insectivores and nest in cavities of trees, as well as human made structures (DeVore et al 2004). This species is state endangered in Illinois. This species is known to occur in Williamson County 6.1 miles from the project areas, as well as in Johnson and Pope Counties in the Shawnee National Forest (IDNR). Presence for the Bewick's wren has been assumed due to its primary habitat being present, as well as its known proximity to the project.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the vegetation survey included: Birds of Illinois, 2004.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most

commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

The primary habitats for Bewick's wren are deciduous forest, grassland herbaceous and pasture/hay. These three (3) habitats take up the majority of the project area. Utilizing the existing gas line and railroad right-of-way limits the impact on potential nesting and foraging uses for the Bewick's wren as much as possible.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during the operation that will help the operator minimize disturbances to the Bewick's wren and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced on-site through reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the Bewick's wren in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

CLO (The Cornell Lab of Ornithology). All About Birds. [Internet]. The Cornell Lab of Ornithology. [cited 2014 August 1]. Available from http://www.allaboutbirds.org/guide/search.aspx

DeVore, Sheryl, etal. Birds of Illinois. Lone Pine Publishing. 2004.

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Site Specific Resource Information and Protection and Enhancement Plan

Ornate Box Turtle *(Terrapene ornata)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1 - Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2 - Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1784.21(a)(2)(A) and 1784.21(b)(2), the Illinois Department of Natural Resources (Department) requires an assessment of threatened and endangered species and protection and enhancement plans for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted and the ornate box turtle was not identified. However, the habitat survey completed by Alliance determined that the ornate box turtle *(Terrapene ornata)* could occur on the proposed permit area and adjacent area. Therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for the ornate box turtle using the best available resources and current technology.

1.2 Species Description

The ornate box turtle (*Terrapene ornata*) is an uncommon to rare species within much of its range in Illinois (INHS 2014). It has a moderately high dark brown carapace that is flattened along the yellow midline and is without a keel. It has a hinged plastron patterned with yellow lines radiating form the center of each scute. It ranges up to 13 cm and the head is sometimes spotted. In Illinois, the ornate box turtle is most commonly associated with prairie habitat. The ornate box turtle inhabits open areas, including agricultural fields, grasslands and pastures. Their diet is dominated by insects, although they also eat gnats, worms, tadpoles, and bird eggs (INHS 2014). Ornate box turtle populations have been documented within Franklin County 15.4 miles from the project area in Wayne Fitzgerrell State Park.

Ornate box turtles remain relatively common throughout much of their range, but in the United States seven Midwestern states, including Illinois, list ornate box turtles as threatened or endangered. The most often cited cause of these declines has been the destruction, degradation and fragmentation of its grassland habitat and anthropogenic affects due to collection or vehicle mortally (Redder et al 2006).

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities

limits impacts previously undisturbed locations. Guides used to aid in field identification for the vegetation survey included: Peterson Field Guide to Reptiles and Amphibians of Eastern/Central North America, 3rd edition, 1998.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

The grassland/herbaceous, pasture/hay and row crop habitats on the site provide potential foraging and nesting areas for the ornate box turtle. Adjacent areas contain similar habitats. No potential nesting sites were found during site investigations and the likelihood of such sites being present is low. By utilizing the existing gas line and railroad right-of-way, it decreases the likelihood that adjacent areas will be impacted by the waterline.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-operation phase to develop appropriate habitat for the species.

3.1 Objective 1- Protection Measures

The first objective of the protection and enhancement plan is to provide protective measures during the operation that will help the operator minimize disturbances to the ornate box turtle and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated

with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation.

3.2 Objective 2-Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the ornate box turtle in the post- operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Illinois Natural History Survey (INHS). 2014. Ornate Box Turtle Species Bio available at www.inhs.illinois.edu/animals_plants/herps/species/te_ornata.html. Accessed 3/16/18.

Redder, A.J., C.K. Dodd, Jr., and D. Keinath. (2006, May 16). Ornate Box Turtle (Terrapene ornate ornate): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: http://www.fs.fed.us/r2/preojects/scp/assessments/ornateboxturtle.pdf [September 2014].

Site Specific Resource Information and Protection and Enhancement Plan

Chuck-Will's Widow (*Caprimulgus carolinensis*)

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed waterline and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The survey completed by Alliance determined that the chuck-will's widow did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to the chuck-will's widow occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a PEP has been prepared for the chuck-will's widow using the best available resources and current technology.

1.2 Species Description

The chuck-will's widow is a ground nesting bird in the *Caprimulgidae* family. It can be found in southern Illinois during its breeding season from mid to late April through September. They are best identified by their voice, but also by their cryptic coloration. They have a mottled brown and buff body with rufous overall, pale brown to buff throat with a white "necklace", dark breast and a rounded tail. Their primary habitat is upland woods often near or in pine plantations. It eats primarily insects, but occasionally eats small birds (DeVore et al 2004). This species is considered state threatened in Illinois (IDNR, accessed 2018). There are 10 occurrences for this species in Williamson County, the closest being one mile away from the project area. It also occurs in Jackson, Union, Johnson, and Pope Counties. The chuck-will's widow was not observed during the field surveys, but presence has been assumed due to the amount of deciduous forest and its proximity to the project.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water. The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts to previously undisturbed locations. Guides used to aid in field identification for the wildlife survey included: Birds of Illinois, 2004.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most

commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

The chuck-will's widow prefers deciduous forest which is the project's second most dominant habitat comprising over 30% of the project. This deciduous forest provides an ample amount of nesting/foraging area for this species. By utilizing the existing gas line and railroad right of way, Williamson is able to limit the potential impacts on the chuck-will's widow as much as possible.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during the operation that will help the operator minimize disturbances to the chuck-will's widow and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. By utilizing the existing right-of-way, it limits the cutting of deciduous forest, which is the chuck-will's widow's primary habitat. Where avoidance of potential habitat is not practical, habitat will be replaced on-site through reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the chuck-will's widow in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

DeVore, Sheryl, etal. Birds of Illinois. Lone Pine Publishing. 2004.

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Site Specific Resource Information and Protection and Enhancement Plan

Climbing Milkweed *(Matelea decipiens)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The field survey, completed by Alliance, determined that climbing milkweed did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to climbing milkweed occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for climbing milkweed using the best available resources and current technology.

1.2 Species Description

Climbing milkweed is of the *Aslepiadaceae* family. Climbing milkweed is a perennial vine with a complete regular flower that is violet with a brownish-purple corolla. Leaves are opposite, simple, entire and ovate to cordate in shape. Climbing milkweed typically grows in valleys and thickets along streams, open woods, and upland thickets. It is listed as state threatened for Illinois (IDNR). Climbing milkweed (*Matelea decipiens*) has one occurrence in Williamson County 3.5 miles from the project area at Cedar Bluff in Ferne Clyffe State Park, one occurrence in Jackson County 19.5 miles from the project area, one occurrence in Johnson County 22.6 miles from the project area, and one occurrence on the Williamson/Union County border 19.0 miles from the project area in the Crab Orchard National Wildlife Refuge.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water. The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts to previously undisturbed locations. Guides used to aid in field identification for the vegetation survey included: Manual of Vascular Plants of Northeastern United States and Adjacent Canada; 2nd edition, 1991; a Flora of Southern Illinois, 1959; and the Tallgrass Prairie Wildflowers, 2005.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most

commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

The primary habitat for climbing milkweed is deciduous forest, woody wetlands, and grassland/herbaceous. These three habitat types comprise 32.68% of the project area. By utilizing the already existing gas line and railroad right of way, Williamson is limiting its potential impacts on the climbing milkweed to the best of their abilities.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and in the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during construction that will help the operator minimize disturbances to climbing milkweed and its habitat. The protection measures include measures that will prevent adverse impacts to deciduous forest, woody wetland, and grassland/herbaceous habitat that serve as potential habitat to climbing milkweed.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site

through reclamation or off-site through compensatory mitigation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for climbing milkweed in the post-construction phase of the operation.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Mohlenbrock, R.H. 2002. Vascular Flora of Illinois. Southern Illinois Univeristy Press. Carbondale and Edwardsville, IL.

Site Specific Resource Information and Protection and Enhancement Plan

Dull Meadow Beauty *(Rhexia mariana)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The field survey, completed by Alliance, determined that dull meadow beauty did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to dull meadow beauty occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for dull meadow beauty using the best available resources and current technology.

1.2 Species Description

Dull meadow beauty is a perennial dicot of the family *Melastomataceae* (USDA). The leaves of this plant are simple, opposite, and the edge of the leaf blade is entire. The flower of the dull meadow beauty possesses four petals and is purple in color with bright yellow stamens. This species' interpreting wetland status within the Midwest is obligate (OBL), meaning that it only grows within wetland habitats, shores of rivers or lakes, and sandplains/barrens (Go Botany). This species is considered endangered within the state of Illinois (IDNR). Dull meadow beauty has one known occurrence in Saline County 15 miles from the project area, eight occurrences in Pope County in the Shawnee National Forest, 18.2 miles from the project area in Cretaceous Hills Nature Preserve and Klondike Springs and 50.7 miles from the project area in Kickasola Cemetery Barrens and Springs. It has one known occurrence in Jackson County 11.2 miles from the project area and six occurrences in Williamson County 12.3 and 10.4 miles from the project area in Crab Orchard National Wildlife Refuge and 12.0, 10.2, 4.6, and 5.8 miles from the project area.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts to previously undisturbed locations. Guides used to aid in field identification for

the vegetation survey included: Manual of Vascular Plants of Northeastern United States and Adjacent Canada; 2nd edition, 1991; a Flora of Southern Illinois, 1959; and the Tallgrass Prairie Wildflowers, 2005.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

Due to the amount of stream and wetlands within the permit area, it provides potential habitat for the dull meadow beauty. However, by utilizing the existing gas line and railroad right of way, it limits the impacts on riparian and wetland habitat that could contain the dull meadow beauty.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during construction that will help the operator minimize disturbances to the dull meadow beauty and its habitat. The protection measures include measures that will prevent adverse impacts to palustrine emergent habitat, as well as riparian areas along streams and rivers that serve as potential habitat for the dull meadow beauty.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated

with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation or off-site through compensatory mitigation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for dull meadow beauty in the post-construction phase of the operation.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Go Botany. Simple Key for Plant Identification. [Internet]. 201-2013. New England Wild Flower Society. [cited 2018 March 1]. Available from https://gobotany.newenglandwild.org/simple/

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Site Specific Resource Information and Protection and Enhancement Plan

Eryngo *(Eryngium prostratum)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 3
3.2.1 Post construction land use 3
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The field survey, completed by Alliance, determined that eryngo did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to eryngo occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for eryngo using the best available resources and current technology.

1.2 Species Description

Eryngo is a perennial dicot of the family *Apiaceae* (USDA). The stems can grow 40 cm long or longer and creep along the ground. The stems are hairless and ribbed. Leaves vary in shape in size, but are around 2 cm long and are oval and elliptic shaped. Some leaves are 3-lobed and all are hairless and have serrated margins. The inflorescence is 7-8 mm x 4mm and contains abundant clusters flowers that occur spring-fall. The flowers each measure .8-1 mm x .3 mm and have five hairless purple to blue petals. The habitat of eryngo consists of low wet woods, borders of swamps and ponds, and moist prairies (Tenaglia). It is listed as state endangered (INHS). Eryngo has one occurrence in Saline County 10.3 miles from the project area, one occurrence in Williamson County 12.4 miles from the project area in the Crab Orchard National Wildlife Refuge in Cambira Neck, and one occurrence in Pope County 22.8 miles from the project area in the Shawnee National Forest in Teal Pond.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the vegetation survey included: Manual of Vascular Plants of Northeastern United States and

Adjacent Canada; 2nd edition, 1991; a Flora of Southern Illinois, 1959; and the Tallgrass Prairie Wildflowers, 2005.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

Due to the amount of deciduous forest and wetlands throughout the project area, it provides potential habitat for eryngo. By locating the project area within the gas line and railroad right of way, Williamson is limiting its impacts to the eryngo as much as possible.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during construction that will help the operator minimize disturbances to eryngo and its habitat. The protection measures include measures that will prevent adverse impacts to forested, scrub shrub, and open water wetland habitats that serve as potential habitat to eryngo.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This

riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced on-site through reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for eryngo in the post-mining phase of the operation.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Tenaglia, Dan. Eryngium prostratum. [Internet]. February 8, 2007. [cited 2018 March 1]. Available from http://www.missouriplants.com/Blueopp/Eryngium_prostratum_page.html

Site Specific Resource Information and Protection and Enhancement Plan

False Bugbane *(Cimicifuga racemosa)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The field survey, completed by Alliance, determined that false bugbane did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to false bugbane occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for false bugbane using the best available resources and current technology.

1.2 Species Description

False bugbane, also known as black cohosh is a perennial herb of the *Ranunculaceae* family (USDA). It is a tall plant at 3-8 feet in height; the stem is glabrous and usually not grooved. It has alternate compound leaves with a serrate margin and oblong to ovate in shape. The flower is one to several racemes 6 inches or more long. The flower is white and appears to be all stamens since the petals are small. It blooms from June to July. The species prefers mesic deciduous woodlands (often where Sugar Maple is dominant) and the bases of bluffs along rivers (IDNR). False bugbane is listed as state endangered (IDNR). False bugbane has only one occurrence in Franklin County 1.3 miles from the project area in the Franklin County Country Club.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts to previously undisturbed locations. Guides used to aid in field identification for the vegetation survey included: Manual of Vascular Plants of Northeastern United States and Adjacent Canada; 2nd edition, 1991; a Flora of Southern Illinois, 1959; and the Tallgrass Prairie Wildflowers, 2005.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (0.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most

commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

False bugbane is most likely to occur in deciduous forest or along streams or rivers. Deciduous forest makes up 31.78% of the habitat in the project area. The surrounding areas have similar habitat. By utilizing the existing gas line and railroad right-of-way, Williamson will be able to decrease their potential impact on false bugbane and its habitat.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or its habitat. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during mining that will help the operator minimize disturbances to false bugbane and its habitat. The protection measures include measures that will prevent adverse impacts to deciduous forest habitat that serve as potential habitat to false bugbane.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced on-site through

reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for false bugbane in the post-construction phase of the operation.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

USDA (United States Department of Agriculture). Plants Database. [Internet]. July 30, 2014. [cited 2014 August 1]. Available from http://plants.usda.gov/java/.

Site Specific Resource Information and Protection and Enhancement Plan

Green Trillium *(Trillium viride)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The field survey, completed by Alliance, determined that green trillium did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to green trillium occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for green trillium using the best available resources and current technology.

1.2 Species Description

Green trillium is a perennial monocot in the *Liliaceae* family (IDNR). This plant had bluish-green mottled lance shaped leaves. It produces a green-yellow erect flower in the spring whose petals are sometimes streaked with purple. It is found in rich woods, bluffs, rocky hillsides with limestone outcrops, in woodsy, humus rich soil over a stiff clay substrate (FNAA). Green trillium is considered endangered in Illinois (USDA). Green trillium has one known occurrence in Franklin County 5.1 miles from the project area, one occurrence in Williamson County 9.6 miles from the project area, and one occurrence in Union County 22.0 miles from the project area in the Shawnee National Forest.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts to previously undisturbed habitat. Guides used to aid in field identification for the vegetation survey included: Manual of Vascular Plants of Northeastern United States and Adjacent Canada; 2nd edition, 1991; a Flora of Southern Illinois, 1959; and the Tallgrass Prairie Wildflowers, 2005.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer Saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most

commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

The primary habitats for green trillium is deciduous forest and woody wetlands. These two habitat types comprise 23.24% of habitat within the project area. By utilizing the already existing gas line and railroad right of way, Williamson is decreasing its impacts on green trillium to the best of their abilities.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during construction that will help the operator minimize disturbances to green trillium and its habitat. The protection measures include measures that will prevent adverse impacts to deciduous forest and woody wetland habitats that serve as potential habitat to green trillium.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream and wetland habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced on-

site through reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for green trillium in the post-construction phase of the operation.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

FNAA (Flora of North America Association). Flora of North America. [Internet]. [cited 2018 March 15]. Available from http://www.efloras.org/flora_page.aspx?flora_id

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Site Specific Resource Information and Protection and Enhancement Plan

Indiana Bat *(Myotis sodalis)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

INTRODUCTION 1
Project Description 1
Species Description 1
POTENTIAL INDIANA BAT HABITAT 1
Known Habitat 1
Potential Summer Habitat 2
MINIMIZING POTENTIAL TAKE OF AN INDIANA BAT 2
Avoidance of Potential Summer and or Winter Habitat 2
Tree Clearing Restrictions 2
Protection of Aquatic Resources 2
SHORT-TERM HABITAT REPLACEMENT 2
Flooded Timber 2
Tree Girdling 3
Staged Tree Removal 3
Minimization of Disturbed Areas 3
LONG TERM HABITAT REPLACEMENT 3
Appropriate Herbaceous Ground Cover 3
Travel Corridors 3
Watering Areas 3
Riparian Buffer Zone Protection 3
Other Long-Term Habitat Replacement: Reforestation 3
SUMMARY 4
LITERATURE CITED 4

INTRODUCTION

Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires an assessment of threatened and endangered species and protection and enhancement plans for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted and the Indiana bat was identified. Therefore, presence of the species is known. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for the Indiana bat using the best available resources and current technology.

A female Indiana bat was captured within the project area during a mist net survey conducted by Alliance in 2017. The bat was affixed with a radio transmitter and tracked to two separate roosts. The roost trees were 2.0 miles north of the project and 2.2 miles north of the project. Due to the roost trees being located, a 2.5 mile buffer was placed around them. This protection and enhancement plan is only for the 20.0 acre area of the project located within the 2.5 mile buffer.

Species Description

The Indiana bat (*Myotis sodalis*) is a small bat of the family *Vespertilionidae* and the genus myotis. They are native to 24 states including Illinois. They have been listed as endangered since 1967 due to large numbers of deaths associated with human disturbances. Indiana bats have dark brown to black fur and only weigh between 5-9 grams, with a wingspan of 9-11 inches (USFWS). According to the 2017 range-wide population estimate, Illinois has the fourth largest Indiana bat population in the United States with an estimated 52,354 bats (USFWS). Also, as noted earlier in this report, an Indiana bat was captured in the project area during a mist net survey in 2017, and a protection and enhancement plan has been provided for the portion of the permit within a two and a half mile buffer of the identified roost location.

POTENTIAL INDIANA BAT HABITAT

Known Habitat

Known habitat is defined as "habitat occupied by Indiana bats based on capture records, survey information, or other sources" (USFWS 2013).

There are no documented caves or other underground openings where Indiana bats have been recorded within the proposed permit area.

As previously discussed, a female Indiana bat was captured within the project area. The bat was found roosting 2.0 and 2.2 miles away from the project area. Due to the 20.0 acres of project

being within the 2.5 mile bat buffer, it makes it known habitat.

Potential Summer Habitat

Suitable/potential habitat is defined as habitat that is "within the range of the species and is either (a) currently suitable for habitation by Indiana bats, but for which no survey or other data is available showing that Indiana bats are present, or (b) may be suitable pending a definitive analysis of its suitability for Indiana bat use, which is especially relevant for potential winter habitat" (USFWS 2013).

MINIMIZING POTENTIAL TAKE OF AN INDIANA BAT

Avoidance of Potential Summer and or Winter Habitat

Due to the nature of this project, it will not be possible to avoid impacts to known summer habitat. The forested areas within the proposed permit area will be cleared to facilitate construction activity. As previously mentioned, the project will only impact 3.9 forested acres.

No potential winter hibernacula exist within the project area; therefore, no buffering of caves or abandoned mines is proposed.

Tree Clearing Restrictions

By avoiding tree clearing during Indiana bat occupancy periods, potential adverse effects to these species can be effectively minimized. As discussed above, the habitat on the proposed permit area does contain known summer habitat. Tree clearing during summer months could cause adverse effects to Indiana bats and will be avoided. Tree clearing operations will only occur from November 15 to March 31, unless otherwise authorized by the Illinois Department of Natural Resources and the U.S. Fish and Wildlife Service.

Protection of Aquatic Resources

One (1) perennial, five (5) intermittent, and one (1) ephemeral stream runs through the section of the project area that falls within the bat buffer and are addressed within the NPDES permit for this project.

SHORT-TERM HABITAT REPLACEMENT

The applicant proposes to girdle 71 trees adjacent to the project area to replace the habitat and provide temporary roost location for displaced bats.

Flooded Timber

Flooded timber is not proposed for this project because the applicant has chosen to girdle 71 trees.

Tree Girdling

Tree girdling has been proposed for this project. The applicant has proposed to girdle 71 trees adjacent to the project area. This will provide adequate roosting habitat for potentially displaced bats.

Staged Tree Removal

The proposed facility will require the clearing of approximately 3.9 forested acres. The applicant intends to remove all the trees in one stage; therefore, staged tree removal is not necessary.

Minimization of Disturbed Areas

The operation will only disturb areas that are necessary for the facilitation of mining and will result in the clearing of 3.9 forested acres.

LONG TERM HABITAT REPLACEMENT

Appropriate Herbaceous Ground Cover

Selection of appropriate ground cover species is important to ensure erosion control. The applicant will use herbaceous species or other species which have proven to be effective in controlling erosion. The project area will be seeded with a temporary seed mixture during construction. Upon completion, the project area will be seeded with a permanent seed mixture of cool season grasses augmented with warm season species. Other areas of the project area, such as farm fields, will be returned to their original land use.

Travel Corridors

No travel corridors are proposed for planting at this time.

Watering Areas

One (1) perennial, five (5) intermittent, and one (1) ephemeral stream occurs within the project area that falls within the bat buffer. Multiple other farm ponds and perennial streams exist within one mile of the project area that will provide adequate alternative water areas.

Riparian Buffer Zone Protection

Riparian buffer zones have been protected to the greatest extent possible; however, the project, as currently proposed, will affect the riparian buffer zone around one (1) perennial, five (5) intermittent, and one (1) ephemeral stream.

Other Long-Term Habitat Replacement: Reforestation

Currently, there are 3.9 acres of forest habitat in the proposed permit area which will be disturbed.

The applicant does not propose to replant the forested acres that are to be disturbed. Due to this project being a water line requiring a right of way, reforestation is not possible.

SUMMARY

The first objective of the PEP is to avoid the potential take of Indiana bats by avoiding or minimizing disturbance to known or potential habitat areas. While the applicant will not disturb any areas that are not critical to the facilitation of construction, there will be 3.9 acres of known Indiana bat summer habitat cleared. This forested habitat will be cleared between the dates of November 15 and March 31 to effectively minimize adverse effects to the bat population. However, Williamson reserves the right to consult with the USFWS and IDNR to explore other options, which may allow them to clear outside these dates should it become necessary.

The second objective of the PEP is to minimize the potential take of Indiana bats by providing short-term habitat measures. The forested habitat cleared during construction operations will be supplemented in the short-term by erecting bat boxes. There are also large amounts of forested habitat adjacent to the project area and forested habitat along Pond Creek that flows through the project to provide additional roosting/foraging habitat for any displaced bats.

The third objective of the PEP is to provide long-term habitat measures for the Indiana and NLEBs in the post-mine reclamation plan. The applicant will provide long-term habitat post-mining by planting appropriate herbaceous ground cover.

Given the minimization efforts to be used and the long-term habitat improvement post-construction, the Indiana bat populations should not be affected by the proposed project.

LITERATURE CITED

U.S. Fish and Wildlife Service (USFWS). 2007. Indiana Bat *(Myotis soda/is)* Draft Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, MN. 258pp.

U.S. Fish and Wildlife Service (USFWS). 2009 (Revised 2013). Range-wide Indiana Bat Protection and Enhancement Plan Guidelines.

U.S. Fish and Wildlife Service (USFWS). 2014. Accessed September 2, 2014. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0JE.

Type and amount of incidental take resulting from SMCRA permits issued by the Ill. Dept. of Natural Resources, Mines & Minerals Division, Land Reclamation Division for the 2018 year reporting period.

Permit No. [c]	Forest Habitat [d] (# acres)			Roost Trees [e] (# trees)		Hibernacula [f] (# hibernacula)	Individual Bats [g] (# bats)	Maternity Colonies [h] (# colonies)
	Known	Potential	Proposed PMLU [i]	Known	Potential			
	3.9		3.9	NA	NA	0	NA	NA
Annual Totals:	3.9		3.9	NA	NA	0	NA	NA

[a] Enter the name of the RA that compiled the data for the table in place of "[RA]".
[b] Enter the year or other period of time for which the table was prepared in place of "[Year or reporting period]".
[c] Enter the permit number for all permits (including amendments and revisions) where Indiana bat incidental take was expected and used based on known occurrence or when Indiana bat presence is assumed. Additional rows should be added to the table as necessary to include all permits where incidental take occurred in a given year.
[d] Enter the number of acres of known and/or potential habitat that will be cleared, removed, or destroyed by the permitted action. Potential habitat (e.g., assumed habitat) and known habitat must be accounted for separately in the table. Most permits will have at least one acreage entry for Forest Habitat and some permits may have entries for both. Indeterminable entries should be marked as "NA" in the table.
[e] Enter the number of known and/or potential roost trees that will be removed by the permitted action. Potential roost trees and known roost trees must be accounted for separately in the table. Indeterminable entries should be marked as N/A."
[f] Enter the number of known hibernacula that will be impacted (e.g., changes in air flow, etc.) or destroyed (e.g., mined-through or entrances closed). Indeterminable entries should be marked as "Unknown" in the table.
[g] Enter the number of individual Indiana bats that were adversely affected by the permitted mining activity. For most permits, and especially those permits where Indiana bat presence was assumed, this number will not be known, because sufficient demographic data is unavailable. If no specific information or data is available regarding the number of Indiana bats that were adversely affected, this entry should be marked as "NA", which will mean that the number of individuals was indeterminable.
[h] Enter the number of maternity colonies that were adversely affected by the permitted mining activity. For most permits, and especially those permits where Indiana bat presence was assumed, this number will not be known because sufficient demographic data was unavailable. If no specific information or data is available regarding the number of Indiana bat maternity colonies that were adversely affected, this entry should be marked as "NA", which will mean that the number of maternity colonies was indeterminable.
[i] Enter the acreage of the proposed Post Mining Forest land use.

Site Specific Resource Information and Protection and Enhancement Plan

Least Bittern (*Ixobrychus exilis*)

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The survey, completed by Alliance, determined that the least bittern did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to the least bittern occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a PEP has been prepared for the least bittern using the best available resources and current technology.

1.2 Species Description

Least bittern is the smallest heron and is of the *Ardeidae* family (INHS). It has buff wing patches with a dark crown and back and a wingspan of only 41-46 cm. Its sides are orange and the fronts of its neck and chest have orange and white stripes (INHS; CLO). The least bittern feeds on small fish and insects and nests on the ground (CLO). It makes a platform and canopy for the nest from vegetation and lays 2-7 eggs (CLO). Its habitat is in freshwater or brackish marshes with tall vegetation (CLO). It is considered endangered in Illinois (IDNR). This species has one known occurrence on the Saline/Williamson County border 14.5 miles from the project area, one occurrence in Jackson County 26.7 miles from the project area in the Shawnee National Forest, and one occurrence in Perry County 28.2 miles from the project area on the Shawnee National Forest border. The least bittern is not likely to occur on the permit area due to distance to known occurrences; however, habitat does exist within the project area in and around the Big Muddy River and Pond Creek where it could potentially occur.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the wildlife survey included: Birds of Illinois, 2004; and Peterson Field Guide to Mammals of North America, 4th edition, 2016.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This

habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

Due to the amount of stream and wetlands that occur within the project, it provides potential nest and foraging habitat for the least bittern. The main areas that provide this habitat are around Pond Creek and the Big Muddy River. By utilizing the already existing gas line and railroad right of way, Williamson is limiting its potential impacts on the least bittern to the best of their abilities.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during the operation that will help the operator minimize disturbances to the least bittern and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest.

Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the least bittern in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

CLO (The Cornell Lab of Ornithology). All About Birds. [Internet]. The Cornell Lab of Ornithology. [cited 2018 March 15]. Available from http://www.allaboutbirds.org/guide/search.aspx

INHS (Illinois Natural History Survey). INHS Biological Collections. [Internet]. 2018. University of Illinois Board of Trustees. [cited 2018 March 15]. Available from http://wwx.inhs.illinois.edu/collections

Site Specific Resource Information and Protection and Enhancement Plan

Little Blue Heron *(Egretta caerulea)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T &E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and to determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The field survey, completed by Alliance, determined that little blue heron did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to little blue heron occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for little blue heron using the best available resources and current technology.

1.2 Species Description

Little blue herons range from New England south to Florida along the Gulf Coast and north to Illinois (CLO). The little blue heron winters on the Gulf and the Atlantic Coasts north to New Jersey and can also be found in the tropics (CLO). This animal makes its home in freshwater swamps, lagoons, coastal thickets, and islands; where its diet consists primarily of fish, but will supplement its diet with crustaceans, amphibians, insects, and reptiles (CLO). The little blue heron has only one known occurrence in Franklin County 17.5 miles from the project area along Rend Lake.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water. The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the wildlife survey included: Birds of Illinois, 2004.

Row Crops (RC)

The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans

annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as

areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation

A stream and wetland delineation of the project area was completed by Alliance in November of 2016, and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional wetlands and non-jurisdictional wetlands were also identified within the project area. At the time of writing this report, a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers had not been received.

The amount of stream and wetlands that occur within and around the project provides ample potential foraging and nesting habitat for the little blue heron. The two primary areas where potential habitat could occur are around Pond Creek and the Big Muddy River. By utilizing the existing gas line and railroad right of way, it limits the impacts to wetlands and riparian areas.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1- Protection Measures

The first objective of the PEP is to provide protective measures during the operation that will help the operator minimize disturbances to little blue heron and its habitat. The protection measures include measures that will prevent adverse impacts to the stream and wetland habitats that serve as potential habitat to the little blue heron.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream and wetland habitats, the permit area boundary is located on an existing gas line and railroad right of way. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation or off-site through compensatory mitigation.

3.2 Objective 2 -Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for little blue heron in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

CLO (The Cornell Lab of Ornithology). All About Birds. [Internet]. The Cornell Lab of Ornithology. [cited 2018 March 15]. Available from http://www.allaboutbirds.org/guide/search.aspx

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Site Specific Resource Information and Protection and Enhancement Plan

River Cooter *(Pseudemys concinna)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1 - Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2 - Enhancement Measures 3
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1784.21(a)(2)(A) and 1784.21(b)(2), the Illinois Department of Natural Resources (Department) requires an assessment of threatened and endangered species and protection and enhancement plans for those deemed likely to occur in or adjacent to the proposed permit area. Williamson obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed waterline and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted and the river cooter was not identified. However, the habitat survey completed by Alliance determined that the river cooter turtle *(Pseudemys concinna)* could occur on the proposed permit area and adjacent area. Therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for the river cooter using the best available resources and current technology.

1.2 Species Description

The river cooter (*Pseudemys concinna*) is a turtle found in the east from Virginia to northern Florida west to Oklahoma and Kansas, and north to southern Illinois and Indiana (IDNR). The river cooter is rather large growing up to 32 cm. It has a striped head with an olive to dark brown carapace patterned with yellow or orange lines or swirls. The river cooter is found in backwaters and oxbow lakes of large rivers and reservoirs (IDNR). The river cooter has been found 11.2 miles from the project area in Franklin County. Considering the distance to known occurrences, the river cooter could potentially occur within or around the project area in or around the Big Muddy River or Pond Creek.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. By collocating these features, it decreases the likelihood of impacting potentially undisturbed habitat of this species.

Row Crops (RC)

The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at

the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

The grassland/herbaceous and pasture/hay habitats on the site provide potential foraging and nesting areas for the river cooter. Adjacent areas contain similar habitats. No potential nesting sites were found during site investigations. By utilizing the existing gas line and railroad right-of-way, William limits their potential impacts on nesting and foraging areas for the river cooter.

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-operation phase to develop appropriate habitat for the species.

3.1 Objective 1- Protection Measures

The first objective of the protection and enhancement plan is to provide protective measures during the operation that will help the operator minimize disturbances to the river cooter and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation or off-site through compensatory mitigation.

3.2 Objective 2-Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the river cooter in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Site Specific Resource Information and Protection and Enhancement Plan

River Redhorse *(Moxostoma carinatum)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1 - Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2 - Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1784.21(a)(2)(A) and 1784.21(b)(2), the Illinois Department of Natural Resources (Department) requires an assessment of threatened and endangered species and protection and enhancement plans for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted and the river redhorse *(Moxostoma carinatum)* was not identified. The habitat survey completed by Alliance determined that the river redhorse could occur on the proposed permit area and adjacent area. Therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a Protection and Enhancement Plan has been prepared for the river redhorse using the best available resources and current technology.

1.2 Species Description

The river redhorse is a species of redhorse in the family *Catostomidae*. It has a slightly compressed body with a red tail with dark spots on the scale bases of the back and sides. This species large head, squarish snout, large eye, and moliform teeth distinguish this species from the greater red horse. The river redhorse prefers deep, swift, gravely riffles of small and medium sized rivers. It is also seemingly intolerant to silty bottoms, turbid waters and pollution (Smith 2002). The river redhorse has one occurrence in Franklin County 1.2 miles away from the project area. Due to its proximity to the project area as well as suitable habitat within the Big Muddy River, the river redhorse could potentially occur within the project area.

It is important to note that the water line has been located within an existing gas line and railroad right-of-way. By utilizing these features, it limits the disturbance to potentially undisturbed habitat. However, the river redhorse habitat that could potentially existing within the Big Muddy River cannot be avoided.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed waterline includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the vegetation

survey included: Peterson Field Guide to Reptiles and Amphibians of Eastern/Central North America, 3rd edition, 1998.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the active phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-operation phase to develop appropriate habitat for the species.

3.1 Objective 1- Protection Measures

The first objective of the protection and enhancement plan is to provide protective measures during the operation that will help the operator minimize disturbances to the river redhorse and its habitat. Protective measures to aquatic habitat is addressed in the NPDES permit through sediment control.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced on-site through reclamation.

3.2 Objective 2-Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the river redhorse in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

Smith, P.W. 1979. The Fishes of Illinois. Urbana. University of Illinois Press. pp 159-160.

Site Specific Resource Information and Protection and Enhancement Plan

Yellow-crowned Night Heron *(Nyctanassa violacea)*

Water Management Pipeline
Williamson and Franklin Counties, IL

Prepared for:
Williamson Energy, LLC

Project No. B16-454-1413

Prepared by:

Alliance Consulting, Inc.
124 Philpott Lane
Beaver, WV 25813

March 2018

Table of Contents

1.0 INTRODUCTION 1
1.1 Project Description 1
1.2 Species Description 1
2.0 SITE SPECIFIC RESOURCE INFORMATION 1
3.0 PROTECTION AND ENHANCEMENT PLAN 3
3.1 Objective 1-Protection Measures 3
3.1.1 Avoid habitat impacts 3
3.2 Objective 2-Enhancement Measures 4
3.2.1 Post construction land use 4
4.0 LITERATURE CITED 4

1.0 INTRODUCTION

1.1 Project Description

Williamson Energy, LLC (Williamson Energy), has proposed to permit an area for a water management pipeline in Williamson and Franklin Counties, Illinois. The proposed permit area consists of 70.7 acres beginning northeast of Johnston City in Williamson County, Illinois. Pursuant to Sections 1780.16(a)(2)(A) and 1780.16(b)(2), the Illinois Department of Natural Resources (Department) requires as assessment of threatened and endangered (T & E) species and Protection and Enhancement Plans (PEP) for those deemed likely to occur in or adjacent to the proposed permit area. Williamson Energy obtained assistance from Alliance Consulting, Inc. (Alliance) to document the habitat and land use conditions on the proposed site and determine the likelihood of occurrence of T&E species. Species specific surveys were conducted. The survey, completed by Alliance, determined that the yellow-crowned night heron did not currently occur within the project area; however, it may occur within the adjacent area. This survey also indicated that habitat conducive to the yellow-crowned night heron occurs both within and adjacent to the permit area; therefore, presence of the species is assumed. As a result, pursuant to 1780.16(b), a PEP has been prepared for the yellow-crowned night heron using the best available resources and current technology.

1.2 Species Description

The yellow-crowned night heron is a nocturnal member of the family *Ardeidae*. This heron is medium in size and stocky. The body is primarily gray with yellow legs. The face and bill of the heron is black, cheeks are white, and the crown is marked with a bright yellowish stripe. Preferred habitat of the yellow-crowned night heron is within or near wetlands, on the coast along islands, mangroves, and barrier beaches; farther inland in wooded swamps, forested uplands, and lakes and rivers, sometimes near residential areas. Nesting usually occurs in small colonies, even with other wading birds. Primary prey for this species includes crustaceans and aquatic insects (CLO). This species is considered endangered within the state of Illinois (IDNR). This species is known to occur in two locations in Williamson County, the closest being 2.6 miles from the project area, and four occurrences in Johnson County, the closest being 28.0 miles in Deer Pond. The yellow-crowned night heron was not identified during the field survey of the site; however, habitat exists within the project area that could be used by this species. Therefore, presence has been assumed and a protection and enhancement plan prepared.

2.0 SITE SPECIFIC RESOURCE INFORMATION

The proposed surface operation includes 70.7 acres as shown on the permit maps. Nine (9) habitat types were identified as occurring within the project limits: row crops, deciduous forest, grassland herbaceous, woody wetland, developed open space, developed low intensity, developed medium intensity, pasture/hay, and open water (NLCD). The project site predominately consists of pasture/hay habitat, as well as deciduous forest habitat. It is important to note that a large portion of the proposed pipeline will be placed within an existing gas pipeline right of way that was located along a historic railroad right of way. Collocating these facilities limits impacts previously undisturbed locations. Guides used to aid in field identification for the

vegetation survey included: Birds of Illinois, 2004; and Peterson Field Guide to Mammals of North America, 4th edition, 2016.

Row Crops (RC)
The permit area contains 12.67 acres (17.42%) of agricultural/row crop (RC) land cover, indicating it is dominated by cultivated crops and is subject to regular management (Figures, Drawing No. B16-454-B44). The majority of the cropland is planted with corn and soybeans annually. Annual cultivation practices in these areas have replaced native species with monocultures that display little diversity. In general, the cropland areas create an edge affect at the margins of the field as it meets the adjacent forest, these areas maintain a wider array of species diversity than the field as a whole. This increase in diversity is due to the influx of volunteer species from the forest competing with the planted monoculture.

Deciduous Forest (DF)
The permit area contained 23.12 acres (31.78%) of deciduous forest (DF) land cover, indicating it is dominated by trees and is not subject to regular management. Deciduous forest is upland habitat and is characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and a herbaceous layer (Figures, Drawing No. B16-454-B44). Deciduous forest in the project area was dominated by white oak (*Quercus alba)* and red maple (*Acer rubrum).*

Grassland/Herbaceous (GH)
The permit area contained 0.44 acres (0.6%) of grassland/herbaceous (GH) land cover, which consists of an assemblage of herbaceous habitat types (Figures, Drawing No. B16-454-B44). The area is not subject to regular management and is dominated by Canada goldenrod (*Solidago canadensis*).

Woody Wetland (PFO)
The permit area contained 0.22 acres (.30%) of palustrine forest land (PFO) cover, indicating it was dominated by wetland tree species and is not subject to regular management (Figures, Drawing No. B16-454-B44). Wetlands identified as forested were characterized by a dominance of woody vegetation six meters tall or taller with an understory of young trees or shrubs, and an herbaceous layer. Woody wetlands in the project area were dominated by sugar maple (*Acer saccharium)*, silver maple (*Acer Saccharinum)*, American elm (*Ulmus Americana*), and river birch (*Betula nigra).*

Developed, Open Space (DOS)
The permit area contained 3.33 acres (4.57%) of developed, open space. This habitat type is made up of constructed materials, but mostly vegetation in the form of lawn grasses. These areas typically include parks, golf courses, and large lot single family homes (Figures, Drawing No. B16-454-B44).

Developed, Low Intensity (DLI)
The permit area contained 2.44 acres (3.35%) of disturbed (LID) habitat which consists areas with a mixture of constructed material and vegetation (Figures, Drawing No. B16-454-B44).

Developed, Medium Intensity (DMI)
The permit area contained 0.22 acres (0.30%) of developed, medium intensity habitat. This habitat type is made up of constructed materials and vegetation. This habitat type most commonly consists of single family homes (Figures, Drawing No. B16-454-B44).

Pasture/Hay (PH)
The permit area contained 30.02 acres (41.27%) of pasture/hay. This habitat type is defined as areas of grasses, legumes, or grass-legume mixtures (Figures, Drawing No. B16-454-B44).

Open Water (OW)
The permit area contained 0.22 acres (0.30%) of open water (Figures, Drawing No. B16-454-B44).

Stream and Wetland Delineation
A stream and wetland delineation of the project area was completed in November of 2016 and January and October of 2017. A total of 24 potentially jurisdictional stream resources were identified as occurring partially or entirely within the project limits. Additionally, 31 jurisdictional and non-jurisdictional wetlands were also identified within the project limits. At the time of writing a formal written Jurisdictional Determination from the U.S. Army Corps of Engineers has not been received.

Due to the amount of stream and wetlands within the project area it provides potential nesting and foraging habitat for the yellow-crowned night heron. The two main areas that provide this habitat is around the Big Muddy River and Pond Creek. By utilizing the existing gas line and railroad right-of-way, it limits the impacts to riparian areas and wetlands which could be potential foraging and nesting areas for the yellow-crowned night heron.

3.0 PROTECTION AND ENHANCEMENT PLAN

According to 62 Ill. Adm. Code Section 1780.16b)3)A) and B) a "Protection and Enhancement Plan" should include "protective measures" and "enhancement measures". The "protective measures" are to be used during the construction phase of the operation and will help the operator to minimize disturbances and adverse impacts to the species or resource. The "enhancement measures" are to be used during reclamation and the post-construction phase of the operation to develop appropriate habitat for the species.

3.1 Objective 1 - Protection Measures

The first objective of the PEP is to provide protective measures during the operation that will help the operator minimize disturbances to the yellow-crowned night heron and its habitat.

3.1.1 Avoid habitat impacts

The proposed permit area was designed to avoid stream and wetland habitats that are associated with the immediate property boundary. To avoid potential impacts to stream habitat, the permit area was located along an existing gas line/railroad right of way, thus minimizing impacts. This

riparian buffer area provides those species that prefer riparian habitat an area to forage and nest. Where avoidance of potential habitat is not practical, habitat will be replaced either on-site through reclamation.

3.2 Objective 2 - Enhancement Measures

The second objective of the PEP is to provide appropriate habitat for the yellow-crowned night heron in the post-operation phase.

3.2.1 Post construction land use

Where applicable, the post construction reclamation plan includes seeding the disturbed areas with a temporary cover crop. Upon completion of the work, herbaceous areas will be seeded with a permanent cool season seed mix and mixed with warm season species. Other areas such as farm fields will be returned to their previous land use.

4.0 LITERATURE CITED

CLO (The Cornell Lab of Ornithology). All About Birds. [Internet]. The Cornell Lab of Ornithology. [cited 2018 March 15]. Available from http://www.allaboutbirds.org/guide/search.aspx

Illinois Department of Natural Resources. 2018. Illinois Threatened and Endangered Species by County. https://www.dnr.illinois.gov/conservation/NaturalHeritage/Documents/Database/ETCountyList.pdf. Accessed 19 March 2018.

PART II ATTACHMENT II.9
WETLAND ASSESSMENT REPORT

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

REQUEST FOR U. S. ARMY CORPS OF ENGINEERS' JURISDICTIONAL DETERMINATION WETLAND AND STREAM DELINEATION REPORT

MACH WATER LINE
FRANKLIN AND WILLIAMSON COUNTIES, ILLINOIS

Prepared for

WILLIAMSON ENERGY, LLC
JOHNSTON CITY, ILLINOIS

ALLIANCE PROJECT NO. B16-454-1413
JANUARY 2018

Charleston, WV
928 Cross Lanes Drive, Suite 300
Charleston, WV 25313
Telephone: (681) 217-2090
Fax: (681) 217-2092

Beckley, WV
Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA
3 Four Coins Drive, Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

January 15, 2018

Project No. B16-454-1413

Mr. Keith McMullen
U. S. ARMY CORPS OF ENGINEERS
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Request for United States Army Corps of Engineers' Jurisdictional Determination
Wetland and Stream Delineation Report
Mach Water Line
Franklin and Williamson Counties, Illinois
Williamson Energy, LLC
Johnston City, Illinois

Dear Mr. McMullen:

On behalf of our client, Williamson Energy, LLC (Williamson), this letter has been prepared to request a Jurisdictional Determination and transmit a wetland and stream delineation report for the proposed Mach Water Line (Project). Alliance Consulting, Inc. (Alliance) and Williamson acknowledge that jurisdictional determinations are solely made by the United States Army Corps of Engineers (USACE) and have submitted this request accordingly. This document has been prepared in general accordance with the December 28, 2004 Draft Guidance for Preparing a Jurisdictional Determination with Post Rapanos Protocols.

1.0 PURPOSE

The purpose of the wetland and stream delineation report was to identify "Waters of the United States" (WOUS) within and adjacent to the proposed Mach Water Line. Both Alliance and Williamson realize that all determinations are preliminary until verified by the USACE. However, this document represents our interpretation of current USACE jurisdictional determination guidelines.

2.0 INTRODUCTION

The Project center is located approximately one mile north of Johnston City in Williamson County, Illinois and has its approximate center at Latitude 37° 50' 49.75" N and Longitude -88° 56' 9.16" W (B16-454-B1). Driving directions to the site are located in Appendix A.

The purpose of the project is to construct a water line from the Mach Mine to the Big Muddy River. The permit area limits investigated total approximately 70.71 acres in size and approximately 12 miles in length and extends through Franklin and Williamson Counties

(Figures, Drawing No. B16-454-B2).

3.0 METHODS

Field investigation of the permit area was conducted on November 8-14, 2016, January 17, 2017, October 6, 2017, and October 16, 2017. The weather conditions were sunny, warm, and dry on each visit. Suspect water resources including streams, wetlands, ponds or lake, and ditches, were initially sought using the offsite method in which secondary source information was evaluated prior to the site visit. The secondary data utilized included: topographic maps (United States Geological Service [USGS]), National Wetlands Inventory (NWI) maps (United States Fish & Wildlife Service [USFWS]), aerial maps (NAIP), the Custom Soil Report and Watershed Boundary Dataset (Natural Resources Conservation Service [NRCS]). The preliminary evaluation was completed to attempt to identify the apparent or the most probable stream and wetland locations prior to the field review.

3.1 Stream Resources

Alliance conducted stream measurements to determine the total linear feet of streams within/ adjacent to the study area. The study area was defined as the proposed permit area plus an additional 25 foot buffer. All points identified within the proposed study area were located using a TRIMBLE GEO XH, (subfoot accuracy) GPS unit. Stream photographs have been included within Appendix B.

3.2 Wetland Resources

Wetland resources within the study area were identified and their boundaries delineated in accordance with the Corps of Engineers Wetlands Delineation Manual (1987 Manual) (Environmental Laboratory, 1987) utilizing the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Environmental Laboratory, 2010). The 1987 Manual was followed in which wetlands are identified based on three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology. Wetland Data Forms and photographs have been included in Appendix C.

In areas determined to be wetlands, the wetland boundaries were flagged in the field and flag locations were surveyed using a GPS unit. The GPS flag points were then converted into a shape file which was then displayed using Geographic Information Systems (GIS) technology to create a graphic showing the site resources. The wetland areas were then calculated using the GIS area utility.

3.3 Open Water Resources

Open water resources within the permit area were identified and surveyed using a GPS unit. The GPS flag points were then converted into a shape file which was then displayed using GIS technology to create a graphic showing the site resources. The open water areas were then calculated using the GIS area utility.



4.0 SITE DESCRIPTION

4.1 Physical Characteristics and Land Use

The Project is located in Franklin and Williamson Counties, Illinois near the town of Johnston City (Figures, Drawing No. B16-454-B1). The permit area is approximately 70.71 acres in size and approximately 12 miles long located within the Midwest region per the Corps Interim Regional Supplement (2010). It is generally characterized by the combination of a relatively low level of topographic relief, a humid climate with moderate to abundant rainfall, mixed prairie and hardwood natural vegetation, and the predominance of agricultural land uses including the extensive use of agricultural drainage systems (Environmental Laboratory, 2010). The project area has a history of extensive agricultural activities; current land use is agricultural fields with some wooded lots (Figures, Drawing B16-454-B2).

4.2 Drainage and Topography

The Project is predominately situated on agricultural fields. The permit area is situated within the Town of Chittyville – Pond Creek, Lake Creek, the Town of West Frankfort – Pond Creek, and Cambon Lake – Big Muddy River HUC 12 watersheds (071401060503, 071401060502, 071401060501, and 071401060704, respectively), all of which are situated in the Upper Mississippi Region HUC 8 watershed (07140106) (Drawing No. B16-454-B8). Drainage of the permit area occurs primarily by way of several ephemeral and intermittent streams that drain to Pond Creek and Big Muddy River, a traditional navigable water (TNW). Pond Creek, a perennial water, flows to the Big Muddy River, a perennial water which flows into the Mississippi River (TNW). The project area is partially situated inside of the 100 year floodplain (Figures, Drawing No. B16-454-B15).

4.3 Soils

The principal soil parent materials of the Midwest Region are glacial tills and outwash, glacial like sediments, wind-blown loess, and alluvium deposited along major rivers and streams (Environmental Laboratory, 2010). Twenty-six (26) soil types were mapped as occurring within the permit area; six (6) of which are listed as hydric for Franklin and Williamson Counties (Table 1). Mapped soils are listed in Table 1 (Figures, Drawing No. B16-454-B16).

Table 1. Descriptions of Soils Occurring within the Permit Area

Map Symbol	Soil Name	Slope	Hydric Soil?	Landform	Drainage Class	Ponding	Flooding
12A	Wynoose silt loam	0-2%	Yes	Ground Moraines	Poorly Drained	Frequent	None
13A	Bluford silt loam	0-2%	No	Ground Moraines	Somewhat poorly drained	None	None
14C2	Ava silt loam, eroded	5-10%	No	hillslopes	Moderately well drained	None	None
639A	Wynoose silt loam, bench	0-2%	Yes	Structural Benches	Poorly Drained	Frequent	None

Map Symbol	Soil Name	Slope	Hydric Soil?	Landform	Drainage Class	Ponding	Flooding
640A	Bluford silt loam, bench, 0 to 2 percent slopes	0-2%	No	Structural Benches	Somewhat poorly drained	None	None
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	2-5%	No	Structural Benches	Somewhat poorly drained	None	None
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	0-2%	No	Flood Plains	Somewhat poorly drained	None	Frequent
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	2-5%	No	Ground Moraines	Somewhat poorly drained	None	None
14B	Ava silt loam, 2 to 5 percent slopes	2-5%	No	Ridges	Moderately well drained	None	None
84A	Okaw silt loam, 0 to 2 percent slopes	0-2%	Yes	Terraces	Poorly drained	Frequent	None
109A	Racoon silt loam, 0 to 2 percent slopes	0-2%	Yes	Fans	Poorly drained	Occasional	None
338A	Hurst silt loam, 0 to 2 percent slopes	0-2%	No	Terraces	Somewhat poorly drained	None	None
908F	Hickory-Kell silt loams, 18 to 35 percent slopes	18-35%	No	Till Plains	Well Drained	None	None
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0-2%	Yes	Flood Plains	Poorly drained	Frequent	Frequent
10C	Plumfield silty clay loam, 5 to 10 percent slopes	5-10%	No	Ground Moraines	Moderately Well Drained	None	None
10D	Plumfield silty clay loam, 10 to 18 percent slopes	10-18%	No	Ground Moraines	Moderately Well Drained	None	None
13B	Bluford silt loam, 2 to 5 percent slopes	2-5%	No	Ground Moraines	Somewhat poorly drained	None	None
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	2-5%	No	Ground Moraines	Somewhat poorly drained	None	None
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	5-10%	No	Till Plains	Moderately Well Drained	None	None
518B	Rend silt loam, 2 to 5 percent slopes	2-5%	No	Structural Benches	Moderately Well Drained	None	None



Map Symbol	Soil Name	Slope	Hydric Soil?	Landform	Drainage Class	Ponding	Flooding
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	5-10%	No	Structural Benches	Moderately Well Drained	None	None
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	5-10%	No	Structural Benches	Moderately Well Drained	None	None
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2-5%	No	Structural Benches	Somewhat poorly drained	None	None
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	2-7%	No	Hills	Well Drained	None	None
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	7-20%	No	Hills	Well Drained	None	None
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0-2%	Yes	Flood Plains	Poorly Drained	Frequent	Frequent

5.0 ECOLOGICAL RESOURCES RESULTS

5.1 Stream Measurements

Alliance conducted stream measurements November 8-14, 2016, January 17, 2017, October 6, 2017, and October 16, 2017 to determine the total linear feet of stream within the permit area. The USGS Topographical map identified seventeen (17) streams in the permit area and SAMB data identifies nine (9) streams as occurring within the permit area. Those streams include one (1) perennial stream, identified as Pond Creek as well as eight (8) intermittent or ephemeral streams identified as unnamed tributaries to Pond Creek (Figures, Drawing Nos. B16-454-B9, B16-454-B10, B16-454-B11, B16-454-B12, B16-454-B13, B16-454-B14, and B16-454-B15).

Field investigation identified twenty-four (24) potentially jurisdictional stream channels within the permit area (Table 2) (Figures, Drawing Nos. B16-454-B18 and B16-454-B38), and two (2) were identified outside the permit area but within 100 feet of the permit area. One (1) stream was determined to be perennial or contain perennial sections within the permit area; the remaining streams were determined to be intermittent and/or ephemeral. All delineated stream segments discharge to, or are tributaries of Pond Creek. Stream Photographs are included in Appendix B.

Table 2. Stream Identified within the Permit Area

Stream Channel ID	Stream Name	Latitude	Longitude	Length	Stream Type	Flow Characteristics
Channel 1	UNT of Pond Creek	37.8348	-88.8390	100	EPH	NRPW
Channel 2	UNT of Pond Creek	37.8343	-88.8452	122	EPH	NRPW
Channel 3	UNT of Pond Creek	37.8341	-88.8529	187	INT	RPW
Channel 4	UNT of Pond Creek	37.8343	-88.8579	180	INT	RPW
Channel 5	UNT of Pond Creek	37.8343	-88.8652	110	INT	RPW
Channel 6	UNT of Pond Creek	37.8374	-88.9103	130	EPH	NRPW
Channel 7	UNT of Pond Creek	37.8514	-88.9424	238	INT	RPW
Channel 8	UNT of Pond Creek	37.8523	-88.9470	254	INT	RPW
Channel 9	UNT of Pond Creek	37.8532	-88.9452	166	INT	RPW
Channel 10	UNT of Pond Creek	37.8556	-88.9484	95	EPH	NRPW
Channel 11	Pond Creek	37.8629	-88.9586	139	PER	RPW
Channel 12	UNT of Pond Creek	37.8724	-88.9719	111	INT	RPW
Channel 13	UNT of Pond Creek	37.8742	-88.9745	99	INT	RPW
Channel 14	UNT of Pond Creek	37.8346	-88.8743	92	EPH	NRPW
Channel 15	UNT of Pond Creek	37.8350	-88.8756	121	EPH	NRPW
Channel 16	UNT of Pond Creek	37.8353	-88.8771	100	EPH	NRPW
Channel 17	UNT of Pond Creek	37.8352	-88.8813	183	INT	RPW
Channel 18	UNT of Pond Creek	37.8352	-88.8823	97	INT	RPW
Channel 19	Isolated	37.8390	-88.9215	207	EPH	NRPW
Channel 20	UNT of Pond Creek	37.8421	-88.9269	66	EPH	NRPW
Channel 21	UNT of Pond Creek	37.8438	-88.9299	619	INT	RPW
Channel 22	UNT of Pond Creek	37.8442	-88.9308	100	INT	RPW
*Channel 23	UNT of Pond Creek	37.8419	-88.9267	802	INT	NRPW
*Channel 24	UNT of Pond Creek	37.8419	-88.9267	421	INT	NRPW
Channel 25	UNT of Pond Creek	37.8332	-88.8985	802	INT	RPW
Channel 26	UNT of Pond Creek	37.8476	-88.9369	421	INT	RPW

*Located outside of the permit area, but within 100 feet of the permit area.

5.2 Wetland Resources

Alliance consulted the National Wetlands Inventory (NWI) for the permit area. NWI mapping identified three (3) wetland systems as occurring within the permit area, which were field truthed (Figures, Drawing B16-454-B15). Field delineated wetlands that corresponded in location with NWI mapped wetlands included: Wetlands R, T, B1, and C1.

5.3 Wetland Delineation

Wetland measurements were conducted by Alliance personnel on November 8 – 14, 2016, January 17, 2017, October 6, 2017, and October 16, 2017 to determine the total acreage of wetlands within the permit area. Thirty-one (31) wetlands were identified by Alliance personnel

within the permit area (Table 3). However, wetlands A and B were determined to be non-jurisdictional by the USACE, and Wetland X was identified as uplands (non-wetland) by the USACE. All identified wetlands were found to consist of one of the following wetland habitat types or a complex of one or more of the following per the classification system developed by Cowardin et al. (1979) for wetland classification:

- Palustrine Persistent Emergent (PEM) Wetland Habitat is characterized by erect, rooted herbaceous hydrophytes, excluding mosses and lichens and includes a vast array of grass-like plants, true grasses, and broad leaved plants (Cowardin, et al., 1979).
- Palustrine Forested (PFO) Wetland Habitat is characterized by woody vegetation that is 6m tall or taller (Cowardin, et al., 1979).
- PFO/PEM, Wetland Complexes were found to consist of an assemblage of two or more of the above-mentioned wetland habitat types.

Wetland ID	Hydrologic Connection*	Receiving Waters	8-Digit HUC	Wetland Type (Cowardin)	Est. size in permit area (ac.)	Dominant Wetland Community
Wetland A	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.08	PEM
How the wetland(s) connects to TNW*:		Wetland A (isolated); Field verified as non-jurisdictional by the USACE.				
Wetland B	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.06	PEM
How the wetland(s) connects to TNW*:		Wetland B (isolated); Field verified as non-jurisdictional by the USACE.				
Wetland C	Adjacent	Channel 3	Upper Mississippi Region/07140106	PEM	0.14	PEM
How the wetland(s) connects to TNW*:		Wetland C →Channel 3 (UNT of Pond Creek) (RPW)→ Big Muddy River (TNW)				
Wetland D	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.06	PEM
How the wetland(s) connects to TNW*:		Wetland D (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland E	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.13	PEM
How the wetland(s) connects to TNW*:		Wetland B (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland A1	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.01	PEM
How the wetland(s) connects to TNW*:		Wetland A1 (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland B1	Abutting	Channel 16	Upper Mississippi Region/07140106	PFO/PEM	1.54	PEM
How the wetland(s) connects to TNW*:		Wetland B1 (abutting)→ Channel 16 – Pond Creek → Big Muddy River (TNW)				



Wetland C1	Abutting	Channel 17	Upper Mississippi Region/07140106	PEM	0.05	PEM
How the wetland(s) connects to TNW*:		Wetland C1 (abutting)→ Channel 17 – Pond Creek → Big Muddy River (TNW)				
Wetland I	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.11	PEM
How the wetland(s) connects to TNW*:		Wetland I (isolated)				
Wetland J	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.02	PEM
How the wetland(s) connects to TNW*:		Wetland J (isolated)				
Wetland K	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.17	PEM
How the wetland(s) connects to TNW*:		Wetland K (isolated)				
Wetland L	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.01	PEM
How the wetland(s) connects to TNW*:		Wetland L (isolated)				
Wetland M	Abutting	Isolated	Upper Mississippi Region/07140106	PFO/PEM	0.24	PEM
How the wetland(s) connects to TNW*:		Wetland M→ UNT of Pond Creek → Pond Creek → Big Muddy River (TNW)				
Wetland N	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.05	PEM
How the wetland(s) connects to TNW*:		Wetland N (isolated)				
Wetland O	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.03	PEM
How the wetland(s) connects to TNW*:		Wetland O (isolated)				
Wetland P	Adjacent	Channel 12	Upper Mississippi Region/07140106	PFO	0.30	PFO
How the wetland(s) connects to TNW*:		Wetland P→ UNT of Pond Creek → Pond Creek → Big Muddy River (TNW)				
Wetland Q	Adjacent	Channel 13	Upper Mississippi Region/07140106	PFO	0.11	PEM
How the wetland(s) connects to TNW*:		Wetland Q→ UNT of Pond Creek → Pond Creek → Big Muddy River (TNW)				
Wetland R	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.72	PEM
How the wetland(s) connects to TNW*:		UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland S	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.03	PEM
How the wetland(s) connects to TNW*:		Wetland S (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland T	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.27	PEM



How the wetland(s) connects to TNW*:		Wetland T (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland U	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM/PFO	0.11	PEM
How the wetland(s) connects to TNW*:		Wetland U (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland V	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.03	PEM
How the wetland(s) connects to TNW*:		Wetland V (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland W	Adjacent	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.04	PEM
How the wetland(s) connects to TNW*:		Wetland W (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River				
Wetland X	Abutting	Big Muddy River	Upper Mississippi Region/07140106	PFO	1.61	PFO
How the wetland(s) connects to TNW*:		Big Muddy River (TNW); Field verified as non-wetland by the USACE.				
Wetland D1	Abutting	Channel 14	Upper Mississippi Region/07140106	PEM	0.04	PEM
How the wetland(s) connects to TNW*:		Wetland D1 → Channel 14 (UNT of Pond Creek) (RPW) → Pond Creek → Big Muddy River (TNW)				
Wetland E1	Abutting	Channel 15	Upper Mississippi Region/07140106	PEM	0.03	PEM
How the wetland(s) connects to TNW*:		Wetland E1 → Channel 15 (UNT of Pond Creek) (RPW) → Pond Creek → Big Muddy River (TNW)				
Wetland G1	Abutting	Channel 21	Upper Mississippi Region/07140106	PEM	0.15	PEM
How the wetland(s) connects to TNW*:		Wetland G1 → Channel 21 (UNT of Pond Creek) (RPW) → Pond Creek → Big Muddy River (TNW)				
Wetland H1	Abutting	UNT of Pond Creek	Upper Mississippi Region/07140106	PEM	0.27	PEM
How the wetland(s) connects to TNW*:		Wetland H1 → UNT of Pond Creek → Pond Creek → Big Muddy River				
Wetland I1	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.008	PEM
How the wetland(s) connects to TNW*:		Wetland I1 (isolated)				
Wetland J1	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.07	PEM
How the wetland(s) connects to TNW*:		Wetland J1 (isolated)				
Wetland K1	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.20	PEM
How the wetland(s) connects to TNW*:		Wetland K1 (isolated)				

Subject to verification by the USACE (TNW=Traditional Navigable Water, RPW=Relatively Permanent Water Perennial or Seasonal, NRPW=Non-RPW)

Ditches
The field investigation identified no provisionally jurisdictional farm ditches.

5.4 Open Water

Alliance surveyed the permit area for areas that are considered "open water" by the USACE. For this project, open water was considered to be "*an area that, during a year with normal patterns of precipitation, has standing or flowing water for sufficient duration to establish an ordinary high water mark, where aquatic vegetation is either non-emergent, sparse, or absent*". No open water features were identified within the permit area.

6.0 CLOSING

In closing, we trust that this letter report and supporting data are sufficient for your needs at this time. The services performed for this project were performed with the care and skill ordinarily exercised by reputable members of the profession practicing under similar conditions at the same time and the same or similar locality. No other warranty, expressed or implied, is made or intended by rendition of these consulting services or by furnishing oral or written reports of the findings made. This report has been prepared for the exclusive use of Williamson Energy, LLC.

If you have any questions or require clarification, please do not hesitate to call.

Respectfully submitted,

ALLIANCE CONSULTING, INC.

Alex Patterson
Staff Scientist

Braden Hoffman
Senior Project Manager

Enclosures

AP/BAH:kjs

\\Aci-zeus\projects\Projects\Williamson Energy (1413)\2016\B16-454-1413\JD\16454-01.doc

REFERENCES CITED

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979, reprinted 1992. *Classification of wetlands and deepwater habitats of the United States*. United States Department of the Interior, Fish and Wildlife Service, Washington, DC.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, United States Army Engineer Waterways Experiment Station, Vicksburg, MS.

Environmental Laboratory. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region, Version 2.0 (USACE, 2010). ERDC/EL TR-10-9, United States Army Engineer Research and Development Center, Vicksburg, MS.

Natural Resource Conservation Service (NRCS). 2004. Watershed Boundary Dataset. United States Department of Agriculture. Accessed 2017.

Natural Resource Conservation Service (NRCS). Custom Soil Resource Report for Franklin County, Williamson Energy Mach Water Line. United States Department of Agriculture. Accessed 2017.

National Aerial Photography Program (NAPP). 2012. Digital Orthophotography Quarter Quadrangle. Ewing, IL.

United States Fish and Wildlife Service (USFWS). 1996. National Wetlands Inventory maps, Illinois Statewide map, United States Department of the Interior. Madison, WI.

United States Geological Survey (USGS). 1968 revised 1976. Topographical quadrangle map (7.5 minute series). Christopher, IL quadrangle. United States Geological Survey. Denver, CO.

United States Geological Survey (USGS). 1963 revised 1976. Topographical quadrangle map (7.5 minute series). Johnston City, IL quadrangle. United States Geological Survey. Denver, CO.

United States Geological Survey (USGS). 1963. Topographical quadrangle map (7.5 minute series). Pittsburg, IL quadrangle. United States Geological Survey. Denver, CO.

APPENDIX A

DRIVING DIRECTIONS

APPENDIX A
DRIVING DIRECTIONS

1. Get on I-64 E from S Tucker Blvd. and Chouteau Ave.
2. Head east on Spruce St. toward S Tucker Blvd for 98 feet.
3. Turn right at the 1st cross street onto S Tucker Blvd.
4. Turn left at the 1st cross street onto Chouteau Ave/Historic U.S. 66 E.
5. Continue straight onto Chouteau Ave for 335 feet.
6. Turn left onto S 6th St for 0.1 miles.
7. Take the ramp onto I-64 E.
8. Follow I-64 E and I-57 S to Herrin Rd in Johnston City. Take exit 59 from I-57 S for 111 miles.
9. Merge onto I-64 E entering Illinois for 0.8 mile.
10. Keep left to continue on I-55 N/I-64 E for 2.2 miles.
11. Keep right at the fork to continue on I-64 E/IL-3 N, follow signs for Louisville/St Clair Ave. Continue to follow I-64 E for 75.0 miles.
12. Keep right at the fork to continue on I-57 S, follow signs for Interstate 57 S/Memphis for 32.8 miles.
13. Take exit 59 toward Herrin Rd.
14. Take Corinth Rd to Liberty School Rd in Lake Creek Precinct for 7.5 miles.
15. Turn left onto Herrin Rd., go 0.2 mile.
16. Continue onto W Broadway Blvd. for 1.3 mile.
17. Continue onto Corinth Rd. for 4.8 miles.
18. Turn left onto Liberty School Rd. and go 1.1 miles to site.



APPENDIX B

STREAM PHOTOGRAPHS

Project No. B16-454-1413

Mach Water Line



Photograph No. 1
Channel 1 at Station 0+00, looking upstream



Photograph No. 2
Channel 1 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 3
Channel 1 at Station 1+00, looking upstream



Photograph No. 4
Channel 1 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 5
Channel 2 at Station 0+00, looking upstream



Photograph No. 6
Channel 2 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 7
Channel 2 at Station 1+00, looking upstream



Photograph No. 8
Channel 2 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 9
Channel 2 at Station 1+22, looking upstream



Photograph No. 10
Channel 2 at Station 1+22, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 11
Channel 3 at Station 0+00, looking upstream



Photograph No. 12
Channel 3 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 13
Channel 3 at Station 1+00, looking upstream



Photograph No. 14
Channel 3 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 15
Channel 3 at Station 1+87, looking upstream



Photograph No. 16
Channel 3 at Station 1+87, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 17
Channel 4 at Station 0+00, looking upstream



Photograph No. 18
Channel 4 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 19
Channel 4 at Station 1+00, looking upstream



Photograph No. 20
Channel 4 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 21
Channel 4 at Station 1+80, looking upstream



Photograph No. 22
Channel 4 at Station 1+80, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 23
Channel 5 at Station 0+00, looking upstream



Photograph No. 24
Channel 5 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 25
Channel 5 at Station 1+00, looking upstream



Photograph No. 26
Channel 5 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 27
Channel 5 at Station 1+10, looking upstream



Photograph No. 28
Channel 5 at Station 1+10, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 29
Channel 6 at Station 0+00, looking upstream



Photograph No. 30
Channel 6 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 31
Channel 6 at Station 1+00, looking upstream



Photograph No. 32
Channel 6 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 33
Channel 6 at Station 0+00, looking upstream



Photograph No. 34
Channel 6 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 35
Channel 7 at Station 0+00, looking upstream



Photograph No. 36
Channel 7 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 37
Channel 7 at Station 1+00, looking upstream



Photograph No. 38
Channel 7 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 39
Channel 7 at Station 2+00, looking upstream



Photograph No. 40
Channel 7 at Station 2+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 41
Channel 7 at Station 2+38, looking upstream



Photograph No. 42
Channel 7 at Station 2+38, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 43
Channel 8 at Station 0+00, looking upstream



Photograph No. 44
Channel 8 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 45
Channel 8 at Station 1+00, looking upstream



Photograph No. 46
Channel 8 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 47
Channel 8 at Station 2+00, looking upstream



Photograph No. 48
Channel 8 at Station 2+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 49
Channel 8 at Station 2+54, looking upstream



Photograph No. 50
Channel 8 at Station 2+54, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 51
Channel 9 at Station 0+00, looking upstream



Photograph No. 52
Channel 9 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 53
Channel 9 at Station 1+00, looking upstream



Photograph No. 54
Channel 9 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 55
Channel 9 at Station 1+66, looking upstream



Photograph No. 56
Channel 9 at Station 1+66, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 57
Channel 10 at Station 0+00, looking upstream



Photograph No. 58
Channel 10 at Station 0+00, looking downstream/culvert ingress

Project No. B16-454-1413

Mach Water Line



Photograph No. 59
Channel 10 at Station 1+00, looking upstream/culvert ingress



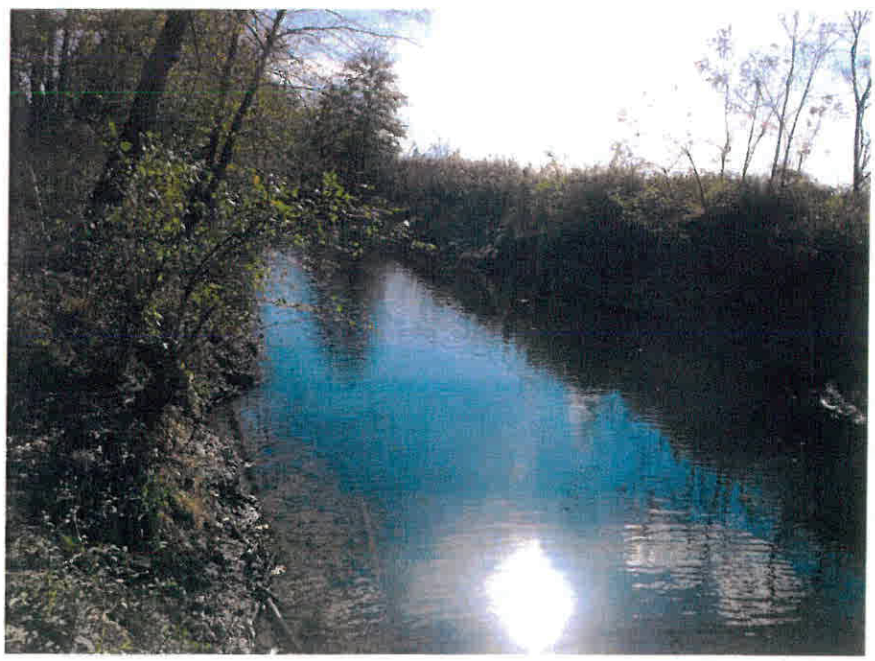
Photograph No. 60
Channel 10 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



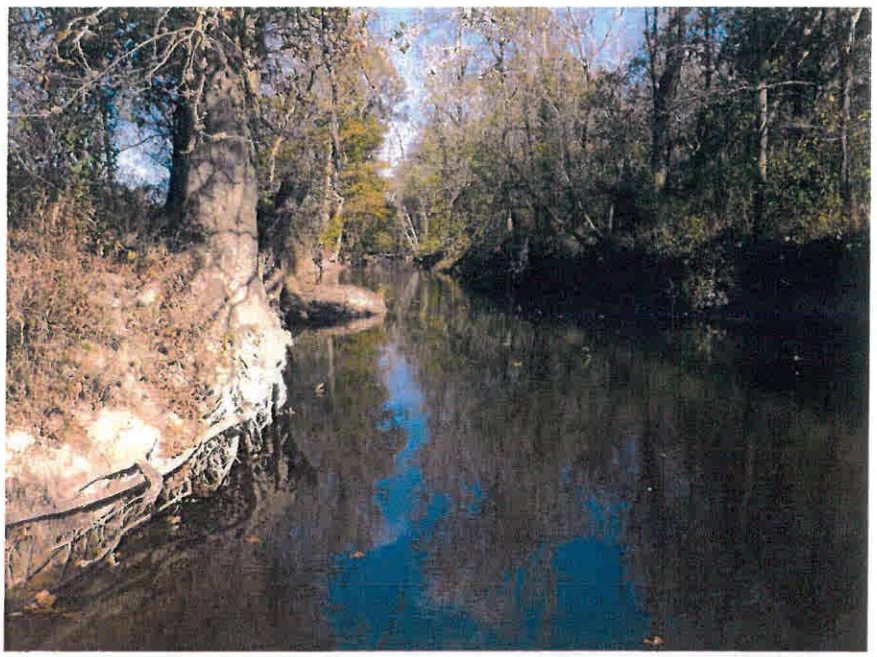
Photograph No. 61
Channel 11 at Station 0+00, looking upstream



Photograph No. 62
Channel 11 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



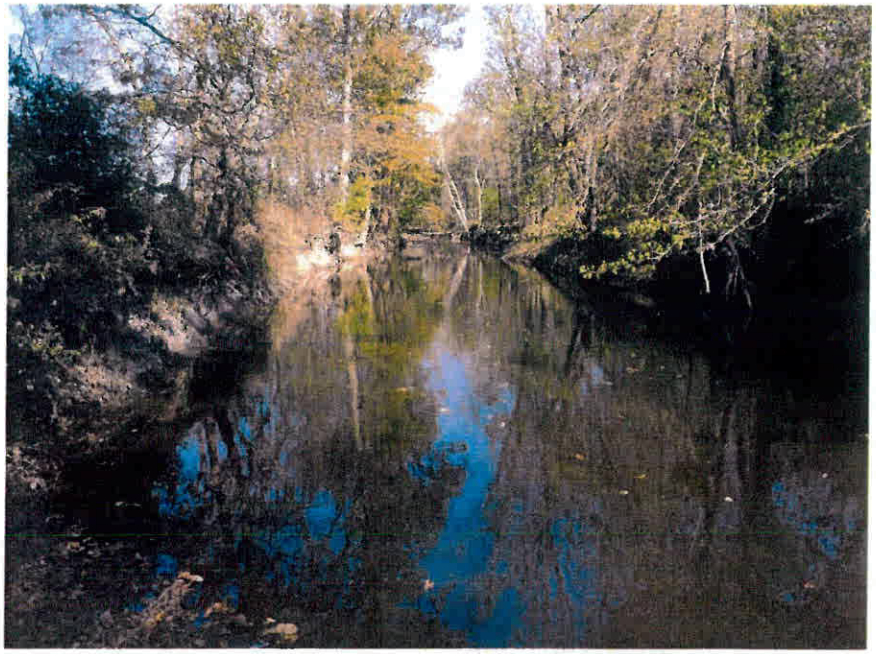
Photograph No. 63
Channel 11 at Station 1+00, looking upstream



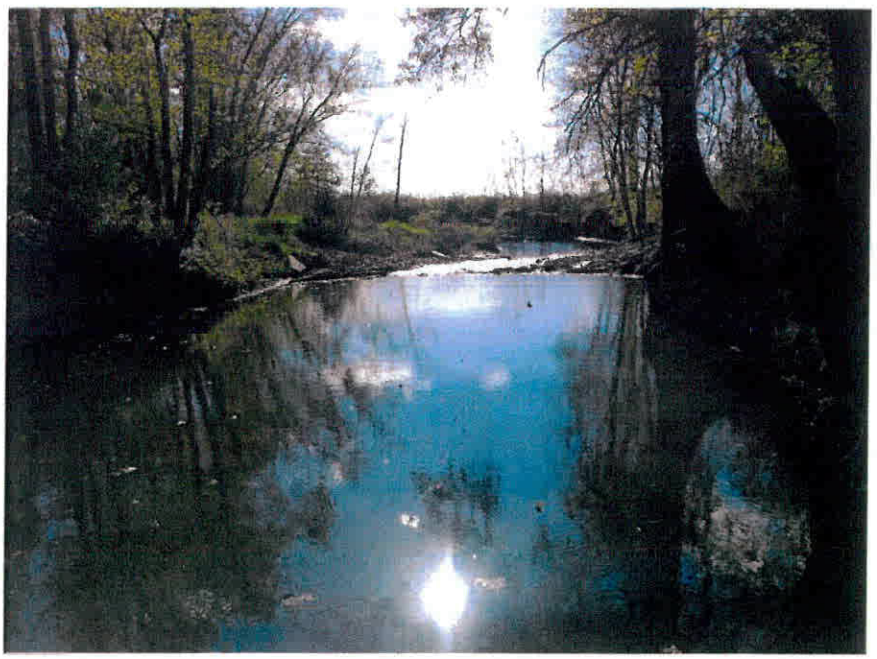
Photograph No. 64
Channel 11 at Station 1+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 65
Channel 11 at Station 1+39, looking upstream



Photograph No. 66
Channel 11 at Station 1+39, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 67
Channel 12 at Station 0+00, looking upstream/culvert egress



Photograph No. 68
Channel 12 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 69
Channel 12 at Station 1+00, looking upstream



Photograph No. 70
Channel 12 at Station 1+00, looking downstream/culvert ingress

Project No. B16-454-1413

Mach Water Line



Photograph No. 71
Channel 12 at Station 1+11, looking upstream



Photograph No. 72
Channel 12 at Station 1+11, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 73
Channel 13 at Station 0+00, looking upstream/culvert egress



Photograph No. 74
Channel 13 at Station 0+00, looking downstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 75
Channel 13 at Station 1+00, looking upstream



Photograph No. 76
Channel 13 culvert ingress

Project No. B16-454-1413

Mach Water Line



Photograph No. 77
Channel 13 at Station 1+00, looking downstream



Photograph No. 78
Channel 14 at Station 0+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 79
Channel 14 at Station 0+00, looking downstream



Photograph No. 80
Channel 14 at Station 0+92, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 81
Channel 14 at Station 0+92, looking downstream



Photograph No. 82
Channel 15 at Station 0+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 83
Channel 15 at Station 0+00, looking downstream



Photograph No. 84
Channel 15 at Station 1+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 85
Channel 15 at Station 1+00, looking downstream



Photograph No. 86
Channel 15 at Station 1+21, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 87
Channel 15 at Station 1+21, looking downstream



Photograph No. 88
Channel 16 at Station 0+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 89
Channel 16 at Station 0+00, looking downstream



Photograph No. 90
Channel 16 at Station 1+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 91
Channel 16 at Station 1+00, looking downstream



Photograph No. 92
Channel 17 at Station 0+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 93
Channel 17 at Station 0+00, looking downstream



Photograph No. 94
Channel 17 at Station 1+00, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 95
Channel 17 at Station 1+00, looking downstream



Photograph No. 96
Channel 17 at Station 1+83, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 97
Channel 17 at Station 1+83, looking downstream



Photograph No. 98
Channel 18 at Station 0+00, looing upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 99
Channel 18 at Station 0+00, looking downstream



Photograph No. 100
Channel 18 at Station 0+97, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 101
Channel 18 at Station 0+97, looking downstream



Photograph No. 102
Channel 19, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 103
Channel 19, looking downstream



Photograph No. 104
Channel 20, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 105
Channel 20, looking downstream



Photograph No. 106
Channel 21, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 107
Channel 21, looking downstream



Photograph No. 108
Channel 22, looking upstream/culvert egress

Project No. B16-454-1413

Mach Water Line



Photograph No. 109
Channel 22, looking upstream/culvert ingress



Photograph No. 110
Channel 23, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 111
Channel 23, looking downstream



Photograph No. 112
Channel 24, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 113
Channel 24, looking downstream



Photograph No. 114
Channel 25, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 115
Channel 25 culvert ingress



Photograph No. 116
Channel 25 culvert egress

Project No. B16-454-1413

Mach Water Line



Photograph No. 117
Channel 25, looking downstream



Photograph No. 118
Channel 26, looking upstream

Project No. B16-454-1413

Mach Water Line



Photograph No. 119
Channel 26, looking downstream



Photograph No. 120
Channel 26 culvert ingress

Project No. B16-454-1413

Mach Water Line



Photograph No. 121
Channel 26 culvert egress

APPENDIX C

WETLAND DETERMINATION DATA FORMS AND PHOTOGRAPHS

R07246

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Waterline City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet A

Investigator(s): AD, PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.8428 Long: -88.8342 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. Ø			
3.			
4.			
5.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. Acer saccharinum	5	X	FACW
2. Salix nigra	5	X	OBL
3.			
4.			
5.			
	10	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Scirpus cyperinus	5		OBL
2. Juncus effusus	10	X	OBL
3. Duckweed	10	X	OBL
4. Echinochloa muricata	5		OBL
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1. Ø			
2.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

Wetland recently mowed

P.1+2 overwrite P.3 soil

SOIL

Sampling Point: Wet A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR Gley 1/10						clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- X Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- X True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 0in

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0in

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

R07248

UL-B same as A

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: DLG-454-1413 City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson County State: IL Sampling Point: Wet A

Investigator(s): AD PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.8734 Long: -88.8326 Datum: WGS 84

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No X

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland?	Yes X No ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix nigra	20	X	OBL
2. Ulmus rubra	5	X	FACW
3.			
4.			
5.			
	25 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Typha latifolia	50	X	OBL
2. Phalaris arundinacea	40	X	FACW
3. Polygonum persicaria	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)

Recently mowed

0-8 overmix 9 soil

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

1 – 1 - Rapid Test for Hydrophytic Vegetation

1 – 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

SOIL

Sampling Point: Wet B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	95	10YR 5/6	5	C	PL	clay-loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson County State: IL Sampling Point: WL A+B

Investigator(s): AP PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.8431 Long: -88.8343 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Acer rubrum	5	Y	FACW
2. Ulmus rubra	5	Y	FACW
3.			
4.			
5.			
6.			
	10 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Solidago canadensis	30	X	UPL
2. Allium canadense	15	X	FACU
3. Plantago major	15	X	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

Overview p. 4-5 Soil: 6

Recently Mowed

SOIL

Sampling Point: UPL-AB

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/6	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet C

Investigator(s): AD, PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Main Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.5343 Long: -88.8552 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus effusus	50	X	OBL
2. Echinochloa muricata	20	X	OBL
3. Polygonum persicaria	10		
4. Eupatorium perfoliatum	20	X	FACW
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. 0			
2.			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: wet C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/4	95	10YR 5/8	5	C	PL	loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

P. 26 soil 27 - 28 overview

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: D16-454-1413 City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-C

Investigator(s): AP, PO Section, Township, Range: _____

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): convex

Slope (%): _____ Lat: 37.8237 Long: -88.8549 Datum: NAD 27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation Y, Soil Y, or Hydrology Y significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glycine max	90	X	UPL
2. Allium cernuum	10		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1. N/A			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

27, 28, 29, 30, 31

SOIL

Sampling Point: UPL-C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10yr 5/6						loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-9-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet D

Investigator(s): API, PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.8344 Long: -88.8314 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	
Hydric Soil Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Iva annua	5	X	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Phragmites australis	40	X	OBL
2. Echinochloa muricata	20	X	OBL
3. Leersia virginica	30	X	OBL
4. Juncus effusus	5		FACW
5. Polygonum persicaria	5		FACW
6.			
7.			
8.			
9.			
10.			
	120 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. Lonicera japonica	5	X	FACU
2.			
	5 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ✓ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

44: Soil 45-46 = Disturbed

SOIL

Sampling Point: Wet D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10yr 5/2	98	10yr 6/6	2	C	PL	L/C	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-9-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-NE C

Investigator(s): AD, PO Section, Township, Range:

Landform (hillslope, terrace, etc.): flat Local relief (concave, convex, none): center

Slope (%): 0 Lat: 37.8344 Long: -88.8772 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology A significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation: N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	
Hydric Soil Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
6.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glycine max	95	X	UPL
2. Allium canadense	5		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

overview

P.47-48 P.49 soil

SOIL

Sampling Point: WL 05

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/1	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

R07260

UPL- B same as D

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-9-16

Applicant/Owner: Williamson energy State: IL Sampling Point: west E

Investigator(s): AD PO Section, Township, Range: concave

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.8345 Long: -88.5037 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Ulmus rubra	5	X	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Phragmites australis	60	X	FACW
2. Carex lurida	15	X	OBL
3. Achillea millefolium	5		FACU
4. Hypericum sphaerocarpum	5		FACW
5. Plantago lanceolata	5		FACU
6. Plantago major	5		FACU
7. Juncus effusus	5		OBL
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)

soil 30 51-52 cumulus

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: Wet E

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix: Color (moist)	%	Redox Features: Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	95	10YR 6/8	5	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-9-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet I
Investigator(s): AP PO Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37.8334 Long: -88.8934 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation N Soil N or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation N Soil N or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Alnus incana	5	X	FACW
2. Acer rubra	5	X	FACW
3.			
4.			
5.			
	10 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Phragmites australis	75	X	FACW
2. Echinochloa muricata	15		OBL
3. Andropogon virginicus	5		FACU
4. Eupatorium perfoliatum	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

P. 68 soil
P. 69-70 overview

SOIL

Sampling Point: wet I

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	95	10YR 6/8	5%	C	PL	loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-9-16

Applicant/Owner: Williamson Energy LLC State: IL Sampling Point: UPL-I

Investigator(s): AP, PO Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.8332 Long: -88.8944 Datum: NAD 27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Elaeagnus umbellata	20	x	FACU
2.			
3.			
4.			
5.			
	20 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Triticum Flavus	50	x	UPL
2. Andropogon virginicus	20	x	UPL
3. Solidago canadensis	20	x	FACU
4. Dipsacus Fullonum	10		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. 0			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

Soil: 71 overview: 72-73

SOIL

Sampling Point: UPL-T

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/6	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: SIU-454 - 1413 City/County: Williamson Sampling Date: 11-5-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet T

Investigator(s): AP PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.8362 Long: -88.9044 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland?	Yes X No
Hydric Soil Present?	Yes X No		
Wetland Hydrology Present?	Yes X No		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Carex lurida	35	X	OBL
2. Cyperus esculentus	15	X	FACW
3. Juncus effusus	15	X	OBL
4. Trifolium pratense	15	X	FACU
5. Polygonum punctatum	5		FACW
6. Plantago major	5		FACW
7.			
8.			
9.			
10.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)

Overview 11-16 Soil 76

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 6 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: wet J

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	95	10YR 5/8	5	C	PL	loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

R07268

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: b16-454-1413 City/County: Williamson Sampling Date: 11-9-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-1
Investigator(s): AD, PO Section, Township, Range:
Landform (hillslope, terrace, etc.): hill Local relief (concave, convex, none): convex
Slope (%): 0 Lat: 37.8360 Long: -88.9041 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes / No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Achillea millefolium	25	X	FACU
2. Dichelostemma capitatum	60	X	FACU
3. Plantago lanceolata	15		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

P. 77-78 overview 29 x 11

SOIL

Sampling Point: UPL-J

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/4	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): _____

Water Table Present? Yes ____ No ____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-10-16
Applicant/Owner: Williamson Energy State: FL Sampling Point: WtK
Investigator(s): AL PO Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave
Slope (%): 6 Lat: 37.8375 Long: -88.9063 Datum: NAD27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland?	Yes X No ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes X No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Ulmus rubra	5	X	FACW
2. Alnus Serrulata	10	X	FACW
3.			
4.			
5.			
	15 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glechoma hederacea	80	X	FACU
2. Carex lurida	40	X	OBL
3. Polygonum hydropiperoides	10		OBL
4. Juncus effusus	30	X	OBL
5. Leersia oryzoides	5		OBL
6.			
7.			
8.			
9.			
10.			
	95 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)
Overview 80-81 Soil 82

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
__ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

SOIL

Sampling Point: WetK

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	95	10YR 5/6	5	C	PL	loamy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-10-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-K
Investigator(s): AP, PO Section, Township, Range:
Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): Convex
Slope (%): 0 Lat: 37.8375 Long: -88.9060 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Zea mays	100	X	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)
Soil 83 Overview 84-85

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

SOIL

Sampling Point: UPL-K

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/4	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-10-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: West C

Investigator(s): AR PO Section, Township, Range:

Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.83.85 Long: -89.415 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No (If no, explain in Remarks.)

Are Vegetation Y, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes Y No	
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Phyla nodiflora	90	X	FACW
2. Carex lurida	10		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- Y 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

92-93 ownrw Soil

SOIL

Sampling Point: wet L

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 4/2	90	10YR 6/8	10	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1412 City/County: Williamson Sampling Date: 11-10-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-L
Investigator(s): AP PO Section, Township, Range: _____
Landform (hillslope, terrace, etc.): Nam Local relief (concave, convex, none): concave
Slope (%): 0 Lat: 37.838 Long: -88.919 Datum: NAD 27
Soil Map Unit Name: _____ NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Stellaria media	20	X	FACU
2. Lysimachia fossicaria	30	X	FACW
3. Glechoma hedracea	15	X	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	65 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)
over 95-96 soil 97

SOIL

Sampling Point: UPL-L

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 4/3	100					Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: D16-457-1413 City/County: Williamson Sampling Date: 11-10-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Inlet M

Investigator(s): AD, DG Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.844 Long: -88.930 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation X, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	15	X	OBL
2.			
3.			
4.			
5.			
	15	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. Salix nigra	5	X	OBL
2. Platanus occidentalis	5	X	FACW
3. Acer saccharinum	15	X	FACW
4. Ulmus rubra	5	X	FAC
5.			
	30	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Boehmeria cylindrica	95	X	FACW
2. Carex vulpinoidea	5		FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0	= Total Cover	

Remarks: (Include photo numbers here or on a separate sheet.)

Overview soil
98-99 100

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: Wet M

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	5Y 4/1	99	10YR 4/6	1	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- X Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No _____ Depth (inches): 0

Water Table Present? Yes _____ No X Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM -- Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-10-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-1

Investigator(s): AD, RC Section, Township, Range:

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none

Slope (%): 0 Lat: 37.844 Long: -88.930 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS -- Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Taxaxicum officinale	15		FACU
2. Hordeum murinum	15		FAC
3. Glechoma hederacea	30	X	FACU
4. Trifolium pratense	40	X	FACU
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1. Lonicera japonica	15	X	FACU
2.			
	15 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

Overview 101-102 Soil 103

SOIL

Sampling Point: UPL-M

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 6/1	95	10YR 5/8	5	C	PL	Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-10-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet N
Investigator(s): AP, Jo Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave
Slope (%): 0 Lat: 37.846 Long: -88.934 Datum: NAD27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation Y, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	___ = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Elaeagnus umbellata	40	X	FACU
2.			
3.			
4.			
5.			
	40 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Indian effusus	5		OBL
2. Polygonum persicaria	15		FACW
3. Phyllostachys australis	50	X	FACW
4. Carex lucida	30	X	OBL
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1. Lonicera japonica	15	X	FACU
2.			
	15 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	30	x 1 = 30
FACW species	50	x 2 = 100
FAC species		x 3 =
FACU species	85	x 4 = 220
UPL species		x 5 =
Column Totals:	135 (A)	350 (B)

Prevalence Index = B/A = 2.6

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

Overview 104-105 Soil 106

SOIL

Sampling Point: wet-N

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	90	10YR 6/8	10	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C5)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B/G-454-1413 City/County: Williamson Sampling Date: 11-10-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-N

Investigator(s): AP, PG Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): convex

Slope (%): 0 Lat: 37.846 Long: -88.935 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. N/A			
2.			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glycine max	100	X	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1. N/A			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

107 - 108 overview 109 soil

SOIL

Sampling Point: WL-N

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/3	100					Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: BL-454-1413 City/County: Williamson Sampling Date: 11-11-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet O

Investigator(s): AP Po Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.845 Long: -88.940 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation Y, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland?	Yes X No
Hydric Soil Present?	Yes X No		
Wetland Hydrology Present?	Yes X No		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer saccharinum	15	X	FACW
2.			
3.			
4.			
5.			
	15 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Quercus palustris	5	X	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Phragmites communis	80	X	FACW
2. Carex lurida	10		OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. Lonicera japonica	15	X	FACU
2.			
	15 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

Soil overview

120 118 119

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	95	10YR 6/8	5	C	PL	Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply) _____

Secondary Indicators (minimum of two required)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)
- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data: (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-11-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-OPQ

Investigator(s): AP PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): none

Slope (%): 0 Lat: 37.848 Long: -88.938 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation 1, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glycine max	100	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

Soil 123

Sources 121-122

SOIL

Sampling Point: UPL OP a

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 6/3	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No N Depth (inches): _____

Water Table Present? Yes ____ No N Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No N Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-11-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet P
Investigator(s): AP PO Section, Township, Range: ____
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave
Slope (%): 0 Lat: 37.873 Long: -88.973 Datum: NAD27
Soil Map Unit Name: ____ NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation N Soil N or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation N Soil N or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Ulmus americana	10		FACW
2. Quercus palustris	20	X	FACW
3. Quercus falcata	20	X	FACU
4. Acer saccharinum	20	X	FACW
5. Fraxinus pennsylvanica	20	X	FACW
Quercus pagoda	10		FACW
	100 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Elaeagnus umbellata	15	X	UPL
2. Ulmus americana	15	X	FACW
3. Fraxinus pennsylvanica	10	X	FACW
4.			
5.			
	40 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Eupatorium perfoliatum	20	X	OBL
2. Lilium fortunae	10	X	FACW
3. Cyperus esculentus	10	X	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.)

Soil	Overview
156	154-155

SOIL

Sampling Point: wet P

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/1	90	10YR 4/6	10	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-11-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet Q

Investigator(s): AP 10 Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.872 Long: -88.971 Datum: NAD 27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus falcata	20	X	FACU
2. Acer saccharinum	70	X	FACW
3. Prunus serotina	10		FACU
4.			
5.			
	100 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	10		FACW
2. Fraxinus pennsylvanicum	40	X	FACW
3. Ulmus rubra	20	X	FAC
4. Ailanthus altissima	10		FACU
5.			
	80 = Total Cover		

Herb Stratum (Plot size: 5)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pilea fontana	10		FACW
2. Michella repens	20	X	FACU
3. Cyperus esculentus	30	X	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		

Woody Vine Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Toxicodendron radicans	10	X	FAC
2.			
	10 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

163 Soil 161-162 overview

SOIL

Sampling Point: wet Q

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	90	10YR 5/8	10	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1403 City/County: Williamson Sampling Date: 11-12-16

Applicant/Owner: Williamson County State: IL Sampling Point: Wet R

Investigator(s): AL PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.806 Long: -88.9818 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Acer rubrum	5	X	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Juncus effusus	30	X	OBL
2. Carex lurida	20	X	OBL
3. Cyperus esculentus	40	X	FACW
4. Rumex obtusifolius	10		FACW
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. N/A			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

Growth soil

164-164 166-167 168

SOIL

Sampling Point: Wet R

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	90	10YR 5/8	10	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-12-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-R
Investigator(s): AD, PC Section, Township, Range:
Landform (hillslope, terrace, etc.): Backslope Local relief (concave, convex, none): convex
Slope (%): 0 Lat: 37.8061 Long: -88.660 Datum: NAD27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
6.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glycine max	90	X	UPL
2. Allium canadense	10		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)
169-176 171 Soil
overview

SOIL

Sampling Point: UPL-R

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: BL6-4154-1403 City/County: Williamson Sampling Date: 11-12-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet S

Investigator(s): AD, LO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.806 Long: -88.952 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes Y No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y No	Is the Sampled Area within a Wetland? Yes Y No
Hydric Soil Present?	Yes Y No	
Wetland Hydrology Present?	Yes Y No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Salix nigra	15	X	OBL
2. Acer rubra	5		FAC
3. Fraxinus pennsylvanica	10	X	FACW
4.			
5.			
6.			
	30 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Typha latifolia	50	X	OBL
2. Veronica giganteo	20	X	FAC
3. Carex lurida	10		OBL
4. Cirsium discolor	10		FACW
5. Asclepias incarnata	5		OBL
6. Solidago canadensis	5		FACU
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)

172-173 Overview 174 soil

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No

SOIL

Sampling Point: WP 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	90	10YR 5/8	10	C	PL	loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes X No ____ Depth (inches): 12 in

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: S16-434-1413 City/County: Williamson Sampling Date: 11-16-11
Applicant/Owner: Williamson Energy State: IL Sampling Point: Up15,T
Investigator(s): AB RO Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave
Slope (%): 2 Lat: 37.876 Long: -88.956 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Allium canadense	10		
2. Glycine max	90	X	UPL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)
Overview 175-176 Soil 177

SOIL

Sampling Point: WL-SVT

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/3	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Williamson B16-454-1413 City/County: Williamson Sampling Date: 11-13-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet T
Investigator(s): AL, RO Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave
Slope (%): 0 Lat: 37.87 Long: -89.091 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland?	Yes X No
Hydric Soil Present?	Yes X No		
Wetland Hydrology Present?	Yes X No		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	5	X	OBL
2.			
3.			
4.			
5.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Phragmites australis	95	X	FACW
2. Chickweed (Stellaria media)	5		FACU
3. clearweed (Pilea fontana)	5		FACW
4. Polygonum persicaria	5		FACW
5. Ground ivy (Glechoma hederacea)	5		FACU
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)
178-179 overview 180 soil

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
- 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: wet T

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	85	7.5YR 5/8	15	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

R07304

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: 116-454-1413 City/County: Williamson Sampling Date: 11-13-16

Applicant/Owner: Williamson Barcsy State: IL Sampling Point: West U

Investigator(s): AP PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave

Slope (%): 0 Lat: 37.806 Long: -89.009 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation U, Soil U, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	15	X	OBL
2.			
3.			
4.			
5.			
	15 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Salix nigra	15	X	OBL
2. Acer saccharinum	10	X	FACW
3. Morus rubra	15	X	FACU
4.			
5.			
	40 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Phenomitis australis	50	X	FACW
2. Cook Lurya	20	X	OBL
3. Seed bag (Ludwigia alternifolia)	10		OBL
4. Boneset (Eupatorium perfoliatum)	10		OBL
5. Fellow nut sedge (Cyperus esculentus)	10		FACW
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1. N/A			
2.			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species:	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

184-185 181-188 186
overview soil

SOIL

Sampling Point: Wet U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	90	10YR 5/8	10	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): 0

Water Table Present? Yes X No ____ Depth (inches): 10

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1412 City/County: Williamson Sampling Date: 11-14-16
Applicant/Owner: Williamson County State: IL Sampling Point: Wet V
Investigator(s): AC DO Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37.826 Long: -89.019 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	
Remarks:		

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Acer saccharinum	25	Y	FACW
2.			
3.			
4.			
5.			
	25 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Leersia oryzoides	20	X	OBL
2. Echinochloa muricata	20	X	OBL
3. Hemicia sicaria	10		FAC
4. Typha latifolia	40	X	OBL
5. Rumex obtusifolius	10		FACW
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)
192 – 193 Overview
194 Soil

SOIL

Sampling Point: Wet V

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix: Color (moist)	%	Redox Features: Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	90	10YR 5/8	10	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- X Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): 0

Water Table Present? Yes X No ____ Depth (inches): 6 in

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-14-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet W

Investigator(s): AP Do Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.876 Long: -89.020 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	___ = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Populus deltoides	5	X	FAC
2. Fraxinus pennsylvanica	5	X	FACW
3. Acer saccharinum	5	X	FACW
4.			
5.			
	15 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Ludwigia alternifolia	10		OBL
2. Carex lurida	20	X	OBL
3. Acorus americanus	20	X	OBL
4. Scirpus atrovirens	30	X	OBL
5. Rumex obtusifolius	10		FACW
6. Echinochloa muricata	10		OBL
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: (Include photo numbers here or on a separate sheet.)

195-196 197

Overview soil

SOIL

Sampling Point: Wetland

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	90	10YR 5/6	10	C	PL	clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- X Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes X No ___ Depth (inches): 10

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: BIG-454-1417 City/County: Williamson Sampling Date: 11-17-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL-U, V, W

Investigator(s): AP PO Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): convex

Slope (%): 0 Lat: 37.876 Long: -89.019 Datum: NAD 27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation Y, Soil Y, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	___ = Total Cover		

Herb Stratum (Plot size: 5)			
1. Glycine max	90	X	UPL
2. Allium cernuum	10		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

198 - 199 overview

200 soil

SOIL

Sampling Point: UPL U, V, W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/4	100					clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-14-16

Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet X

Investigator(s): AP PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.876 Long: -89.029 Datum: NAD 27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland?	Yes X No
Hydric Soil Present?	Yes X No		
Wetland Hydrology Present?	Yes X No		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer saccharinum	20	X	FACW
2. Ulmus americana	15		FACW
3. Quercus lyrata	15		FACW
4. Quercus rubra	50	X	FACU
5.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1. Acer saccharinum	20	X	FACW
2. Quercus palustris	20	X	FACW
3.			
4.			
5.			
	40	= Total Cover	

Herb Stratum (Plot size: 6)			
1. Carex lurida	70	X	OBL
2. Cyperus esculentus	10	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0	= Total Cover	

Remarks: (Include photo numbers here or on a separate sheet.)

201-202 LOG
overview soil

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: wet x

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/2	60	10YR 5/8	40	C	PL	loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-14-16

Applicant/Owner: Williamson County State: TX Sampling Point: UPL X

Investigator(s): AL PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none

Slope (%): 0 Lat: 30.825 Long: -86.03 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation A, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	= Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
6.			
	= Total Cover		

Herb Stratum (Plot size: 5)			
1. Zea mays	100	X	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	= Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	= Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

JS4-205 9.06

OUNUS 50.1

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/2	100					clay loam	
7-12	10YR 6/1	100					clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: BL-454-1413 City/County: Williamson Sampling Date: 11/17/17
Applicant/Owner: Williamson Energy LLC State: IL Sampling Point: A1
Investigator(s): RD, AP Section, Township, Range:
Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37.835 Long: -88.806 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fagus grandifolia	20	X	FACU
2. Quercus palustris	50	X	FACW
3. Ulmus rubra	10		FAC
4.			
5.			
	80	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Carex lupulina	50	X	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	50	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0	= Total Cover	

Remarks: (Include photo numbers here or on a separate sheet.)

Overview: 22,23 Soil: 24,25

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: Wet A1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10yr 4/2	90	10yr 5/6	10	C	PL	clay/loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): 1

Water Table Present? Yes X No ____ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): ____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11/7/17
Applicant/Owner: Williamson Energy LLC State: IL Sampling Point: B1
Investigator(s): PD, AP Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave
Slope (%): 0 Lat: 37.835 Long: -88.881 Datum: NAD27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland?	Yes X No
Hydric Soil Present?	Yes X No		
Wetland Hydrology Present?	Yes X No		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	50	X	FAC
2. Betula nigra	50	X	FACW
3.			
4.			
5.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Dichanthelium clandestinum	40	X	FACU
2. Juncus effusus	50	X	OBL
3. Andropogon virginicus	10		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
- 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)

Overview: 30, 31, 32 Soil: 33

SOIL

Sampling Point: B1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10yr 4/1	50	10yr 4/6	50	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Remarks:

Hydric Soil Present? Yes X No ___

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Wetland Hydrology Present? Yes X No ___

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 1/17/17

Applicant/Owner: Williamson Energy LLC State: IL Sampling Point: C1

Investigator(s): PD, AP Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.835 Long: -88.882 Datum: NAD 27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N Soil N or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N Soil N or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____
Hydric Soil Present?	Yes X	No ____
Wetland Hydrology Present?	Yes X	No ____

Is the Sampled Area within a Wetland? Yes X No ____

Remarks:

VEGETATION -- Use scientific names of plants.

Tree Stratum (Plot size: 20)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	____ = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	____ = Total Cover		

Herb Stratum (Plot size: 5)			
1. Carex lurida	10		OBL
2. Alopecurus carolinianus	10		
3. Dichanthelium clandestinum	50	x	FACW
4. Juncus arcticus	20	x	OBL
5. Plantago lanceolata	5		FACU
6. Carex alopecoidea	5		FACW
7.			
8.			
9.			
10.			
	____ = Total Cover		

Woody Vine Stratum (Plot size: 15)			
1.			
2. N/A			
	____ = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	____	x 1 = ____
FACW species	____	x 2 = ____
FAC species	____	x 3 = ____
FACU species	____	x 4 = ____
UPL species	____	x 5 = ____
Column Totals:	____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.)

Overview: 44,45 soil: 46,47

SOIL

Sampling Point: 4of C1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10yr 4/2	90	10yr 5/8	10	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1/2

Water Table Present? Yes X No ___ Depth (inches): D

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-9-16

Applicant/Owner: Williamson energy State: IL Sampling Point: UPL-A1, B1, E1

Investigator(s): AD, PG Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): none

Slope (%): 0 Lat: 37.8341 Long: -88.8764 Datum: NAD27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present?	Yes ___	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Rubus allegheniensis	20	X	FACU
2. Achillea millefolium	15	X	FACU
3. Echinocloa muricata	5		OBL
4. Solidago canadensis	20	X	FACU
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		

Woody Vine Stratum (Plot size: 20)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (Include photo numbers here or on a separate sheet.)

Soil 56 overview 57-58

SOIL

Sampling Point: WL-A1, B1, C1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 7/3	100					Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Water Line City/County: Williamson Sampling Date: 10/16/17
Applicant/Owner: Williamson Energy State: IL Sampling Point: G1 wet
Investigator(s): AD, PO Section, Township, Range:
Landform (hillslope, terrace, etc.): Forest Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37°50'34.037"N Long: 88°55'41.364"W Datum: NAD27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X	No	
Wetland Hydrology Present?	Yes X	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	30%	X	OBL
2.			
3.			
4.			
5.			
	30 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Impatiens capensis	20%	X	FACW
2. Phalaris arundinacea	20%	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	40% = Total Cover		

Woody Vine Stratum (Plot size: 30%)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
Total Number of Dominant Species Across All Strata: _____ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
X 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0¹
__ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)
P. 311 - 312
Soil + Vegetation

SOIL

Sampling Point: Wet61

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/1	100%					clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): 2.5

Water Table Present? Yes X No ____ Depth (inches): 0.5

Saturation Present? (includes capillary fringe) Yes X No ____ Depth (inches): 0.5

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Water Line City/County: Williamson Sampling Date: 10/16/13
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet #1
Investigator(s): AP Section, Township, Range:
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): concave
Slope (%): 0 Lat: 37°50'32.123" N Long: -88°55'38.37" W Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes	No	
Wetland Hydrology Present?	Yes	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	10%	X	FAC
2. Salix nigra	10%	X	OBL
3.			
4.			
5.			
	20	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5)			
1. Phenanthes australis	30%	X	FACW
2. Impatiens capensis	20%	X	FACW
3. Carex lurida	10%		OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60	= Total Cover	

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0	= Total Cover	

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)
Total Number of Dominant Species Across All Strata: _____ (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:
X 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)
P. 273-277 Observers.1

SOIL

Sampling Point: wetH12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 2/1	100%					Clayloam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- X Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 5in

Water Table Present? Yes X No ___ Depth (inches): 0ft

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0 in

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Waterline City/County: Williamson Sampling Date: 10/16/17
Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL G1+H1
Investigator(s): AP, PO Section, Township, Range:
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): none
Slope (%): 0 Lat: 37°50'34.275" N Long: -88°55'39.184° W Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Trifolium repens	60%	Y	FACU
2. Poa spp	20%		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
__ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)
P. 278 - 280 overview soil

SOIL

Sampling Point: UPL G14B1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6in	10YR 5/4	100%					clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 10/16/17

Applicant/Owner: Foresight Energy State: IL Sampling Point: T1

Investigator(s): JOAP Section, Township, Range:

Landform (hillslope, terrace, etc.): None Local relief (concave, convex, none): CONCAVE

Slope (%): ≤ 1% Lat: Long: Datum:

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ____	Is the Sampled Area within a Wetland?	Yes ____ No ____
Hydric Soil Present?	Yes ____ No ____		
Wetland Hydrology Present?	Yes ____ No ____		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus Americana	5	Yes	FACW
2.			
3.			
4.			
5.			
	5 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Carex lurida	80	Yes	OBL
2. Echinochloa crus-galli	15		FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	95 = Total Cover		

Woody Vine Stratum (Plot size: 15)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

	Total % Cover of	Multiply by:
OBL species	80	x 1 = 80
FACW species	15	x 2 = 30
FAC species	0	x 3 = 0
FACU species	5	x 4 = 20
UPL species	0	x 5 = 0
Column Totals:	100 (A)	130 (B)

Prevalence Index = B/A = 1.3

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ____

Remarks: (Include photo numbers here or on a separate sheet.)

Pictures: Overview: 268-269
Soil: 270

SOIL

Sampling Point: Wet E1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 7/1	95	10YR 4/6	5	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Water Line City/County: Williamson Sampling Date: UPL-E1
Applicant/Owner: Williamson Energy State: IL Sampling Point: 10/16/17
Investigator(s): AP, DO Section, Township, Range:
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): None
Slope (%): 0 Lat: 37°56'25.179"N Long: -88°55'26.784"W Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Achillea millefolium	40%	X	FACU
2. Poa spp	20%		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

P. 271-272 overview soil

SOIL

Sampling Point: UPL-S1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 5/3	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): _____

Water Table Present? Yes ____ No ____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Water Line City/County: Williamson Sampling Date: 10/16/12
Applicant/Owner: Williamson Energy State: IL Sampling Point: JWetJ1
Investigator(s): AD PD Section, Township, Range:
Landform (hillslope, terrace, etc.): Forest Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37°50'21.424" N Long: 88°55'18.286" W Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation, Soil, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	Is the Sampled Area within a Wetland? Yes X No
Hydric Soil Present?	Yes X No	
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	20	X	FACW
2. Ulmus americana	30	X	FACW
3. Carya ovata	15	X	FACU
4. Quercus rubra	10		FACU
5.			
	75%	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Toxicodendron radicans	30%	X	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0	= Total Cover	

Remarks: (Include photo numbers here or on a separate sheet.)
P. 327-328 OV
P. 329 SO:1

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: wet 51

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/1	95%	10YR 6/8	5%	C	PL	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Water Line City/County: Williamson Sampling Date: 10/16/17
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet K1
Investigator(s): AD, PO Section, Township, Range: _____
Landform (hillslope, terrace, etc.): forest Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37°50'19.34"N Long: -88°55'14.921"W Datum: NAD 27
Soil Map Unit Name: _____ NWI classification: _____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____ Soil ____ or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes ____ No ____	
Wetland Hydrology Present?	Yes ____ No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer rubrum	50%	x	FACW
2. Ulmus americana	15%		FACW
3. Carya ovata	10%		FACU
4. Quercus rubra	10%		FACU
5.			
	85% = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Carex lucida	65%	x	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	65% = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: Wet K1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
10YR 6/1	10YR 6/1	90	10YR 5/6	10%	C	PL	loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- X Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary indicators (minimum of two required)

- X Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- X Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: Mach Water Line City/County: Williamson Sampling Date: 10/16/17

Applicant/Owner: Williamson Energy State: IL Sampling Point: UPL - J1 + K1

Investigator(s): AP, PO Section, Township, Range: _____

Landform (hillslope, terrace, etc.): Field Local relief (concave, convex, none): none

Slope (%): 0 Lat: 37°50'20.486"N Long: -88°55'15.103"W Datum: NAD 27

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes X No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus rubra	30%	x	FACU
2. Carya ovata	15%	x	FACU
3.			
4.			
5.			
	45 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Herb Stratum (Plot size: 5)			
1. Trifolium repens	30	x	FACU
2. Plantago minor	15	x	FAC
3. Taraxacum officinale	10		FACU
4. Achillea millifolium	10		FACU
5.			
6.			
7.			
8.			
9.			
10.			
	65 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0	x 2 = 0
FAC species	15	x 3 = 45
FACU species	75	x 4 = 300
UPL species	0	x 5 = 0
Column Totals:	90 (A)	345 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

__ 1 - Rapid Test for Hydrophytic Vegetation

__ 2 - Dominance Test is >50%

__ 3 - Prevalence Index is ≤3.0[1]

__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (Include photo numbers here or on a separate sheet.)

Soil = 339

OV = 340-341

SOIL

Sampling Point: UPL J1+K1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6+	10YR 2/2	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Project No. B16-454-1413

Mach Water Line



Photograph No. 1
Wetland A Overview



Photograph No. 2
Wetland A Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 3
Wetland B Overview



Photograph No. 4
Wetland B Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 5
Upland Point A and B Overview



Photograph No. 6
Upland Point A and B Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 7
Wetland C Overview



Photograph No. 8
Wetland C Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 9
Upland Point C Overview



Photograph No. 10
Upland Point C Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 11
Wetland D Overview



Photograph No. 12
Wetland D Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 13
Upland Point D and E Overview



Photograph No. 14
Upland Point D and E Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 15
Wetland E Overview



Photograph No. 16
Wetland E Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 17
Wetland I Overview



Photograph No. 18
Wetland I Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 19
Upland Point I Overview



Photograph No. 20
Upland Point I Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 21
Wetland J Overview



Photograph No. 22
Wetland J Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 23
Upland Point J Overview



Photograph No. 24
Upland Point J Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 25
Wetland K Overview



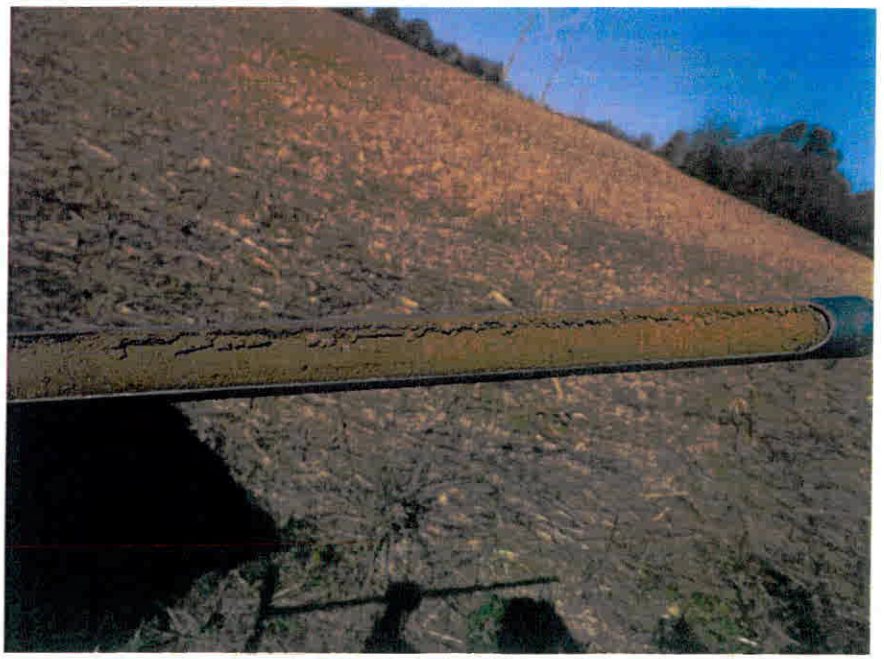
Photograph No. 26
Wetland K Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 27
Upland Point K Overview



Photograph No. 28
Upland Point K Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 29
Wetland L Overview



Photograph No. 30
Wetland L Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 31
Upland Point L Overview



Photograph No. 32
Upland Point L Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 33
Wetland M Overview



Photograph No. 34
Wetland M Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 35
Upland Point M Overview



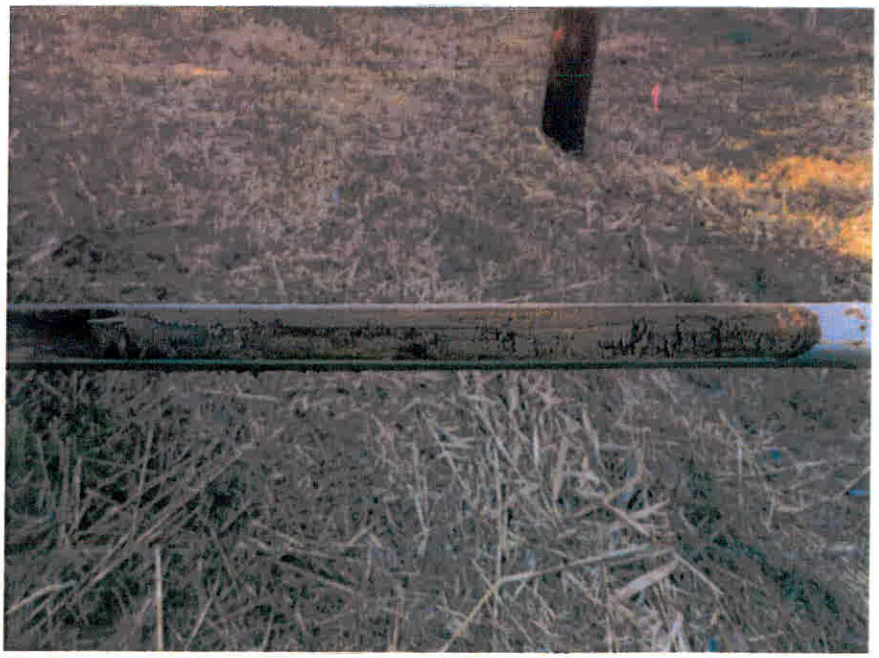
Photograph No. 36
Upland Point M Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 37
Wetland N Overview



Photograph No. 38
Wetland N Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 39
Upland Point N Overview



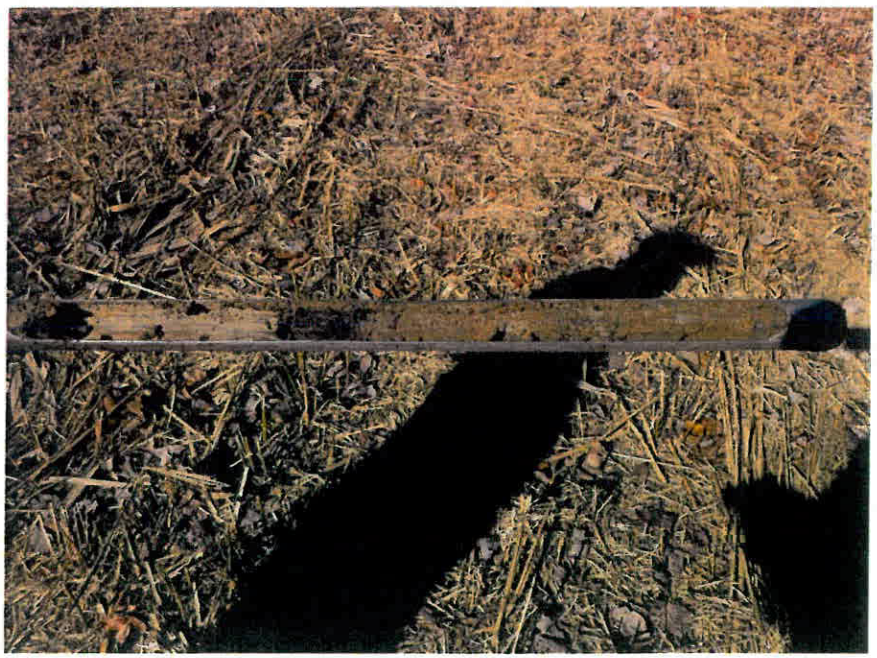
Photograph No. 40
Upland Point N Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 41
Wetland O Overview



Photograph No. 42
Wetland O Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 43
Upland Points O, P, Q Overview



Photograph No. 44
Upland Points O, P, Q Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 45
Wetland P Overview



Photograph No. 46
Wetland P Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 47
Wetland Q Overview



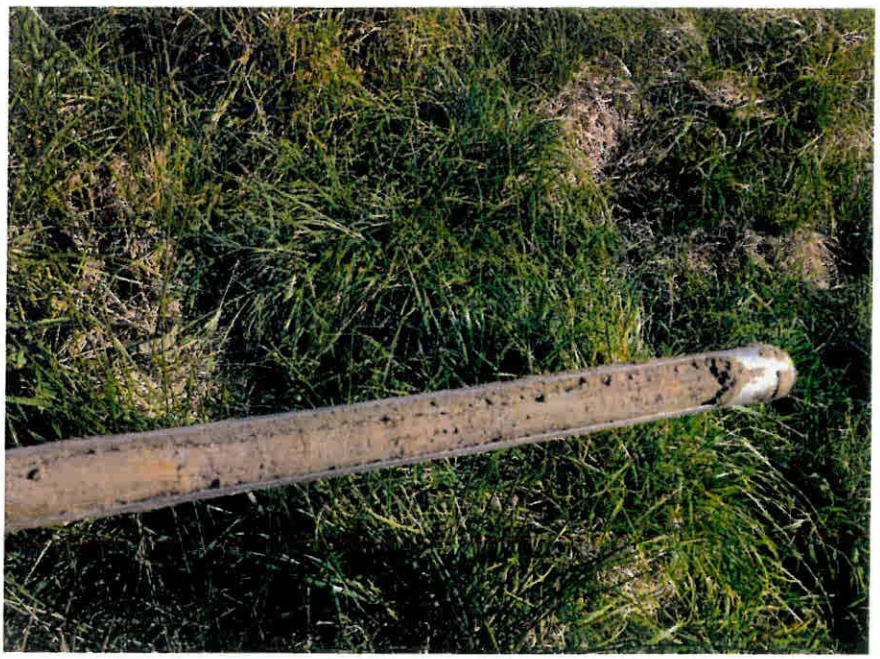
Photograph No. 48
Wetland Q Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 49
Wetland R Overview



Photograph No. 50
Wetland R Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 51
Upland Point R Overview



Photograph No. 52
Upland Point R Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 53
Wetland S Overview



Photograph No. 54
Wetland S Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 55
Upland Points S and T Overview



Photograph No. 56
Upland Points S and T Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 57
Wetland T Overview



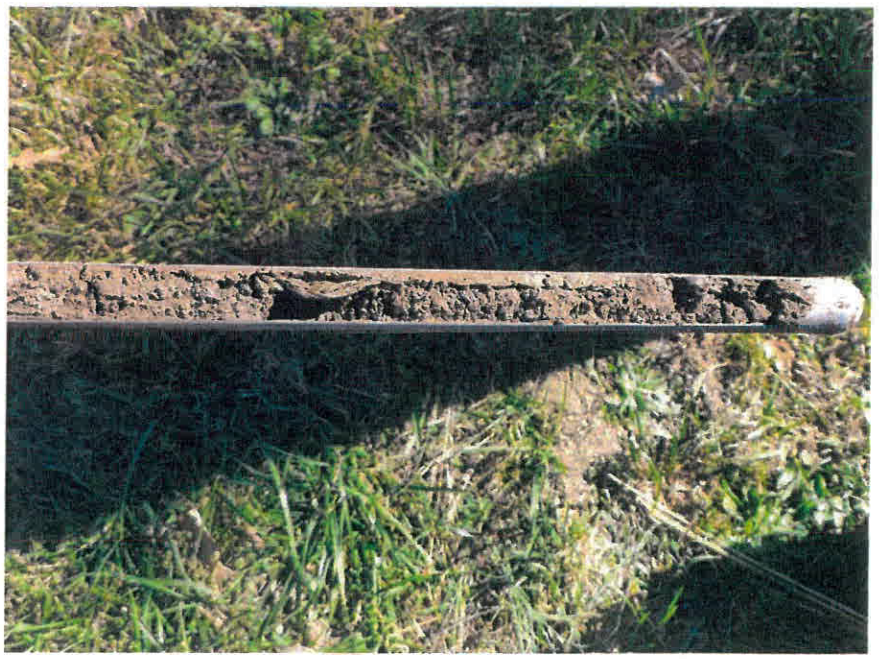
Photograph No. 58
Wetland T Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 59
Wetland U Overview



Photograph No. 60
Wetland U Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 61
Wetland V Overview



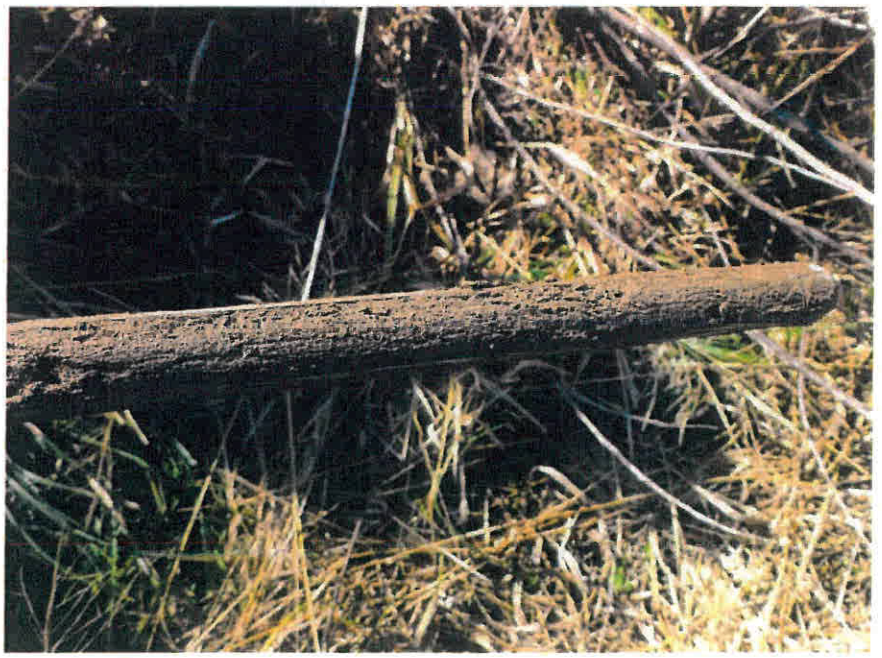
Photograph No. 62
Wetland V Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 63
Wetland W Overview



Photograph No. 64
Wetland W Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 65
Upland Points U, V, W Overview



Photograph No. 66
Upland Points U, V, W Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 67
Wetland X Overview



Photograph No. 68
Wetland X Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 69
Upland Point X Overview



Photograph No. 70
Upland Point X Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 71
Wetland A1 Overview



Photograph No. 72
Wetland A1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 73
Wetland B1 Overview



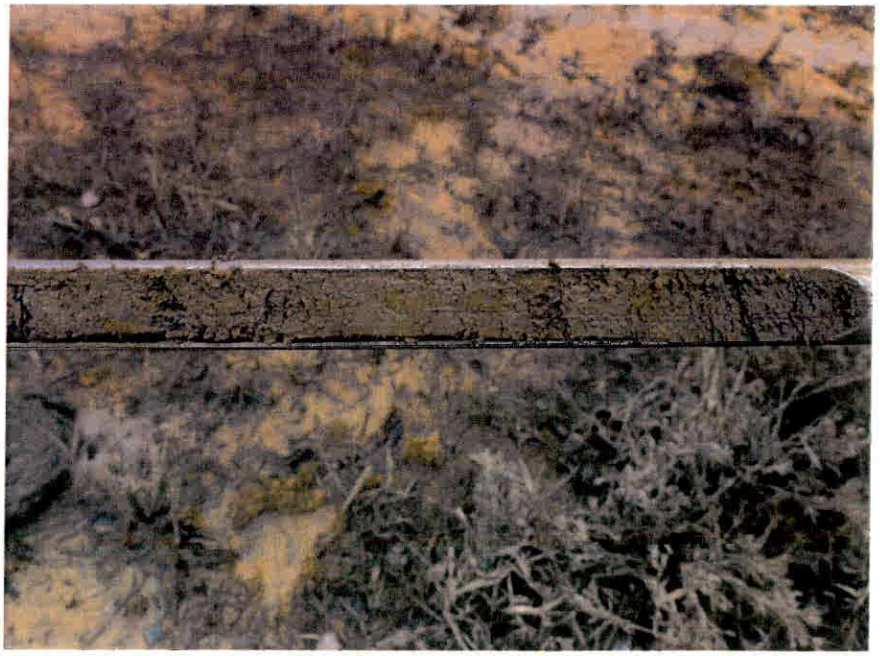
Photograph No. 74
Wetland B1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 75
Wetland C1 Overview



Photograph No. 76
Wetland C1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 77
Upland Points A1, B1, C1 Overview



Photograph No. 78
Upland Points A1, B1, C1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 79
Wetland D1 Overview



Photograph No. 80
Wetland D1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 81
Wetland E1 Overview



Photograph No. 82
Wetland E1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 83
Upland D1 and E1 Overview



Photograph No. 84
Upland D1 and E1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 85
Wetland G1 Overview



Photograph No. 86
Wetland G1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 87
Wetland H1 Overview



Photograph No. 88
Wetland H1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 89
Upland G1 and H1 Overview



Photograph No. 90
Upland G1 and H1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 91
Wetland I1 Overview



Photograph No. 92
Wetland I1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 93
Upland I1 Overview



Photograph No. 94
Upland I1 Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 95
Wetland J1 Overview



Photograph No. 96
Wetland J1 Soil



Wetland ID	Wetland Type	Size (acres)
N	PEM	0.05
O	PEM	0.03

Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 26	97	Intermittent

Legend

- UPLAND AND WETLAND POINTS
- WETLANDS
- PERMIT BOUNDARY
- STREAMS
- CULVERT EGRESS
- CULVERT INRESS

1 inch = 200 feet

0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial images were retrieved from ESRI Online Services on 3/20/17.

REV.	DATE	DESCRIPTION	BY

BECKLEY, WV
(304) 250-0481
CANONSBURG, PA
(724) 745-8830

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

DELINEATION MAP - SHEET 11

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	1/12/2018	Project No.	B16-454-1413
CHECKED BY	BWA	1/12/2018		
APPROVED BY	BAH	1/12/2018	DRAWING NO. B16-454-B20	


N
Channel 9
Channel 8
Channel 7
Stream Measurement Table
Stream Name | Length (ft.) | Stream Type
Channel 7 | 238 | Intermittent
Channel 8 | 254 | Intermittent
Channel 9 | 166 | Intermittent
Legend
PERMIT BOUNDARY
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the U. Street Addressing and Mapping Board (U. SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/20/17.
BECKLEY, WV
(304) 255-0491
OAKMONT, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Surveyors
DELINEATION MAP - SHEET 12
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJF 11/1/2017
CHECKED BY BMA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-464-1413
DRAWING NO. B16-464-B26



Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 10	95	Ephemeral

Legend

- PERMIT BOUNDARY
- STREAMS
- WETLANDS
- CULVERT EGRESS
- CULVERT INGRESS

1 inch = 200 feet

0 100 200 400 Feet

References:

Streams were retrieved from the L Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 9/20/17.

REV.	DATE	DESCRIPTION	PAS

BECKLEY, WV
(304) 255-9491
CANONSBURG, PA
(724) 745-3836

Alliance Consulting, Inc.
Engineers · Constructors · Surveyors

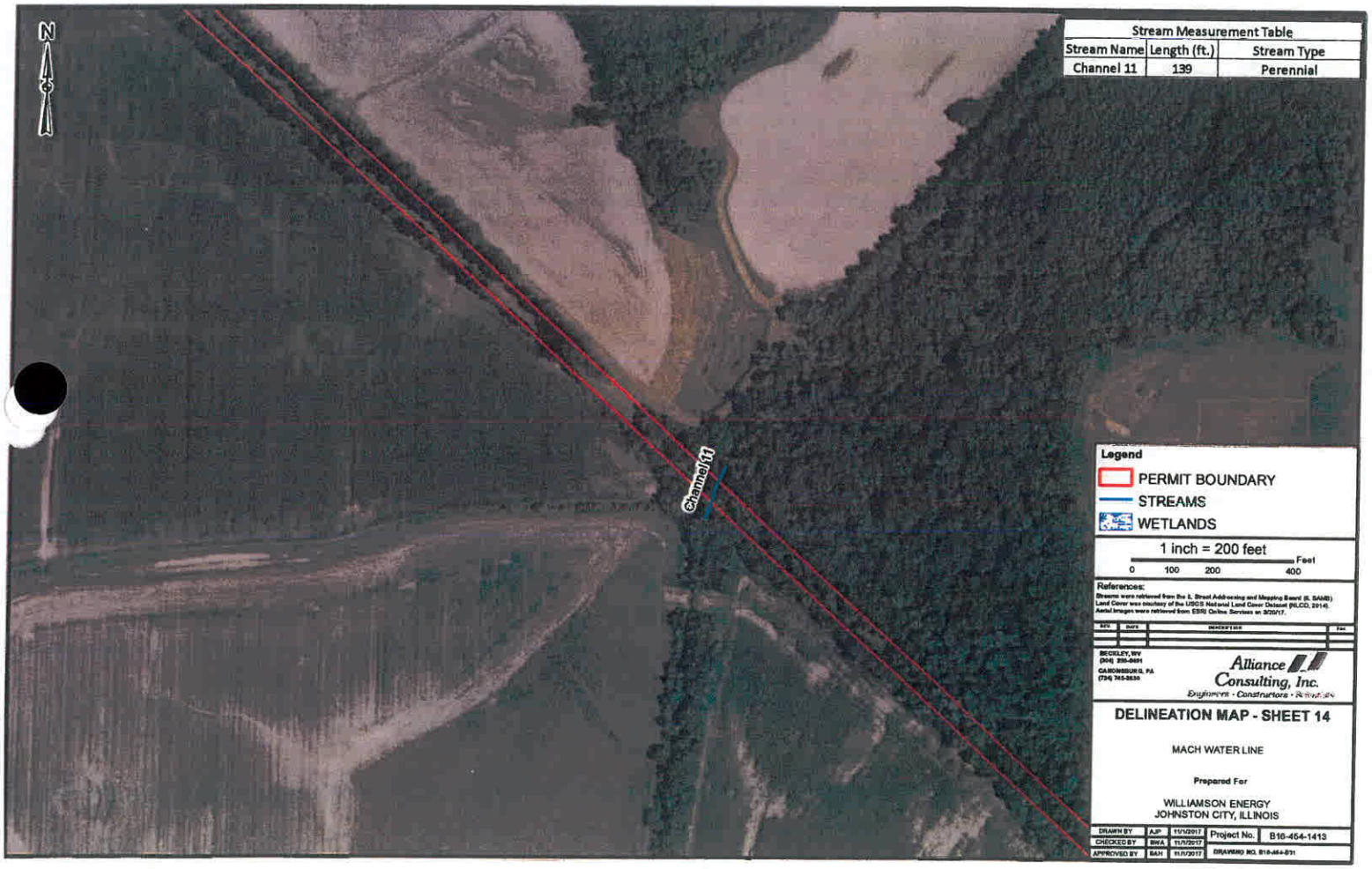
DELINEATION MAP - SHEET 13

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJF	12/18/2017	Project No.	B16-454-1413
CHECKED BY	BWA	12/18/2017		
APPROVED BY	BAH	12/18/2017	DRAWING NO. B16-454-E39	


N
Channel 11
Stream Measurement Table
Stream Name | Length (ft.) | Stream Type
Channel 11 | 139 | Perennial
Legend
PERMIT BOUNDARY
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 3/20/17.
BECKLEY, WV
(304) 255-0401
CANONSBURG, PA
(724) 745-5530
Alliance Consulting, Inc.
Engineers • Constructors • Surveyors
DELINEATION MAP - SHEET 14
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BHA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-464-1413
DRAWING NO. B16-464-S11


N
Legend
PERMIT BOUNDARY
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014)
Aerial Images were retrieved from ESRI Online Services on 8/30/17.
BECKLEY, WV
(304) 255-0421
GANDINSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP- SHEET 15
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-B22



Wetland ID	Wetland Type	Size (acres)
P	PFO	0.3
Q	PFO	0.11

Stream Measurement Table

Stream Name	Length (ft.)	Stream Type
Channel 12	111	Intermittent
Channel 13	99	Intermittent

Legend

- UPLAND AND WETLAND POINTS
- PERMIT BOUNDARY
- STREAMS
- WETLANDS
- CULVERT EGRESS
- CULVERT INGRESS

1 inch = 200 feet

0 100 200 400 Feet

References:

Streams were retrieved from the U. Street Addressing and Mapping Board (S. SAMB.) Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial images were retrieved from ESRI Online Services on: 3/2017.

BECKLEY, WV
(304) 255-5501
CANONSBURG, PA
(724) 745-3430

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

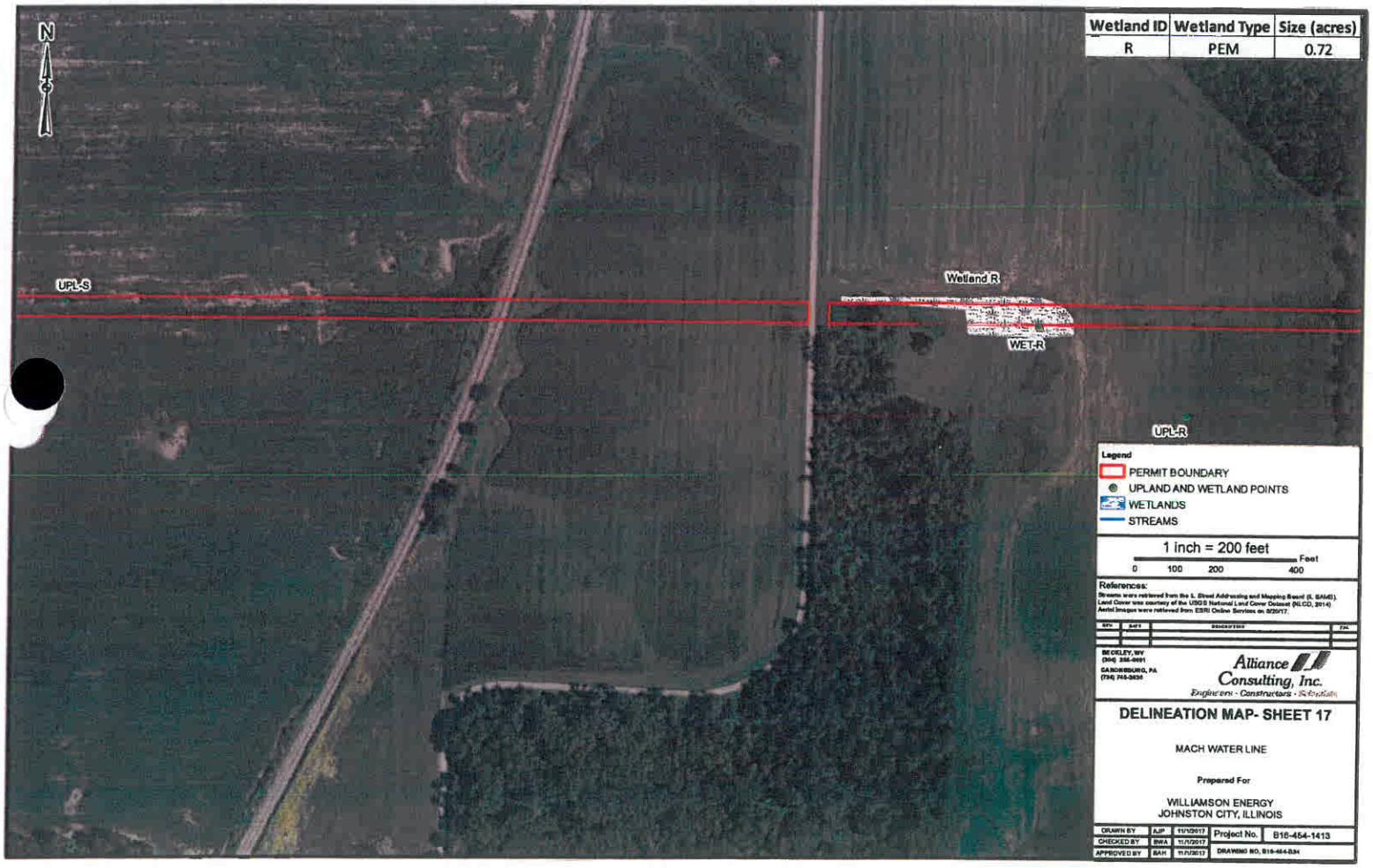
DELINEATION MAP - SHEET 16

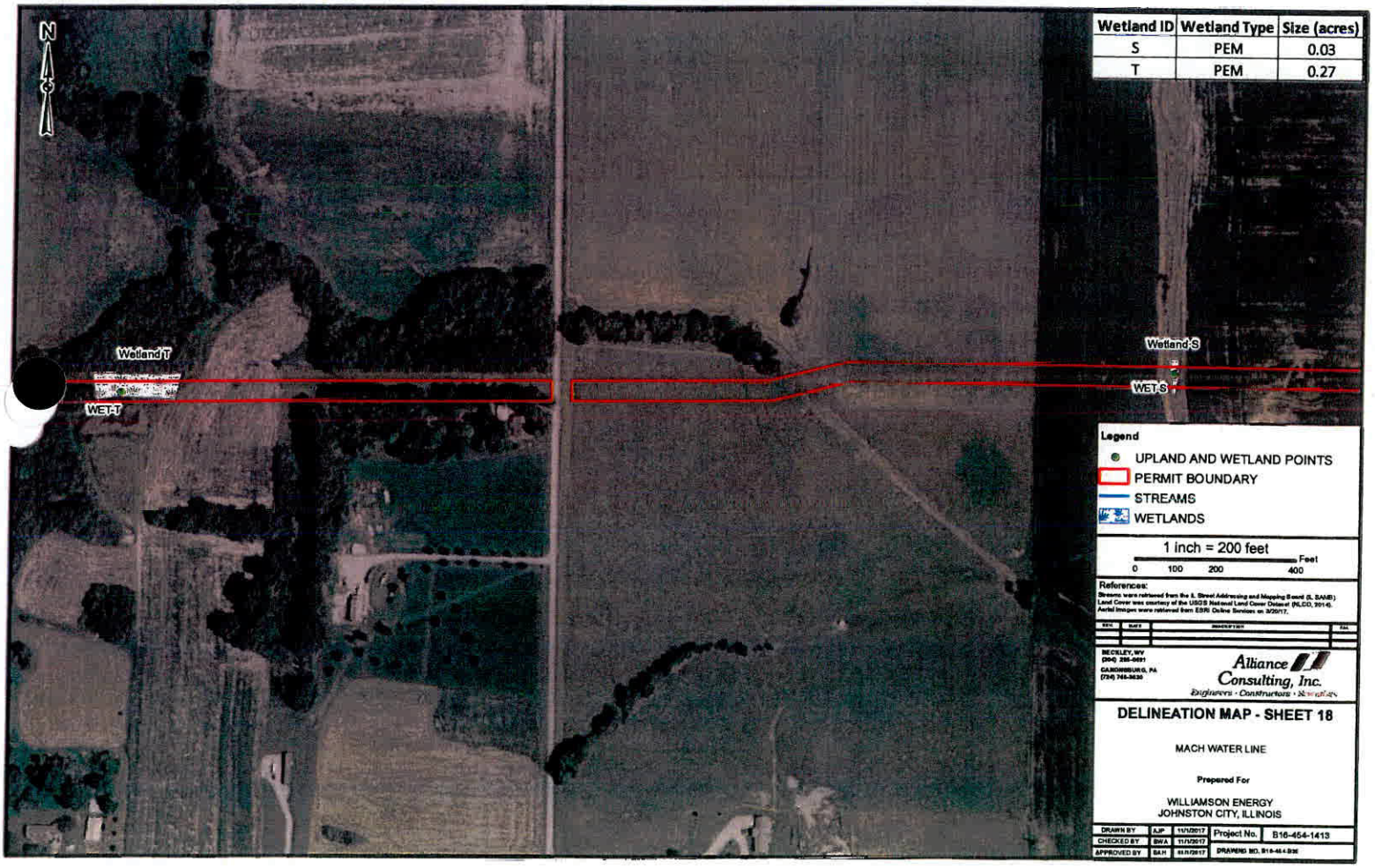
MACH WATER LINE

Prepared For

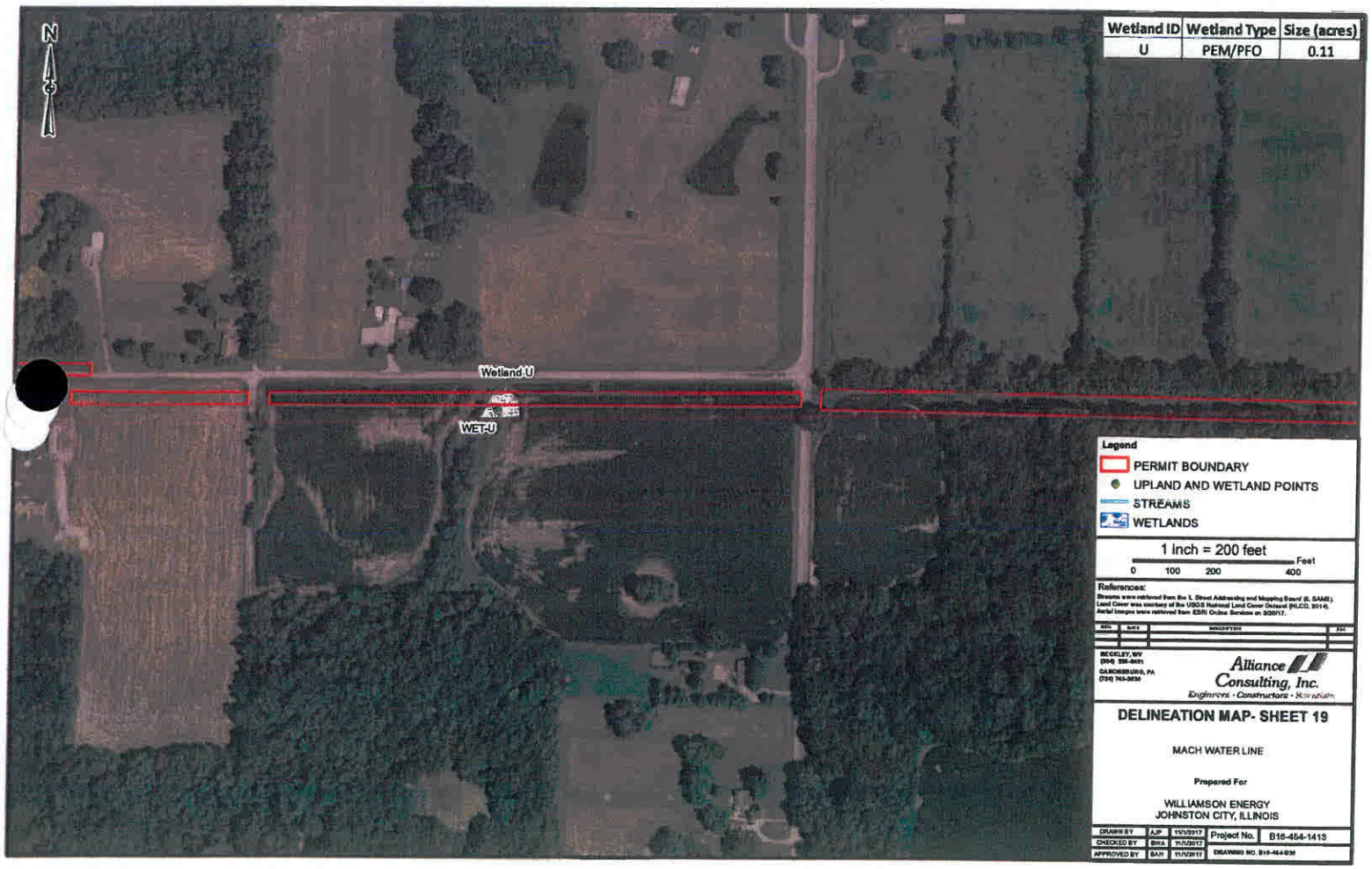
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

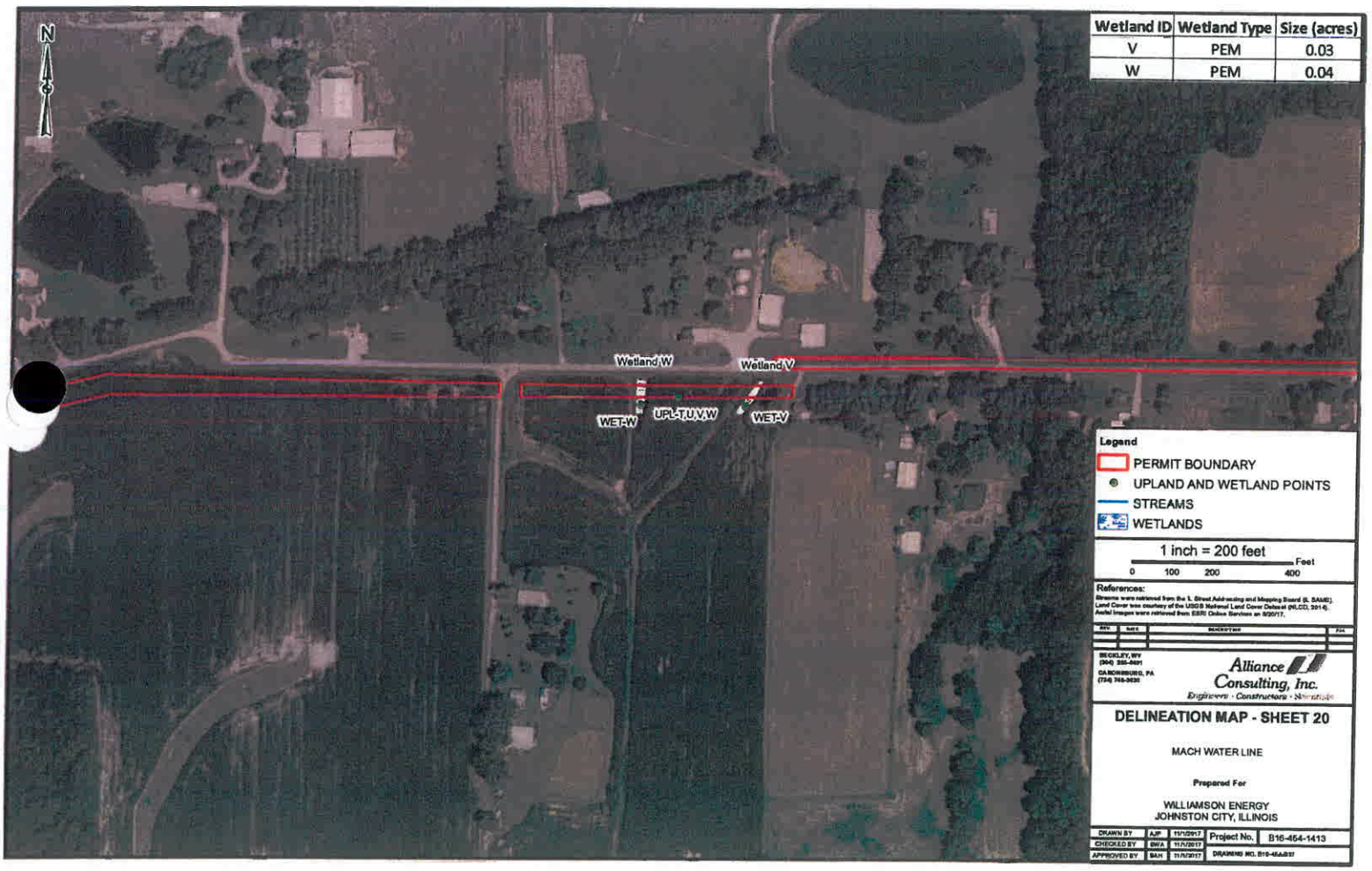
DRAWN BY	AJP	12/18/2017	Project No.	B16-454-1413
CHECKED BY	BWA	12/18/2017		
APPROVED BY	BAH	12/18/2017	DRAWING NO. B16-454-B33	


N
UPL-S
Wetland R
WET-R
UPL-R
Wetland ID | Wetland Type | Size (acres)
R | PEM | 0.72
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
WETLANDS
STREAMS
1 inch = 200 feet
0 100 200 400 Feet
References:
BECKLEY, WV
(304) 256-0001
GAUNDERBURG, PA
(724) 745-3330
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP- SHEET 17
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017 Project No. B16-454-1413
CHECKED BY BMA 11/1/2017
APPROVED BY BAH 11/1/2017 DRAWING NO. B16-454-B34



Wetland ID	Wetland Type	Size (acres)
S	PEM	0.03
T	PEM	0.27


N
Wetland U
WET-U
Wetland ID | Wetland Type | Size (acres)
U | PEM/PFO | 0.11
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on: 3/20/17.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 743-3530
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP- SHEET 19
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-B36


N
Wetland W
Wetland V
WET-W
UPL-T,U,V,W
WET-V
Wetland ID | Wetland Type | Size (acres)
V | PEM | 0.03
W | PEM | 0.04
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the U. Street Addressing and Mapping Board (S. SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 9/20/17.
BECKLEY, WV
(304) 255-5431
CANONSBURG, PA
(724) 745-3330
Alliance Consulting, Inc.
Engineers · Constructors · Surveyors
DELINEATION MAP - SHEET 20
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-464-1413
DRAWING NO. B16-464-S37


N
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial Images were retrieved from ESRI Online Services on 3/20/17.
BECKLEY, WV
(304) 255-8691
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP- SHEET 21
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 12/11/2015
CHECKED BY BWA 12/11/2015
APPROVED BY BAH 12/11/2015
Project No. B16-454-1413
DRAWING NO. B16-454-B36
Note - Wetland X was verified by the USCOE in the field as non-wetland

PART II ATTACHMENT II.10
CULTURAL, ARCHEOLOGICAL AND HISTORICAL RESOURCES REPORT

Approximately two-thirds of the proposed permit area is within multiple archaeological survey project areas.

Phase I cultural resources survey for Steelhead Development Corporation (predecessor to Williamson Energy, LLC) was conducted between June 14, 2004 and August 17, 2004. The location of the Fry Farmstead Site and Cemetery was listed during this survey and the location of the cemetery is shown on the Hydrology – Mining Operations Map (Drawing No. B17-222-M13). The Phase II cultural resources survey for the Fry Farmstead Site (11WM150) was conducted on May 10 – 17, 2005.

A Phase I cultural resources survey for Illinois Methane, LLC was conducted on February 1, 2, and 5, 2001. The project area extended from the storage facility located near Thorn Road (T8S, R4E, Section 8), west through the old Zeigler No. 6 mine site, along an abandoned railroad grade and north towards the community of Pershing, IL. The project area was approximately 12.3 miles and 30 acres through Franklin and Williamson counties. Project clearance was recommended for the installation of the pipeline.

A consultant has been contacted to conduct a cultural resources survey on the remaining one-third of the proposed Water Management Pipeline project area and to verify the previous surveys are valid. The Cultural, Archeological and Historical Resources Report(s) has been provided to the State Historic Preservation Agency.

A copy of the Phase I survey and the Concurrence Letter is attached.

RECEIVED
JUN 26 2017
011062617
PRESERVATION SERVICES

ILLINOIS
NATURAL RESOURCES

Illinois Department of
Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

IHPA REVIEW
H/A
AC Concur
AR
File VA/FRANK
6/29/17

June 23, 2017

2 COPIES RCVD & CD

Rachel Leibowitz, Ph.D.
Preservation Services Division Manager
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, IL 62701

Dear Dr. Leibowitz:

Pursuant to the requirements of the Programmatic Agreement between the Illinois Historic Preservation Agency (IHPA) and the Illinois Department of Natural Resources (IDNR) concerning mining, please review the enclosed Archaeological Survey Report.

PROJECT: Williamson Energy, LLC waterline, starting 1.75 miles south of Zeigler, IL, ending 1.75 miles east of Johnston City, IL (DNR Permit application #456)
STREET ADDRESSES: starting 1000ft. west of 7059 Lake Creek Rd., (P.O. West Frankfort) the line runs east to about 1000 ft. west of the intersection of Presley Ln and Freeman Rd., then southeast to near 16688 Duncan Road (P.O. Johnston City), then east ¾ miles cross-country, then southeast to the intersection of Eberhardt and Old Frankfort Rds, then east to endpoint at 16468 Liberty School Rd., Johnston City, IL
COUNTY: Franklin and Williamson Counties CONSULTANT: ARG (Titus)

The Phase One archaeological reconnaissance of **72 acres** has located two sites, **11FK301 and 11WM402,** which are recommended as not eligible for listing to the National Register of Historic Places. The project does not affect the cemetery at site 11FK150. No other previously reported sites were relocated within the project area.

In accordance with the established procedures for coordination of Illinois Department of Natural Resources projects, IDNR requests Illinois Historic Preservation Agency concurrence in the determination that the project has no effect to any Historic Property.

If no reply is received from IHPA within 45 days, IDNR will conclude, as per the Programmatic Agreement, this application is approved and will proceed with the undertaking.

Sincerely,

Dawn E. Cobb

Dawn E. Cobb
Archaeologist
Office of Realty and Environmental Planning

CONCUR
By: Rachel Leibowitz
Deputy State Historic Preservation Officer
Date: 7-12-17

DC:mbs
(2 hard copies of report, 1 CD)

Printed On Recycled Paper

American Resources Group Ltd.
Cultural Resource Management
est. A.D. 1979

June 9, 2017

Dawn Cobb
Archaeologist
Office of Realty and Environmental Planning
Illinois Department of Natural Resources
One Natural Resource Way
Springfield, IL 62702

RE: Archaeological Survey Short Report: *Phase I Cultural Resources Survey and Assessment of a Proposed Waterline Project for Williamson Energy, LLC, Williamson County, Illinois* (ARG CRM 1981).

Dear Ms. Cobb:

Enclosed please find three hard copies and one electronic copy (pdf) on CD of the above short report. If you have any questions, please give us a call.

Sincerely,

Cally Lence
Project Manager

Enclosures

Copy: Mr. James Plumley, Williamson Energy, LLC

www.argltd.com • 127 N. Washington • Carbondale IL 62901
Phone 618 529 2741 • Fax 618-457-5070 • archaeology@argltd.com

ARCHAEOLOGICAL SURVEY SHORT REPORT **Reviewer:**
Illinois Historic Preservation Agency **Date:**
1 Old State Capitol Plaza, Springfield, Illinois 62701-1507 **Accept:** **Reject:**
(217) 782-4836

IHPA Log Number:

LOCATIONAL INFORMATION AND SURVEY CONDITIONS:

County: Williamson and Franklin **Quadrangle:** Christopher, Illinois 7.5'; West Frankfort, Illinois 7.5'; Pittsburg, Illinois 7.5'; Johnston City, Illinois 7.5'

Project Type/Title: Phase I Cultural Resources Survey and Assessment of a Proposed Waterline Project for Williamson Energy, LLC, Williamson County, Illinois (ARG CRM 1981).

Funding and/or Permitting Federal/State Agencies: Illinois DNR and U.S. Army Corps of Engineers

Legal Location: **Section:** 27, 28, 29, 31, 32, 33, 34, 35 **Township:** 7S **Range:** 2E
Section: 1, 2, 12 **Township:** 8S **Range:** 2E
Section: 7, 8, 9, 11, 14, 15, 16, 17 **Township:** 8S **Range:** 3E

UTM Coordinates: **West End UTM North:** 4193974 **UTM East:** 321426
East End UTM North: 4189079 **UTM East:** 338450

Location: The western end of the project corridor, which begins at the proposed location of the associated pump station, is situated about 1.75 miles (2.8 km) southeast of Zeigler. The project corridor then proceeds to head east to within approximately .7 mile (1.1 km) west of Pershing before heading southeast toward the northeastern outskirts of Johnston City; at this point, it heads east, terminating at a point located approximately 1.75 miles (2.8 km) east of Johnston City.

Project Description: Phase I archaeological survey of a proposed waterline and associated pump station for Williamson Energy, LLC.

Topography: Low-lying uplands, terrace, drainages

Elevation (' AMSL): 380'-545'

Soils: Ava-Bluford-Wynoose (University of Illinois 1966)

Drainage: Unnamed intermittent, Lake Creek, Pond Creek, Big Muddy River, Mississippi River.

Land Use/Ground Cover (include % visibility): The smallest percentage of the project corridor was planted in immature crops (85% ground surface visbility), followed by woods (0% ground surface visibility), hayfields (0% ground surface visibility) and grass (0% ground surface visbility). A large portion of the project corridor (approximately 50%) was abandoned railroad grade (0% ground surface visibility).

Survey Limitations: The Big Muddy River bank, the occasional creek bed and banks, and the railroad grades, were visually inspected. The railroad grade has been built up, on average, a height of 7 feet above the natural ground surface.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION:

Historic Plats/Atlases/Sources: Illinois Inventory of Archaeological Sites; IHPA HARGIS database;
1807 GLO Plat Maps of Township 7 South, Range 2 East, Township 8 South, Range 2 East, and Township 8 South, Range 3 East (Illinois State Archives) (Attachment B, Figure B-1);
1876 Atlas of the State of Illinois (Warner and Beers) (Attachment B, Figure B-2);
1900 Map of Franklin County, Illinois (Guy Beauman) (Attachment B, Figure B-3);
1918 Standard Atlas of Franklin County, Illinois (Sims and Sons, Publishers) (Attachment B, Figure B-4),
1908 Standard Atlas of Williamson County, Illinois (George A. Ogle and Company) (Attachment B, Figure B-5);
1939 Williamson County Plat Map (W.W. Hixson) (Attachment B, Figure B-6);
1937? Plat Books of Franklin and Hamilton Counties, Illinois (W.W. Hixson) (Attachment B, Figure B-7);
1951? Franklin County Plat Book, Illinois (Dudley Darrell) (Attachment B, Figure B-8);
1909 USGS West Frankfort, Illinois, and 1910 Herrin, Illinois, 15-minute series topographic quadrangles (Attachment B, Figure B-9);

Previously Reported Sites: Within or adjacent to project area: 11WM145, 11WM150, 11WM151, 11WM152, 11FK200, 11FK201, 11FK202

Previously recorded sites 11WM145, 11WM151, and 11WM152 had previously been evaluated as ineligible for NRHP listing. Site 11WM145 is a very small, low density lithic scatter that was recorded in 1981; it was not relocated during the subsequent 2005 survey (Ensor et al. 2005; Vander Leest 1981). Site 11WM151 was recorded in 1981 as an ineligible historic site; the site was revisited in 2005 but was not relocated at that time (Ensor et al. 2005; Vander Leest 1981). Site 11WM152 is a late nineteenth- to early twentieth-century farmstead first recorded in 1981 and revisited in 2005; the site was evaluated as ineligible during both surveys (Ensor et al. 2005; Vander Leest 1981).

Sites 11FK200, 11FK201, and 11FK202 were recorded in 2001 during a linear survey for a methane pipeline (Shah 2001). Each is a prehistoric lithic scatter identified along the edges of an abandoned rail grade near Pond Creek. The sites were evaluated as potentially eligible outside the 2001 survey corridor. Though these sites are located adjacent to the current project, the project is located within the railroad grade that was presumed to have destroyed portions of these sites when the railroad was constructed.

In 2005, ARG conducted a Phase II investigation at site 11WM150, a mid-nineteenth- to mid-twentieth century farmstead (Ensor and Lence 2005). A small family cemetery containing three to five children is located within the northern half of the site. Following the Phase II investigation, the site was evaluated as ineligible and project clearance was recommended, with the caveat that the cemetery be protected or moved to another location. The cemetery (Fry Cemetery) is still extant, but is located outside (~140 feet) the current project boundary on private land.

In 1-mile of project area: 11WM56, 58, 111, 112, 116-120, 130-137, 146, 149, 313, 333, 334, 337-339, 343, 363, 372-385; 11FK3, 31, 103, 215

Previous Surveys: Within project area: Paralleling and/or entirely covering project area: 11295 (Shah 2001), 14961 (Ensor et al. 2005); Phase II, site 11WM150 (Ensor and Lence 2005) (See Attachment A); Crossing project area perpendicularly: 99999 (I-57), 9296 (Penman 1998), 13930 (Witty 2003)

In 1-mile of project area: 669 (Vander Leest 1981); 3170 (McNerney 1990); 4650 (Simon 1992); 5025 (Rubach 1993); 11604 (Burrow and Aberle 2001); 12834 (Halpin 2002); 14963 (Stratton and Mansberger 2005); 15634 (Unknown-not in CRM Report Archive); 18933 (Anderson 2010); 19490 (Craig and Rein 2011); 20334 (Craig and Rein 2014)

Regional Archaeologist Contacted: None, consulted the Illinois Inventory of Archaeological Sites

Investigation Techniques: Systematic, screened shovel testing along transects spaced 15 m apart in grass, hay fields, and woods where visibility fell below 25 percent; systematic surface survey along transects spaced 5 m apart in the newly planted agricultural fields. The railroad grade was subject to systematic walkover survey along a single transect.

Time Expended: 53 Hours
Sites/Find Spots Located: 11FK301, 11WM402

Cultural Material: 1 fragment of brick and mortar (Site 11WM402); 35 fragments of early to mid-twentieth century glass, ceramic, and wire nails (Site 11FK301)
Collection Techniques: Total collection of all artifacts observed. **Curated At:** Illinois State Museum
Area Surveyed (acres and square meters): 72 acres; 291,373 square meters

RESULTS OF INVESTIGATIONS AND RECOMMENDATIONS: (check one)

_ **Phase I archaeological reconnaissance has located no archaeological material; project clearance is recommended.**

X **Phase I archaeological reconnaissance has located archaeological materials; site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.**

_ **Phase I archaeological reconnaissance has located archaeological materials; site(s) may meet requirements for National Register eligibility; further testing is recommended.**

_ **Phase II archaeological investigation has indicated that site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.**

_ **Phase II archaeological investigation has indicated that site(s) meet requirements for National Register eligibility; formal report is pending and a determination of eligibility is recommended.**

Comments: Two small historic sites (11FK301 and 11WM402) were recorded in the course of the current investigation. The sites are evaluated as ineligible for NRHP listing. Project clearance is recommended. See Attachment C.

ARCHAEOLOGICAL CONTRACTOR INFORMATION:

Archaeological Contractor: American Resources Group, Ltd.
Address/Phone: 127 North Washington Street
Carbondale, Illinois 62901-1507 / (618) 529-2741

Surveyor(s): James Burrow, Bob Sadler, and John A. Schwegman **Survey Date(s):** May 24–25, 2017
Report Completed by: John A. Schwegman, Cally Lence, and Bob Sadler **Date:** June 6, 2017
Submitted by (signature and title): Steve Titus, Principal Investigator

ATTACHMENT CHECK LIST: (#1 through #4 are mandatory)

_x_ **1) Relevant portion of USGS 7.5' topographic quadrangle map(s) showing project location and any recorded site;**
_x_ **2) Project map(s) depicting survey limits and, when applicable, approximate site limits and concentrations of cultural materials;**
_x_ **3) Site form(s): (two copies of each form);**
_x_ **4) All relevant project correspondence;**
_x_ **5) Additional information sheets as necessary.**

Address of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed To:

Williamson Energy, LLC
16824 Liberty School Road
Marion, Illinois 62959

Contact Person: Mr. James Plumley
Telephone Number: (618) 969-8259

American Resources Group, Ltd.
127 North Washington Street
Carbondale, Illinois 62901-1507

Contact Person: Mr. Steve Titus
Telephone Number: (618) 529-2741

REVIEWERS COMMENTS:

List of Attachments

Attachment A: Project Maps

Figure A-1. General location of the project area, Williamson and Franklin counties, Illinois.
Figure A-2. Topographic location of the a portion of the project area.
Figure A-3. Topographic location of the a portion of the project area.
Figure A-4. Topographic location of the a portion of the project area.
Figure A-5. Topographic location of the a portion of the project area.
Figure A-6. Site map, 11WM402.
Figure A-7. Site map, 11FK301.

Attachment B: Historic Maps

Figure B-1. Portion of the 1807 GLO Plat Maps of Township 7 South, Range 2 East, township 8 South, Range 2 East, and Township 8 South, Range 3 East, illustrating the project area (Illinois State Archives 2017).
Figure B-2. Portion of the 1876 Atlas of the State of Illinois illustrating the project area (Warner and Beers 1876).
Figure B-3. Portion of the 1900 Map of Franklin County, Illinois, illustrating the project area (Guy Beauman 1900).
Figure B-4. Portion of the 1918 Standard Atlas of Franklin County, Illinois, illustrating the project area (Sims and Sons Publishers 1918).
Figure B-5. Portion of the 1908 Standard Atlas of Williamson County, Illinois, illustrating the project area (George A. Ogle and Company 1908).
Figure B-6. Portion of the 1939? Plat Book of Williamson County, illustrating the project area (W.W. Hixson and Company 1939?).
Figure B-7. Portion of the 1937? Plat Books of Franklin and Hamilton Counties, illustrating the project area. (W.W. Hixson and Company 1937?).
Figure B-8. Portion of the 1951? Franklin County Plat Book, illustrating the project area (Dudley Darrell 1951?).
Figure B-9. Portion of the 1909 West Frankfort, and 1910 Herrin, Illinois, USGS 15' series topographic quadrangles illustrating the project area.

Attachment C: Comments and Site Description

Table C-1. Historic Artifact Inventory, Site 11FK301.

Attachment D: Project Photographs

Figure D-1. Headstone of Anna M. Dorthea Fry, Fry Cemetery, site 11WM150, view north.
Figure D-2. Headstone of Mary and Malinda Fry, Fry Cemetery, site 11WM150.
Figure D-3. View north from northern edge of project corridor toward Fry Cemetery (Bob Sadler in orange shirt is standing at cemetery), view north.
Figure D-4. Site 11WM402, cistern, view north-northwest.
Figure D-5. Site 11WM402 cistern interior.
Figure D-6. Site 11FK301 overview, view northeast.
Figure D-7. Northern edge of site 11FK301 at Big Muddy River, view northwest.

Attachment E: References Cited

Attachment F: Site Form

Attachment A

Project Maps

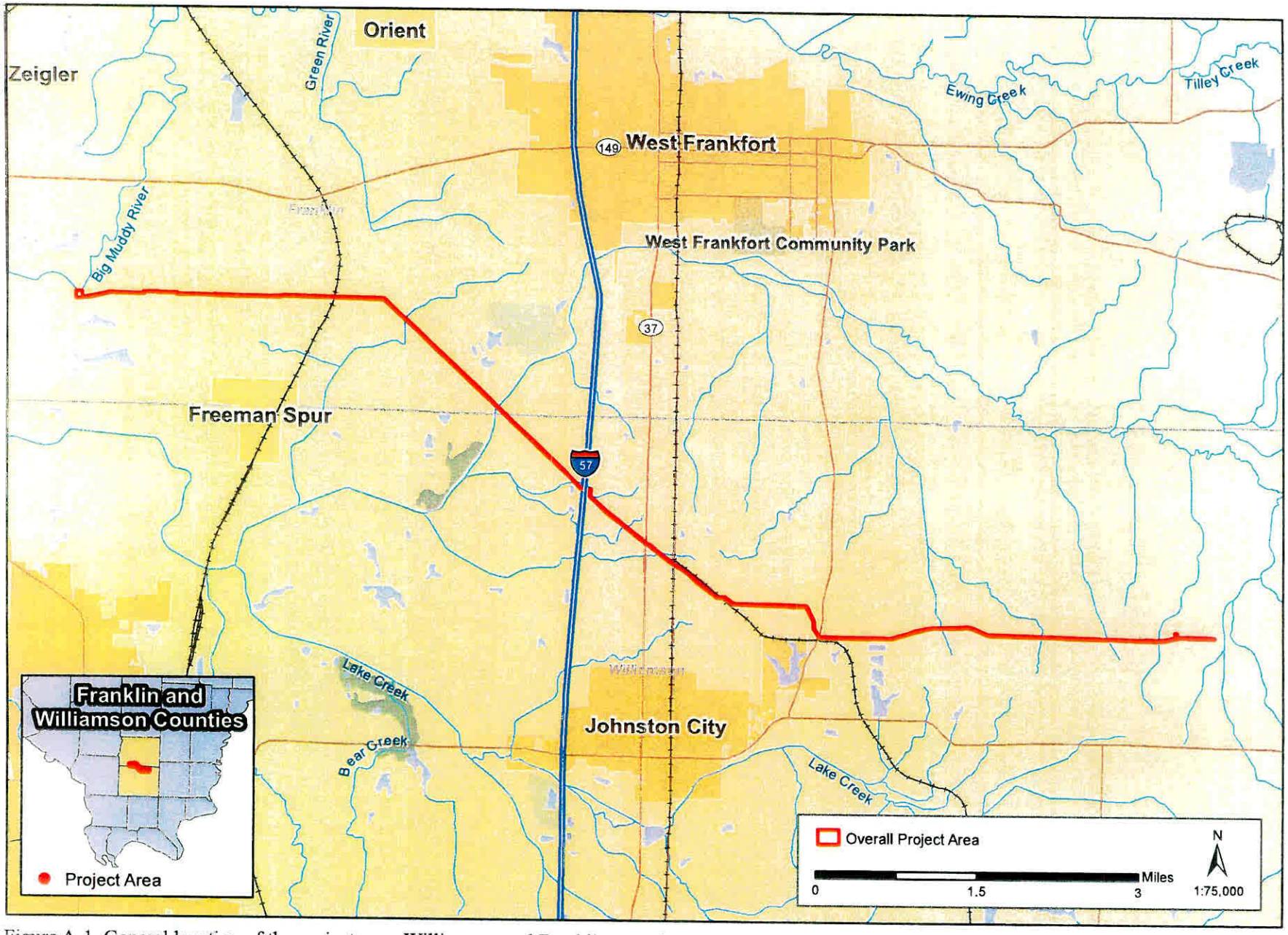


Figure A-1. General location of the project area, Williamson and Franklin counties, Illinois.

R07410

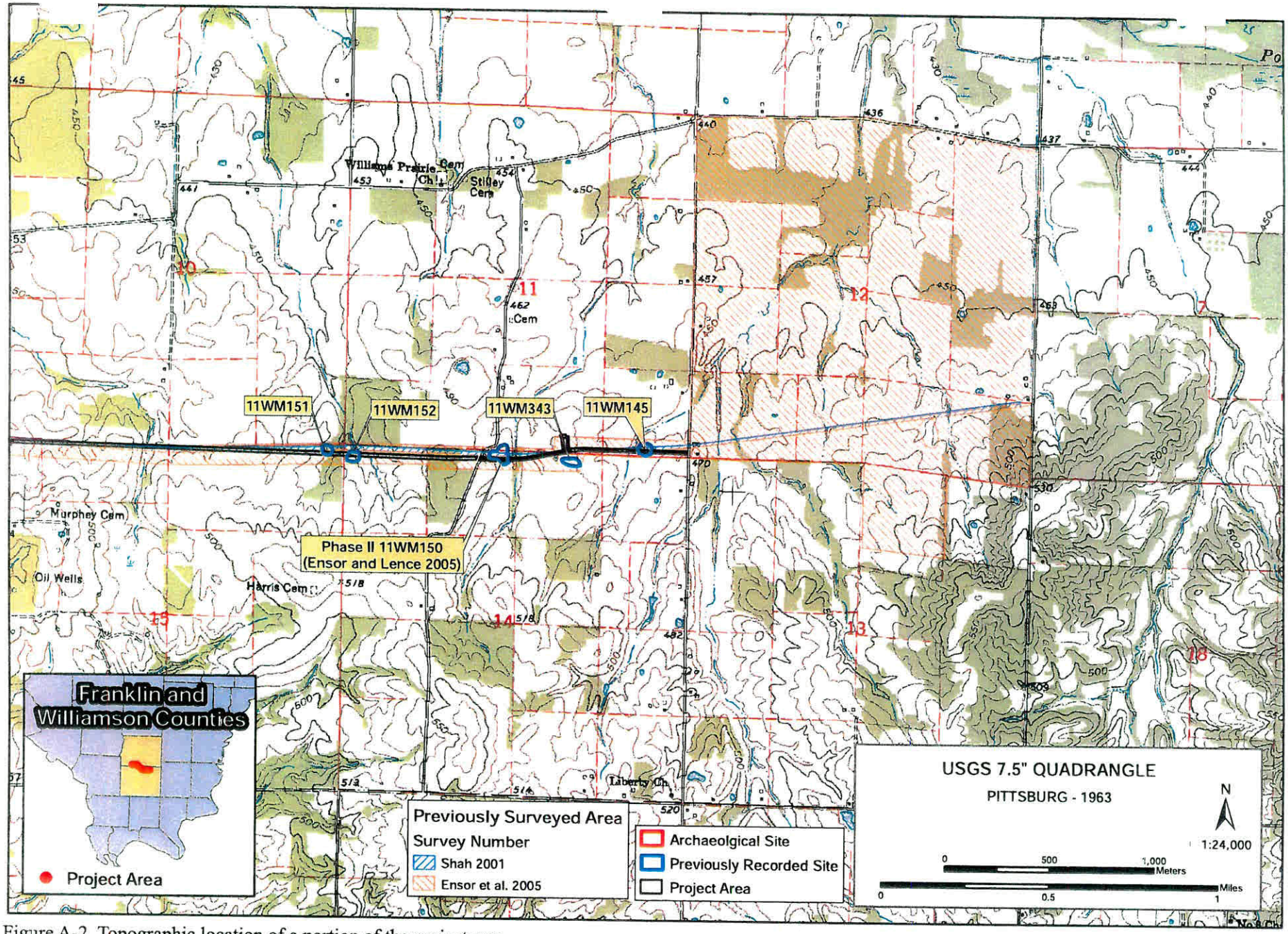


Figure A-2. Topographic location of a portion of the project area.

R07411

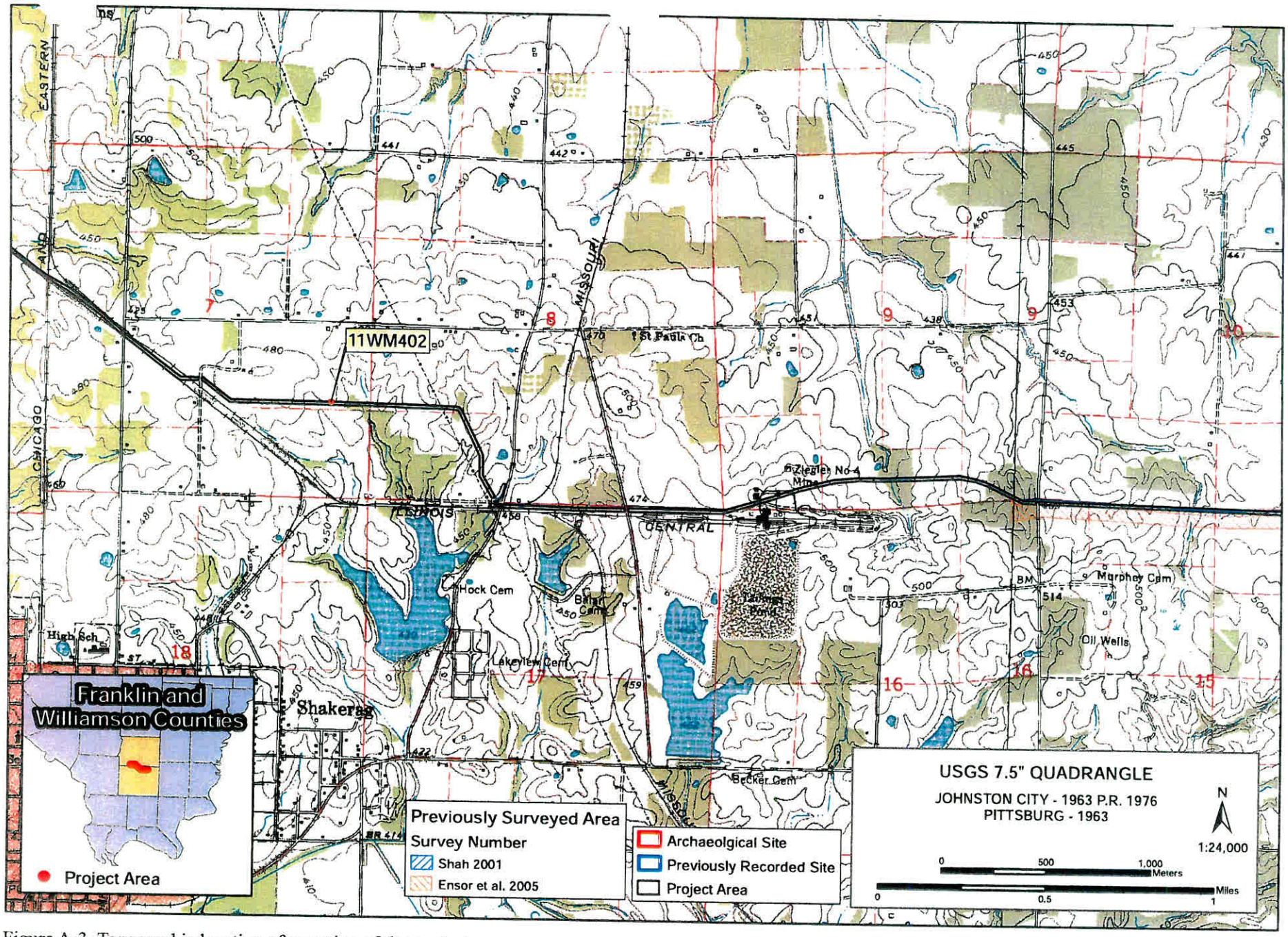


Figure A-3. Topographic location of a portion of the project area.

R07412

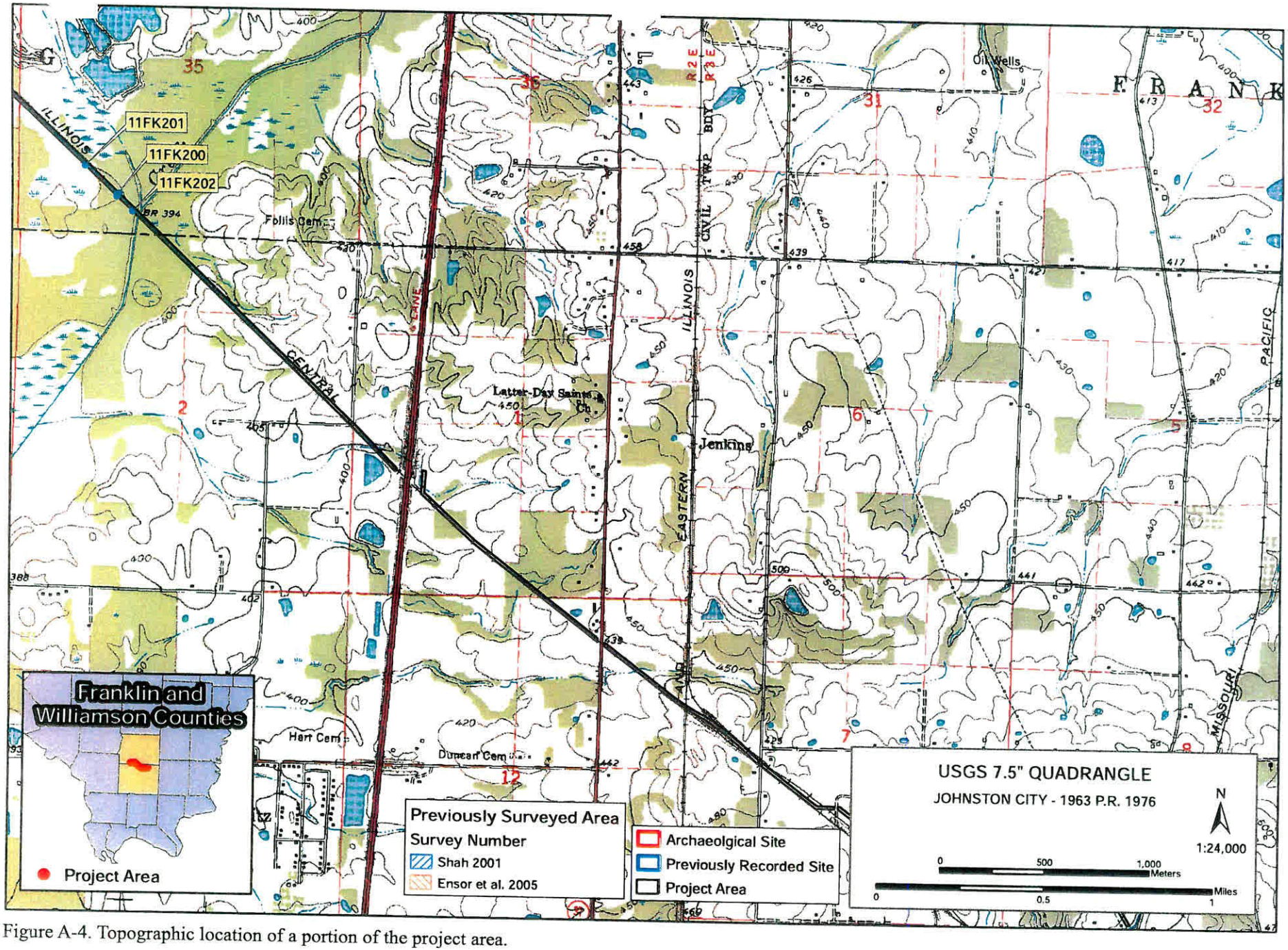


Figure A-4. Topographic location of a portion of the project area.

R07413

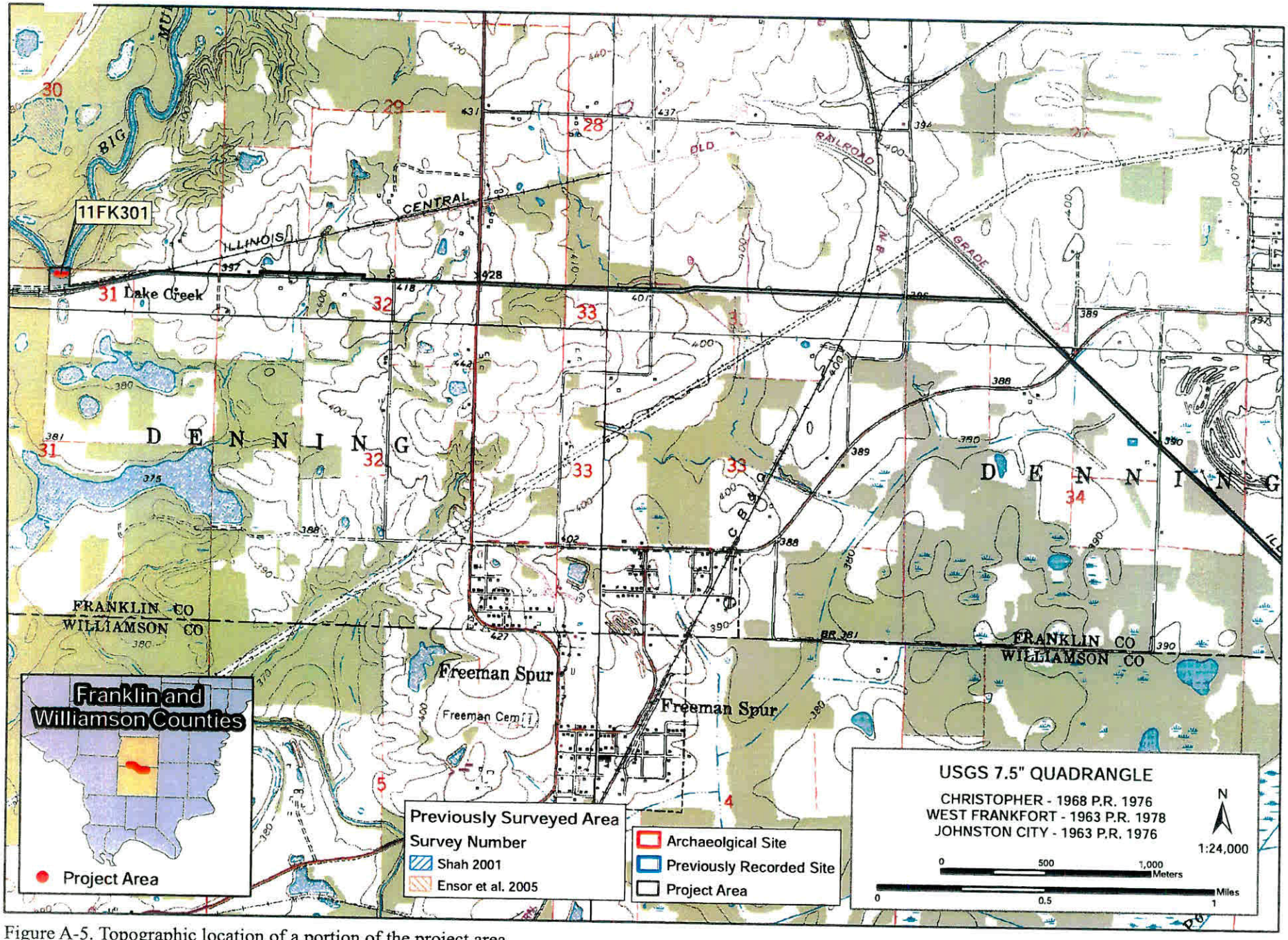


Figure A-5. Topographic location of a portion of the project area.

R07414

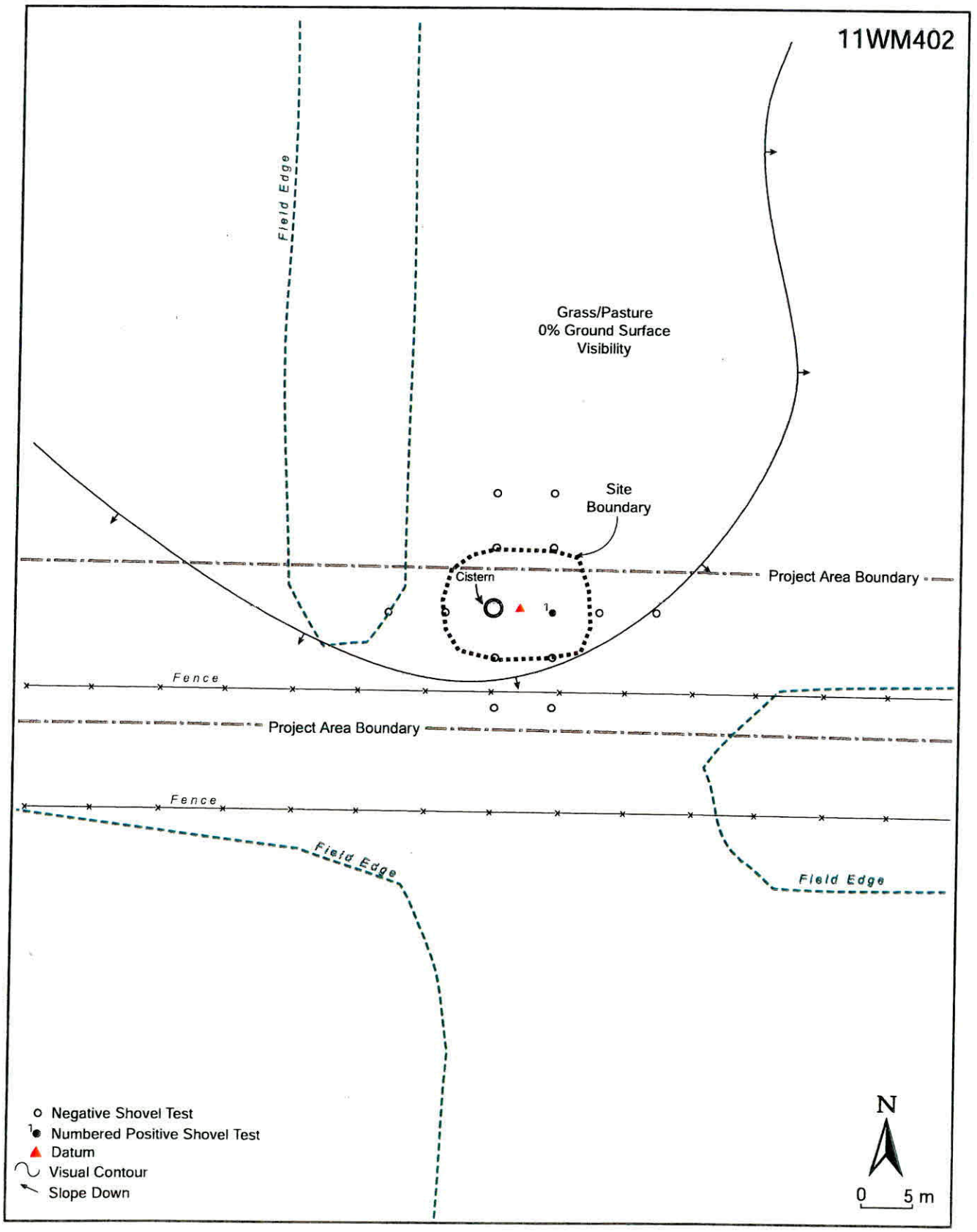


Figure A-6. Site map, 11WM402.

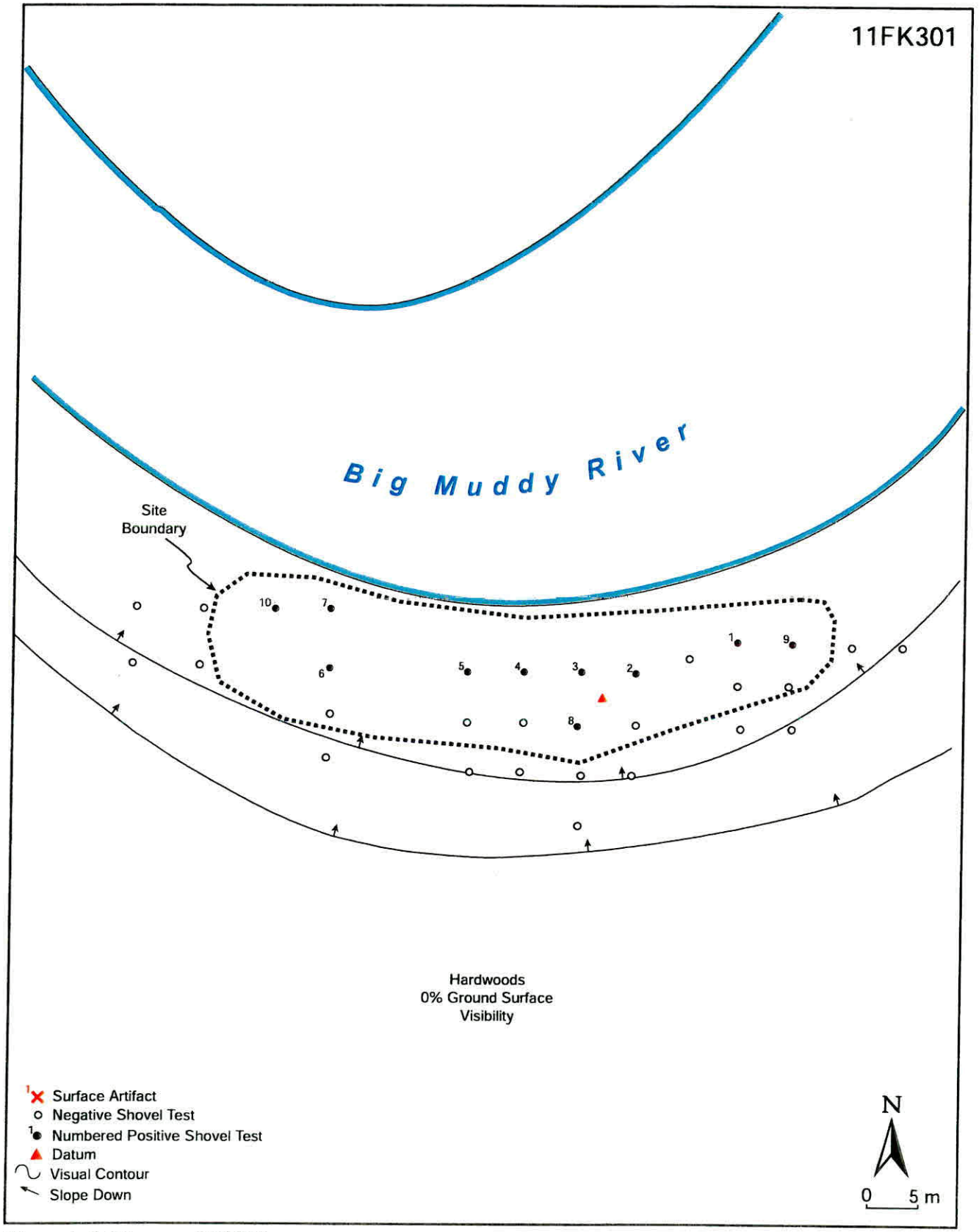


Figure A-7. Site map, 11FK301.

Attachment B

Historic Maps

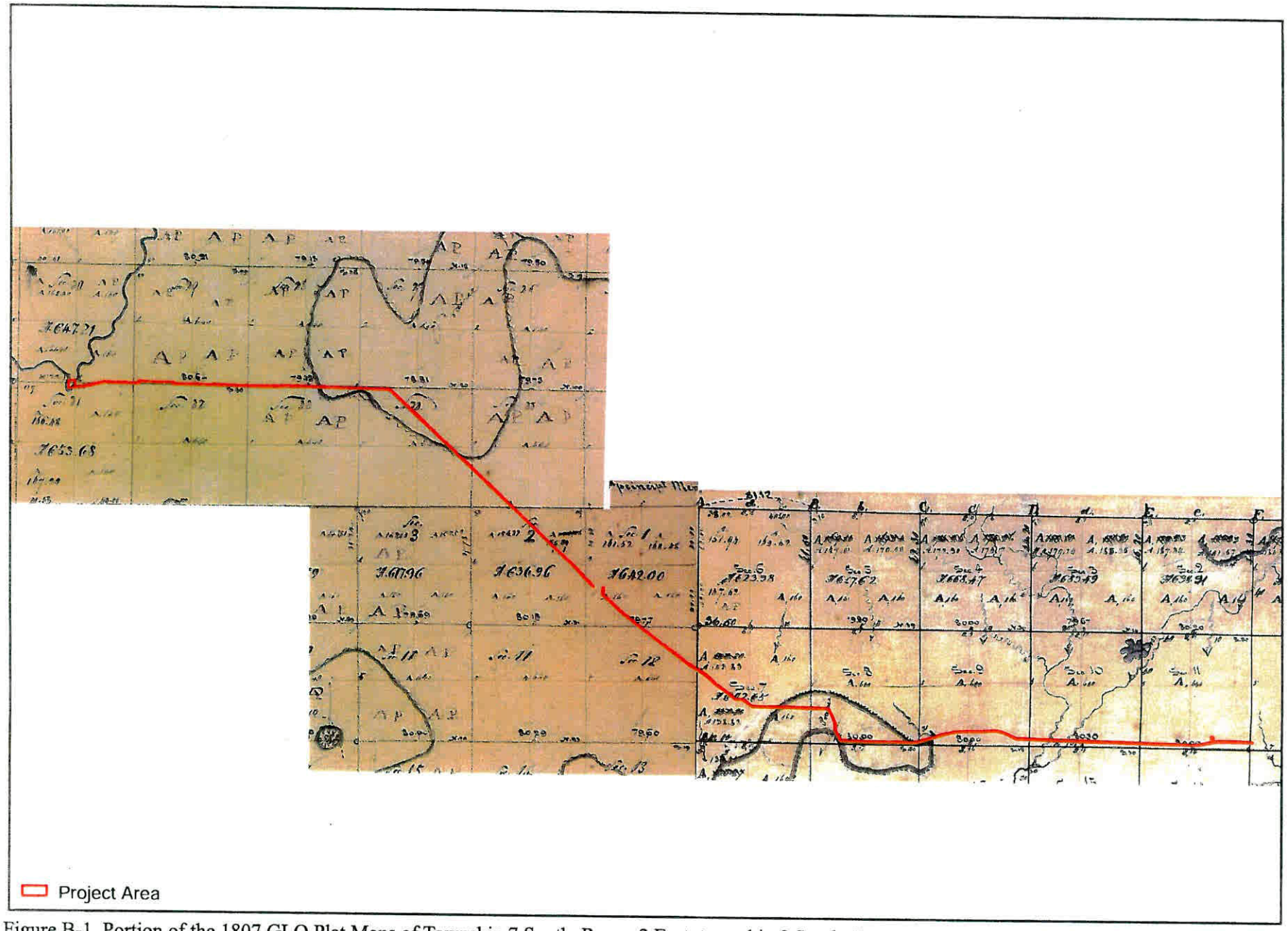


Figure B-1. Portion of the 1807 GLO Plat Maps of Township 7 South, Range 2 East, township 8 South, Range 2 East, and Township 8 South, Range 3 East, illustrating the project area (Illinois State Archives 2017).

R07418

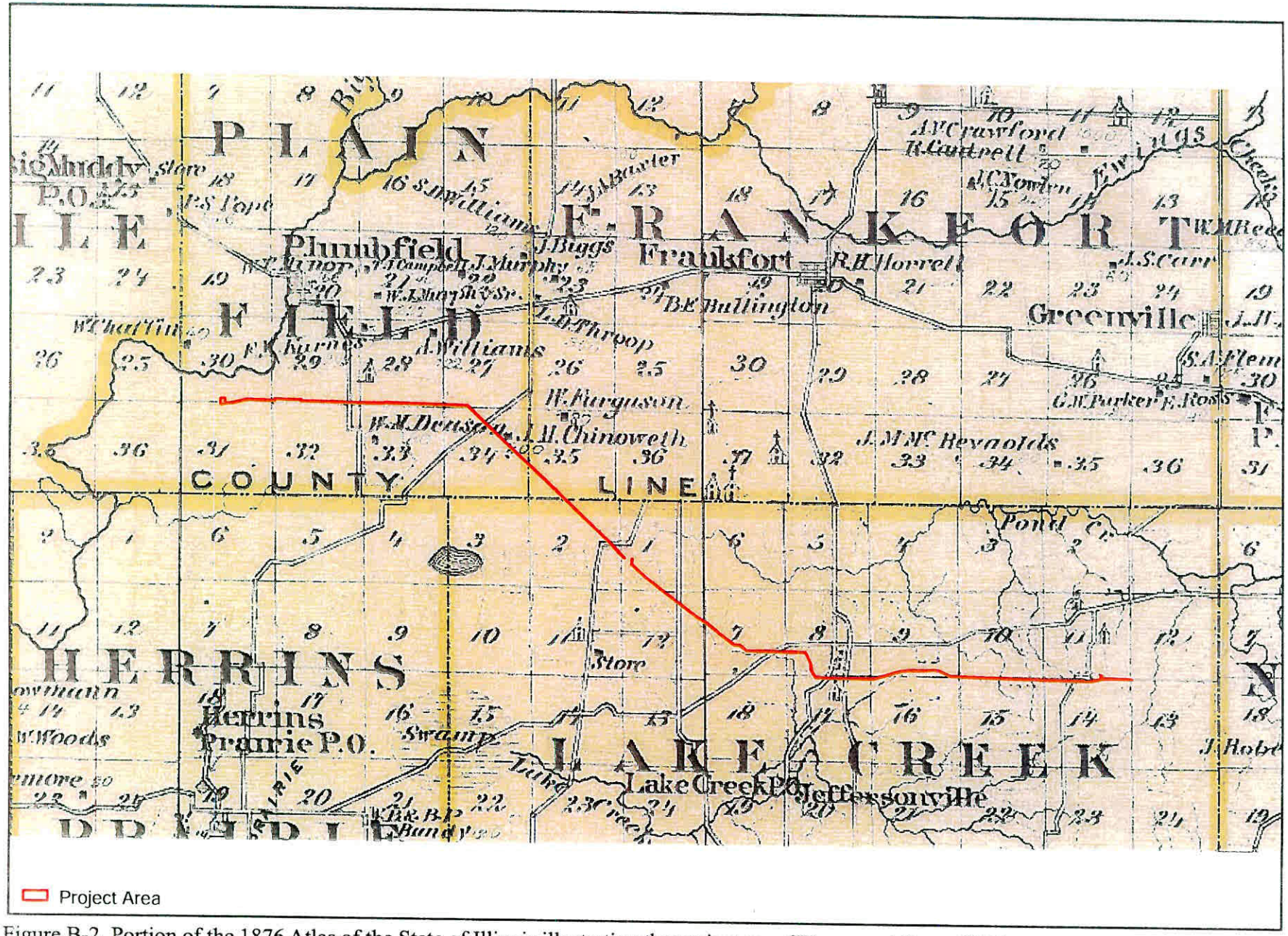


Figure B-2. Portion of the 1876 Atlas of the State of Illinois illustrating the project area (Warner and Beers 1876).

R07419

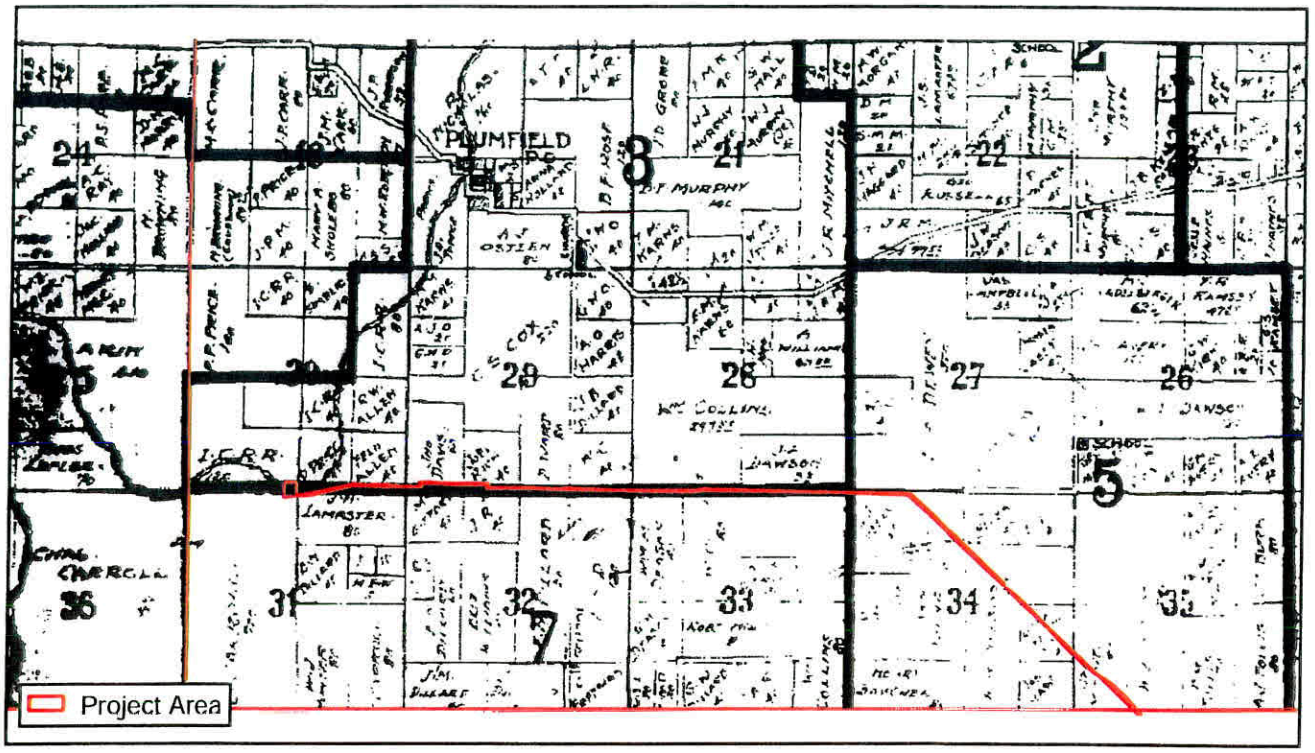


Figure B-3. Portion of the 1900 Map of Franklin County, Illinois, illustrating the project area (Guy Beauman 1900).

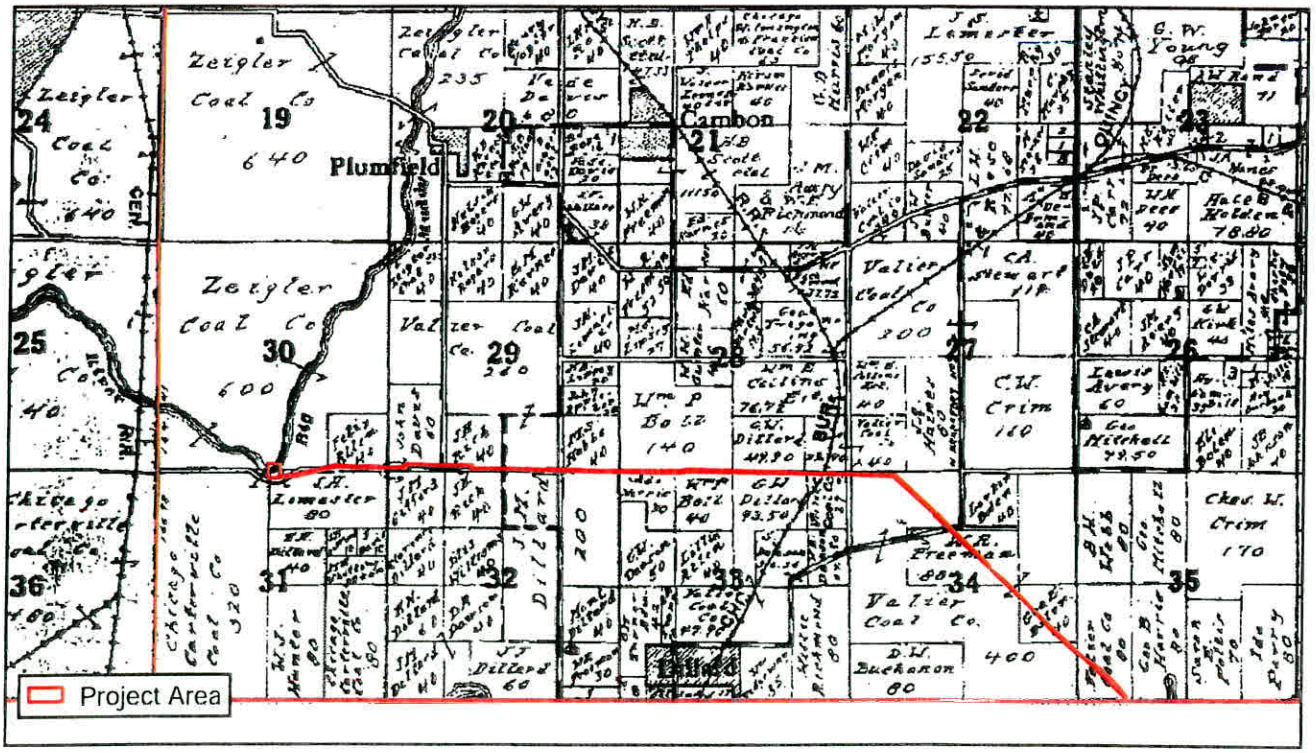


Figure B-4. Portion of the 1918 Standard Atlas of Franklin County, Illinois, illustrating the project area (Sims and Sons Publishers 1918).

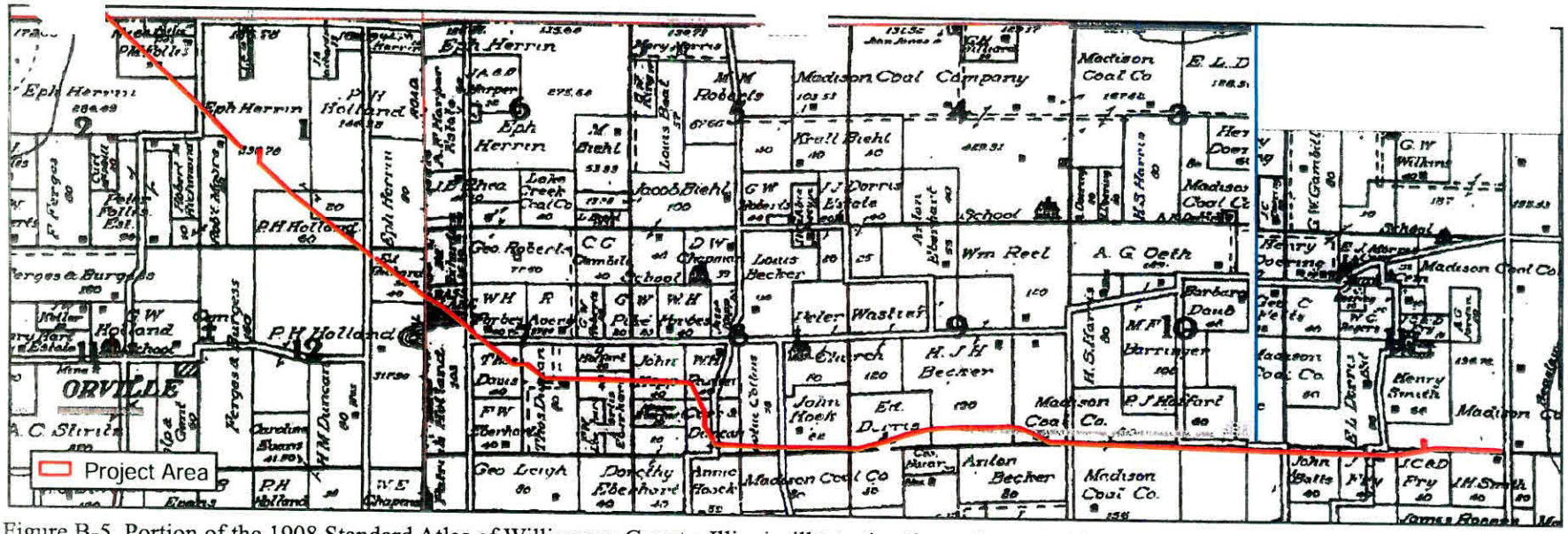


Figure B-5. Portion of the 1908 Standard Atlas of Williamson County, Illinois, illustrating the project area (George A. Ogle and Company 1908).

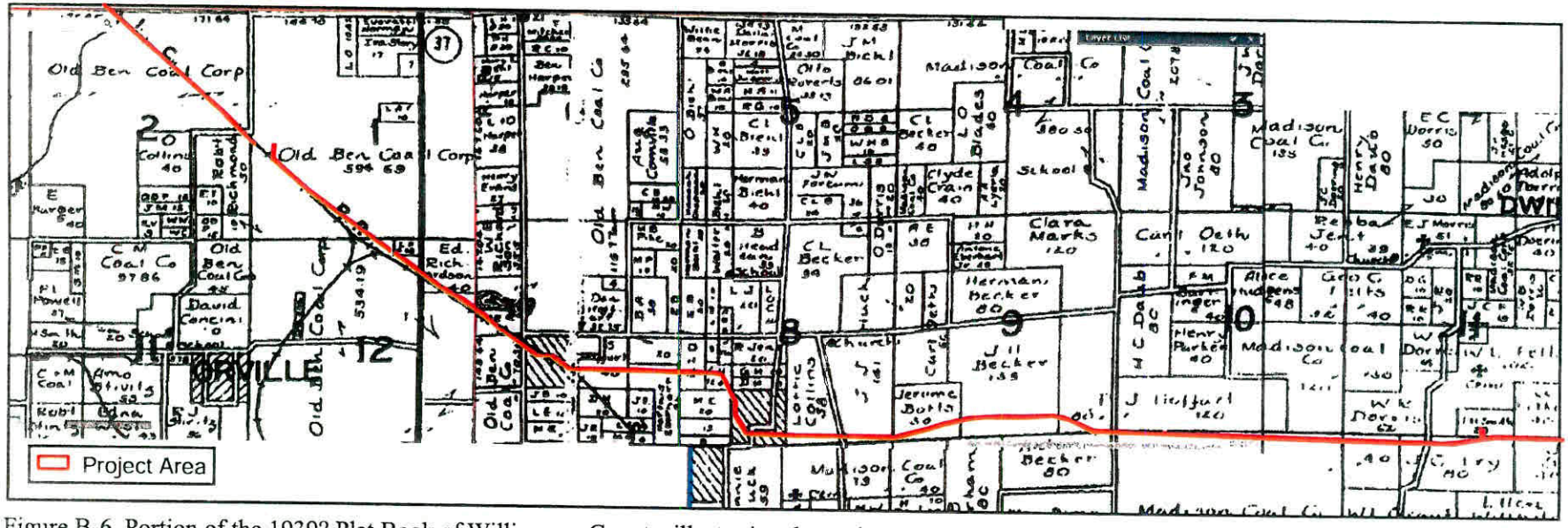


Figure B-6. Portion of the 1939? Plat Book of Williamson County, illustrating the project area (W.W. Hixson and Company 1939?).

R07421

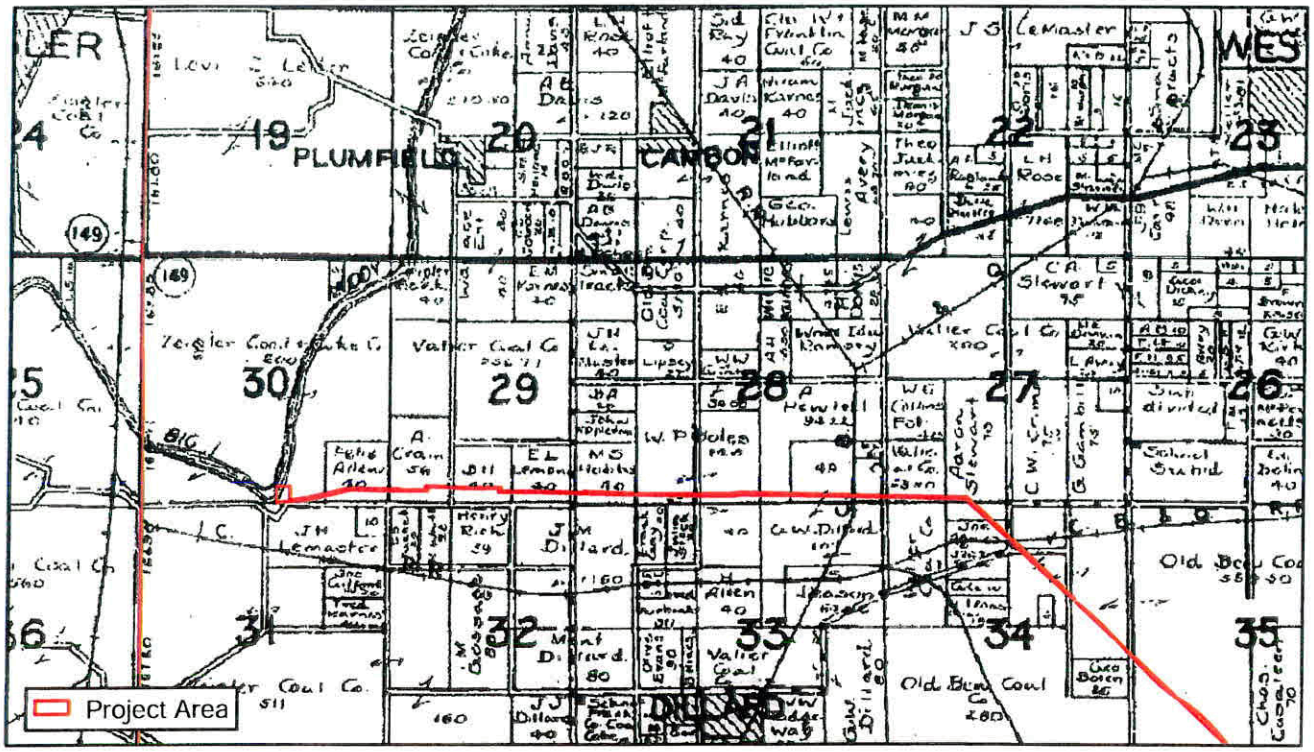


Figure B-7. Portion of the 1937? Plat Books of Franklin and Hamilton Counties, illustrating the project area. (W.W. Hixson and Company 1937?).

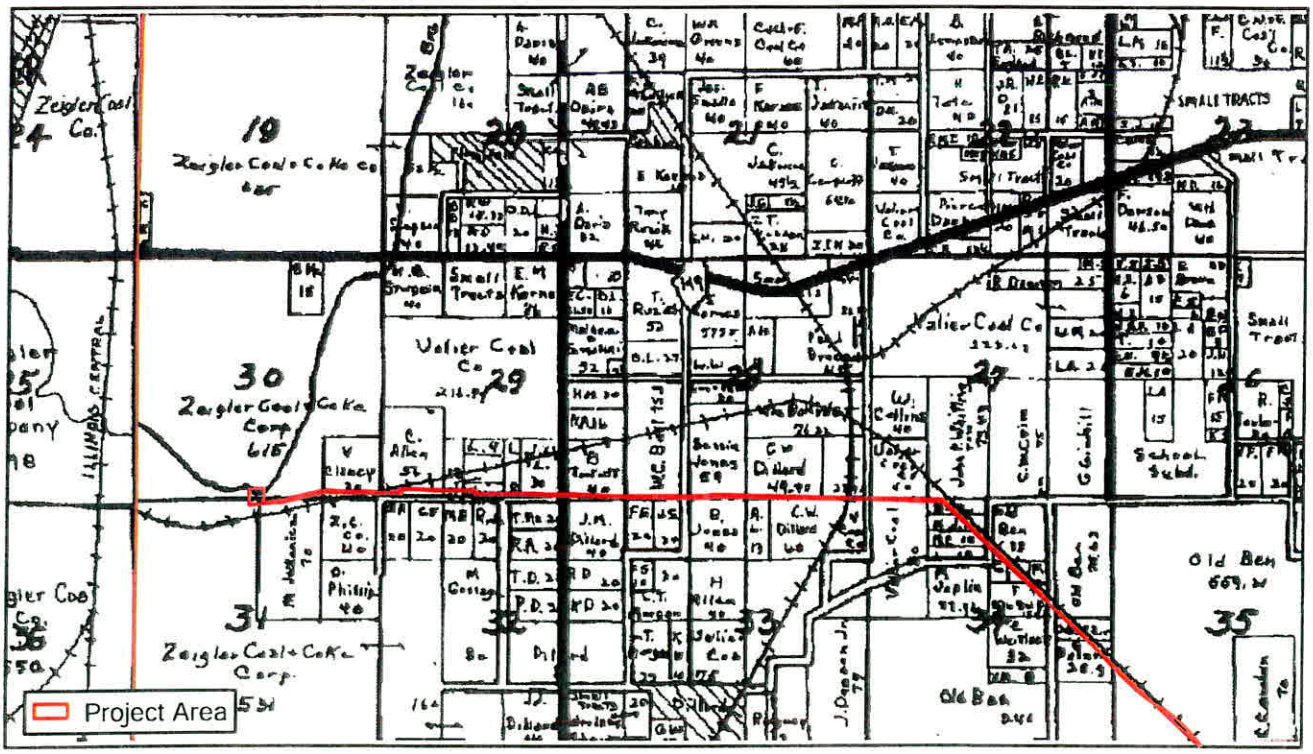


Figure B-8. Portion of the 1951? Franklin County Plat Book, illustrating the project area (Dudley Darrell 1951?).

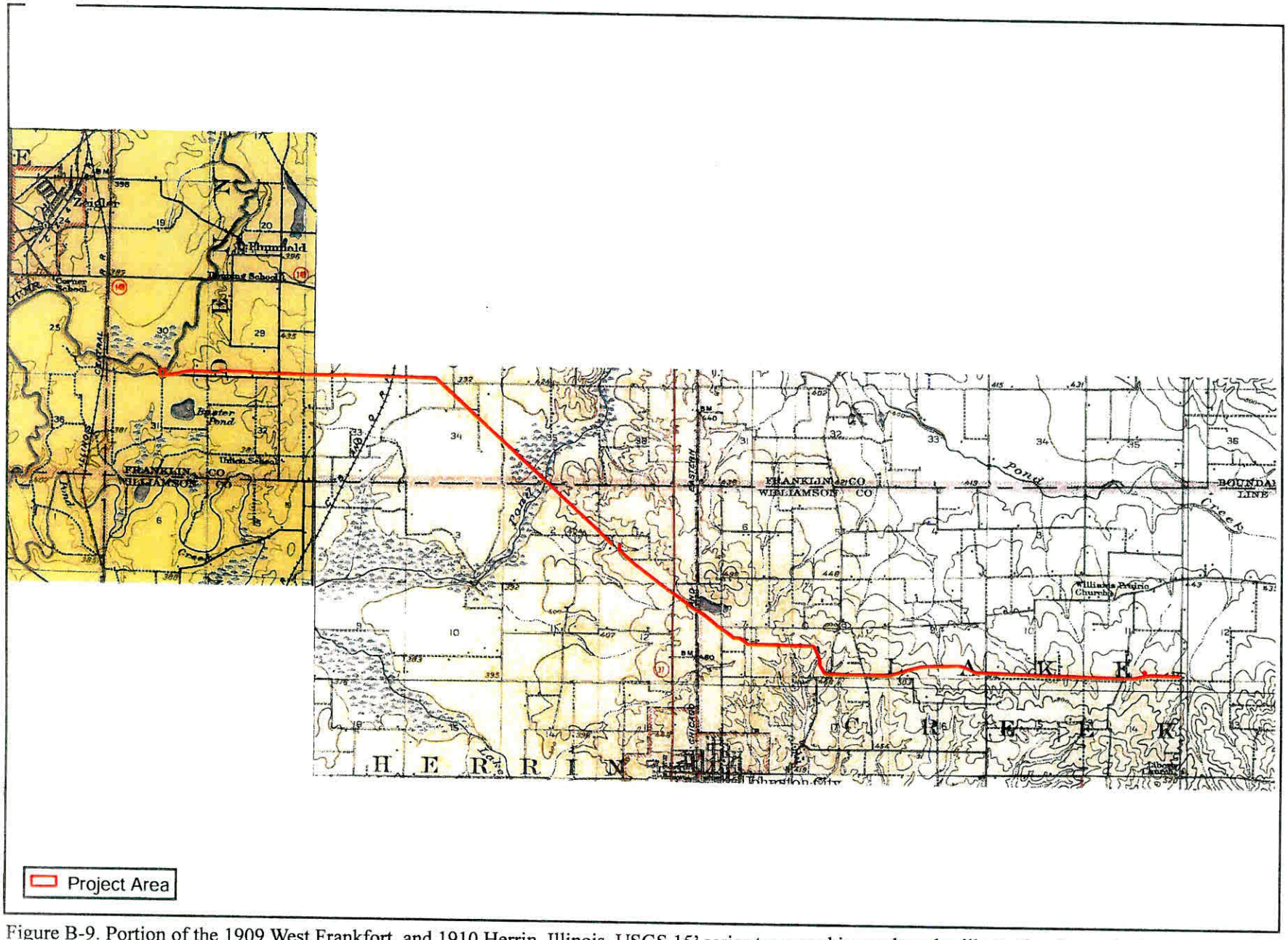


Figure B-9. Portion of the 1909 West Frankfort, and 1910 Herrin, Illinois, USGS 15' series topographic quadrangles illustrating the project area.

R07423

This page intentionally blank

Attachment C

Comments and Site Descriptions

American Resources Group recently completed an intensive, Phase I cultural resources survey of the project corridor of a proposed waterline for Williamson Energy, LLC. The project corridor is approximately 12 miles long, and extends from an existing mine to the Big Muddy River in northern Williamson and southern Franklin counties, Illinois. The nearest cities are West Frankfort to the north and Johnston City to the south (Attachment A, Figure A-1). The survey was conducted by a three-person crew on May 24 and 25, 2017.

The site-file search and architectural records review conducted prior to beginning the field survey revealed that the easternmost 2 miles of the current survey corridor has been previously surveyed (Attachment A, Figure A-2). A 1981 survey by Espey, Huston and Associates recorded sites 11WM145, 11WM150, 11WM151, and 11WM152 (Vander Leest 1981); at the request of IHPA, much of this survey area (located within the current Permit 375 area) was re-surveyed by ARG in 2005 (Ensor et al. 2005). Only sites 11WM150 and 11WM152 were relocated during subsequent surveys. In 2001, a 100-foot-wide corridor was surveyed in and adjacent to the current project area in advance of a methane pipeline installation (Shah 2001). Site 11WM150 was revisited within and adjacent to the project area during this survey. In 2005, much of this corridor was resurveyed as part of a proposed rail line for current Permit 375 (Ensor et al. 2005) (Attachment A, Figure A-1). Again, site 11WM150 was revisited, and site 11WM152 was relocated. Site 11WM150, a mid-nineteenth- to mid-twentieth-century farmstead containing a small family cemetery was evaluated as potentially eligible for NRHP listing and was subsequently tested in later in 2005 (Ensor and Lence 2005). The results of the Phase II testing suggested the site was not eligible (the Phase II testing and archival research had exhausted the research potential of the site) and it was subsequently cleared for construction. However, a small family cemetery, the Fry Cemetery, was to be avoided by any ground-disturbing activities. As a result of the above-mentioned cultural resources surveys between 1981 and 2005, each of the five sites located in or adjacent to the current project area has been evaluated as not eligible for NRHP listing, and only the family cemetery located at site 11WM150 remained at issue. This cemetery will be avoided buy the current survey; the current project corridor is located approximately 43 m (141 feet) south of the cemetery, which is located on private land.

Farther west along the current project corridor, a 2001 Phase I survey for Illinois Methane also paralleled a good portion of the current survey area, particularly along the northwest-southeast-aligned portion (Shah 2001). Three of the sites that were recorded adjacent to the project corridor during that survey—11FK200–11FK202—

were evaluated as potentially eligible for NRHP listing outside of the 2001 survey corridor. However, because the current survey corridor within this area is located within the disturbed, abandoned railroad grade, the extant portions of each of the three sites (primarily located to the southwest of the survey area) will not be impacted by the current project. No portions of these sites were observed within the current project area.

The results of the pre-field records and literature review suggested that prehistoric site density was apt to be moderately low in the project corridor due to relatively great distance from perennial streams, with the exception of the western areas near Big Muddy River and Pond Creek, though much of the area encompassed by the project area near these water sources is floodplain and low uplands and located within the existing railaroad grade. The pre-field review of historic maps also suggests that the project corridor had a relatively low potential for containing historic sites (Attachment B, Figures B-1–B-9).

The width of the majority of the project corridor is 15 m (50 feet) wide, though small portions near the western end along Lake Creek Road were only 9 m (30 feet) wide. A block area for a pump station was also surveyed at the western terminus; this area is approximately 90 m x 100 m (300 feet x 330 feet). The total area surveyed in the course of the current investigation is 72 acres.

A large portion of the project corridor consists of an abandoned railroad grade with weeds, trees and secondary growth. This portion of the project corridor was subject to systematic walkover survey along a single transect. The railroad was built in the early twentieth century. The remainder of the project area consisted of grass, hay fields, woods and newly planted crops. Only the newly planted agricultural fields exhibited good ground surface visibility and were consequently surface surveyed along transects spaced 5 m apart. The remaining areas were subject to systematic, screened shovel testing along transects spaced 15 m apart.

Though the eastern two miles of the project corridor was not resurveyed during the current investigation, the Fry Cemetery at site 11WM150 was visited. Both previously reported grave stones at site 11W150 were relocated as part of the current investigation (Attachment D, Figures D-1–D-3). These stones are located at 4189085N 357558E (Zone 16S) which is 43 m (141 feet) north of the newly relocated ROW (Attachment D, Figure D-3). At the time of the visit, the cemetery area was in tall grass making the stones hard to find. Of the two grave stones previously documented at the site, one has been highly damaged by bush hogging equipment; there have been no activities related to mining in this area and the cemetery is located on private property. This stone was found lying flat on the ground approximately 3 m (10 feet) northeast of its original location.

Two cultural properties were recorded during the present survey: 11WM402 and 11FK301. The sites are described below.

Site 11WM402

Field Number: 1981-2
Site Type: Isolated cistern
Component: Mid- to late twentieth century
Site Location: SE¼, NE¼, SE¼, Section 7, Township 8 South, Range 3 East, Johnstone City Quadrangle, Williamson County, Illinois
UTM at Main Datum (NAD 83): 4189532N 331722E, Zone 16S
Approximate Site Area: 121 m^2
Topographic Location: Flat uplands
Elevation: 143 m (470 feet) amsl
Soil Type: Ava silt loam, 2–5 percent slopes
Nearest Water: Unnamed intermittent stream (170 m east) which empties into Lake Creek.
Survey Method: Systematic shovel testing at 5 m intervals
Site Condition: The site has been impacted by cultivation and most likely by the placement of two gas pipelines to the south of the well feature.
NRHP Evaluation: Not eligible

Site Description

Site 11WM402 is a historic site defined by the occurrence of a capped cistern (Feature 1) in the northern portion of the proposed waterline ROW. The site is located in the uplands 1,300 feet north of Eberhardt Road (Attachment A, Figure A-2), a location that is 0.9 mile northeast of Johnston City, Illinois. The site limits as defined through shovel testing and visible surface features covered an area measuring roughly 14 m by 9 m (Attachment A, Figure A-6).

At the time of survey, the ground surface on the landform containing site 11WM402 was completely obscured by grass with 0 percent ground surface visibility. The site perimeter was defined through systematic shovel testing, which produced a single positive test, and by the location of the cistern (Feature 1).

The soil profile observed in a shovel test excavated within site limits exhibited a dark yellowish brown (10YR 4/4) silt loam to a depth of 20 cm below surface, over a yellowish brown (10YR 5/6) silt loam subsoil that extending to at least 30 cm bs.

Feature Description

Feature 1

A single feature was noted in the eastern portion of the site. This feature consists of a wet-laid brick-lined cistern which had been capped with a large tile culvert and a tin-covered wooden frame (Attachment D, Figures D-4 and D-5). It has a diameter of 70 cm (2.2 feet) and a measured depth of 4 m (ca. 13 feet). The feature bells out approximately half way down its base. Water was present at the base of the cistern at the time of definition.

Artifacts

Only two cultural materials were excavated in a single shovel test: a small, unidentified brick fragment, and a fragment of small pebble aggregate mortar/concrete.

Interpretation

Site 11WM402 is an isolated cistern that was probably constructed in the mid- or late twentieth century. No temporally diagnostic artifacts were found in association, and all historic maps and atlases show no structures at or near the site. The cistern appears fairly modern and was probably constructed at a field edge for livestock/ farming purposes.

Site 11FK301

Field Number: 1981-1
Site Type: Historic dump
Component: Early to mid-twentieth century
Site Location: NW¼, NW¼, NE¼, Section 31, Township 7 South, Range 2 East, Christopher Quadrangle, Franklin County, Illinois
UTM at Main Datum (NAD 83): 4194049N 321489E, Zone 16S
Approximate Site Area: 687 m^2
Topographic Location: Terrace
Elevation: 116 m (382 feet) amsl
Soil Type: Hurst silt loam, 0–2 percent slopes
Nearest Water: Big Muddy River (10 m north)
Survey Method: Systematic shovel testing at 5 m intervals.
Site Condition: The site has been impacted by soil erosion.
NRHP Evaluation: Not eligible

Site Description

Site 11FK301 is a historic dump site discovered during shovel testing on a high terrace south of the Big Muddy River (Attachment A, Figure A-2). The site is 164 feet (50 m) north of an unnamed road which follows an old railroad grade, a location that is about 1.6 miles northwest of Freeman Spur, Illinois. The site limits as defined

through shovel testing and surface material covers an area along the river bank measuring roughly 57 m by 12 m (Attachment A, Figure A-7).

At the time of survey, ground surface visibility in the site area was completely obscured by leaf litter (Attachment D, Figure D-6). The site perimeter was defined through systematic shovel testing. In the northern half of the site boundary was defined by the steep bank which extends down to the Big Muddy River (Attachment D, Figure D-7).

The soil profile observed in a shovel test excavated within site limits exhibited a very dark grayish brown (10YR 3/2) silty clay loam which extends to a depth of 10 cm below surface, over a pale brown (10YR 6/3) clay loam subsoil that extending to at least 30 cm below the ground surface.

Artifacts

Thirty-five historic artifacts were collected from 10 positive shovel tests at site 11FK301 (Table C-1). Kitchenwares comprise the majority of artifacts recovered at the site, and include only two refined ceramics, both appearing to date to the very late nineteenth or early twentieth century. Seventeen fragments of kitchen glass were recovered, including aqua fruit jar glass melted and unmelted colorless glass, and one fragment of an opaque green glass bowl, typical of a 1940s or 1950s manufacture. The architectural group is comprised of architectural remnants, such as nails and flat glass (window) fragments. All 10 of the nails are wire-drawn examples that date to the late nineteenth or twentieth century. Activities- and personal group artifacts consist of a terra cotta planter fragment, barbed wire, and a colorless, mid-twentieth-century perfume bottle.

Interpretation

Site 11FK301 is interpreted as an early to mid-twentieth-century historic dump/discard area located at an old crossroads overlooking a steep slope down to the Big Muddy River, a typical location for historic trash dumping. There is no structure at or near the site location on any of the historic atlases or maps consulted (Attachment B, Figures B-1 to B-9).

Site Evaluations and Project Recommendation

Two cultural properties were recorded during the current investigation. Both are small twentieth-century sites with little to no potential to contain significant cultural deposits and are evaluated as ineligible for NRHP listing. The Fry Cemetery at site 11WM150 will be avoided by the current project.

The proposed project will not have an adverse effect on significant cultural properties. It is recommended that the proposed undertaking be allowed to proceed as planned without further archaeological investigation.

Table C-1.Historic Artifact [illegible]ry, Site 11FK301.

Description	Date Range	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total	Reference
KITCHEN													
CERAMIC													
TABLEWARE													
Plate													
white ironstone rim fragment with lightly embossed pattern, burned	1880+			1								1	
Unknown												0	
floral decal-decorated whiteware body fragment	1890+					1						1	
GLASS												0	
CONTAINER												0	
Fruit/Food Jars												0	
aqua jar base fragment with Owen's scar, embossed "4"	1910-1982						1					1	Lindsey 2017
aqua jar body fragment										1		1	
Unknown												0	
melted colorless body fragment				1								1	
colorless curved body fragment					8	2			1		2	13	
TABLEWARES												0	
opaque green (Jadeite) ribbed bowl rim/body fragment	1940s-1950s						1					1	
KITCHEN TOTAL		*0*	*0*	*2*	*8*	*3*	*2*	*0*	*1*	*1*	*2*	*19*	
ARCHITECTURE													
CONSTRUCTION MATERIALS													
wire nail fragment	1880+	6	1	2		1						10	
FLAT GLASS												0	
colorless flat glass fragment				1		1						2	
ARCHITECTURE TOTAL		*6*	*1*	*3*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*12*	
ACTIVITIES													
OTHER													
terra cotta flowerpot rim fragment with green painted exterior						2						2	
FENCING												0	
barbed wire fragment	1873+							1				1	
ACTIVITIES TOTAL		*0*	*0*	*0*	*0*	*2*	*0*	*1*	*0*	*0*	*0*	*3*	
PERSONAL													
HEALTH AND GROOMING													
machine-made colorless perfume/cologne bottle with narrow-mouth continuous screw finish, embossed "PAT D-117024"	mid-20th c.						1					1	
PERSONAL TOTAL		*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	
OVERALL TOTAL		*6*	*1*	*5*	*8*	*7*	*3*	*1*	*1*	*1*	*2*	*35*	

R07429

This page intentionally blank

Attachment D

Project Photographs



Figure D-1. Headstone of Anna M. Dorthea Fry, Fry Cemetery, site 11WM150, view north.



Figure D-2. Headstone of Mary and Malinda Fry, Fry Cemetery, site 11WM150.



Figure D-3. View north from northern edge of project corridor toward Fry Cemetery (Bob Sadler in orange shirt is standing at cemetery), view north.



Figure D-4. Site 11WM402, cistern, view north-northwest.

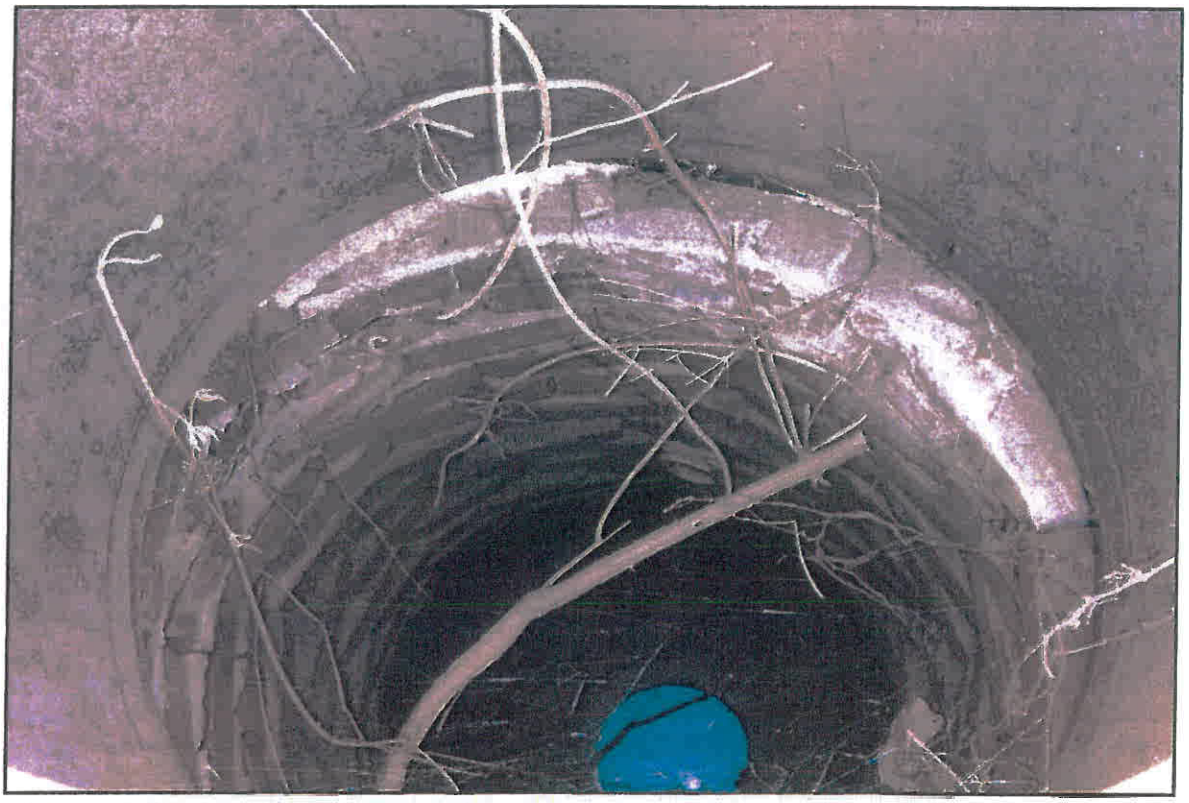


Figure D-5. Site 11WM402 cistern interior.



Figure D-6. Site 11FK301 overview, view northeast.



Figure D-7. Northern edge of site 11FK301 at Big Muddy River, view northwest.

This page intentionally blank

Attachment E

References Cited

Anderson, J.M.
2010 *A Cultural Resource Survey for the Williamson Energy Concrete Borehole and Access Road in Williamson County, Illinois.* Archaeological Survey Short Report, Cultural Resource Analysts, Inc., Lexington, KY.

Beauman, Guy
1900 *Map of Franklin County, Illinois 1900.* Guy Beauman. Vienna, Illinois.

Burrow, J., and G. Aberle
2001 *Phase I Cultural Resources Survey and Assessment for 17 Miles of Pipeline in Franklin County, Illinois.* Cultural Resources Management Report No. 1105, American Resources Group, Carbondale, Illinois.

Craig, J., and J. Rein
2011 *Phase I Cultural Resource Survey of 1048-Acre Woolard Property Project Area, Williamson County, Illinois.* Prairie Archaeology and Research, Springfield, Illinois.

2014 *Phase I Cultural Resource Survey of 13-Acre Mach Mining IBR Project, Williamson County, Illinois.* Prairie Archaeology and Research, Springfield, Illinois.

Darrell, D.
1951? *Franklin County Plat Book.* Drawn by Dudley Darrell.

Ensor, H.B., C. Lence, and S. Titus
2005 *Phase I Cultural Resources Survey of the Steelhead Development Corporation, LLC, Williamson County Project Area.* Cultural Resources Management Report No. 1324, American Resources Group, Carbondale, Illinois.

George A. Ogle and Company
1908 *Standard Atlas of Williamson County, Illinois*. George A. Ogle and Company, Chicago.

Halpin, D.
2002 *Archaeological Reconnaissance Survey for Proposed Telecommunications Tower #8192 at 17695 Route 37, Williamson County, Illinois.* Archaeological Survey Short Report, Cultural Resource Services, Springfield, Illinois.

Illinois State Archives
2017 1807 GLO Township Plats, Township 7 South, Range 2 East, Township 8 South, Range 2 East, and Township 8 South, Range 3 East. In Illinois Secretary of State, Federal Township Plats of Illinois website http://landplats.ilsos.net/

Lindsey, B.
2017 Historic Glass Bottle Identification and Information Website. https://sha.org/bottle/ Bureau of Land Management and Society for Historical Archaeology.

McNerney, M.
1990 *Construction of Recreational and Camping Facilities at Arrowhead Lake, Johnston City, Illinois.* Archaeological Survey Short Report, American Resources Group, Carbondale, Illinois.

Penman, J.T.
1998 *FAS 876 Freeman Spur Road.* Illinois Transportation Archaeological Research Program, University of Illinois at Urbana-Champaign.

Rubach, B.
1993 Corinth Water District: Phase I Survey for Proposed New Water Distribution System. Archaeological Survey Short Report, American Resources Group, Carbondale, Illinois.

Shah, M.
2001 *Phase I Cultural Resources Survey and Assessment of a Proposed Gas Gathering Pipeline and Gas Plant Location for Illinois Methane, LLC.* Archaeological Survey Short Report, American Resources Group, Carbondale, Illinois.

Simon, M.
1992 *I-57, I-57, X1-4VB-1, NHI-57-2(129)59, "Abba" and "Fox" Borrow Pits 1 of 1.* Illinois Transportation Archaeological Research Program, University of Illinois at Urbana-Champaign.

Sims and Sons, Publishers
1918 *Atlas of Franklin County, Illinois, containing Map of County, Plats of all Townships with Owners' names, Illinois State Map, Map of the United States, population tables, and charts on treatment of domestic animals*. Sims and Sons, Christopher, Illinois.

Stratton, C., and F. Mansberger
2005 *Illinois Department of Natural Resources Cultural Resource Management Program Abandoned Mined Lands Reclamation Cultural Resources Evaluation, Taylor No. 5 Mine Site (11FK215) (Franklin County Coal Corporation No. 5 Mine) Freeman Spur, Franklin County, Illinois.* Archaeological Survey Short Report, Fever River Research, Springfield, Illinois.

United States Geological Survey (USGS)
1909 West Frankfort, Illinois, 15 minute topographic map.

1910 Herrin, Illinois, 15 minute topographic map.

University of Illinois
1966 *General Soil Map of Illinois.* Agricultural Experiment Station, University of Illinois, Urbana. In cooperation with U.S. Department of Agriculture, Soil Conservation Service.

Vander Leest, B.
1981 *A Cultural Resource Survey of The Proposed Zeigler #6 Mine in Williamson County, Illinois.* Espey, Huston and Associates, Austin, Texas. Document No. 81283, EH&A Job No. 1317.

Warner and Beers
1876 *Atlas of the State of Illinois.* Warner and Beers, Chicago.

Witty, C.
2003 *FAU 9481 & HAS 2887 IL 37 from West Frankfort to Johnston City.* Illinois Transportation Archaeological Research Program, University of Illinois at Urbana-Champaign.

W.W. Hixson and Company
1939? *Plat Book of Williamson County, Illinois.* W.W. Hixson and Company. Rockford, Illinois.

1937? *Plat Books of Franklin and Hamilton Counties, Illinois.* W.W. Hixson and Company. Rockford, Illinois.

This page intentionally blank

Attachment F

Site Forms

ILLINOIS ARCHAEOLOGICAL SITE RECORDING FORM

County: Franklin
Site Name:
Revisit: N
Field Number: 1981-1
State Site No.: 301
Quadrangle (7.5'): Christopher
Date Recorded: 2017.06.06

LEGAL DESCRIPTION (to quarter quarter quarter section)

Align: NW 1/4s: NWNWNE — Section: 31 Township: 7 S Range: 2 E
Align: 1/4s: — Section: 0 Township: 0 Range: 0
Align: 1/4s: — Section: 0 Township: 0 Range: 0
Align: 1/4s: — Section: 0 Township: 0 Range: 0

UTM Coordinates (by ISM): UTM Zone: 16 UTM North: 4193841 UTM East: 321482
Ownership: Private

ENVIRONMENT

Topography: Terrace
Elevation (in meters): 116
Nearest Water Supply: Big Muddy River
Drainage: Big Muddy
Soil Association: Markland-Colp-Del Rey
Description: The site is located on the margin of a terrace overlooking the Big Muddy River to the north.

SURVEY

Project Name: Williamson Franklin Water
Site Area (square meters): 680
Ground Cover (List up to 3): Forest
Visibility (%): 0
Survey Methods (List up to 2): Shovel Test Pedestrian
Standing Structures: N
Site Type (List up to 2): Other (Dump)

SITE CONDITION

Extent of Damage: Moderate
Main Cause of Damage: Erosion

MATERIAL OBSERVED

Number of Prehistoric Artifacts (count or estimate): 0
Number of Historic Artifacts (count or estimate): 35
Prehistoric Diagnostic Artrifacts: N
Historic Diagnostic Artifacts: Y
Prehistoric Surface Features: N
Historic Surface Features: N
Description: 1 ironstone plate fragment, 1 whiteware fragment, 16 glass container fragments, 1 glass tableware fragment, 10 wire nails, 2 flat glass, 2 terra cotta, 1 barbed wire fragment, 1 perfume/cologne bottle.

TEMPORAL AFFILIATION (check all that apply)

Prehistoric Unknown:	Late Archaic:	Mississippian:	Colonial (1673-1780):
Paleoindian:	Woodland:	Upper Mississippian:	Pioneer (1781-1840):
Archaic:	Early Woodland:	Protohistoric:	Frontier (1841-1870):
Early Archaic:	Middle Woodland:	Historic Native American:	Early Industrial (1871-1900):
Middle Archaic:	Late Woodland:	Historic (generic):	Urban Industrial (1901-1945): Y
			Post-War (1946-present): Y

Description: The site is interpreted as an early- to mid-twentieth-century dump. The artifacts depict a date range of early- to mid-twentieth century. No structures are depicted on any historic maps.

Surveyor: John Schwegman
Institution: ARG
Survey Date: 05/25/2017
Curation Facility: ISM
Site Report by: Robert Sadler
Institution: ARG
Date: 06/01/2017
IHPA Log No.:
IHPA First Sur. Doc. No.:
Compliance Status:
NRHP Listing: N

ILLINOIS ARCHAEOLOGICAL SITE RECORDING FORM

County: Williamson
Field Number: 1981-2
Quadrangle (7.5'): Johnston City

Site Name:

Revisit: N
State Site No.: 402
Date Recorded: 2017.06.06

LEGAL DESCRIPTION (to quarter quarter quarter section)

Align: SE	1/4s: SENESE	Section: 7	Township: 8	S	Range: 3	E
Align:	1/4s:	Section: 0	Township: 0		Range: 0	
Align:	1/4s:	Section: 0	Township: 0		Range: 0	
Align:	1/4s:	Section: 0	Township: 0		Range: 0	

UTM Coordinates (by ISM): UTM Zone: 16 UTM North: 4189321 UTM East: 331724

Ownership: Private

ENVIRONMENT

Topography: Upland Ridge
Elevation (in meters): 143
Nearest Water Supply: intermittent
Drainage: Big Muddy
Soil Association: Ava-Bluford-Wynoose
Description: The site is located on the southwestern edge of a broad, southeasterly trending ridge spur.

SURVEY

Project Name: Williamson Franklin Water
Site Area (square meters): 123
Ground Cover (List up to 3): Grass
Visibility (%): 0
Survey Methods (List up to 2): Shovel Test
Standing Structures: N
Site Type (List up to 2): Other

SITE CONDITION

Extent of Damage: Severe
Main Cause of Damage: Development

MATERIAL OBSERVED

Number of Prehistoric Artifacts (count or estimate): 0
Number of Historic Artifacts (count or estimate): 2
Prehistoric Diagnostic Artrifacts: N
Historic Diagnostic Artifacts: N
Prehistoric Surface Features: N
Historic Surface Features: Y
Description: 1 brick fragment, 1 mortar fragment

TEMPORAL AFFILIATION (check all that apply)

Prehistoric Unknown:	Late Archaic:	Mississippian:	Colonial (1673-1780):
Paleoindian:	Woodland:	Upper Mississippian:	Pioneer (1781-1840):
Archaic:	Early Woodland:	Protohistoric:	Frontier (1841-1870):
Early Archaic:	Middle Woodland:	Historic Native American:	Early Industrial (1871-1900):
Middle Archaic:	Late Woodland:	Historic (generic):	Urban Industrial (1901-1945): Y
			Post-War (1946-present): Y

Description: The site is interpreted as a twentieth-century isolated cistern. No structures are depicted on any of the 20th-century historic maps or aerial maps.

Surveyor: John Schwegman
Institution: ARG
Survey Date: 05/25/2017
Curation Facility: ISM
Site Report by: Robert Sadler
Institution: ARG
Date: 06/01/2017
IHPA Log No.:
IHPA First Sur. Doc. No.:
Compliance Status:
NRHP Listing: N

PART II ATTACHMENT II.13.A
SOIL RESOURCES REPORT

United States Department of Agriculture

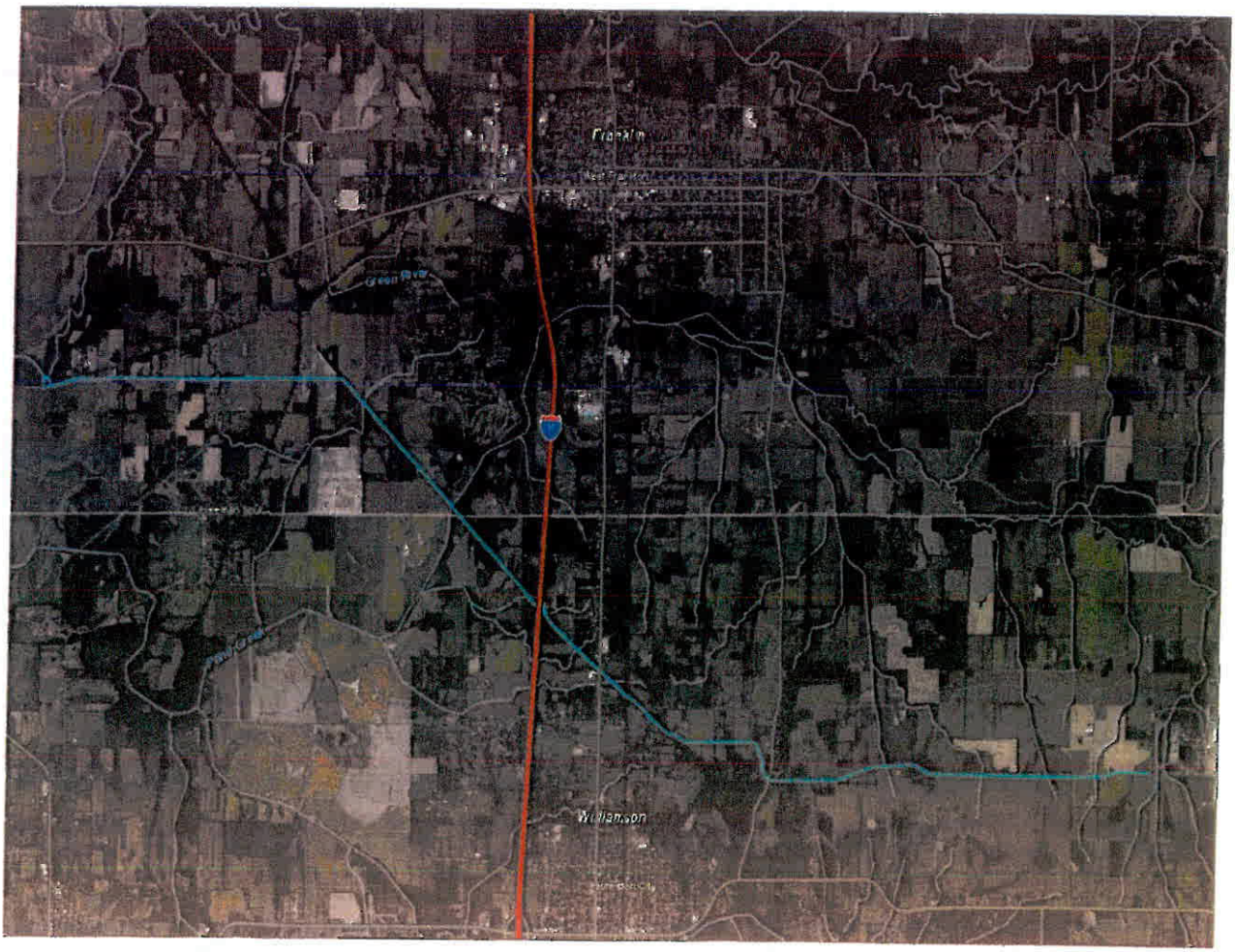
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Franklin County, Illinois, and Williamson County, Illinois

Williamson Energy, LLC - Proposed Water Management Pipeline Permit



April 26, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface 2
How Soil Surveys Are Made 5
Soil Map 8
Soil Map 9
Legend 10
Map Unit Legend 12
Map Unit Descriptions 18
Franklin County, Illinois 20
13A—Bluford silt loam, 0 to 2 percent slopes 20
13B2—Bluford silt loam, 2 to 5 percent slopes, eroded 21
14B—Ava silt loam, 2 to 5 percent slopes 22
14C2—Ava silt loam, 5 to 10 percent slopes, eroded 24
84A—Okaw silt loam, 0 to 2 percent slopes 25
109A—Racoon silt loam, 0 to 2 percent slopes 26
338A—Hurst silt loam, 0 to 2 percent slopes 27
640A—Bluford silt loam, bench, 0 to 2 percent slopes 28
908F—Hickory-Kell silt loams, 18 to 35 percent slopes 30
3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded 31
3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded 32
W—Water 34
Williamson County, Illinois 35
10C—Plumfield silty clay loam, 5 to 10 percent slopes 35
10D—Plumfield silty clay loam, 10 to 18 percent slopes 36
12A—Wynoose silt loam, 0 to 2 percent slopes 38
13A—Bluford silt loam, 0 to 2 percent slopes 39
13B—Bluford silt loam, 2 to 5 percent slopes 40
13B2—Bluford silt loam, 2 to 5 percent slopes, eroded 42
14B—Ava silt loam, 2 to 5 percent slopes 43
14B2—Ava silt loam, 2 to 5 percent slopes, eroded 44
14C2—Ava silt loam, 5 to 10 percent slopes, eroded 46
14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded 47
518B—Rend silt loam, 2 to 5 percent slopes 48
518C2—Rend silt loam, 5 to 10 percent slopes, eroded 49
518C3—Rend silty clay loam, 5 to 10 percent slopes, severely eroded 50
640B—Bluford silt loam, bench, 2 to 5 percent slopes 51
640B2—Bluford silt loam, bench, 2 to 5 percent slopes, eroded 52
802B—Orthents, loamy, undulating 53
871B—Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony 54
871D—Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony 55
3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded 56
3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded 57
3420A—Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded 58
References 60

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

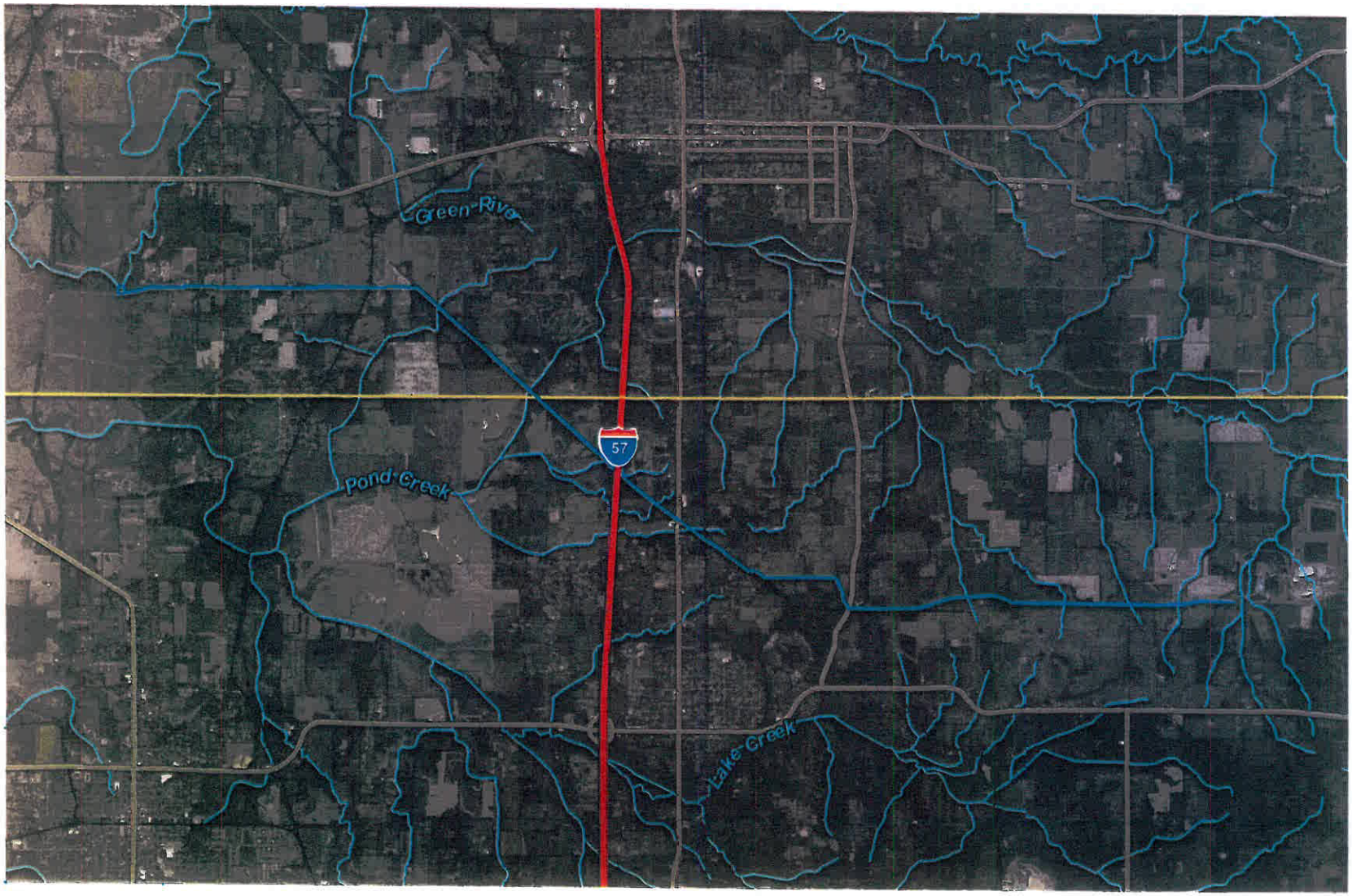
Soil Map

89° 2' 59" W

89° 48' 58" W

37° 54' 54" N

37° 47' 42" N



Map Scale: 1:93,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 1000 2000 4000 6000

Feet
0 4500 9000 18000 27000

Map projection: Web Mercator Corner coordinates: WGS84

R07450

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Survey Areas
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Franklin County, Illinois
Survey Area Data: Version 10, Sep 16, 2016

Soil Survey Area: Williamson County, Illinois
Survey Area Data: Version 11, Sep 16, 2016

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 13, 2011—Jun 10, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

R07451

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

R07452

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10C	Plumfield silty clay loam, 5 to 10 percent slopes	6.5	9.2%
10D	Plumfield silty clay loam, 10 to 18 percent slopes	2.3	3.3%
12A	Wynoose silt loam, 0 to 2 percent slopes	0.9	1.3%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	0.7%
13B	Bluford silt loam, 2 to 5 percent slopes	3.1	4.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4.0	5.7%
14B	Ava silt loam, 2 to 5 percent slopes	5.4	7.6%
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	0.9	1.3%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	2.5	3.5%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3.6	5.1%
518B	Rend silt loam, 2 to 5 percent slopes	1.1	1.6%
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	0.1	0.1%
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2.0	2.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	1.6	2.3%
802B	Orthents, loamy, undulating	1.7	2.4%
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3.1	4.4%
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	0.6	0.8%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	3.2	4.5%
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
Subtotals for Williamson County		**44.5**	**62.9%**

Franklin County, Illinois (IL055)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13A	Bluford silt loam, 0 to 2 percent slopes	1.0	1.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	1.7	2.4%
14B	Ava silt loam, 2 to 5 percent slopes	3.8	5.4%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
84A	Okaw silt loam, 0 to 2 percent slopes	5.5	7.8%
109A	Racoon silt loam, 0 to 2 percent slopes	2.8	4.0%
338A	Hurst silt loam, 0 to 2 percent slopes	1.8	2.5%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	2.3	3.3%
908F	Hickory-Kell silt loams, 18 to 35 percent slopes	1.5	2.1%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	1.8	2.5%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	2.7	3.8%
W	Water	0.1	0.1%
Subtotals for Franklin County		**26.2**	**37.1%**
Totals for Area of Interest		**70.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named

and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous

areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Illinois

13A—Bluford silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t95c
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

13B2—Bluford silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95f
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 9 inches: silt loam
Btg - 9 to 32 inches: silty clay
2Btgx - 32 to 47 inches: silty clay loam
2Btg - 47 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 5 to 20 inches to abrupt textural change; 19 to 45 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Ava
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wynoose
Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

14B—Ava silt loam, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: 2t95h
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Ava and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 14 inches: silt loam
Bt - 14 to 34 inches: silty clay loam
2Btx - 34 to 50 inches: silty clay loam
3Btb - 50 to 79 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

14C2—Ava silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95l
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ava, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Eroded

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 9 inches: silt loam
Bt and E - 9 to 28 inches: silty clay loam
Btx - 28 to 36 inches: silty clay loam
2Btx - 36 to 64 inches: silt loam
3Btb - 64 to 78 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford, eroded

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

84A—Okaw silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: w3zc
Elevation: 340 to 500 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 180 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Okaw and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Okaw

Setting

Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin loess over clayey lacustrine deposits

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 15 inches: silt loam
H3 - 15 to 54 inches: silty clay
H4 - 54 to 80 inches: stratified silty clay loam to silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 20 inches to abrupt textural change
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)

Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Hydric soil rating: Yes

109A—Racoon silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t960
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Racoon and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Racoon

Setting

Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Mixture of loess and/or local silty alluvium

Typical profile

Ap - 0 to 6 inches: silt loam
Eg - 6 to 30 inches: silt loam
Btg - 30 to 59 inches: silty clay loam
Cg - 59 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None

Frequency of ponding: Occasional
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Bluford

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bonnie, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

338A—Hurst silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tbsb
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hurst and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hurst

Setting

Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over clayey lacustrine deposits

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 12 inches: silt loam
2Btg - 12 to 53 inches: silty clay
2BCg - 53 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Okaw

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

640A—Bluford silt loam, bench, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: w2vt
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford, bench, and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 20 inches: silt loam
H3 - 20 to 35 inches: silty clay
H4 - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose, bench

Percent of map unit: 5 percent
Landform: Structural benches
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

908F—Hickory-Kell silt loams, 18 to 35 percent slopes

Map Unit Setting

National map unit symbol: w2y7
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hickory and similar soils: 50 percent
Kell and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hickory

Setting

Landform: Till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 16 inches: silt loam
H3 - 16 to 43 inches: clay loam
H4 - 43 to 80 inches: loam

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Kell

Setting

Landform: Till plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 7 inches: silt loam
H3 - 7 to 13 inches: clay loam
H4 - 13 to 35 inches: very channery silt loam
Cr - 35 to 60 inches: bedrock

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrr
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Bonnie, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Cg1 - 10 to 27 inches: silt loam
Cg2 - 27 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Belknap

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrv
Elevation: 330 to 490 feet

Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Belknap, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belknap, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 59 inches: silt loam
Bg - 59 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Bonnie, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Piopolis, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform: Oxbows, channels, drainageways, lakes, perenial streams, rivers

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

Williamson County, Illinois

10C—Plumfield silty clay loam, 5 to 10 percent slopes

Map Unit Setting

National map unit symbol: 2wk1l
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Plumfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plumfield

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 5 inches: silty clay loam
2Btx1 - 5 to 12 inches: silty clay loam
2Btx2 - 12 to 36 inches: silt loam
3Btgb - 36 to 70 inches: silty clay loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 5 to 20 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Passport, eroded

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Belknap, occasionally flooded

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bluford

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

10D—Plumfield silty clay loam, 10 to 18 percent slopes

Map Unit Setting

National map unit symbol: 2wk1m
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Plumfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plumfield

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 5 inches: silty clay loam
2Btx1 - 5 to 12 inches: silty clay loam
2Btx2 - 12 to 36 inches: silt loam
3Btgb - 36 to 70 inches: silty clay loam

Properties and qualities

Slope: 10 to 18 percent
Depth to restrictive feature: 5 to 20 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Belknap, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bluford

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

12A—Wynoose silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t959
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wynoose and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wynoose

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over sangamon age paleosol till

Typical profile

Ap - 0 to 7 inches: silt loam *Eg*
- 7 to 19 inches: silt loam *Btg -*
19 to 36 inches: silty clay
2Btg - 36 to 66 inches: silty clay loam
3Btgb - 66 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 13 to 24 inches to abrupt textural change
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.02 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

13A—Bluford silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t95c
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

13B—Bluford silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t95d
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Ava

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

13B2—Bluford silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95f
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 9 inches: silt loam
Btg - 9 to 32 inches: silty clay
2Btgx - 32 to 47 inches: silty clay loam
2Btg - 47 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 5 to 20 inches to abrupt textural change; 19 to 45 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Ava

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wynoose

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

14B—Ava silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t95h
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ava and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 6 inches: silt loam

E - 6 to 14 inches: silt loam
Bt - 14 to 34 inches: silty clay loam
2Btx - 34 to 50 inches: silty clay loam
3Btb - 50 to 79 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

14B2—Ava silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95j
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ava and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 4 inches: silt loam
Bt and E - 4 to 30 inches: silty clay loam
2Btx - 30 to 60 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

14C2—Ava silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95l
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ava, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Eroded

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 9 inches: silt loam
Bt and E - 9 to 28 inches: silty clay loam
Btx - 28 to 36 inches: silty clay loam
2Btx - 36 to 64 inches: silt loam
3Btb - 64 to 78 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford, eroded
Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: 1lm1b
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Ava, severely eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Severely Eroded

Setting
Landform: Till plains
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Peoria and roxana loess over glacial drift

Typical profile
H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 28 inches: silty clay loam
H3 - 28 to 64 inches: silt loam
H4 - 64 to 78 inches: silt loam

Properties and qualities
Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)

Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

518B—Rend silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1lm63
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rend and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rend

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 11 inches: silt loam
H3 - 11 to 23 inches: silty clay loam
H4 - 23 to 77 inches: silt loam
H5 - 77 to 80 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None

Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

518C2—Rend silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting
National map unit symbol: 1lm65
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Rend, eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rend, Eroded

Setting
Landform: Structural benches
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile
H1 - 0 to 8 inches: silt loam
H2 - 8 to 23 inches: silty clay loam
H3 - 23 to 77 inches: silt loam
H4 - 77 to 80 inches: silt loam

Properties and qualities
Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

518C3—Rend silty clay loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 1nbkr
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Rend, severely eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rend, Severely Eroded

Setting

Landform: Structural benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 8 inches: silty clay loam
H2 - 8 to 23 inches: silty clay loam
H3 - 23 to 77 inches: silt loam
H4 - 77 to 80 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Hydric soil rating: No

640B—Bluford silt loam, bench, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1n88v
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford, bench, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 20 inches: silt loam
H3 - 20 to 35 inches: silty clay
H4 - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D

Hydric soil rating: No

640B2—Bluford silt loam, bench, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 1n88t
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford, bench, eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench, Eroded

Setting

Landform: Structural benches
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 27 inches: silty clay
H3 - 27 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

802B—Orthents, loamy, undulating

Map Unit Setting

National map unit symbol: 1lm68
Elevation: 330 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Orthents, loamy, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orthents, Loamy

Setting

Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Earthy fill

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

871B—Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony

Map Unit Setting

National map unit symbol: 1lm6d
Elevation: 360 to 820 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenzburg and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenzburg

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 3 inches: gravelly silty clay loam
H2 - 3 to 26 inches: silty clay loam
H3 - 26 to 60 inches: gravelly silty clay loam

Properties and qualities

Slope: 2 to 7 percent
Percent of area covered with surface fragments: 0.1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Hydric soil rating: No

871D—Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony

Map Unit Setting

National map unit symbol: 1lm6f
Elevation: 360 to 820 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenzburg, stony, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenzburg, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mine spoil

Typical profile

H1 - 0 to 3 inches: gravelly silty clay loam
H2 - 3 to 26 inches: silty clay loam
H3 - 26 to 60 inches: gravelly silty clay loam

Properties and qualities

Slope: 7 to 20 percent
Percent of area covered with surface fragments: 0.1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrr
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Bonnie, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Cg1 - 10 to 27 inches: silt loam
Cg2 - 27 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Belknap

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrv
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Belknap, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belknap, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 59 inches: silt loam
Bg - 59 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Bonnie, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Piopolis, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

3420A—Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 1lm1t
Elevation: 340 to 500 feet
Mean annual precipitation: 38 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 180 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Piopolis, frequently flooded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Piopolis, Frequently Flooded

Setting

Landform: Flood plains

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 7 inches: silty clay loam
H2 - 7 to 37 inches: silty clay loam
H3 - 37 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Project No. B16-454-1413

Mach Water Line



Photograph No. 97
Wetland K1 Overview



Photograph No. 98
Wetland K1 Soil

Project No. B16-454-1413

Mach Water Line

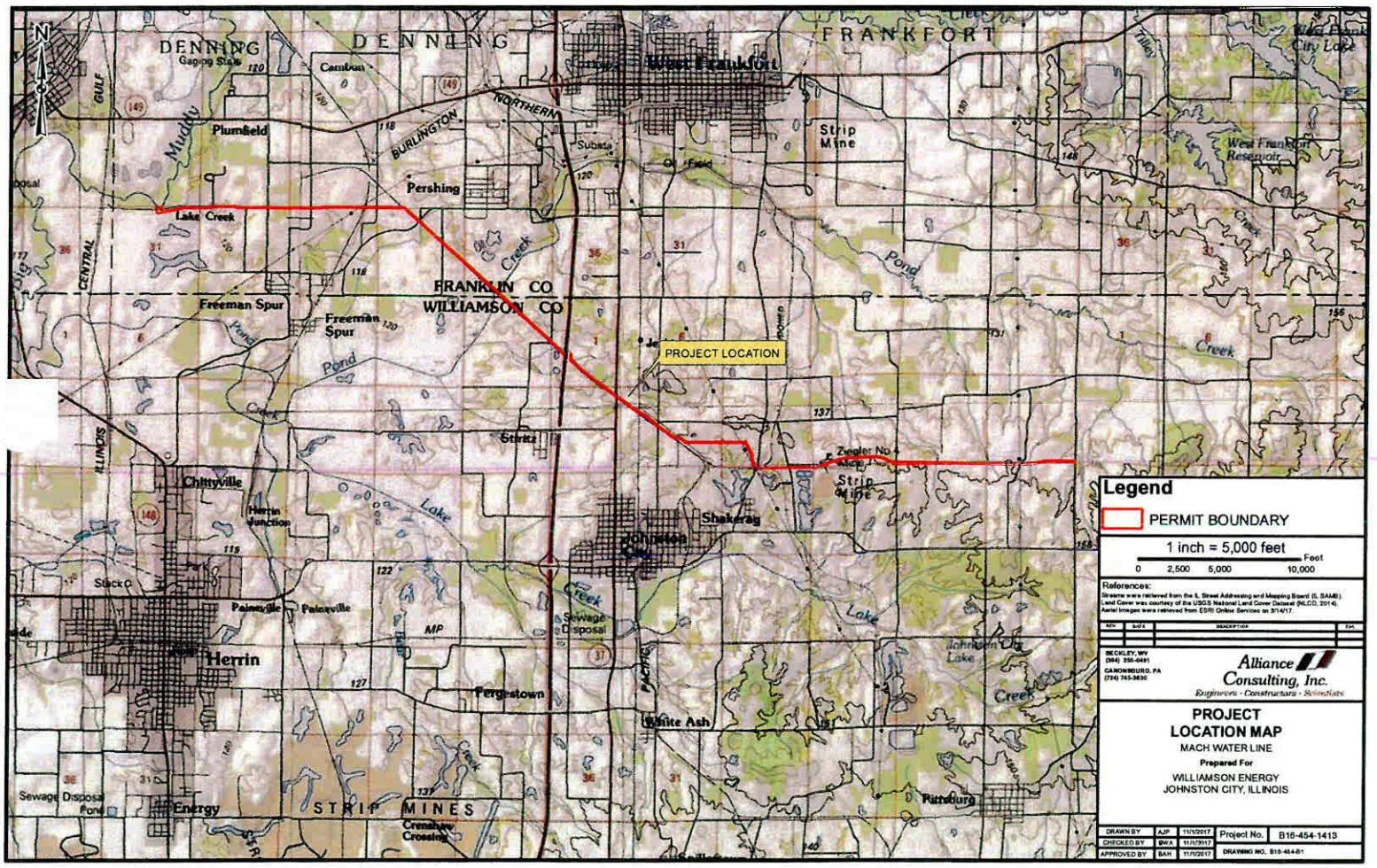


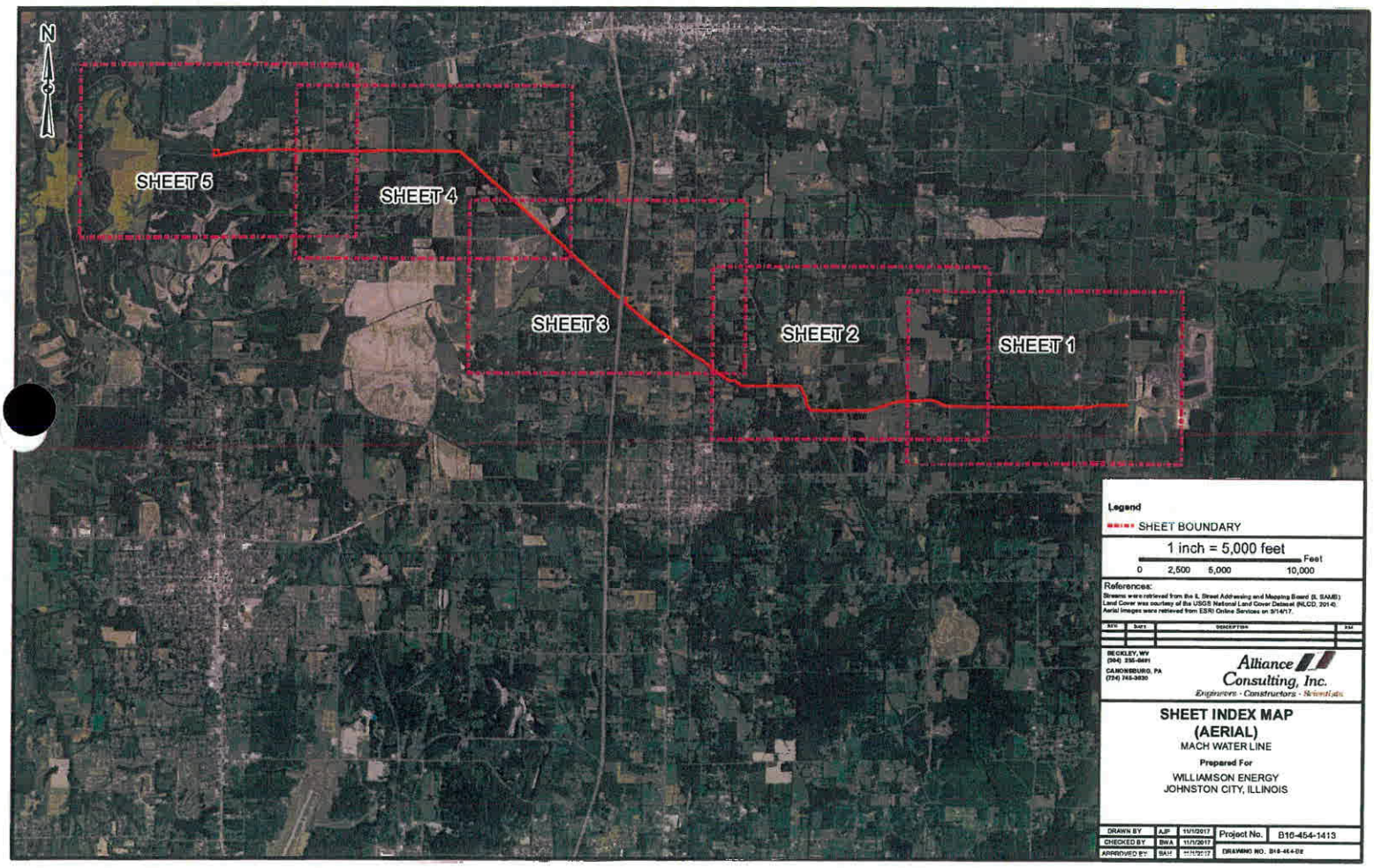
Photograph No. 99
Upland J1 and K1 Overview

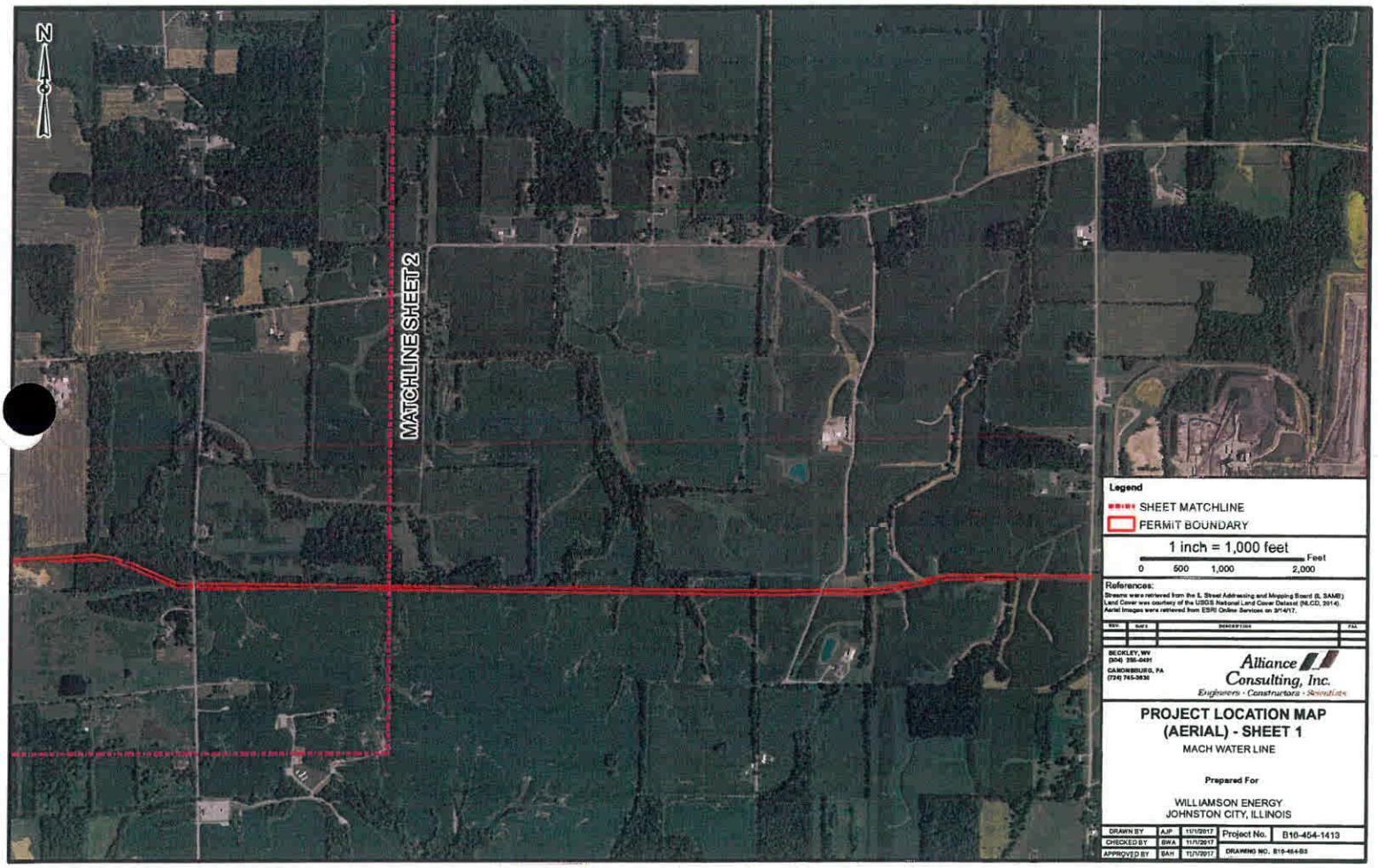


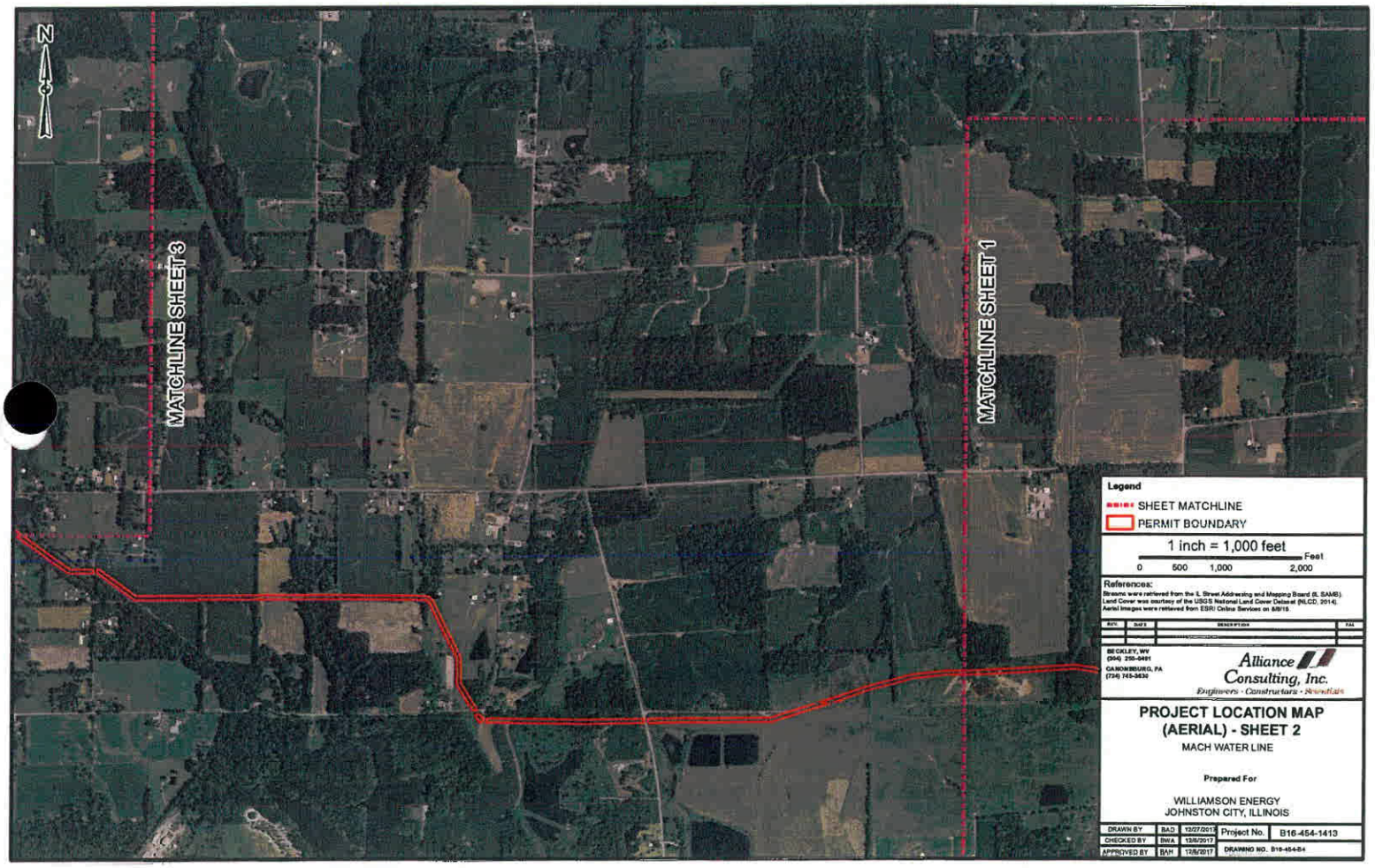
Photograph No. 100
Upland J1 and K1 Soil

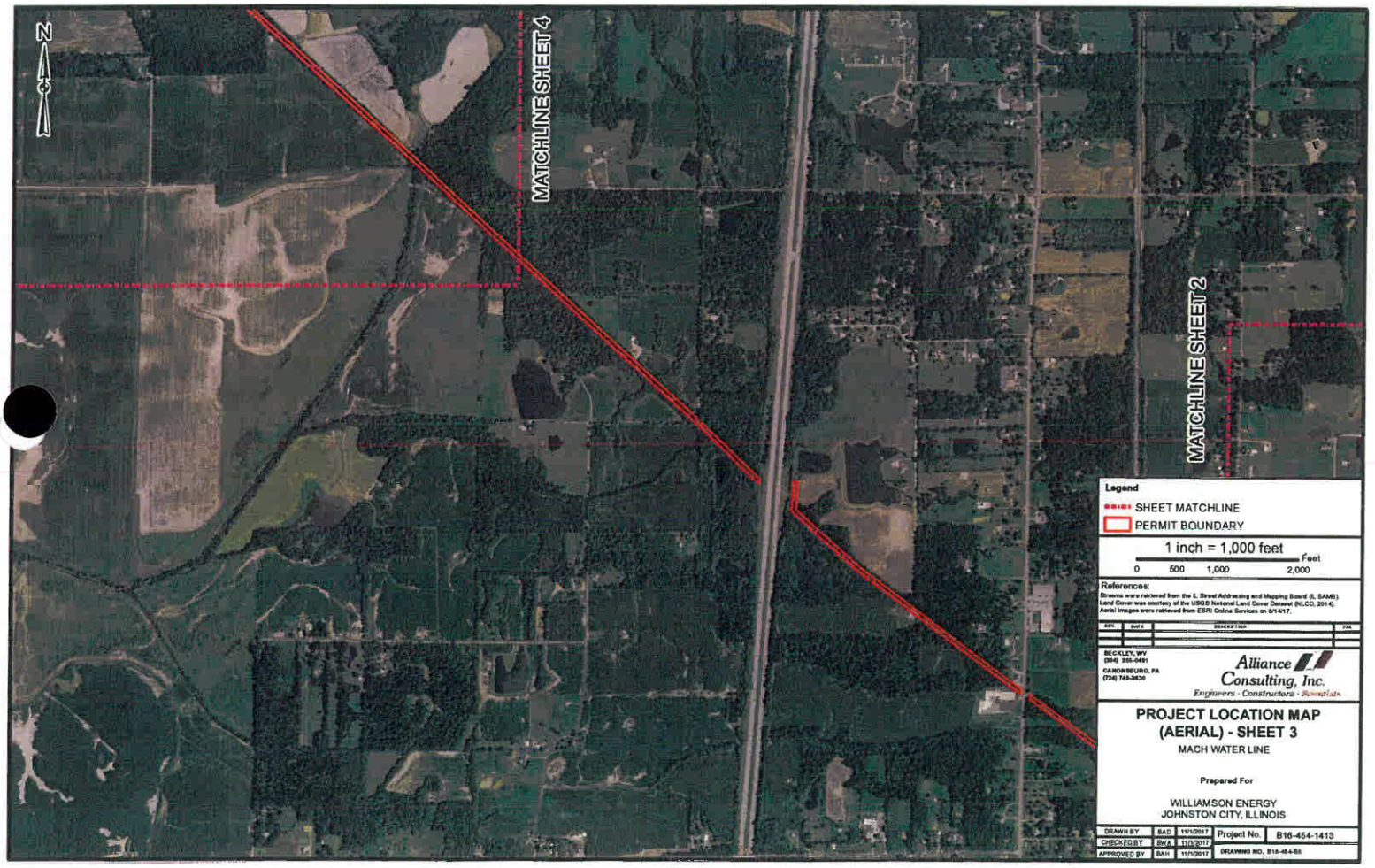
FIGURES

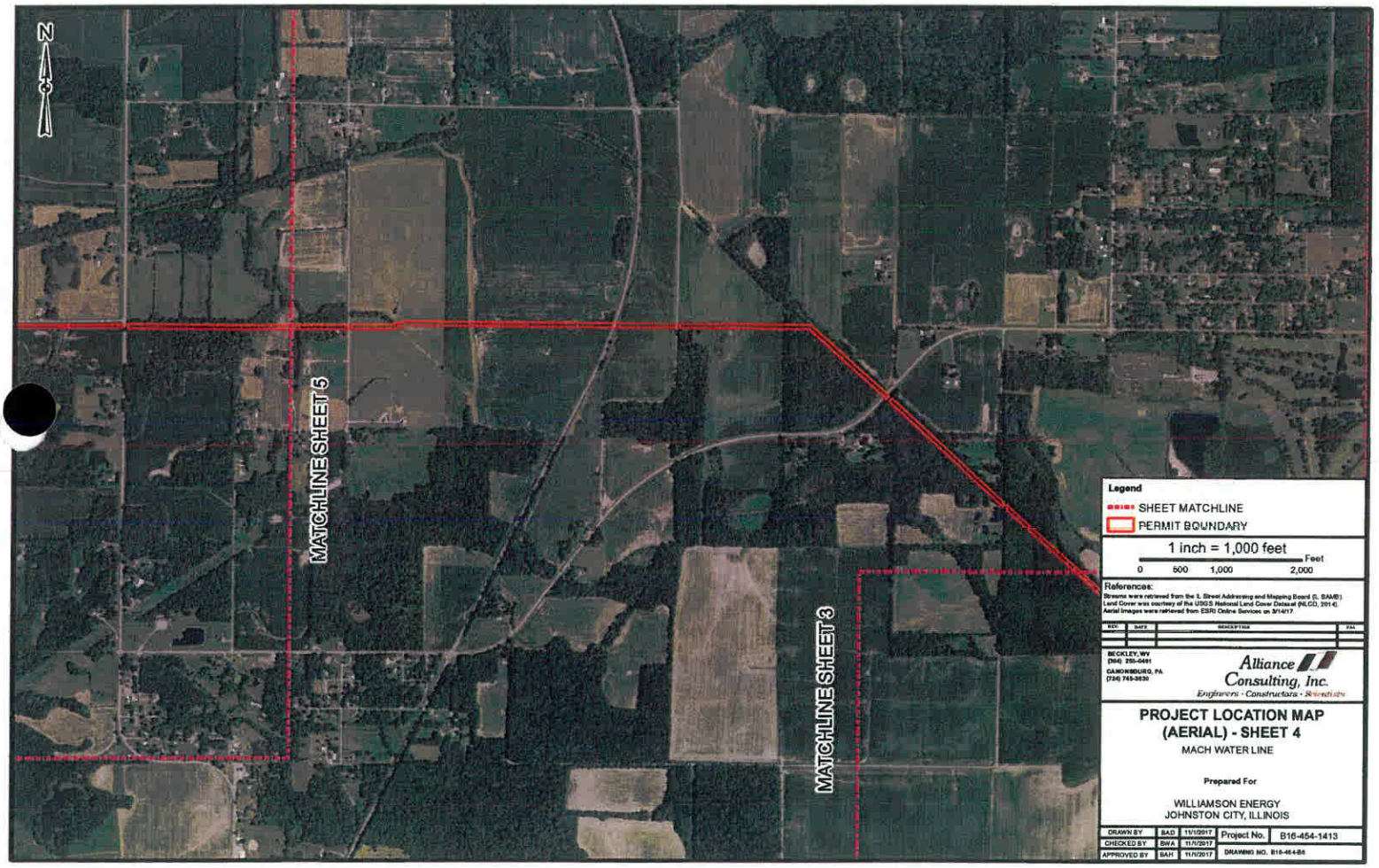

DENNING
DENNING
FRANKFORT
West Frankfort
Plumfield
Pershing
Lake Creek
Freeman Spur
Freeman Spur
FRANKLIN CO
WILLIAMSON CO
PROJECT LOCATION
Strip Mine
Strip Mine
Chittyville
Herrin Junction
Shakerag
Johnston City
Herrin
Pergestown
White Ash
Pittsburg
Energy
STRIP MINES
Sewage Disposal
Legend
PERMIT BOUNDARY
1 inch = 5,000 feet
0 2,500 5,000 10,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/14/17.
BECKLEY, WV
(304) 256-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
PROJECT LOCATION MAP
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-B1

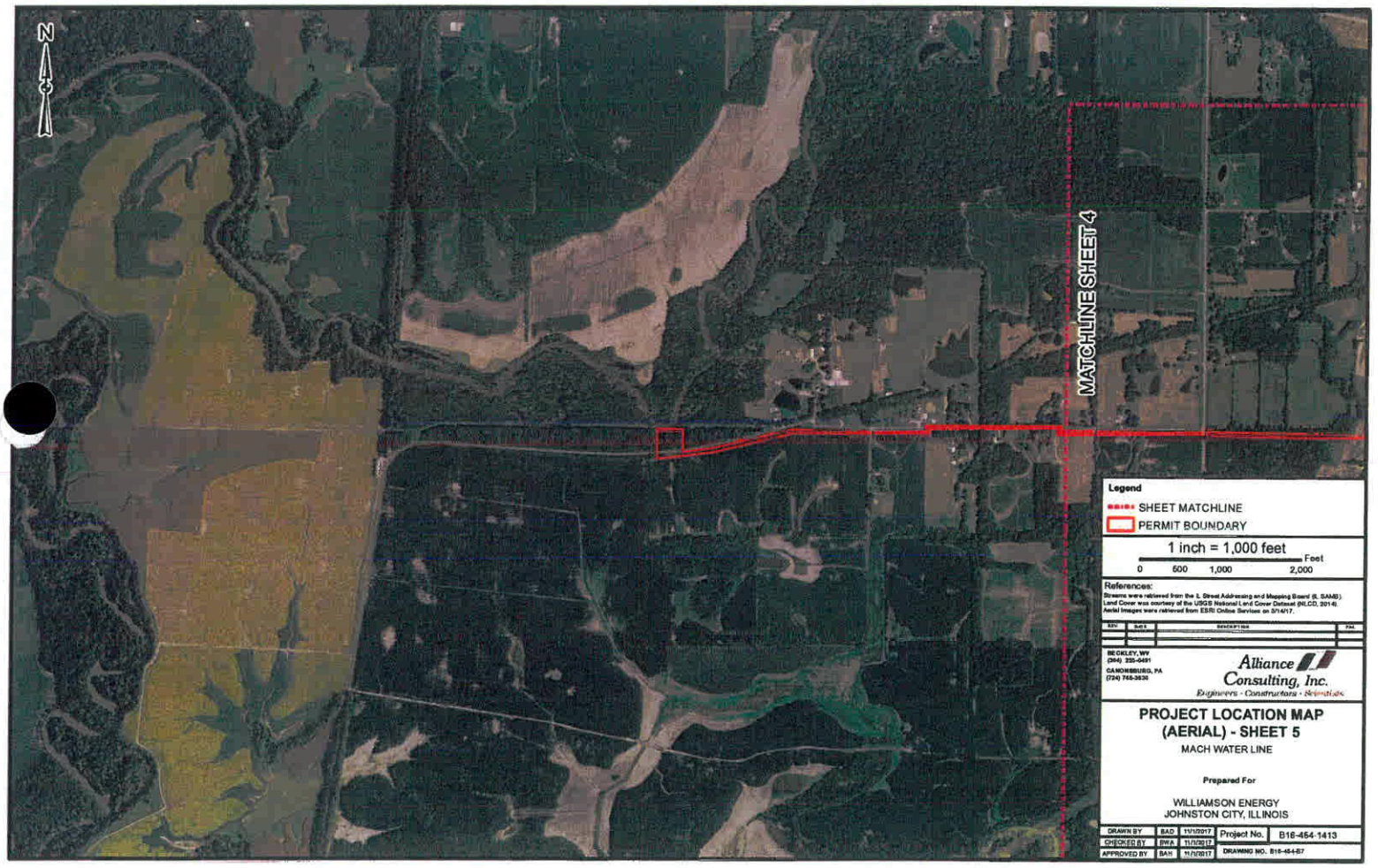

N
SHEET 5
SHEET 4
SHEET 3
SHEET 2
SHEET 1
Legend
SHEET BOUNDARY
1 inch = 5,000 feet
0 2,500 5,000 10,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014)
Aerial images were retrieved from ESRI Online Services on 9/14/17.
REV DATE DESCRIPTION BY
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3830
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
SHEET INDEX MAP
(AERIAL)
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BMA 11/1/2017
APPROVED BY SAT
Project No. B16-454-1413
DRAWING NO. B16-454-D2

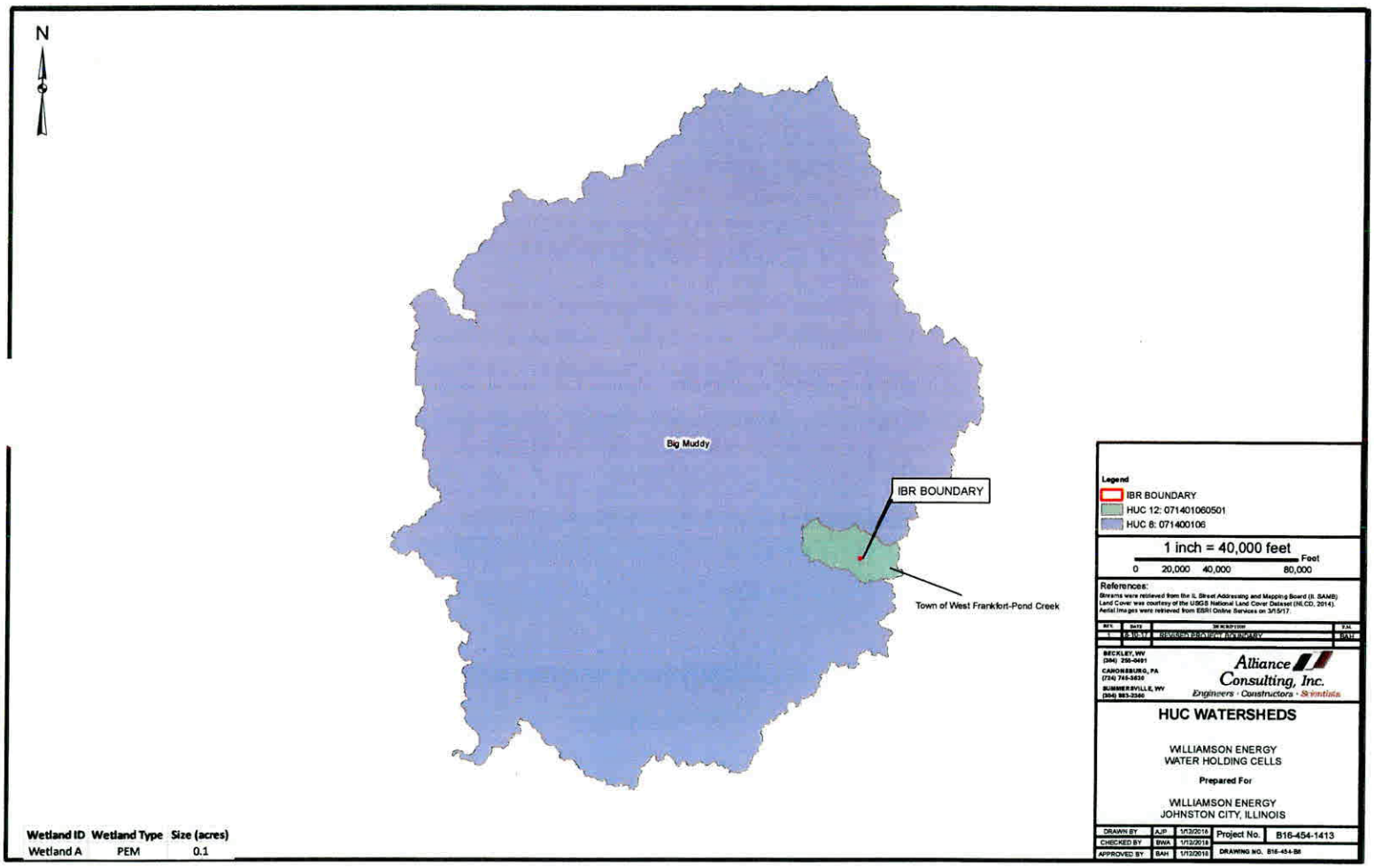

N
MATCHLINE SHEET 2
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
Feet
0
500
1,000
2,000
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 3/14/17.
REV.
DATE
DESCRIPTION
PM
BECKLEY, WV
(304) 255-0491
CARONSBURG, PA
(724) 745-3530
Alliance Consulting, Inc.
Engineers · Constructors · Specialists
PROJECT LOCATION MAP
(AERIAL) - SHEET 1
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
AJP
11/1/2017
Project No.
B16-454-1413
CHECKED BY
BWA
11/1/2017
APPROVED BY
BAH
11/1/2017
DRAWING NO. B16-454-BS


N
MATCHLINE SHEET 3
MATCHLINE SHEET 1
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
Feet
0
500
1,000
2,000
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 8/8/15.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Realtors
PROJECT LOCATION MAP
(AERIAL) - SHEET 2
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY BAD 12/27/2017 Project No. B16-454-1413
CHECKED BY BWA 12/6/2017
APPROVED BY BAR 12/6/2017 DRAWING NO. B16-454-B4

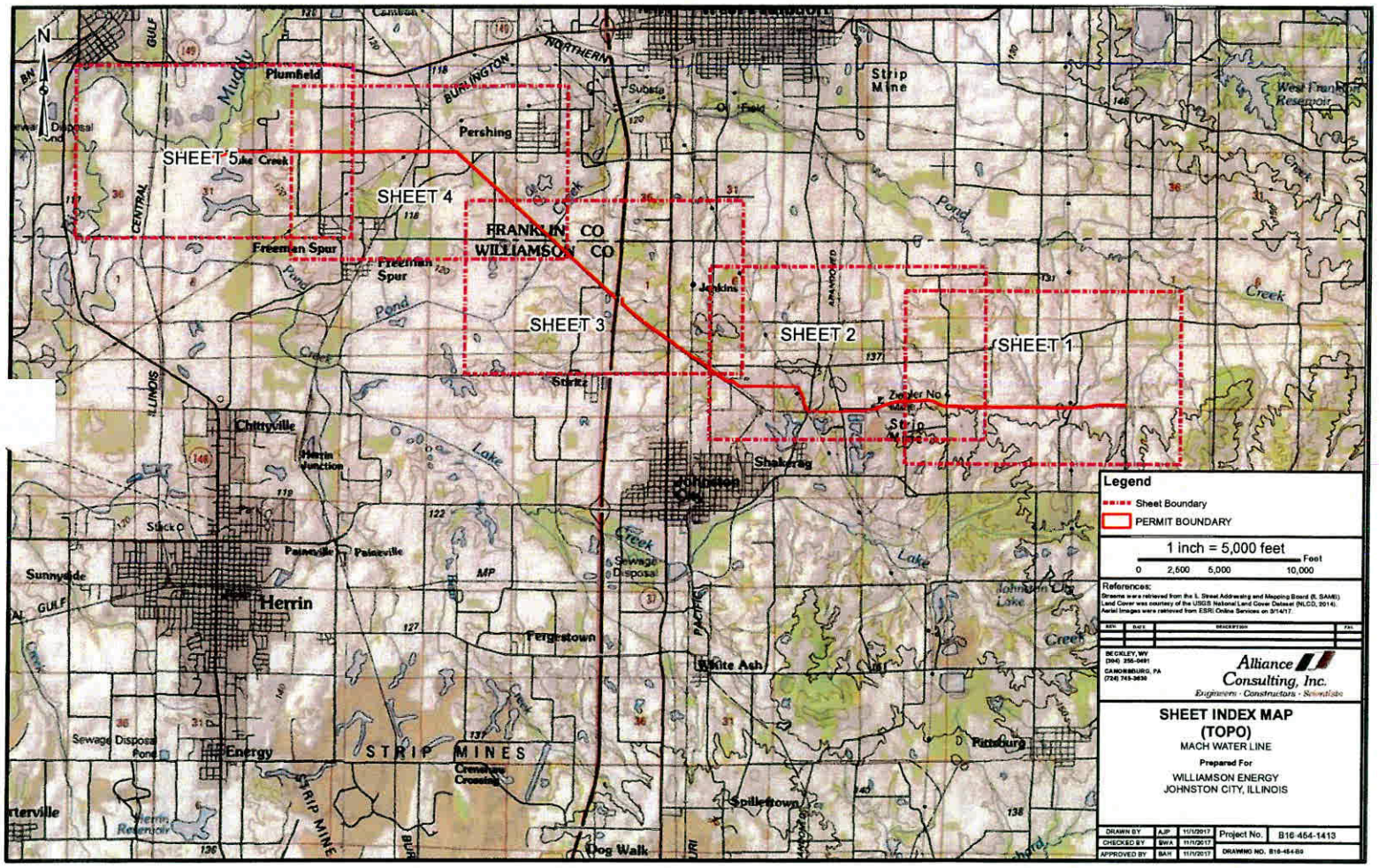

N
MATCHLINE SHEET 4
MATCHLINE SHEET 2
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
Feet
0 500 1,000 2,000
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 3/14/17.
NO. DATE DESCRIPTION APP.
BECKLEY, WV
(304) 255-0401
CANONSBURG, PA
(724) 743-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
PROJECT LOCATION MAP
(AERIAL) - SHEET 3
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY BAD 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-464-1413
DRAWING NO. B16-464-SS

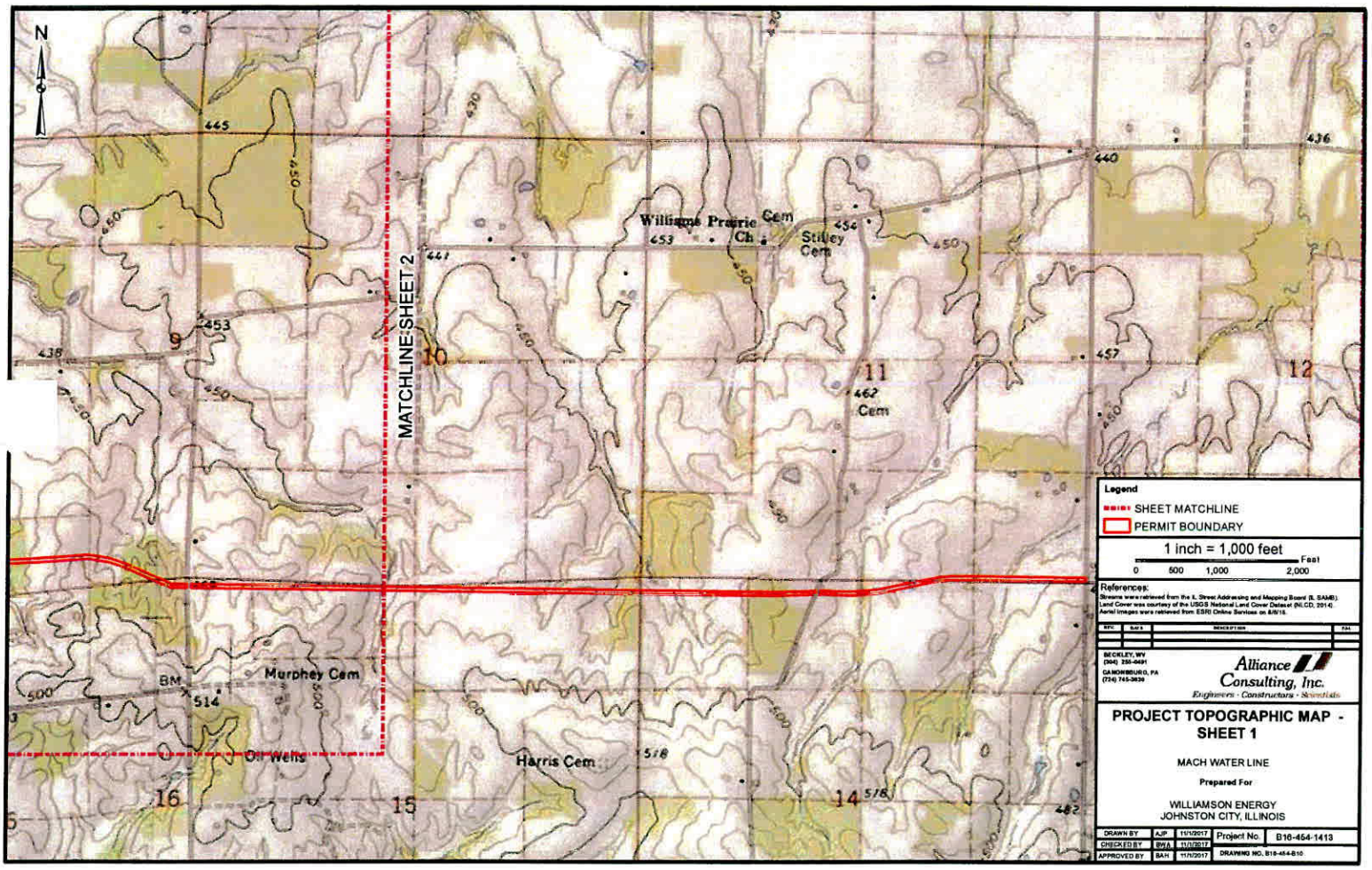

N
MATCHLINE SHEET 5
MATCHLINE SHEET 3
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
Feet
0
500
1,000
2,000
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 3/14/17.
NO.
DATE
DESCRIPTION
BY
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
PROJECT LOCATION MAP
(AERIAL) - SHEET 4
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
BAD
11/1/2017
Project No.
B16-454-1413
CHECKED BY
BWA
11/1/2017
APPROVED BY
BAH
11/1/2017
DRAWING NO. B16-454-B6

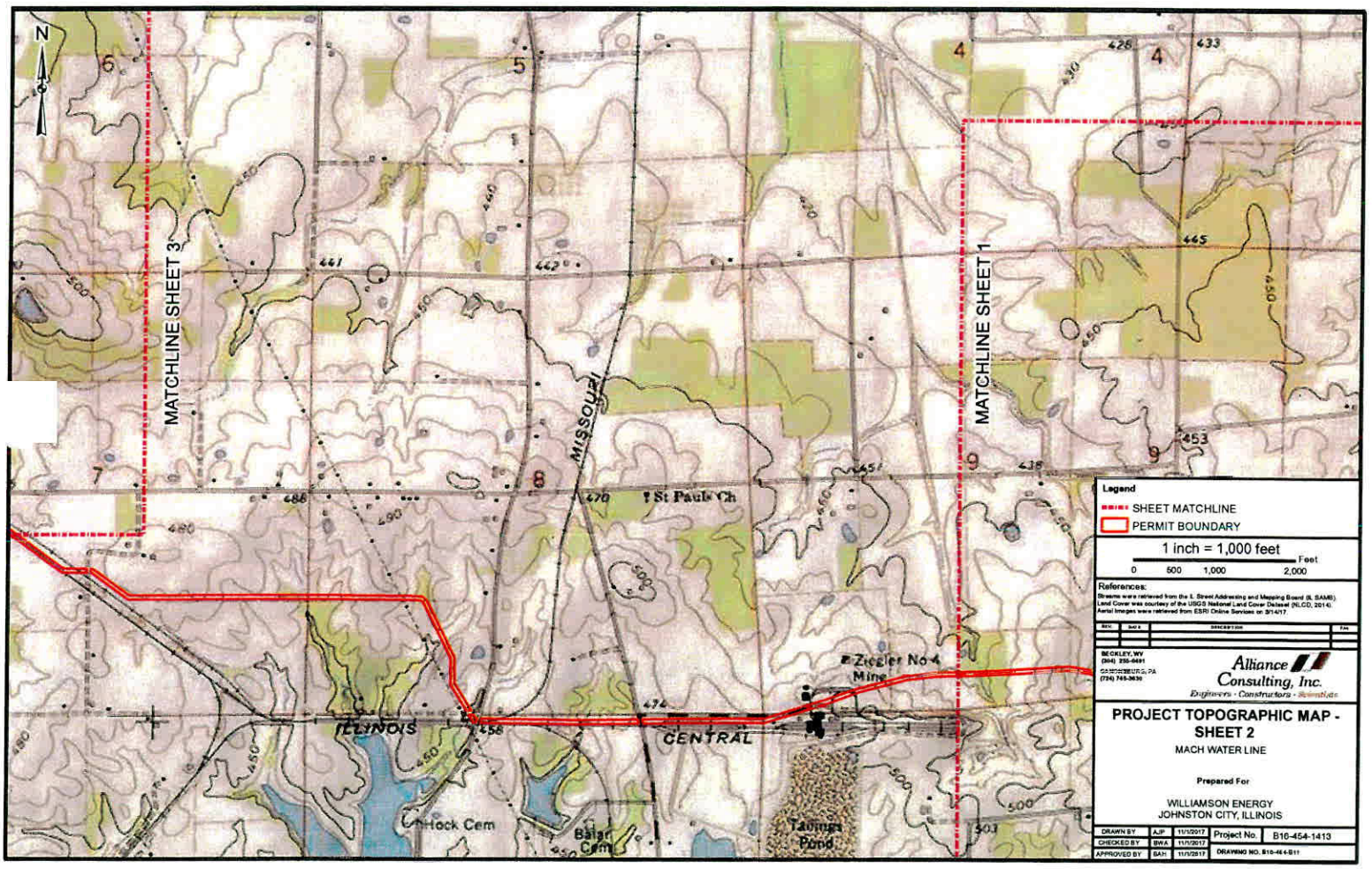

N
MATCHLINE SHEET 4
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
Feet
0
500
1,000
2,000
References:
Streams were retrieved from the U. Street Addressing and Mapping Board (E. SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014)
Aerial Images were retrieved from ESRI Online Services on 5/14/17.
REV
DATE
DESCRIPTION
PM
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 746-3636
Alliance Consulting, Inc.
Engineers · Constructors · Specialists
PROJECT LOCATION MAP
(AERIAL) - SHEET 5
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
BAD
11/1/2017
Project No.
B16-454-1413
CHECKED BY
BWA
11/1/2017
APPROVED BY
BAR
11/1/2017
DRAWING NO. B16-454-E7

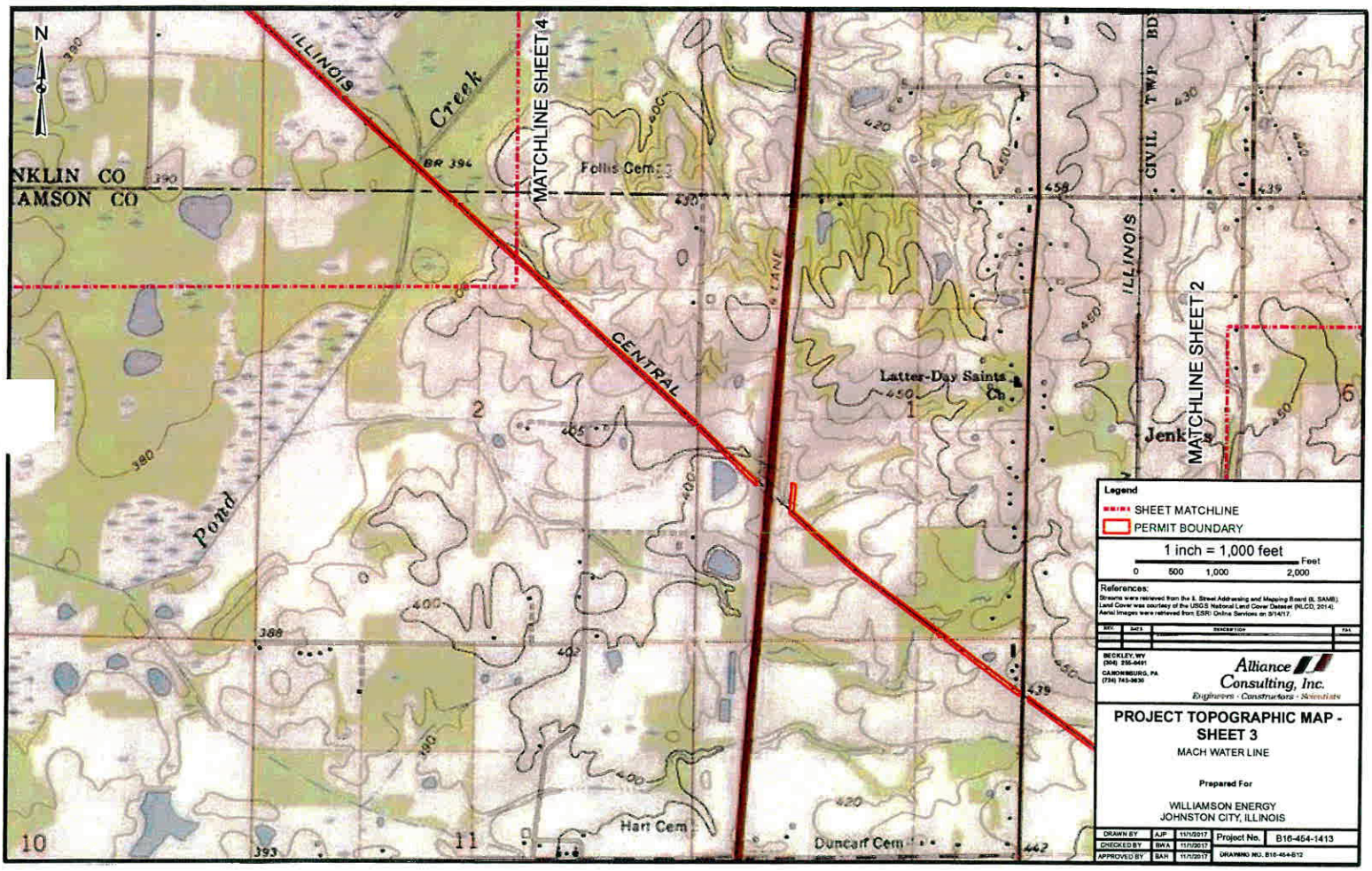


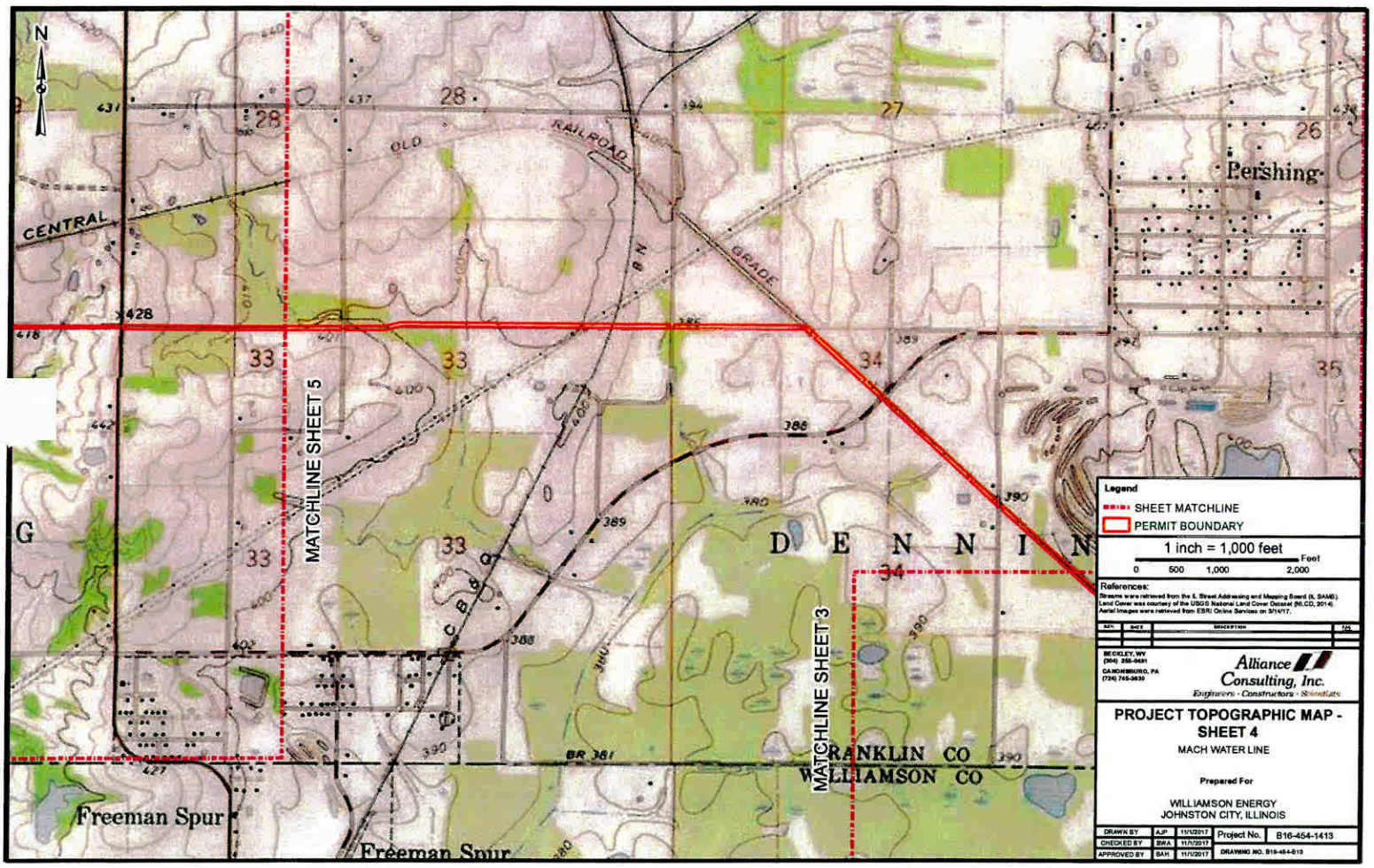
Wetland ID	Wetland Type	Size (acres)
Wetland A	PEM	0.1

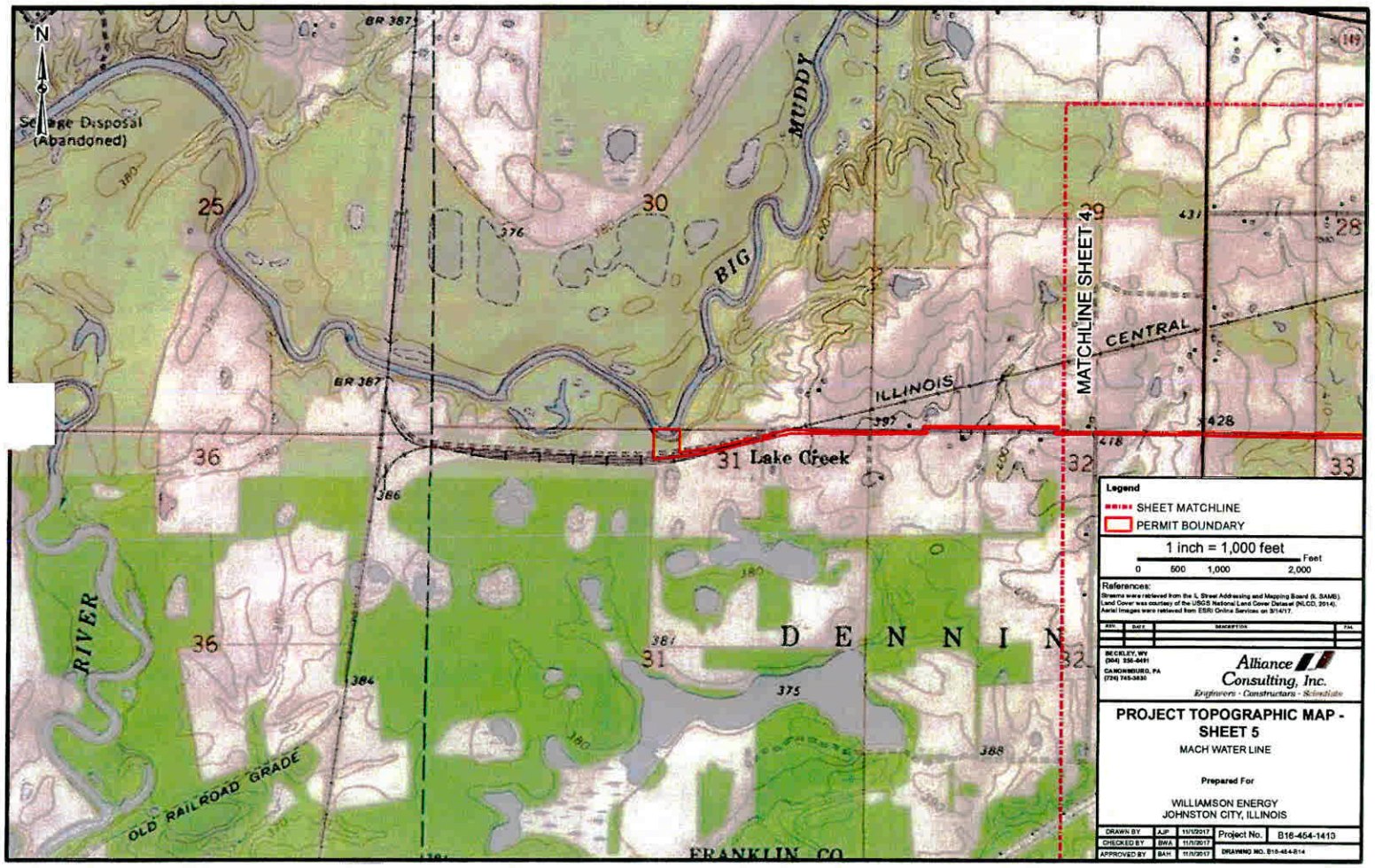

SHEET 5
SHEET 4
SHEET 3
SHEET 2
SHEET 1
FRANKLIN CO
WILLIAMSON CO
Plumfield
Pershing
Freeman Spur
Chittyville
Herrin
Sunnyside
Energy
STRIP MINES
Pergestown
White Ash
Spillertown
Dog Walk
Pittsburg
Johnston City
Shakerag
Strip Mine
West Franklin Reservoir
Legend
Sheet Boundary
PERMIT BOUNDARY
1 inch = 5,000 feet
0 2,500 5,000 10,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial Images were retrieved from ESRI Online Services on 3/14/17.
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 743-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
SHEET INDEX MAP
(TOPO)
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-B9

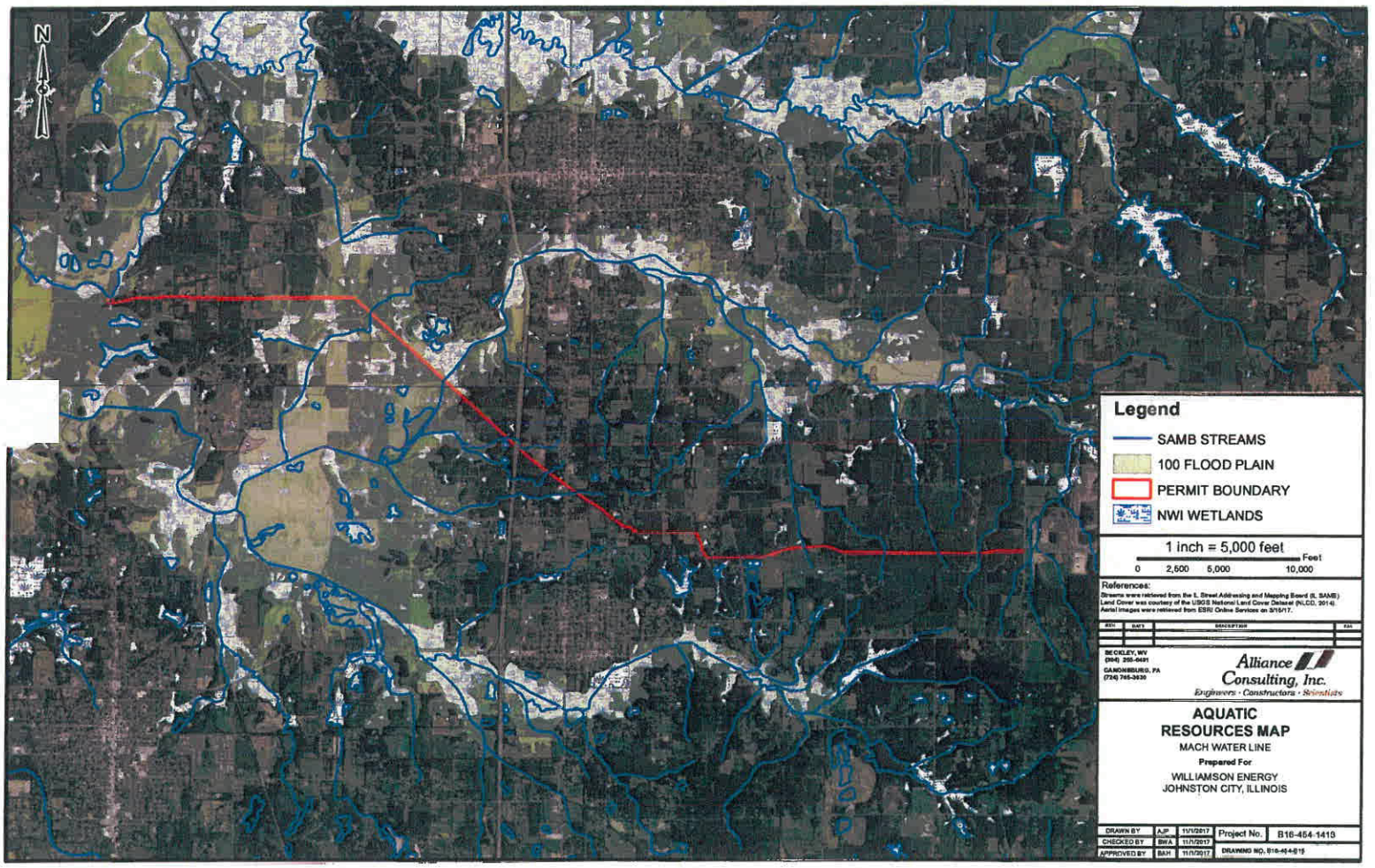

N
MATCHLINE SHEET 2
Williams Prairie Ch
Cem
Stilley Cem
Murphey Cem
BM 514
Oil Wells
Harris Cem
462 Cem
9
10
11
12
14
15
16
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
0 500 1,000 2,000 Feet
References:
Streams were retrieved from the E. Street Addressing and Mapping Board (E. SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2011).
Aerial images were retrieved from ESRI Online Services on 8/8/16.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3639
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
PROJECT TOPOGRAPHIC MAP - SHEET 1
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-464-1413
DRAWING NO. B16-464-B10

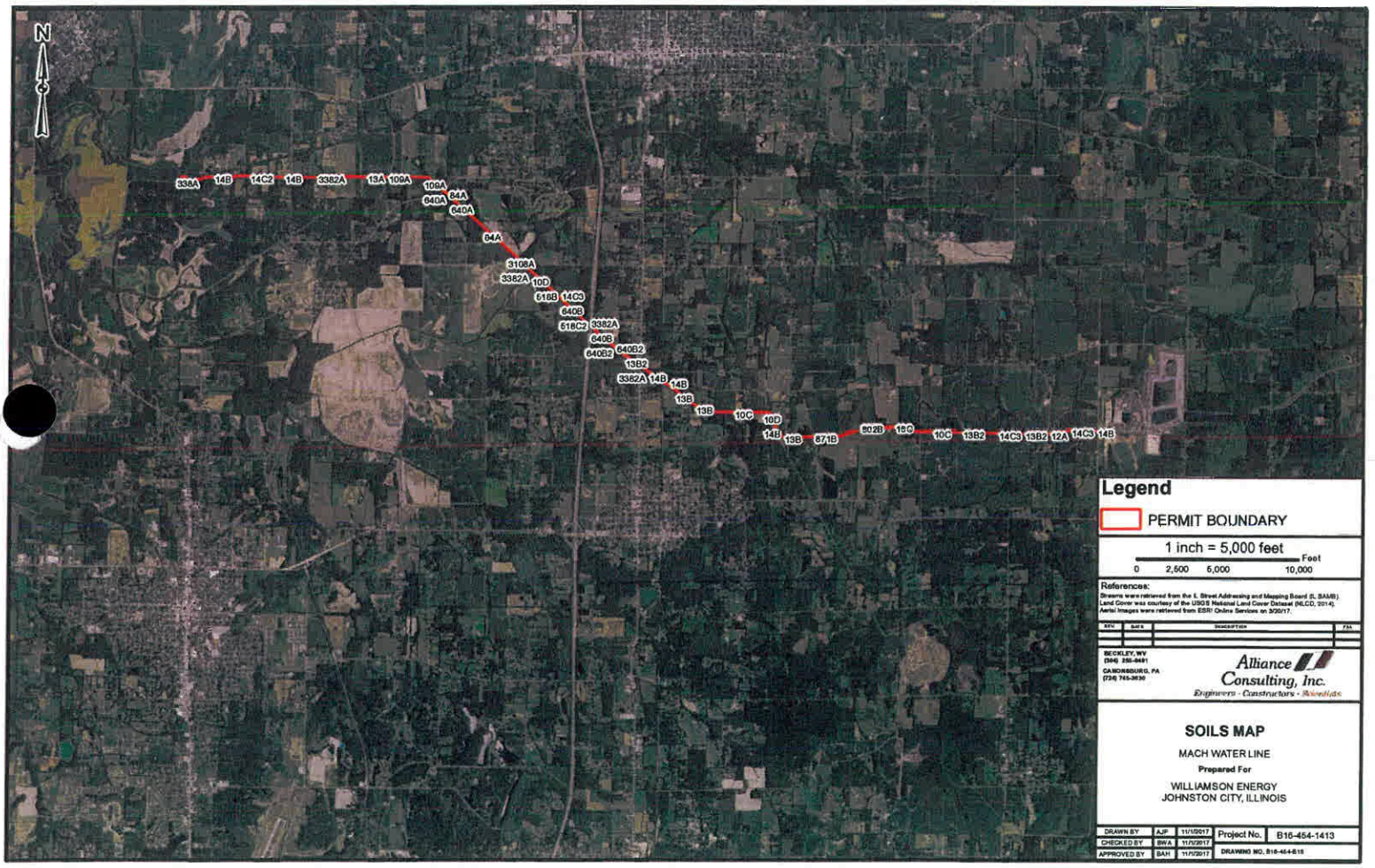

N
MATCHLINE SHEET 3
MATCHLINE SHEET 1
MISSOURI
ILLINOIS CENTRAL
St Paul Ch
Ziegler No 4 Mine
Cemetery
Baker Cem
Tailings Pond
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
0 500 1,000 2,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/14/17.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers - Constructors - Specialists
PROJECT TOPOGRAPHIC MAP - SHEET 2
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-B11

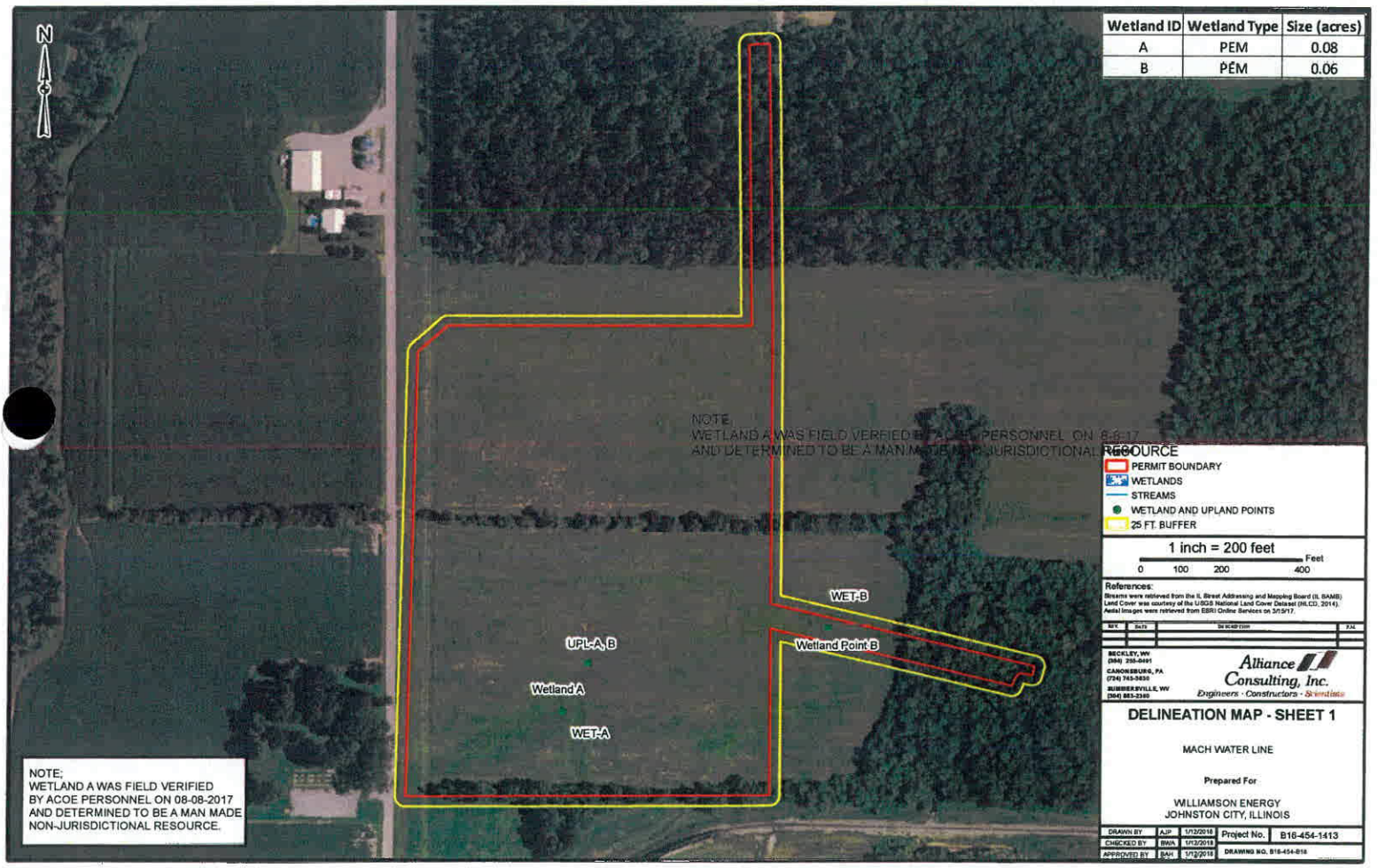

N
ILLINOIS
Creek
MATCHLINE SHEET 4
BR 394
Follis Cem
NKLIN CO
AMSON CO
CENTRAL
LANE
Latter-Day Saints
Ch
ILLINOIS
CIV IL TWP BD
MATCHLINE SHEET 2
Jenk s
Pond
Hart Cem
Duncan Cem
10
11
2
1
6
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
0 500 1,000 2,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/14/17.
NO. DATE DESCRIPTION PM
BECKLEY, WV
(304) 256-0491
CANONSBURG, PA
(724) 743-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
PROJECT TOPOGRAPHIC MAP - SHEET 3
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017 Project No. B16-454-1413
CHECKED BY BKA 11/1/2017
APPROVED BY BAH 11/7/2017 DRAWING NO. B16-454-S12


N
MATCHLINE SHEET 5
MATCHLINE SHEET 3
CENTRAL
RAILROAD
OLD
GRADE
Pershing
D E N N I N
FRANKLIN CO
WILLIAMSON CO
Freeman Spur
Freeman Spur
BR 361
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
0 500 1,000 2,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 3/14/17.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Specialists
PROJECT TOPOGRAPHIC MAP - SHEET 4
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BHA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-813

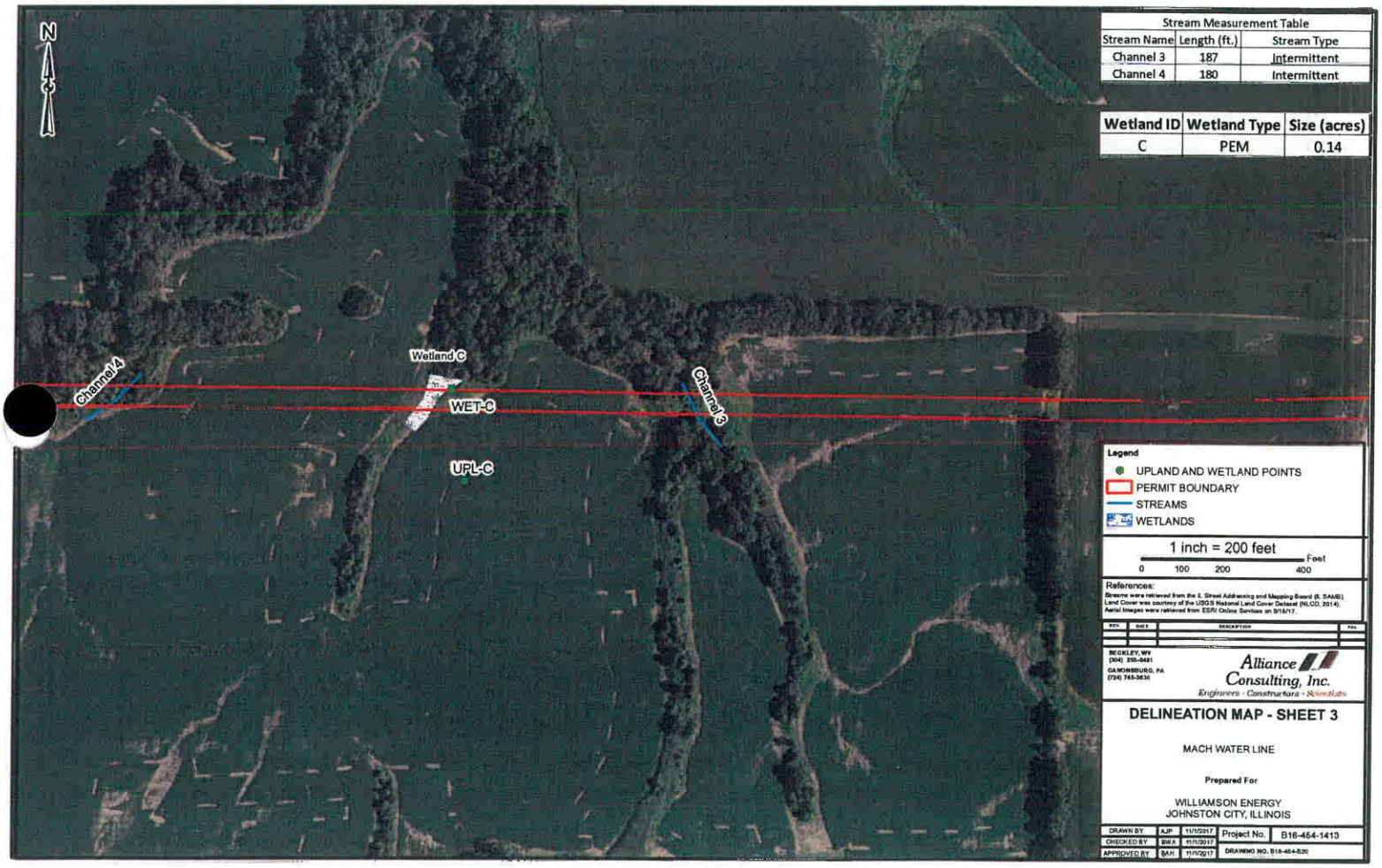

N
Sewage Disposal
(Abandoned)
BR 387
MUDDY
BIG
MATCHLINE SHEET 4
CENTRAL
ILLINOIS
Lake Creek
RIVER
DENNIN
OLD RAILROAD GRADE
FRANKLIN CO
25
30
36
31
32
33
28
Legend
SHEET MATCHLINE
PERMIT BOUNDARY
1 inch = 1,000 feet
0 500 1,000 2,000 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/14/17.
NO. DATE DESCRIPTION PM
BECKLEY, WV
(304) 256-0451
CANONSBURG, PA
(724) 745-3830
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
PROJECT TOPOGRAPHIC MAP - SHEET 5
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017 Project No. B16-464-1413
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017 DRAWING NO. B16-464-814


N
Legend
SAMB STREAMS
100 FLOOD PLAIN
PERMIT BOUNDARY
NWI WETLANDS
1 inch = 5,000 feet
0
2,500
5,000
10,000
Feet
References:
Streams were retrieved from the L Street Addressing and Mapping Board (L SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 3/15/17.
NO.
DATE
DESCRIPTION
BY
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
AQUATIC RESOURCES MAP
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
AJP
11/1/2017
Project No.
B16-454-1415
CHECKED BY
BWA
11/1/2017
APPROVED BY
BAH
11/1/2017
DRAWING NO. B16-454-E15


N
336A
14B
14C2
14B
3382A
13A
109A
109A
64A
640A
640A
64A
3108A
3382A
10D
616B
14C9
640B
518C2
3382A
640B
640B2
640B2
13B2
3382A
14B
14B
13B
13B
10C
10D
14B
13B
871B
902B
18C
10C
13B2
14C3
13B2
12A
14C3
14B
Legend
PERMIT BOUNDARY
1 inch = 5,000 feet
Foot
0
2,500
5,000
10,000
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/20/17.
NO.
DATE
DESCRIPTION
FSA
BECKLEY, WV
(304) 256-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Specialists
SOILS MAP
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
AJP
11/1/2017
Project No.
B16-454-1413
CHECKED BY
BWA
11/1/2017
APPROVED BY
BAH
11/1/2017
DRAWING NO. B16-454-E15


N
Wetland ID | Wetland Type | Size (acres)
A | PEM | 0.08
B | PEM | 0.06
NOTE;
WETLAND A WAS FIELD VERIFIED BY ACOE PERSONNEL ON 8-8-17
AND DETERMINED TO BE A MAN MADE NON-JURISDICTIONAL RESOURCE
PERMIT BOUNDARY
WETLANDS
STREAMS
WETLAND AND UPLAND POINTS
25 FT. BUFFER
1 inch = 200 feet
0 100 200 400 Feet
References:
WET-B
Wetland Point B
UPL-A, B
Wetland A
WET-A
NOTE;
WETLAND A WAS FIELD VERIFIED
BY ACOE PERSONNEL ON 08-08-2017
AND DETERMINED TO BE A MAN MADE
NON-JURISDICTIONAL RESOURCE.
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP - SHEET 1
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
Project No. B16-454-1413


N
Channel 1
Channel 2
Stream Measurement Table
Stream Name | Length (ft.) | Stream Type
Channel 1 | 100 | Ephemeral
Channel 2 | 122 | Ephemeral
Legend
PERMIT BOUNDARY
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Flood Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014)
Aerial Images were retrieved from ESRI Online Services on 9/18/17.
BECKLEY, WV
(304) 255-0401
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Specialists
DELINEATION MAP - SHEET 2
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 12/27/2017
CHECKED BY BWA 12/5/2017
APPROVED BY BAH 12/5/2017
Project No. B16-464-1413
DRAWING NO. B16-464-B16



Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 3	187	Intermittent
Channel 4	180	Intermittent

Wetland ID	Wetland Type	Size (acres)
C	PEM	0.14

Legend
- UPLAND AND WETLAND POINTS
- PERMIT BOUNDARY
- STREAMS
- WETLANDS

1 inch = 200 feet
0 100 200 400 Feet

References:
Streams were retrieved from the U. Street Addressing and Mapping Board (E. SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial Images were retrieved from ESRI Online Services on 9/16/17.

NO.	DATE	DESCRIPTION	PAL

BECKLEY, WV
(304) 255-0481
OAKMONSBURG, PA
(724) 745-3636
Alliance Consulting, Inc.
Engineers · Constructors · Scientists

DELINEATION MAP - SHEET 3

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	11/1/2017	Project No.	B16-464-1413
CHECKED BY	BWA	11/1/2017		
APPROVED BY	BAH	11/2/2017	DRAWING NO. B16-464-B20	



Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 5	110	Intermittent

Legend

- PERMIT BOUNDARY
- STREAMS
- WETLANDS

1 inch = 200 feet

0 100 200 400 Feet

References:

Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2011). Aerial images were retrieved from ESRI Online Services on 3/15/17.

REV.	DATE	DESCRIPTION	PAA

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3650

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

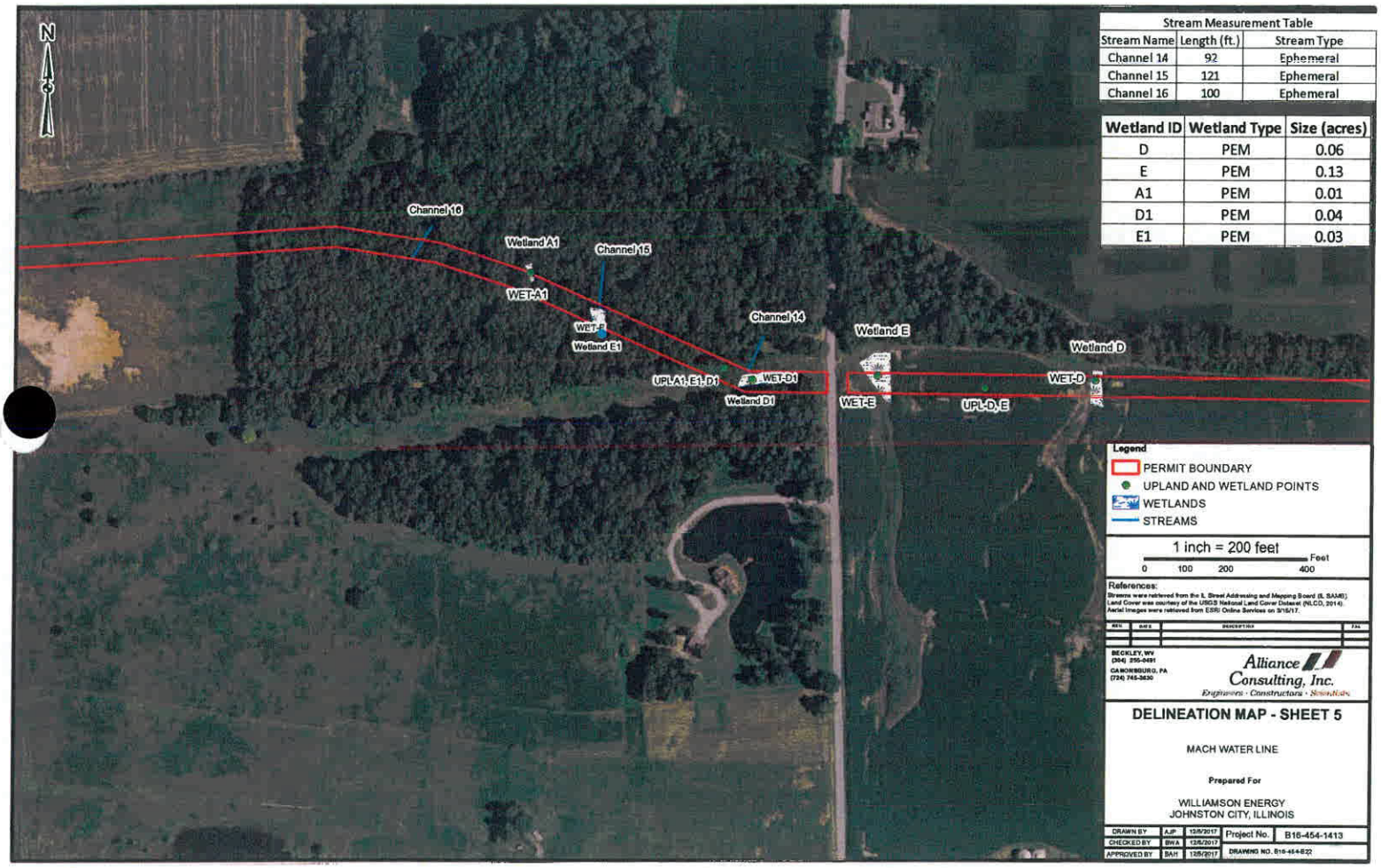
DELINEATION MAP - SHEET 4

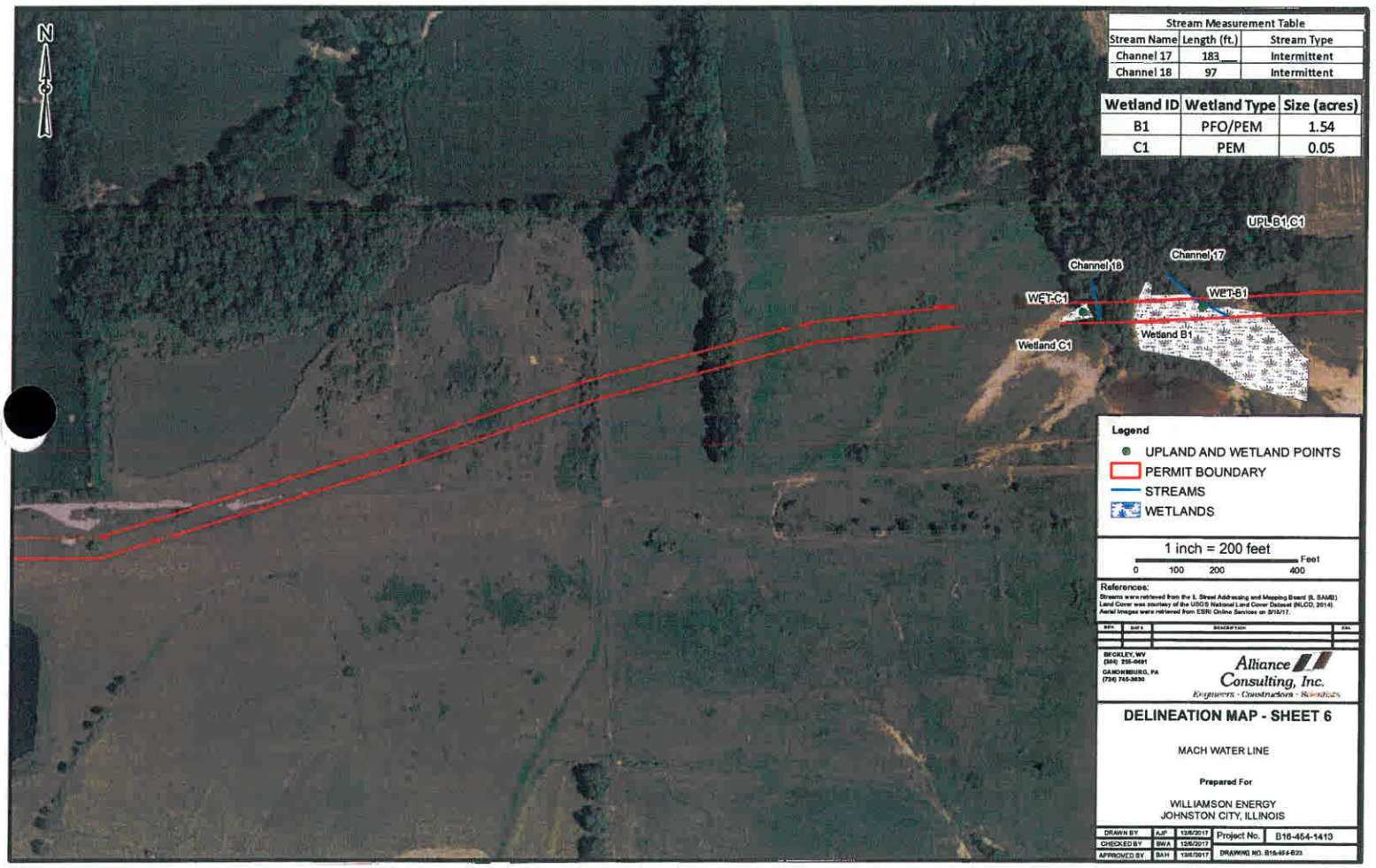
MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

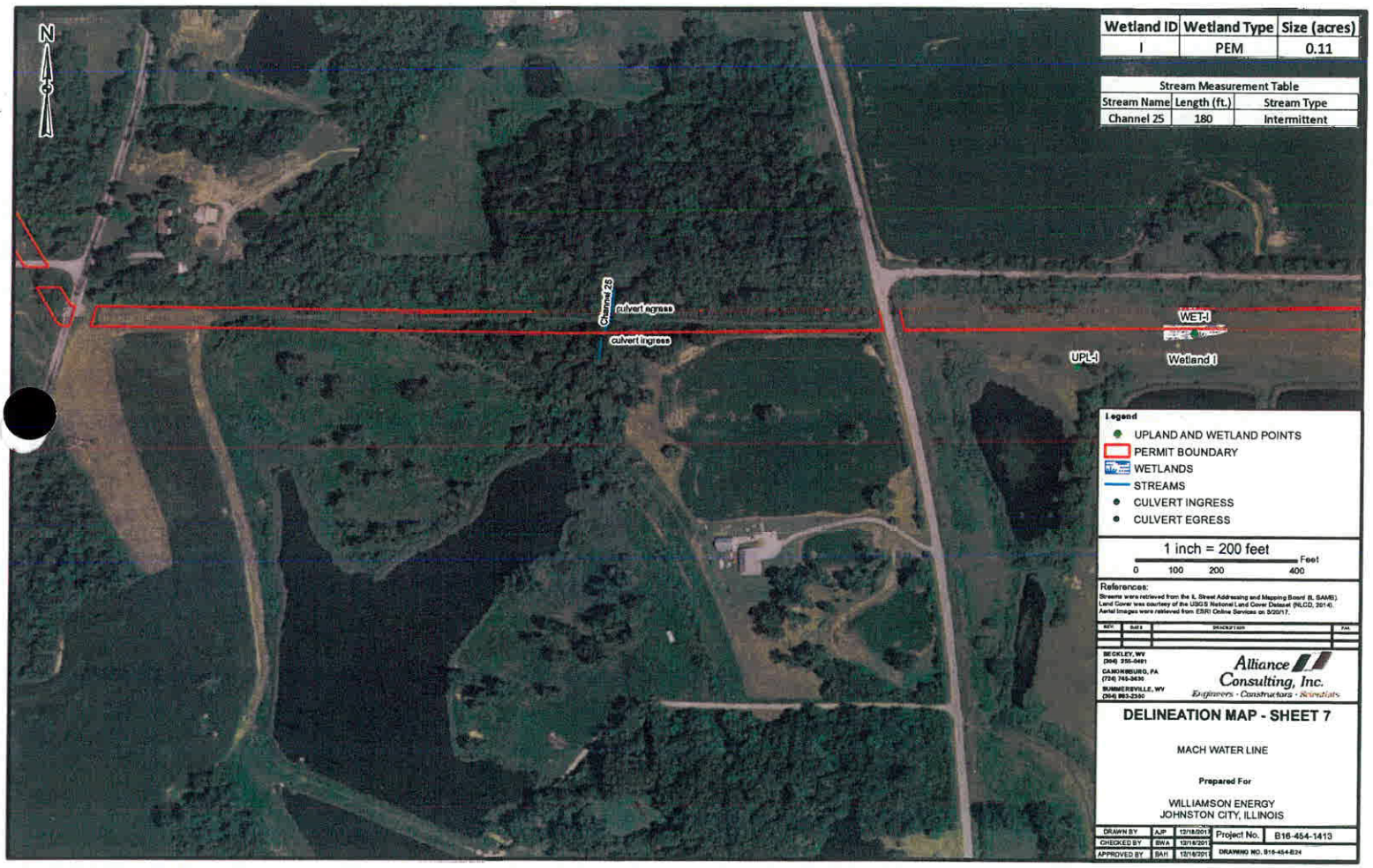
DRAWN BY	AJP	11/1/2017	Project No.	B16-454-1413
CHECKED BY	BWA	11/1/2017		
APPROVED BY	BAH	11/1/2017	DRAWING NO. B16-454-B21	


N
Channel 16
Wetland A1
Channel 15
WET-A1
WET-E
Wetland E1
Channel 14
UPLA1, E1, D1
WET-D1
Wetland D1
Wetland E
WET-E
UPL-D, E
Wetland D
WET-D
Stream Measurement Table
Stream Name | Length (ft.) | Stream Type
Channel 14 | 92 | Ephemeral
Channel 15 | 121 | Ephemeral
Channel 16 | 100 | Ephemeral
Wetland ID | Wetland Type | Size (acres)
D | PEM | 0.06
E | PEM | 0.13
A1 | PEM | 0.01
D1 | PEM | 0.04
E1 | PEM | 0.03
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
WETLANDS
STREAMS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/15/17.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP - SHEET 5
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 12/5/2017
CHECKED BY BWA 12/5/2017
APPROVED BY BAH 12/5/2017
Project No. B16-454-1413
DRAWING NO. B16-454-E22



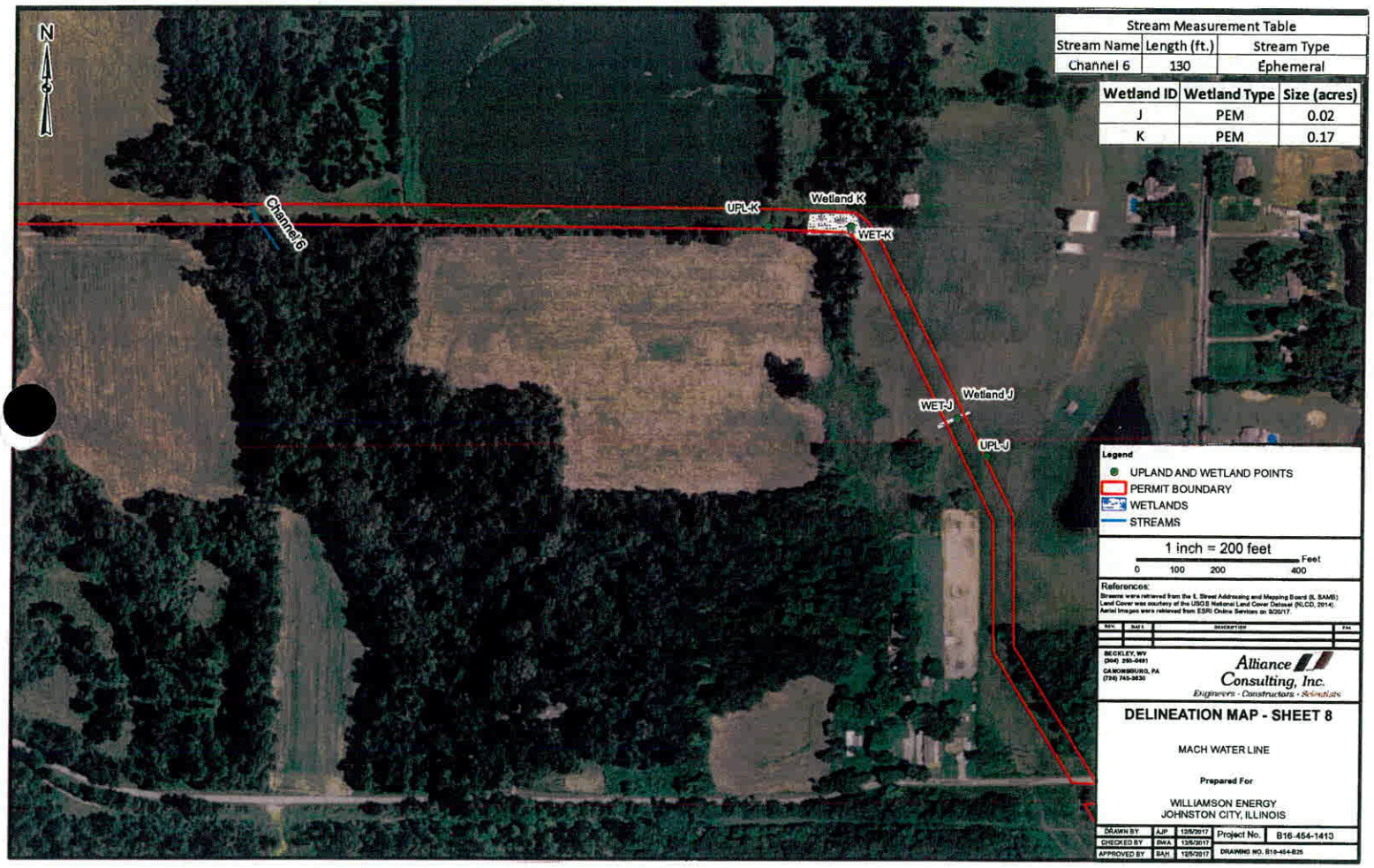
Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 17	183	Intermittent
Channel 18	97	Intermittent

Wetland ID	Wetland Type	Size (acres)
B1	PFO/PEM	1.54
C1	PEM	0.05



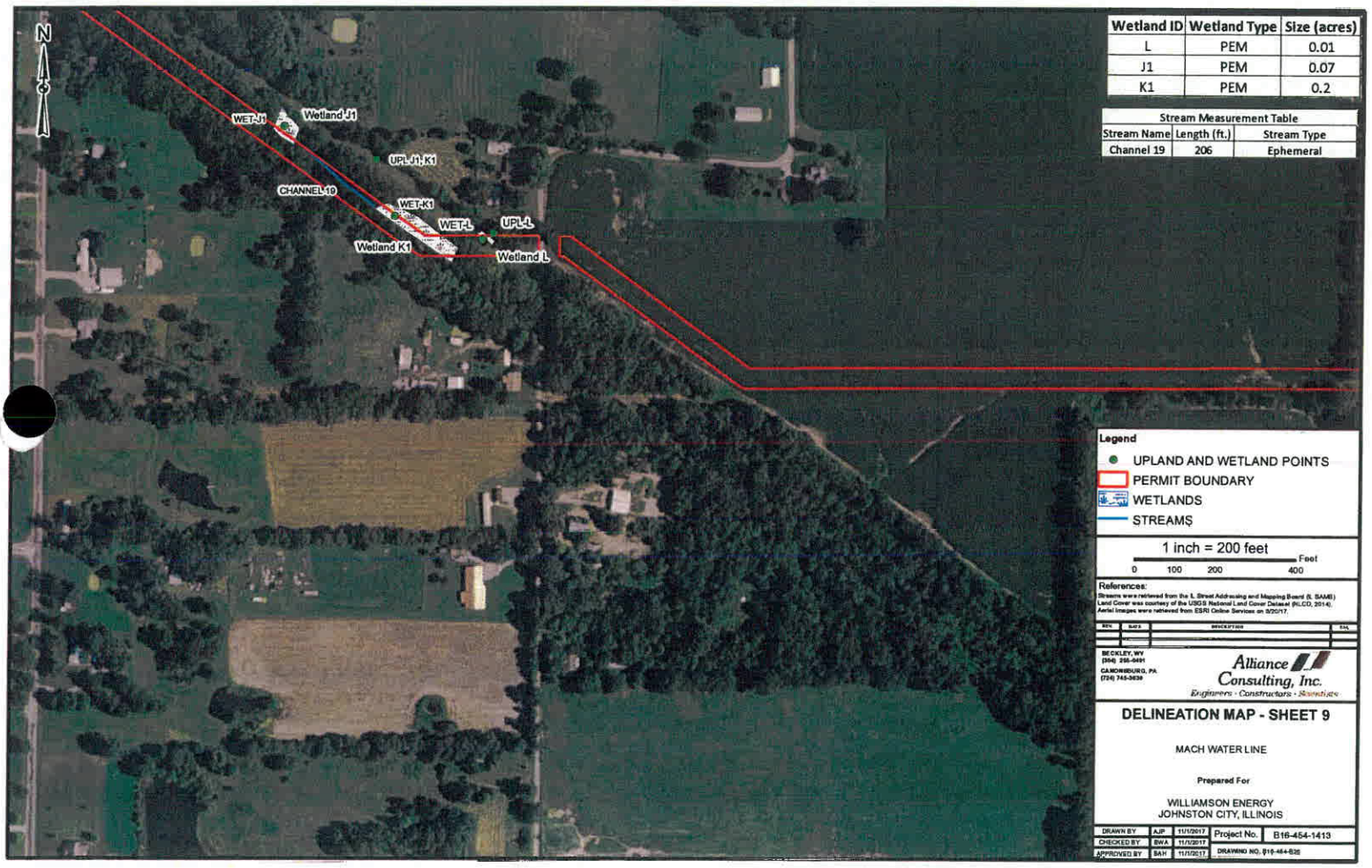
Wetland ID	Wetland Type	Size (acres)
I	PEM	0.11

Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 25	180	Intermittent



Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 6	130	Ephemeral

Wetland ID	Wetland Type	Size (acres)
J	PEM	0.02
K	PEM	0.17



Wetland ID	Wetland Type	Size (acres)
L	PEM	0.01
J1	PEM	0.07
K1	PEM	0.2

Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 19	206	Ephemeral

Legend
- UPLAND AND WETLAND POINTS
- PERMIT BOUNDARY
- WETLANDS
- STREAMS

1 inch = 200 feet
0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial images were retrieved from ESRI Online Services on 9/20/17.

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3636
Alliance Consulting, Inc.
Engineers · Constructors · Scientists

DELINEATION MAP - SHEET 9

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	11/1/2017	Project No.	B16-454-1413
CHECKED BY	BWA	11/1/2017		
APPROVED BY	SAH	11/1/2017	DRAWING NO. B16-454-B26	



Wetland ID	Wetland Type	Size (acres)
M	PFO/PEM	0.24
G1	PEM	0.15
H1	PEM	0.27
I1	PEM	0.008

Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 20	66	Ephemeral
Channel 21	618	Intermittent
Channel 22	100	Intermittent
Channel 23	802	Intermittent
Channel 24	421	Intermittent

Legend
- UPLAND AND WETLAND POINTS
- PERMIT BOUNDARY
- WETLANDS
- STREAMS
- CULVERT EGRESS
- CULVERT INGRESS

1 inch = 200 feet
0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 9/20/17.

NO.	DATE	DESCRIPTION	PM

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630

Alliance Consulting, Inc.
Engineers · Constructors · Specialists

DELINEATION MAP - SHEET 10

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	12/15/2017	Project No.	B16-464-1413
CHECKED BY	BWA	12/18/2017		
APPROVED BY	BAH	12/18/2017	DRAWING NO. B16-464-E27	



Wetland ID	Wetland Type	Size (acres)
N	PEM	0.05
O	PEM	0.03

Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 26	97	Intermittent

Legend
- UPLAND AND WETLAND POINTS
- WETLANDS
- PERMIT BOUNDARY
- STREAMS
- CULVERT EGRESS
- CULVERT INRESS

1 inch = 200 feet

0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial images were retrieved from ESRI Online Services on 3/20/17.

KEY	Date	DESCRIPTION	Y/A

BECKLEY, WV (304) 256-0691
CANONSBURG, PA (724) 745-3939

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

DELINEATION MAP - SHEET 11

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	1/12/2018	Project No.	B16-454-1413
CHECKED BY	BMA	1/12/2018		
APPROVED BY	BAH	1/12/2018	DRAWING NO. B16-454-B26	


N
Channel 9
Channel 8
Channel 7
Stream Measurement Table
Stream Name | Length (ft.) | Stream Type
Channel 7 | 238 | Intermittent
Channel 8 | 254 | Intermittent
Channel 9 | 166 | Intermittent
Legend
PERMIT BOUNDARY
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/20/17.
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP - SHEET 12
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017
Project No. B16-454-1413
DRAWING NO. B16-454-B39



Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 10	95	Ephemeral

Legend

- PERMIT BOUNDARY
- STREAMS
- WETLANDS
- CULVERT EGRESS
- CULVERT INGRESS

1 inch = 200 feet

0 100 200 400 Feet

References:

Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/20/17.

BEN	DATE	DESCRIPTION	PAR

BECKLEY, WV
(304) 255-8491
CANONSBURG, PA
(724) 745-3630

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

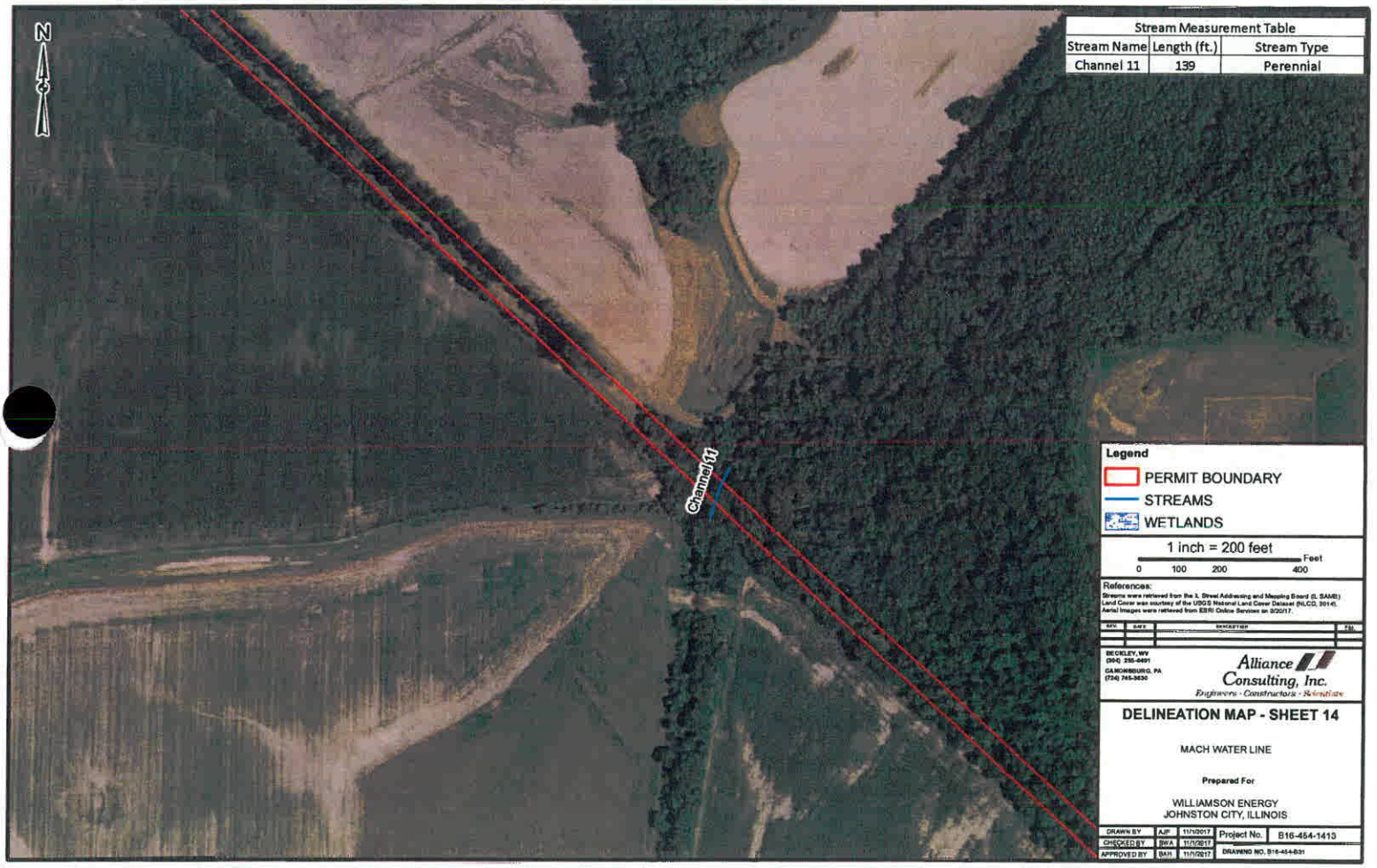
DELINEATION MAP - SHEET 13

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	12/14/2017	Project No.	B16-454-1413
CHECKED BY	BWA	12/18/2017		
APPROVED BY	BAH	12/18/2017	DRAWING NO. B16-454-B30	



Stream Measurement Table		
Stream Name	Length (ft.)	Stream Type
Channel 11	139	Perennial

Legend

- PERMIT BOUNDARY
- STREAMS
- WETLANDS

1 inch = 200 feet

0 100 200 400 Feet

References:

Streams were retrieved from the U. Street Addressing and Mapping Board (E. SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 9/2017.

REV.	DATE	DESCRIPTION	PM

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

DELINEATION MAP - SHEET 14

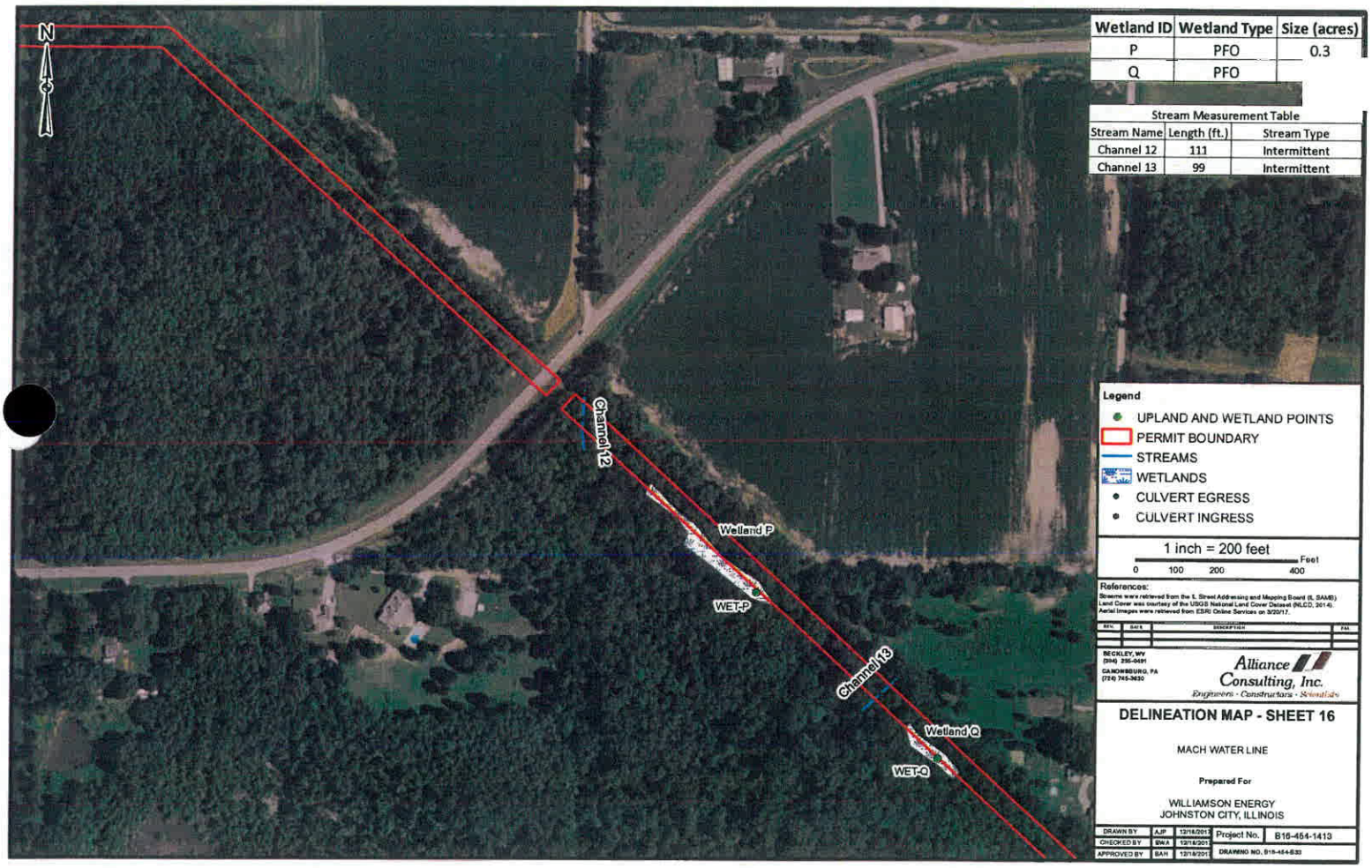
MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJF	11/1/2017	Project No.	B16-454-1413
CHECKED BY	BKA	11/1/2017		
APPROVED BY	BAR	11/1/2017	DRAWING NO. B16-454-B31	


N
Legend
PERMIT BOUNDARY
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014)
Aerial Images were retrieved from ESRI Online Services on 9/20/17.
REV. DATE DESCRIPTION PM
BECKLEY, WV
(304) 255-0491
OAKMONSBURG, PA
(724) 745-3633
Alliance Consulting, Inc.
Engineers · Constructors · Specialists
DELINEATION MAP- SHEET 15
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017 Project No. B18-454-1413
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017 DRAWING NO. B18-454-D02



Wetland ID	Wetland Type	Size (acres)
P	PFO	0.3
Q	PFO	

Stream Measurement Table

Stream Name	Length (ft.)	Stream Type
Channel 12	111	Intermittent
Channel 13	99	Intermittent

Legend

- UPLAND AND WETLAND POINTS
- PERMIT BOUNDARY
- STREAMS
- WETLANDS
- CULVERT EGRESS
- CULVERT INGRESS

1 inch = 200 feet

0 100 200 400 Feet

References:

Streams were retrieved from the U. Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2011). Aerial images were retrieved from ESRI Online Services on 3/20/17.

REV.	DATE	DESCRIPTION	PM

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

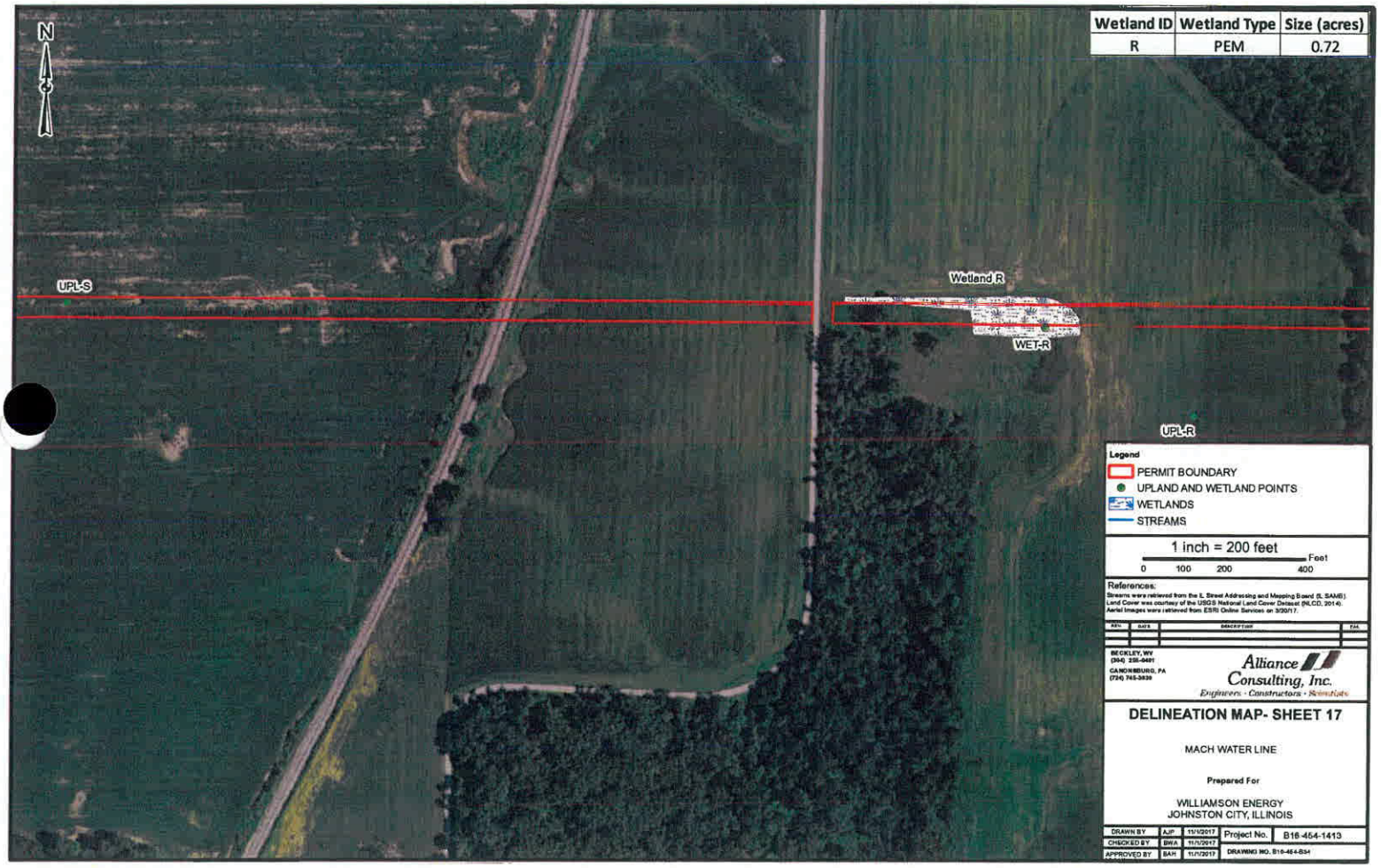
DELINEATION MAP - SHEET 16

MACH WATER LINE

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	12/18/2017	Project No.	B16-454-1413
CHECKED BY	BWA	12/18/2017		
APPROVED BY	BAH	12/18/2017	DRAWING NO.	B16-454-E32



Wetland ID	Wetland Type	Size (acres)
R	PEM	0.72

Legend
- PERMIT BOUNDARY
- UPLAND AND WETLAND POINTS
- WETLANDS
- STREAMS

1 inch = 200 feet

0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB). Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014). Aerial Images were retrieved from ESRI Online Services on 3/30/17.

REV.	DATE	DESCRIPTION	PM

BECKLEY, WV
(304) 255-0401
CANONSBURG, PA
(724) 743-3939

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

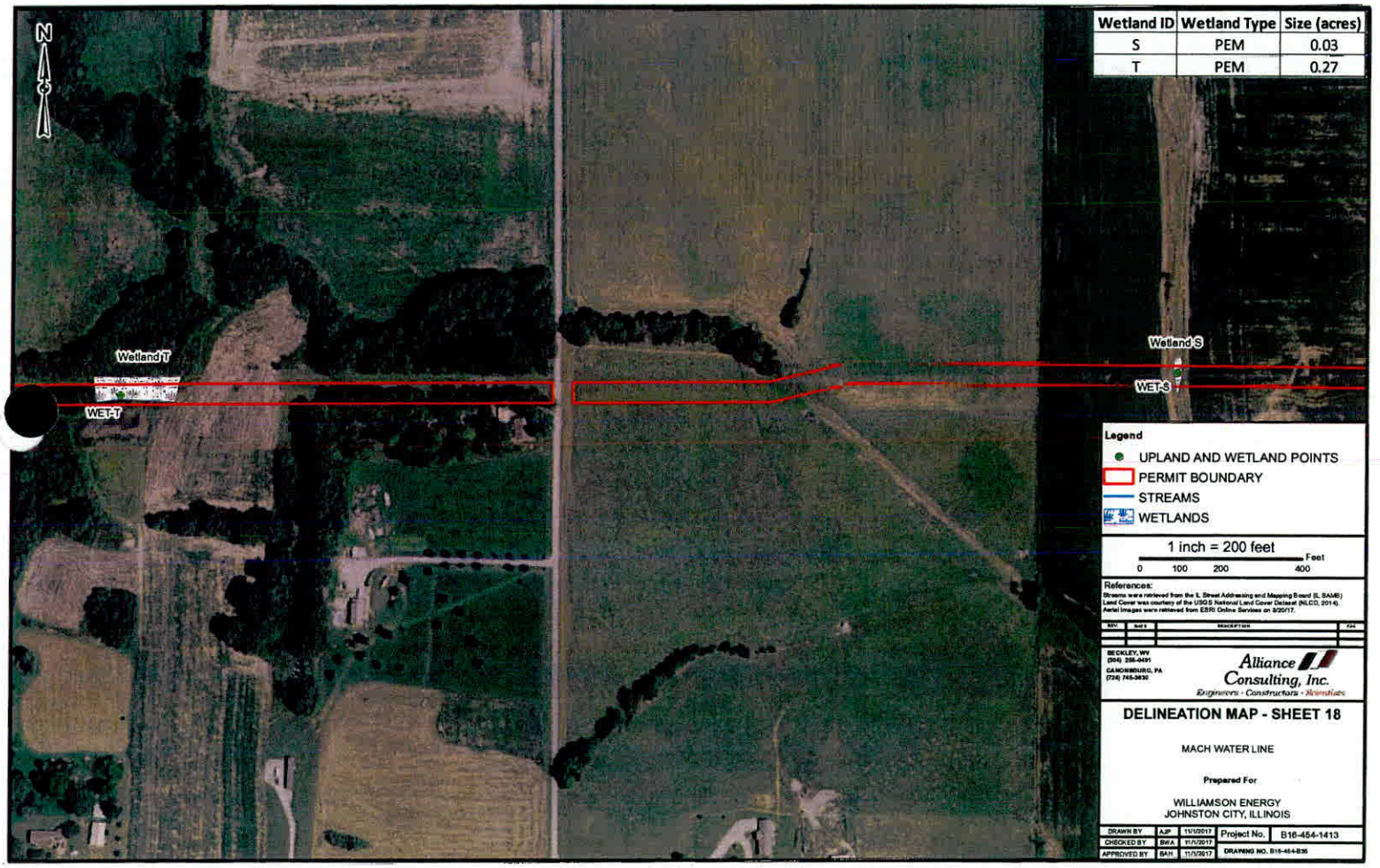
DELINEATION MAP- SHEET 17

MACH WATER LINE

Prepared For

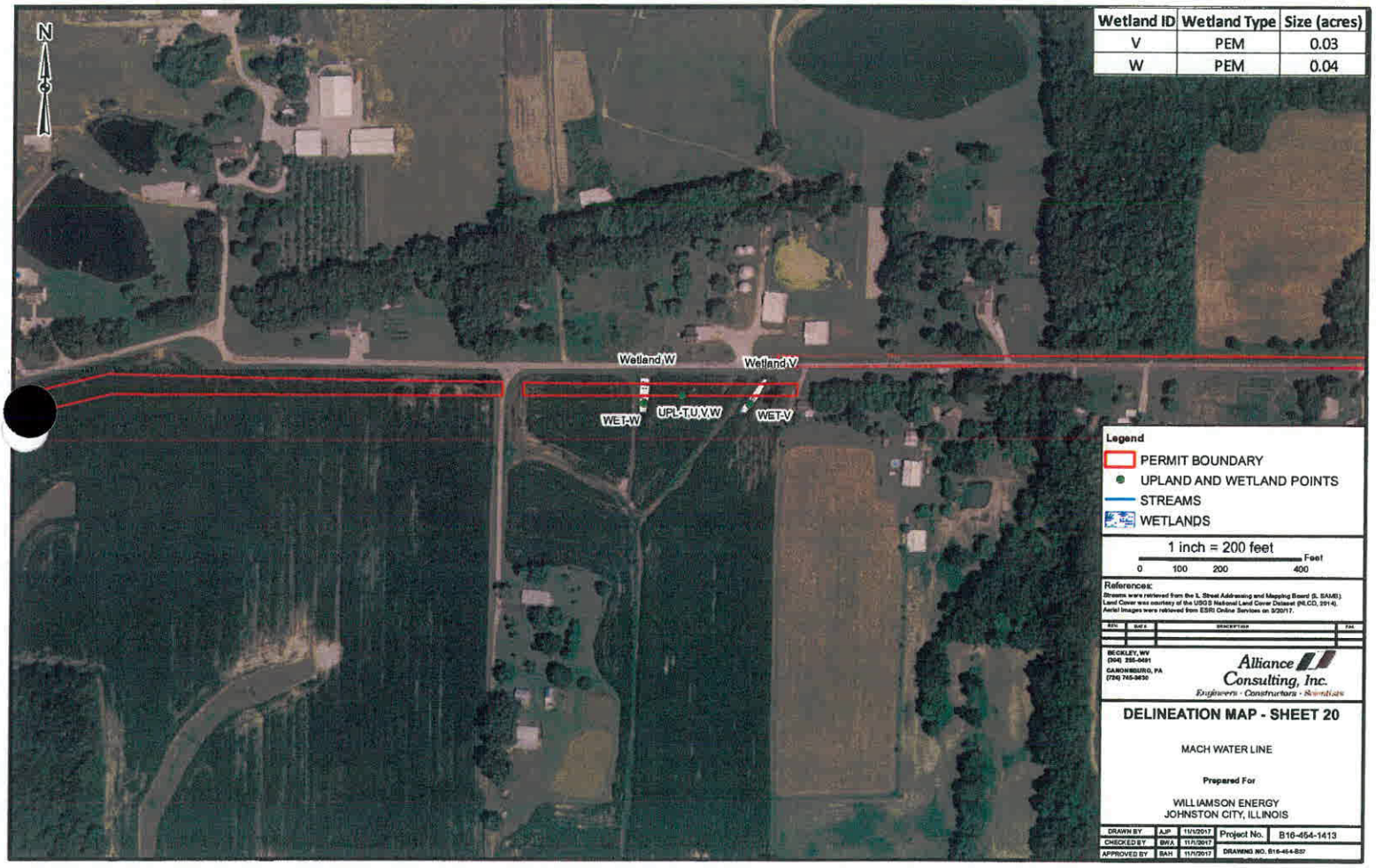
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

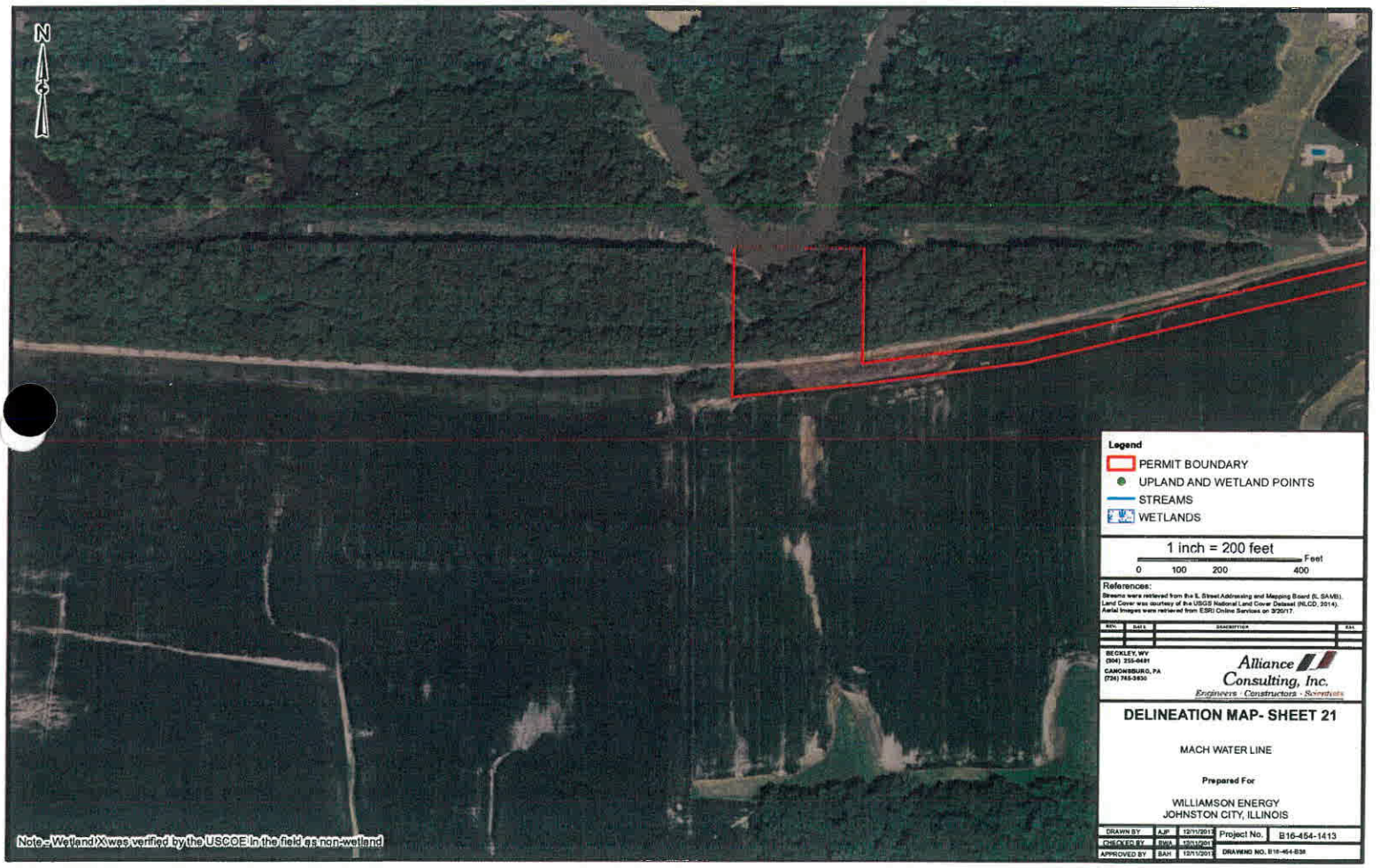
DRAWN BY	AJP	11/1/2017	Project No.	B16-454-1413
CHECKED BY	BWA	11/1/2017		
APPROVED BY	BAH	11/1/2017	DRAWING NO. B16-454-BS4	



Wetland ID	Wetland Type	Size (acres)
S	PEM	0.03
T	PEM	0.27


N
Wetland U
WET-U
Wetland ID | Wetland Type | Size (acres)
U | PEM/PFO | 0.11
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP- SHEET 19
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
Project No. B16-454-1413


N
Wetland W
Wetland V
WET-W
UPL-T,U,V,W
WET-V
Wetland ID | Wetland Type | Size (acres)
V | PEM | 0.03
W | PEM | 0.04
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
STREAMS
WETLANDS
1 inch = 200 feet
0 100 200 400 Feet
References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB)
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 9/20/17.
NO. DATE DESCRIPTION BY
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP - SHEET 20
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 11/1/2017 Project No. B16-454-1413
CHECKED BY BWA 11/1/2017
APPROVED BY BAH 11/1/2017 DRAWING NO. B16-454-BS7


N
Note - Wetland X was verified by the USCOE in the field as non-wetland
Legend
PERMIT BOUNDARY
UPLAND AND WETLAND POINTS
STREAMS
WETLANDS
1 inch = 200 feet
Feet
0
100
200
400
References:
Streams were retrieved from the E. Street Addressing and Mapping Board (E. SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2011).
Aerial Images were retrieved from ESRI Online Services on 3/20/17.
REV.
DATE
DESCRIPTION
BY
BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
DELINEATION MAP- SHEET 21
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
AJP
12/11/2017
Project No.
B16-454-1413
CHECKED BY
RWA
12/11/2017
APPROVED BY
BAH
12/11/2017
DRAWING NO. B16-454-B38

PART II ATTACHMENT II.10
CULTURAL, ARCHEOLOGICAL AND HISTORICAL RESOURCES REPORT

Approximately two-thirds of the proposed permit area is within multiple archaeological survey project areas.

Phase I cultural resources survey for Steelhead Development Corporation (predecessor to Williamson Energy, LLC) was conducted between June 14, 2004 and August 17, 2004. The location of the Fry Farmstead Site and Cemetery was listed during this survey and the location of the cemetery is shown on the Hydrology – Mining Operations Map (Drawing No. B17-222-M13). The Phase II cultural resources survey for the Fry Farmstead Site (11WM150) was conducted on May 10 – 17, 2005.

A Phase I cultural resources survey for Illinois Methane, LLC was conducted on February 1, 2, and 5, 2001. The project area extended from the storage facility located near Thorn Road (T8S, R4E, Section 8), west through the old Zeigler No. 6 mine site, along an abandoned railroad grade and north towards the community of Pershing, IL. The project area was approximately 12.3 miles and 30 acres through Franklin and Williamson counties. Project clearance was recommended for the installation of the pipeline.

A consultant has been contacted to conduct a cultural resources survey on the remaining one-third of the proposed Water Management Pipeline project area and to verify the previous surveys are valid. The Cultural, Archeological and Historical Resources Report(s) has been provided to the State Historic Preservation Agency.

A copy of the Phase I survey and the Concurrence Letter is attached.

RECEIVED
JUN 26 2017
011062617
PRESERVATION SERVICES

ILLINOIS
NATURAL RESOURCES

Illinois Department of **Natural Resources**

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

IHPA REVIEW
H/A
AC Concur
AR
File VA/FANK
6/29/17

June 23, 2017

2 COPIES RCVD & CD

Rachel Leibowitz, Ph.D.
Preservation Services Division Manager
Illinois Historic Preservation Agency
1 Old State Capitol Plaza
Springfield, IL 62701

Dear Dr. Leibowitz:

Pursuant to the requirements of the Programmatic Agreement between the Illinois Historic Preservation Agency (IHPA) and the Illinois Department of Natural Resources (IDNR) concerning mining, please review the enclosed Archaeological Survey Report.

PROJECT: Williamson Energy, LLC waterline, starting 1.75 miles south of Zeigler, IL, ending 1.75 miles east of Johnston City, IL (DNR Permit application #456)
STREET ADDRESSES: starting 1000ft. west of 7059 Lake Creek Rd., (P.O. West Frankfort) the line runs east to about 1000 ft. west of the intersection of Presley Ln and Freeman Rd., then southeast to near 16688 Duncan Road (P.O. Johnston City), then east ¾ miles cross-country, then southeast to the intersection of Eberhardt and Old Frankfort Rds, then east to endpoint at 16468 Liberty School Rd., Johnston City, IL
COUNTY: Franklin and Williamson Counties CONSULTANT: ARG (Titus)

The Phase One archaeological reconnaissance of **72 acres** has located two sites, **11FK301 and 11WM402,** which are recommended as not eligible for listing to the National Register of Historic Places. The project does not affect the cemetery at site 11FK150. No other previously reported sites were relocated within the project area.

In accordance with the established procedures for coordination of Illinois Department of Natural Resources projects, IDNR requests Illinois Historic Preservation Agency concurrence in the determination that the project has no effect to any Historic Property.

If no reply is received from IHPA within 45 days, IDNR will conclude, as per the Programmatic Agreement, this application is approved and will proceed with the undertaking.

Sincerely,

Dawn E. Cobb

Dawn E. Cobb
Archaeologist
Office of Realty and Environmental Planning

CONCUR
By: Rachel Leibowitz
Deputy State Historic Preservation Officer
Date: 7-12-17

DC:mbs
(2 hard copies of report, 1 CD)

Printed On Recycled Paper

American Resources Group Ltd.
Cultural Resource Management
est. A.D. 1979

June 9, 2017

Dawn Cobb
Archaeologist
Office of Realty and Environmental Planning
Illinois Department of Natural Resources
One Natural Resource Way
Springfield, IL 62702

RE: Archaeological Survey Short Report: *Phase I Cultural Resources Survey and Assessment of a Proposed Waterline Project for Williamson Energy, LLC, Williamson County, Illinois* (ARG CRM 1981).

Dear Ms. Cobb:

Enclosed please find three hard copies and one electronic copy (pdf) on CD of the above short report. If you have any questions, please give us a call.

Sincerely,

Cally Lence
Project Manager

Enclosures

Copy: Mr. James Plumley, Williamson Energy, LLC

www.argltd.com • 127 N. Washington • Carbondale IL 62901
Phone 618-529-2741 • Fax 618-457-5070 • archaeology@argltd.com

ARCHAEOLOGICAL SURVEY SHORT REPORT **Reviewer:**
Illinois Historic Preservation Agency **Date:**
1 Old State Capitol Plaza, Springfield, Illinois 62701-1507 **Accept:** **Reject:**
(217) 782-4836

IHPA Log Number:

LOCATIONAL INFORMATION AND SURVEY CONDITIONS:

County: Williamson and Franklin **Quadrangle:** Christopher, Illinois 7.5'; West Frankfort, Illinois 7.5'; Pittsburg, Illinois 7.5'; Johnston City, Illinois 7.5'
Project Type/Title: Phase I Cultural Resources Survey and Assessment of a Proposed Waterline Project for Williamson Energy, LLC, Williamson County, Illinois (ARG CRM 1981).
Funding and/or Permitting Federal/State Agencies: Illinois DNR and U.S. Army Corps of Engineers

Legal Location: **Section:** 27, 28, 29, 31, 32, 33, 34, 35 **Township:** 7S **Range:** 2E
Section: 1, 2, 12 **Township:** 8S **Range:** 2E
Section: 7, 8, 9, 11, 14, 15, 16, 17 **Township:** 8S **Range:** 3E
UTM Coordinates: **West End UTM North:** 4193974 **UTM East:** 321426
East End UTM North: 4189079 **UTM East:** 338450

Location: The western end of the project corridor, which begins at the proposed location of the associated pump station, is situated about 1.75 miles (2.8 km) southeast of Zeigler. The project corridor then proceeds to head east to within approximately .7 mile (1.1 km) west of Pershing before heading southeast toward the northeastern outskirts of Johnston City; at this point, it heads east, terminating at a point located approximately 1.75 miles (2.8 km) east of Johnston City.
Project Description: Phase I archaeological survey of a proposed waterline and associated pump station for Williamson Energy, LLC.
Topography: Low-lying uplands, terrace, drainages
Elevation (' AMSL): 380'-545'
Soils: Ava-Bluford-Wynoose (University of Illinois 1966)
Drainage: Unnamed intermittent, Lake Creek, Pond Creek, Big Muddy River, Mississippi River.
Land Use/Ground Cover (include % visibility): The smallest percentage of the project corridor was planted in immature crops (85% ground surface visbility), followed by woods (0% ground surface visibility), hayfields (0% ground surface visibility) and grass (0% ground surface visbility). A large portion of the project corridor (approximately 50%) was abandoned railroad grade (0% ground surface visibility).
Survey Limitations: The Big Muddy River bank, the occasional creek bed and banks, and the railroad grades, were visually inspected. The railroad grade has been built up, on average, a height of 7 feet above the natural ground surface.

ARCHAEOLOGICAL AND HISTORICAL INFORMATION:

Historic Plats/Atlases/Sources: Illinois Inventory of Archaeological Sites; IHPA HARGIS database;
1807 GLO Plat Maps of Township 7 South, Range 2 East, Township 8 South, Range 2 East, and Township 8 South, Range 3 East (Illinois State Archives) (Attachment B, Figure B-1);
1876 Atlas of the State of Illinois (Warner and Beers) (Attachment B, Figure B-2);
1900 Map of Franklin County, Illinois (Guy Beauman) (Attachment B, Figure B-3);
1918 Standard Atlas of Franklin County, Illinois (Sims and Sons, Publishers) (Attachment B, Figure B-4),
1908 Standard Atlas of Williamson County, Illinois (George A. Ogle and Company) (Attachment B, Figure B-5);
1939 Williamson County Plat Map (W.W. Hixson) (Attachment B, Figure B-6);
1937? Plat Books of Franklin and Hamilton Counties, Illinois (W.W. Hixson) (Attachment B, Figure B-7);
1951? Franklin County Plat Book, Illinois (Dudley Darrell) (Attachment B, Figure B-8);
1909 USGS West Frankfort, Illinois, and 1910 Herrin, Illinois, 15-minute series topographic quadrangles (Attachment B, Figure B-9);

Previously Reported Sites: Within or adjacent to project area: 11WM145, 11WM150, 11WM151, 11WM152, 11FK200, 11FK201, 11FK202

Previously recorded sites 11WM145, 11WM151, and 11WM152 had previously been evaluated as ineligible for NRHP listing. Site 11WM145 is a very small, low density lithic scatter that was recorded in 1981; it was not relocated during the subsequent 2005 survey (Ensor et al. 2005; Vander Leest 1981). Site 11WM151 was recorded in 1981 as an ineligible historic site; the site was revisited in 2005 but was not relocated at that time (Ensor et al. 2005; Vander Leest 1981). Site 11WM152 is a late nineteenth- to early twentieth-century farmstead first recorded in 1981 and revisited in 2005; the site was evaluated as ineligible during both surveys (Ensor et al. 2005; Vander Leest 1981).

Sites 11FK200, 11FK201, and 11FK202 were recorded in 2001 during a linear survey for a methane pipeline (Shah 2001). Each is a prehistoric lithic scatter identified along the edges of an abandoned rail grade near Pond Creek. The sites were evaluated as potentially eligible outside the 2001 survey corridor. Though these sites are located adjacent to the current project, the project is located within the railroad grade that was presumed to have destroyed portions of these sites when the railroad was constructed.

In 2005, ARG conducted a Phase II investigation at site 11WM150, a mid-nineteenth- to mid-twentieth century farmstead (Ensor and Lence 2005). A small family cemetery containing three to five children is located within the northern half of the site. Following the Phase II investigation, the site was evaluated as ineligible and project clearance was recommended, with the caveat that the cemetery be protected or moved to another location. The cemetery (Fry Cemetery) is still extant, but is located outside (~140 feet) the current project boundary on private land.

In 1-mile of project area: 11WM56, 58, 111, 112, 116-120, 130-137, 146, 149, 313, 333, 334, 337-339, 343, 363, 372-385; 11FK3, 31, 103, 215

Previous Surveys: Within project area: Paralleling and/or entirely covering project area: 11295 (Shah 2001), 14961 (Ensor et al. 2005); Phase II, site 11WM150 (Ensor and Lence 2005) (See Attachment A); Crossing project area perpendicularly: 99999 (I-57), 9296 (Penman 1998), 13930 (Witty 2003)

In 1-mile of project area: 669 (Vander Leest 1981); 3170 (McNerney 1990); 4650 (Simon 1992); 5025 (Rubach 1993); 11604 (Burrow and Aberle 2001); 12834 (Halpin 2002); 14963 (Stratton and Mansberger 2005); 15634 (Unknown-not in CRM Report Archive); 18933 (Anderson 2010); 19490 (Craig and Rein 2011); 20334 (Craig and Rein 2014)

Regional Archaeologist Contacted: None, consulted the Illinois Inventory of Archaeological Sites

Investigation Techniques: Systematic, screened shovel testing along transects spaced 15 m apart in grass, hay fields, and woods where visibility fell below 25 percent; systematic surface survey along transects spaced 5 m apart in the newly planted agricultural fields. The railroad grade was subject to systematic walkover survey along a single transect.

Time Expended: 53 Hours
Sites/Find Spots Located: 11FK301, 11WM402

Cultural Material: 1 fragment of brick and mortar (Site 11WM402); 35 fragments of early to mid-twentieth century glass, ceramic, and wire nails (Site 11FK301)
Collection Techniques: Total collection of all artifacts observed. **Curated At:** Illinois State Museum
Area Surveyed (acres and square meters): 72 acres; 291,373 square meters

RESULTS OF INVESTIGATIONS AND RECOMMENDATIONS: (check one)

_ **Phase I archaeological reconnaissance has located no archaeological material; project clearance is recommended.**

X **Phase I archaeological reconnaissance has located archaeological materials; site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.**

_ **Phase I archaeological reconnaissance has located archaeological materials; site(s) may meet requirements for National Register eligibility; further testing is recommended.**

_ **Phase II archaeological investigation has indicated that site(s) does(do) not meet requirements for National Register eligibility; project clearance is recommended.**

_ **Phase II archaeological investigation has indicated that site(s) meet requirements for National Register eligibility; formal report is pending and a determination of eligibility is recommended.**

Comments: Two small historic sites (11FK301 and 11WM402) were recorded in the course of the current investigation. The sites are evaluated as ineligible for NRHP listing. Project clearance is recommended. See Attachment C.

ARCHAEOLOGICAL CONTRACTOR INFORMATION:

Archaeological Contractor: American Resources Group, Ltd.
Address/Phone: 127 North Washington Street
Carbondale, Illinois 62901-1507 / (618) 529-2741

Surveyor(s): James Burrow, Bob Sadler, and John A. Schwegman **Survey Date(s):** May 24–25, 2017
Report Completed by: John A. Schwegman, Cally Lence, and Bob Sadler **Date:** June 6, 2017
Submitted by (signature and title): Steve Titus, Principal Investigator

ATTACHMENT CHECK LIST: (#1 through #4 are mandatory)

_x_ **1) Relevant portion of USGS 7.5' topographic quadrangle map(s) showing project location and any recorded site;**
_x_ **2) Project map(s) depicting survey limits and, when applicable, approximate site limits and concentrations of cultural materials;**
_x_ **3) Site form(s): (two copies of each form);**
_x_ **4) All relevant project correspondence;**
_x_ **5) Additional information sheets as necessary.**

Address of Owner/Agent/Agency To Whom SHPO Comment Should Be Mailed To:

Williamson Energy, LLC
16824 Liberty School Road
Marion, Illinois 62959

Contact Person: Mr. James Plumley
Telephone Number: (618) 969-8259

American Resources Group, Ltd.
127 North Washington Street
Carbondale, Illinois 62901-1507

Contact Person: Mr. Steve Titus
Telephone Number: (618) 529-2741

REVIEWERS COMMENTS:

This page intentionally blank

List of Attachments

Attachment A: Project Maps

Figure A-1. General location of the project area, Williamson and Franklin counties, Illinois.
Figure A-2. Topographic location of the a portion of the project area.
Figure A-3. Topographic location of the a portion of the project area.
Figure A-4. Topographic location of the a portion of the project area.
Figure A-5. Topographic location of the a portion of the project area.
Figure A-6. Site map, 11WM402.
Figure A-7. Site map, 11FK301.

Attachment B: Historic Maps

Figure B-1. Portion of the 1807 GLO Plat Maps of Township 7 South, Range 2 East, township 8 South, Range 2 East, and Township 8 South, Range 3 East, illustrating the project area (Illinois State Archives 2017).
Figure B-2. Portion of the 1876 Atlas of the State of Illinois illustrating the project area (Warner and Beers 1876).
Figure B-3. Portion of the 1900 Map of Franklin County, Illinois, illustrating the project area (Guy Beauman 1900).
Figure B-4. Portion of the 1918 Standard Atlas of Franklin County, Illinois, illustrating the project area (Sims and Sons Publishers 1918).
Figure B-5. Portion of the 1908 Standard Atlas of Williamson County, Illinois, illustrating the project area (George A. Ogle and Company 1908).
Figure B-6. Portion of the 1939? Plat Book of Williamson County, illustrating the project area (W.W. Hixson and Company 1939?).
Figure B-7. Portion of the 1937? Plat Books of Franklin and Hamilton Counties, illustrating the project area. (W.W. Hixson and Company 1937?).
Figure B-8. Portion of the 1951? Franklin County Plat Book, illustrating the project area (Dudley Darrell 1951?).
Figure B-9. Portion of the 1909 West Frankfort, and 1910 Herrin, Illinois, USGS 15' series topographic quadrangles illustrating the project area.

Attachment C: Comments and Site Description

Table C-1. Historic Artifact Inventory, Site 11FK301.

Attachment D: Project Photographs

Figure D-1. Headstone of Anna M. Dorthea Fry, Fry Cemetery, site 11WM150, view north.
Figure D-2. Headstone of Mary and Malinda Fry, Fry Cemetery, site 11WM150.
Figure D-3. View north from northern edge of project corridor toward Fry Cemetery (Bob Sadler in orange shirt is standing at cemetery), view north.
Figure D-4. Site 11WM402, cistern, view north-northwest.
Figure D-5. Site 11WM402 cistern interior.
Figure D-6. Site 11FK301 overview, view northeast.
Figure D-7. Northern edge of site 11FK301 at Big Muddy River, view northwest.

Attachment E: References Cited

Attachment F: Site Form

Attachment A

Project Maps

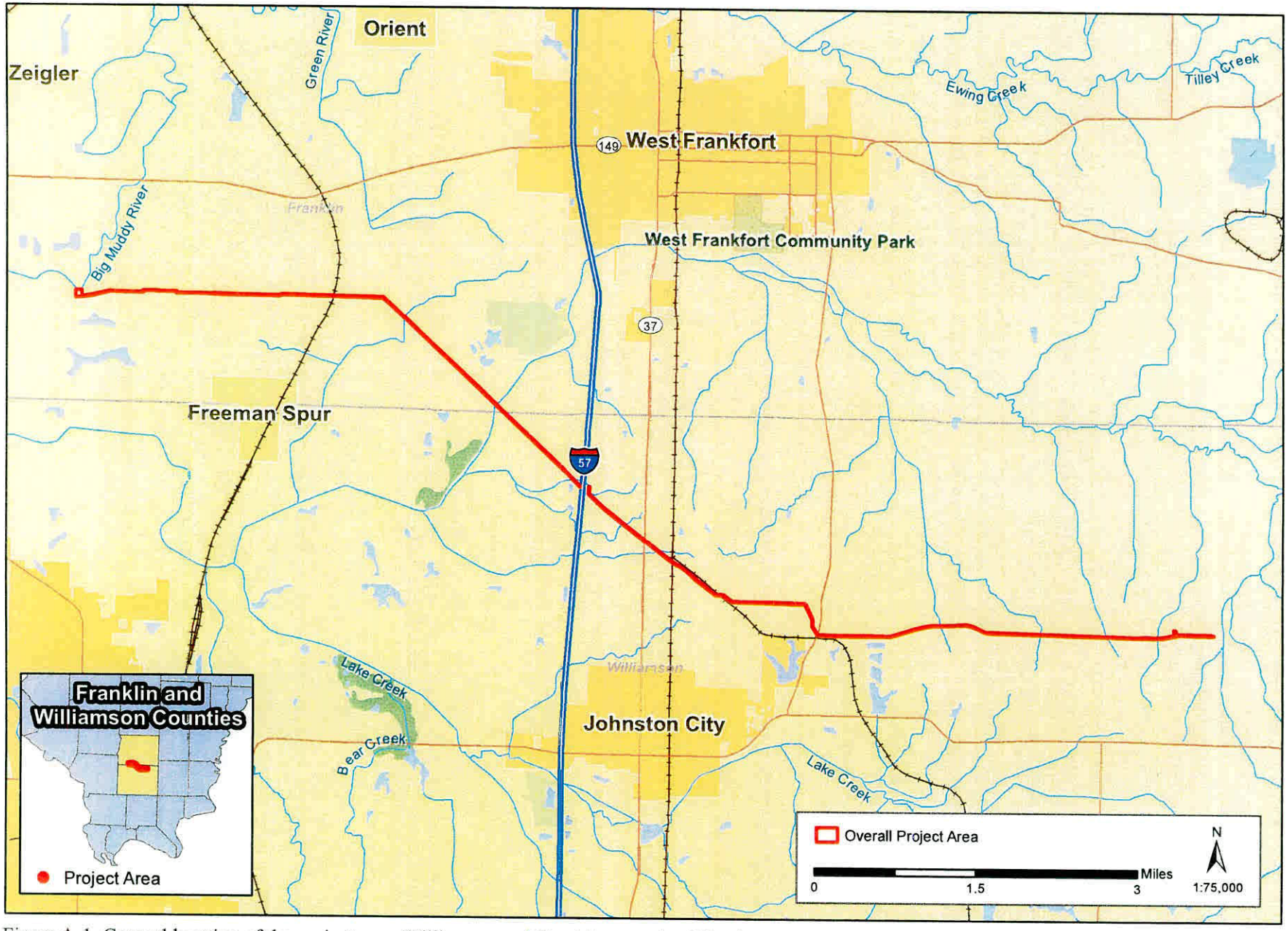


Figure A-1. General location of the project area, Williamson and Franklin counties, Illinois.

R07550

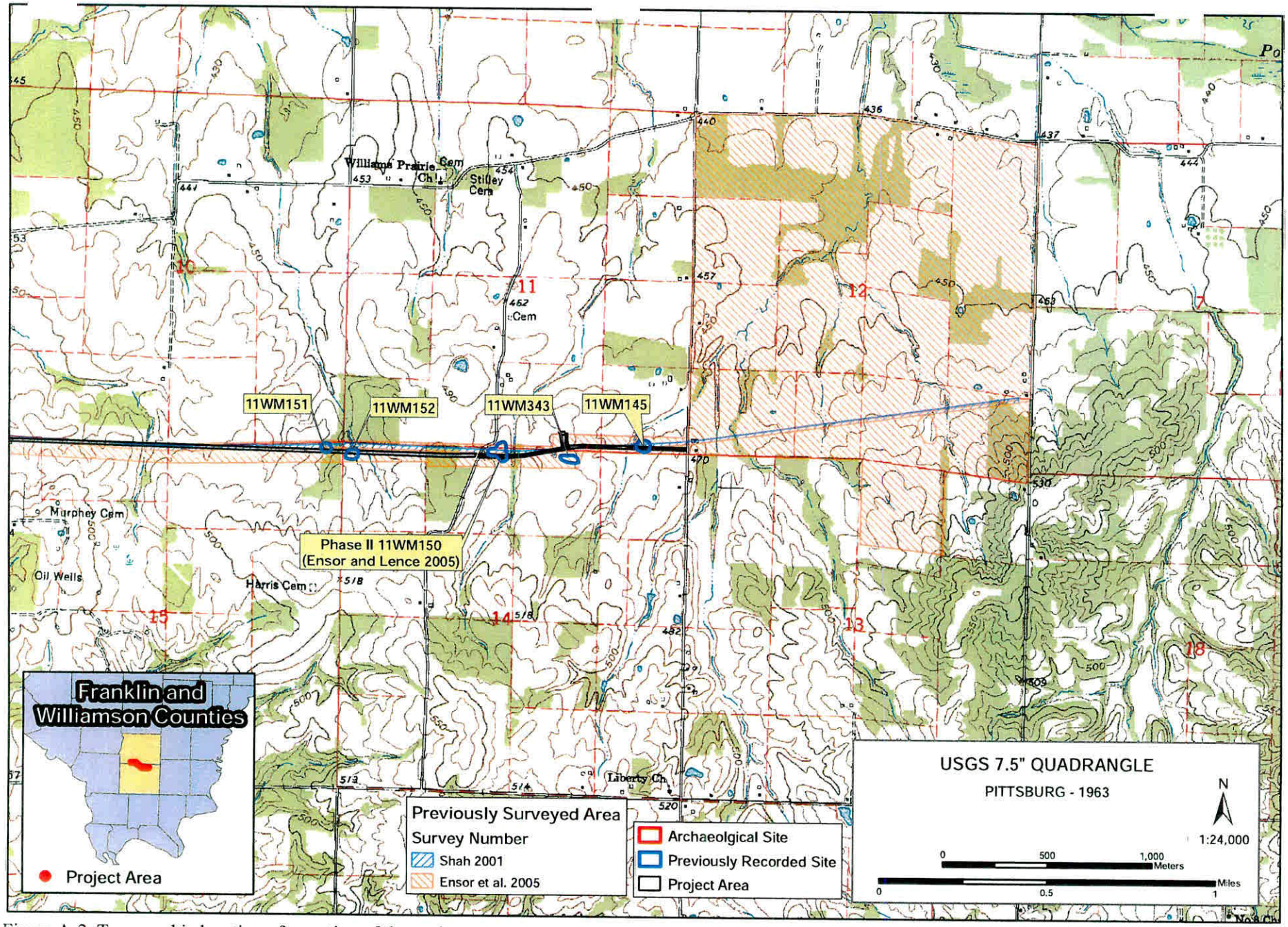


Figure A-2. Topographic location of a portion of the project area.

R07551

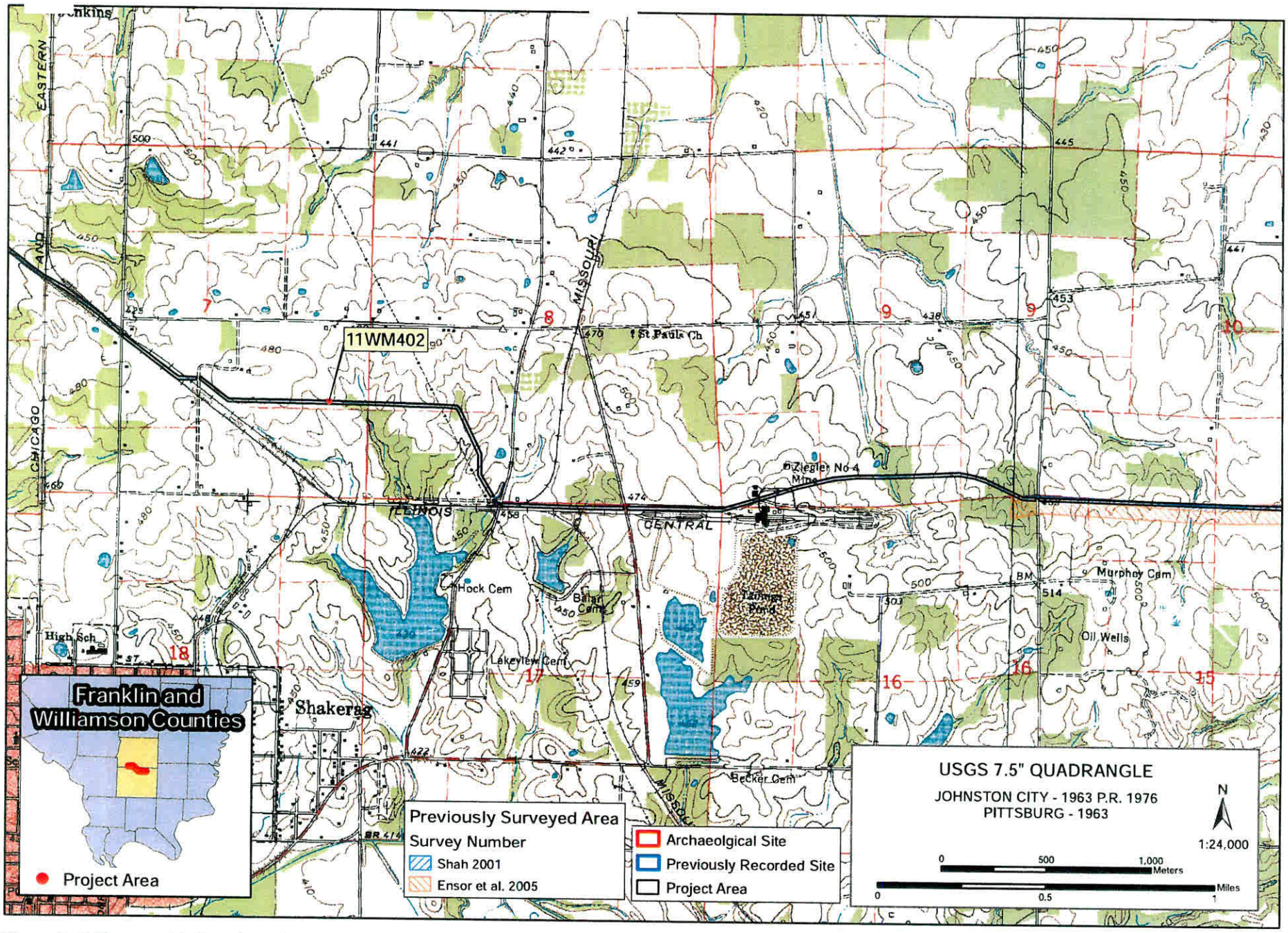


Figure A-3. Topographic location of a portion of the project area.

R07552

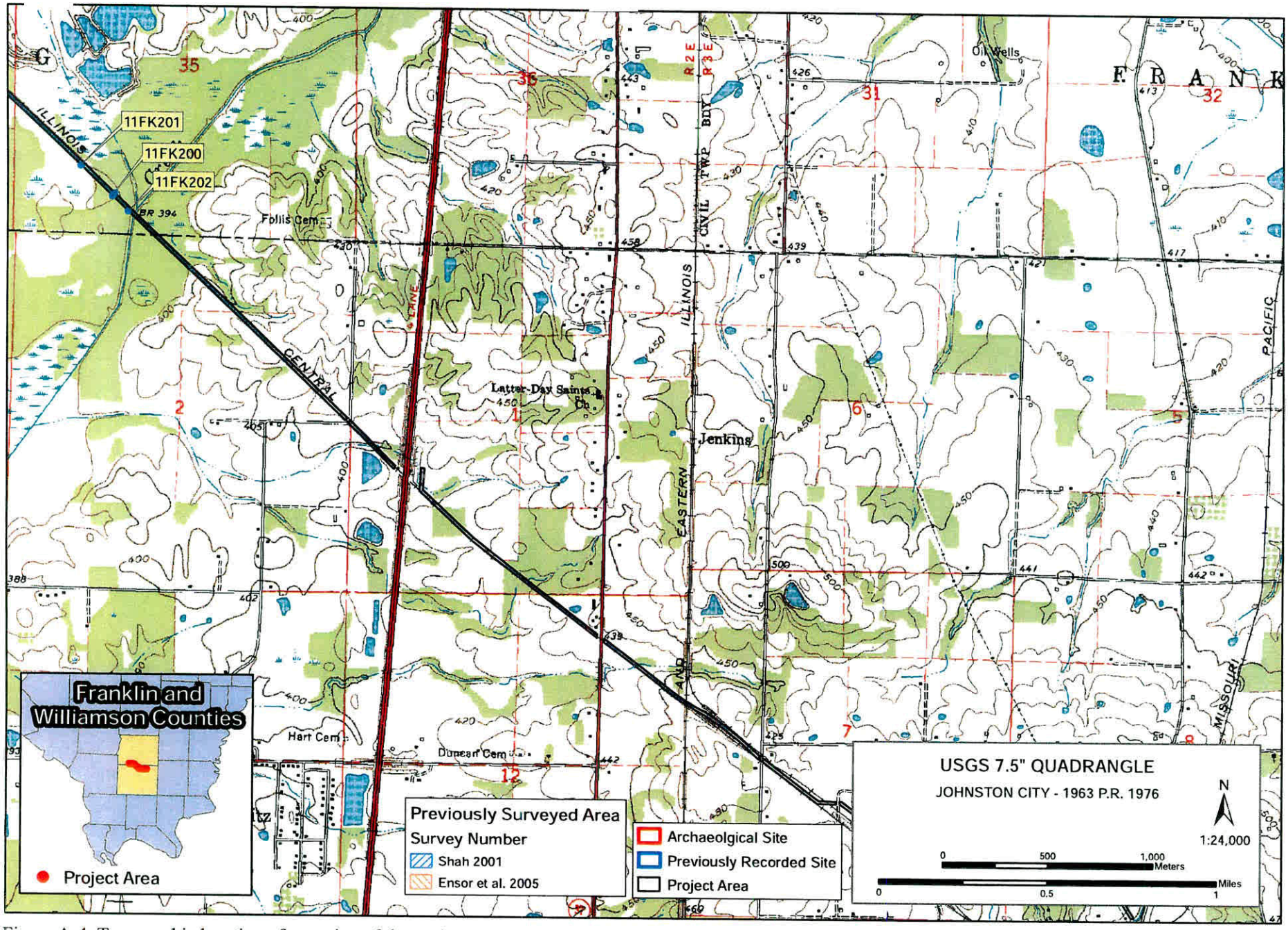


Figure A-4. Topographic location of a portion of the project area.

R07553

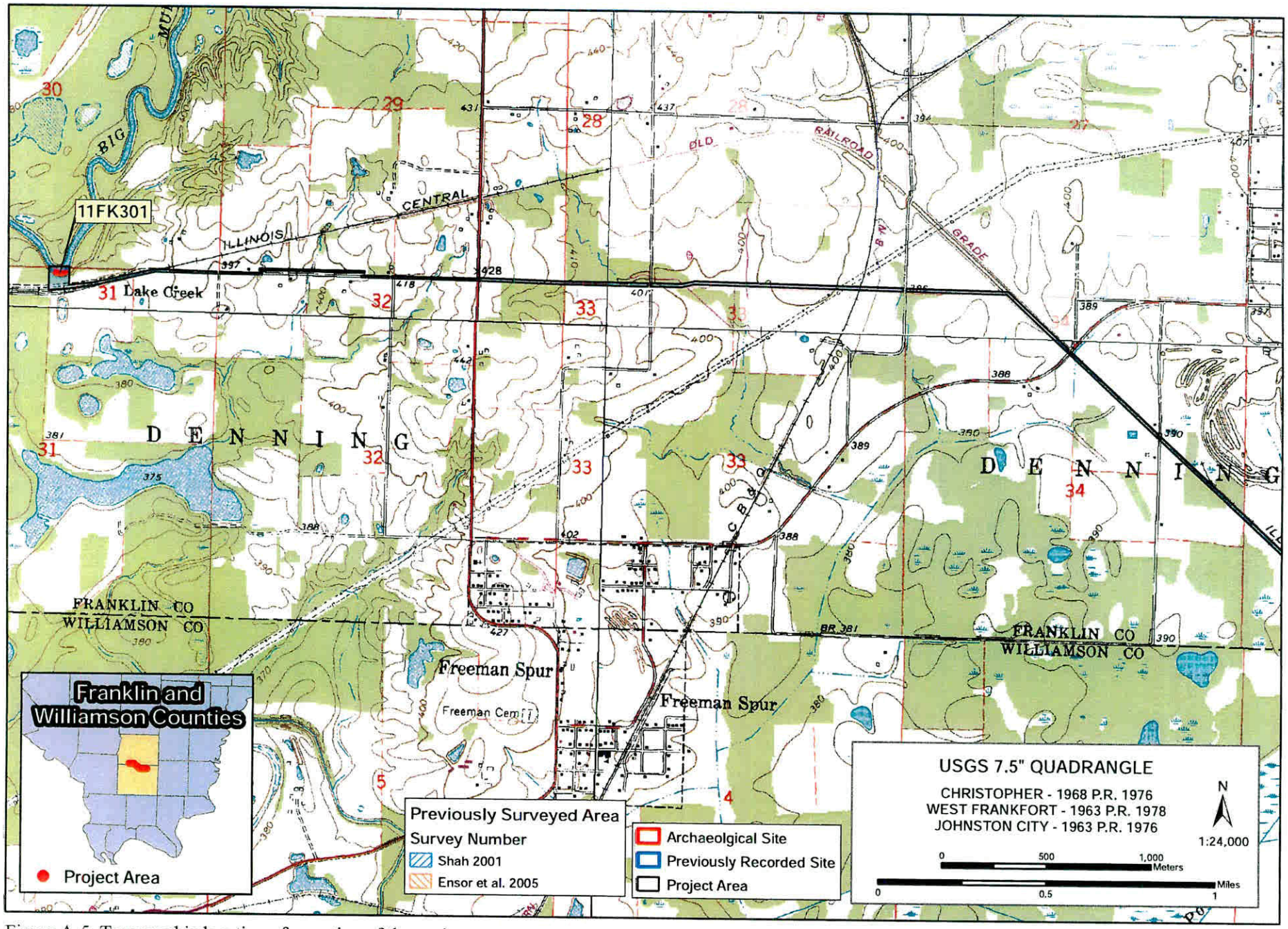


Figure A-5. Topographic location of a portion of the project area.

R07554

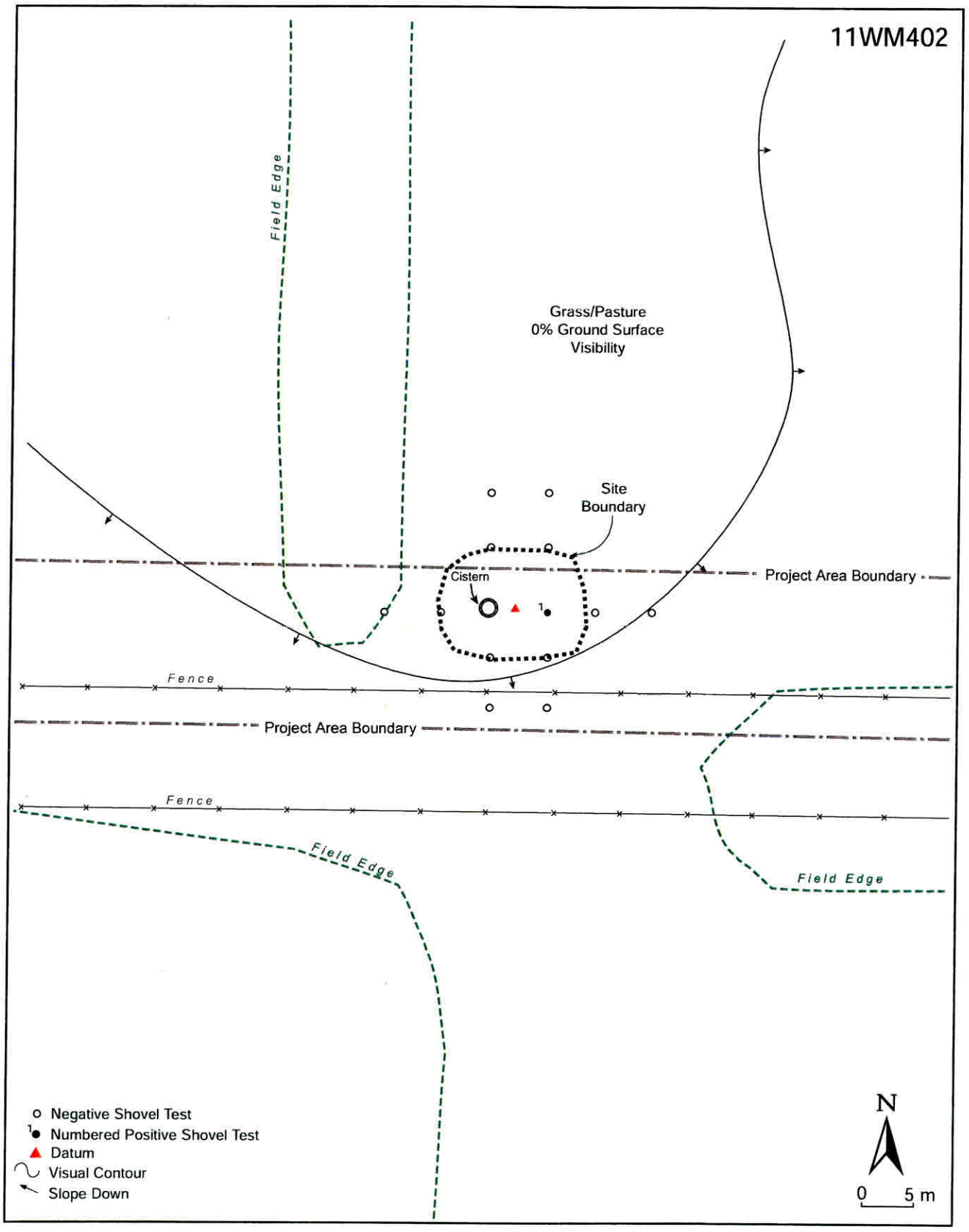


Figure A-6. Site map, 11WM402.

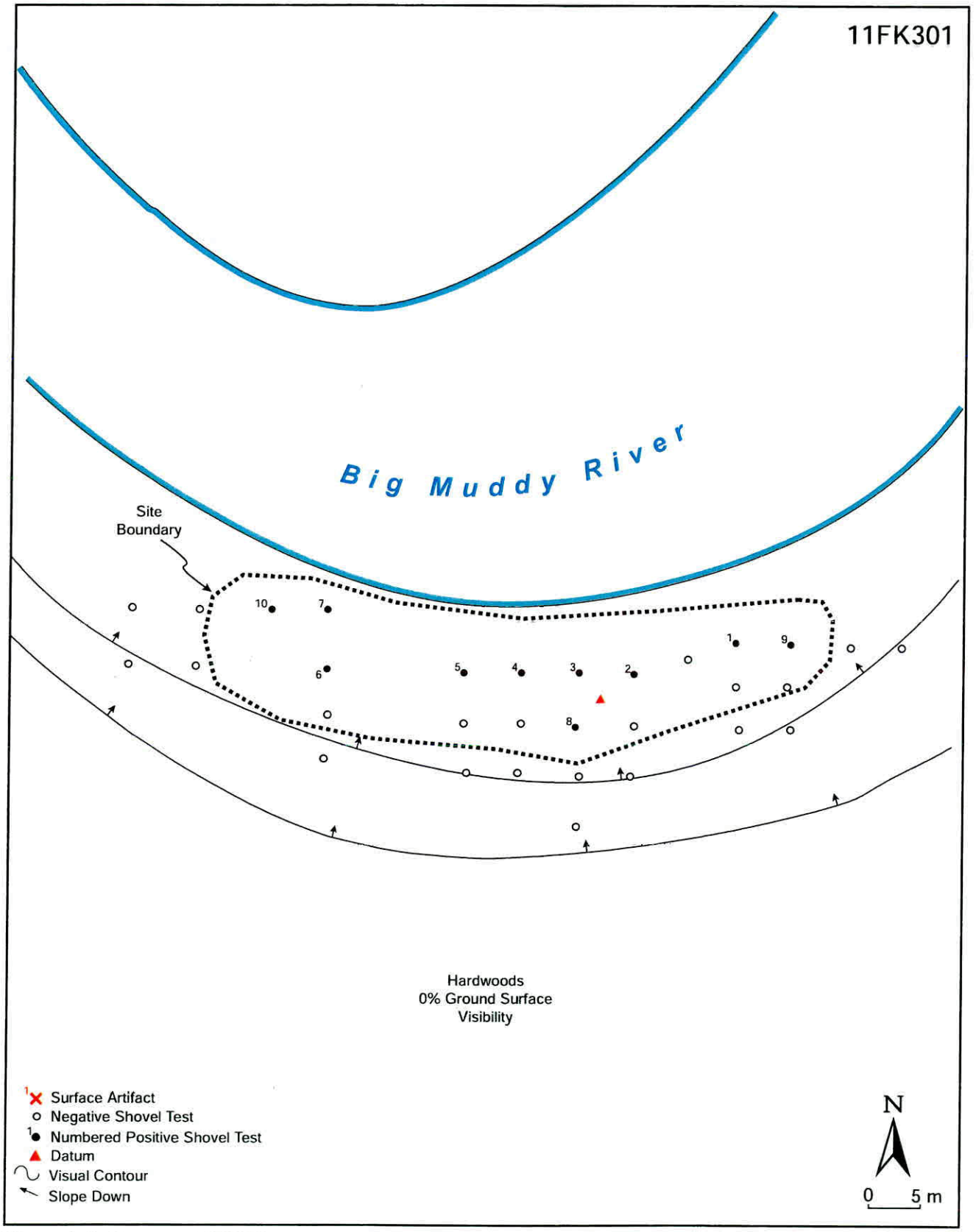


Figure A-7. Site map, 11FK301.

Attachment B

Historic Maps

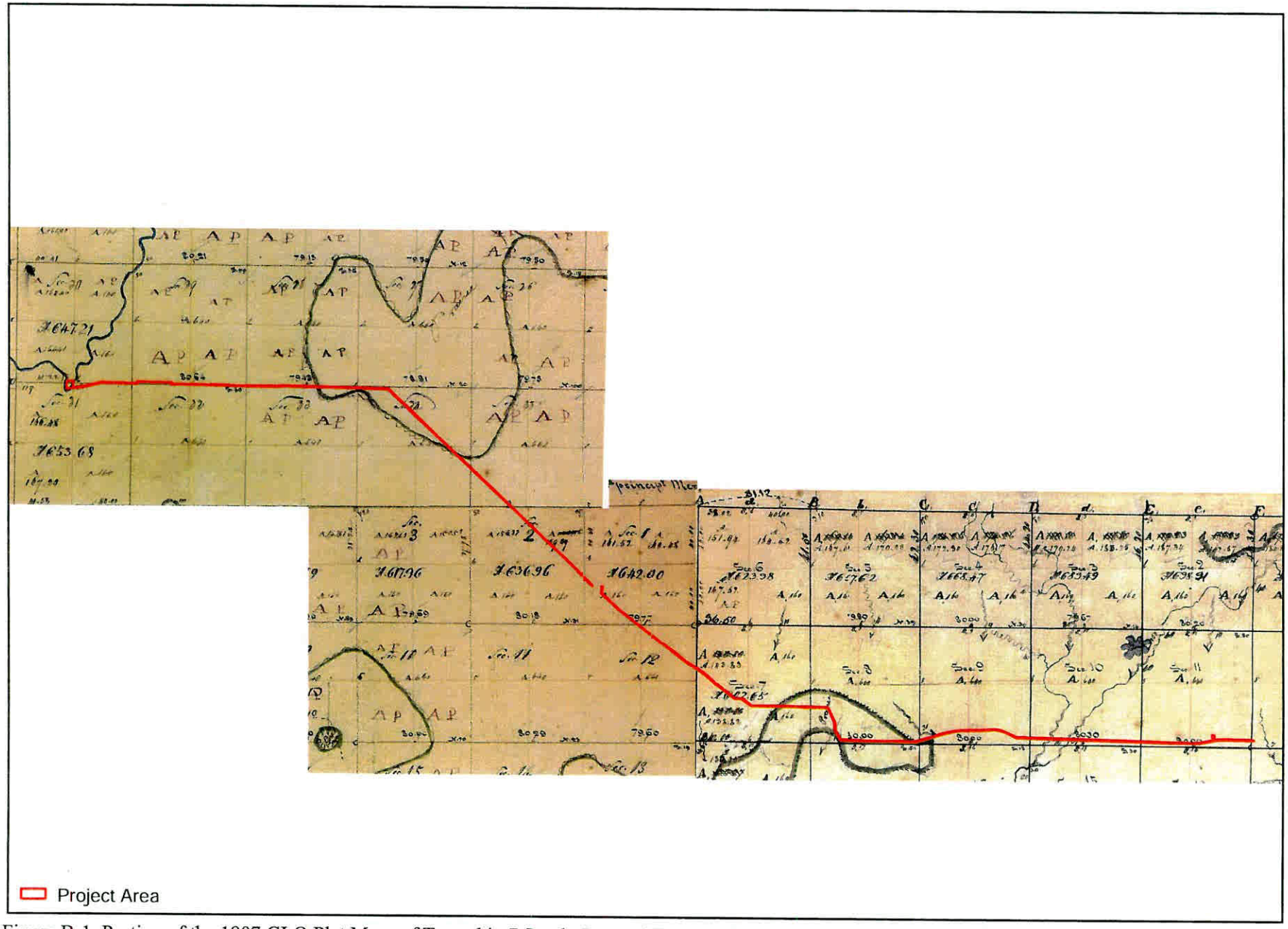


Figure B-1. Portion of the 1807 GLO Plat Maps of Township 7 South, Range 2 East, township 8 South, Range 2 East, and Township 8 South, Range 3 East, illustrating the project area (Illinois State Archives 2017).

R07558

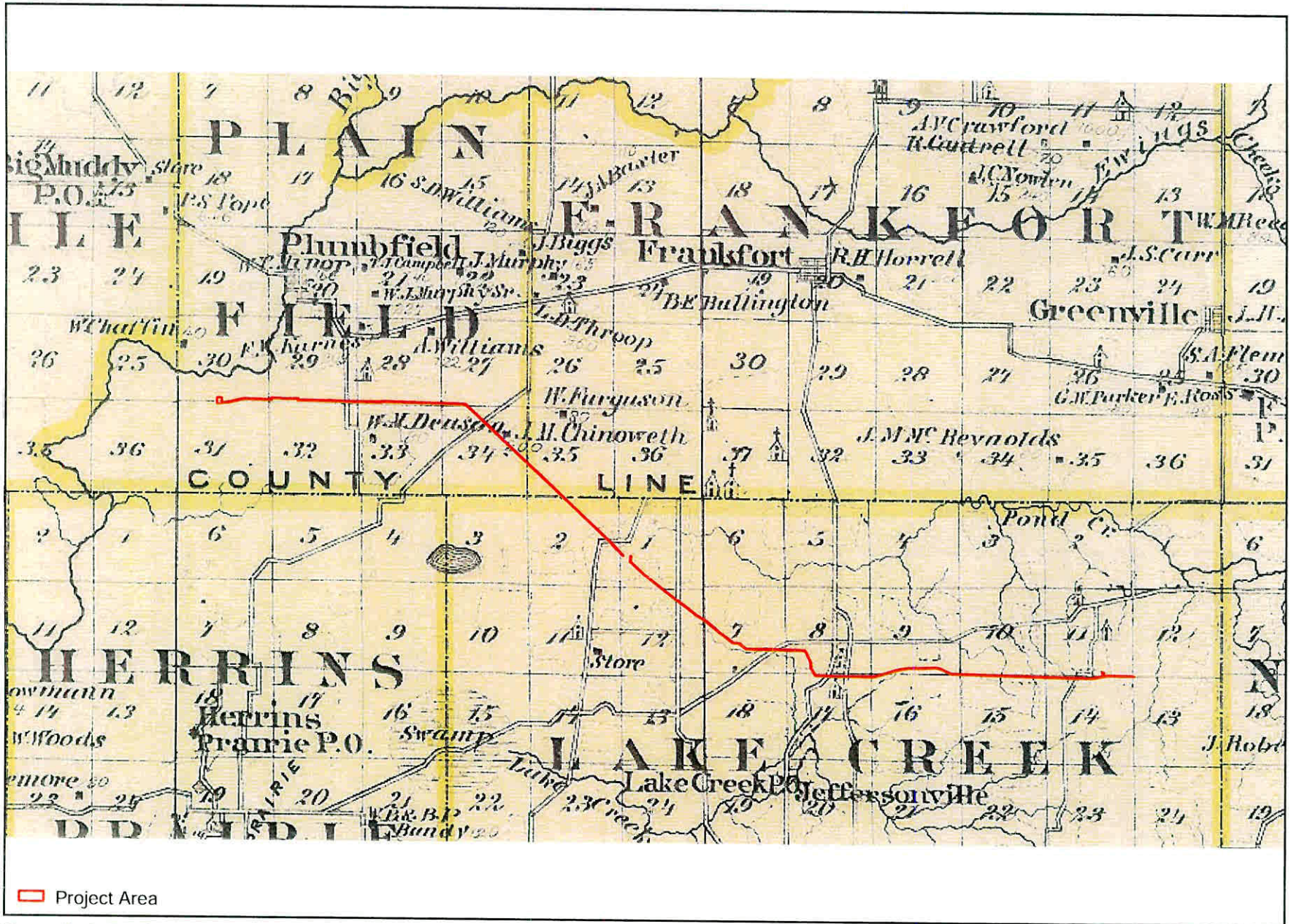


Figure B-2. Portion of the 1876 Atlas of the State of Illinois illustrating the project area (Warner and Beers 1876).

R07559

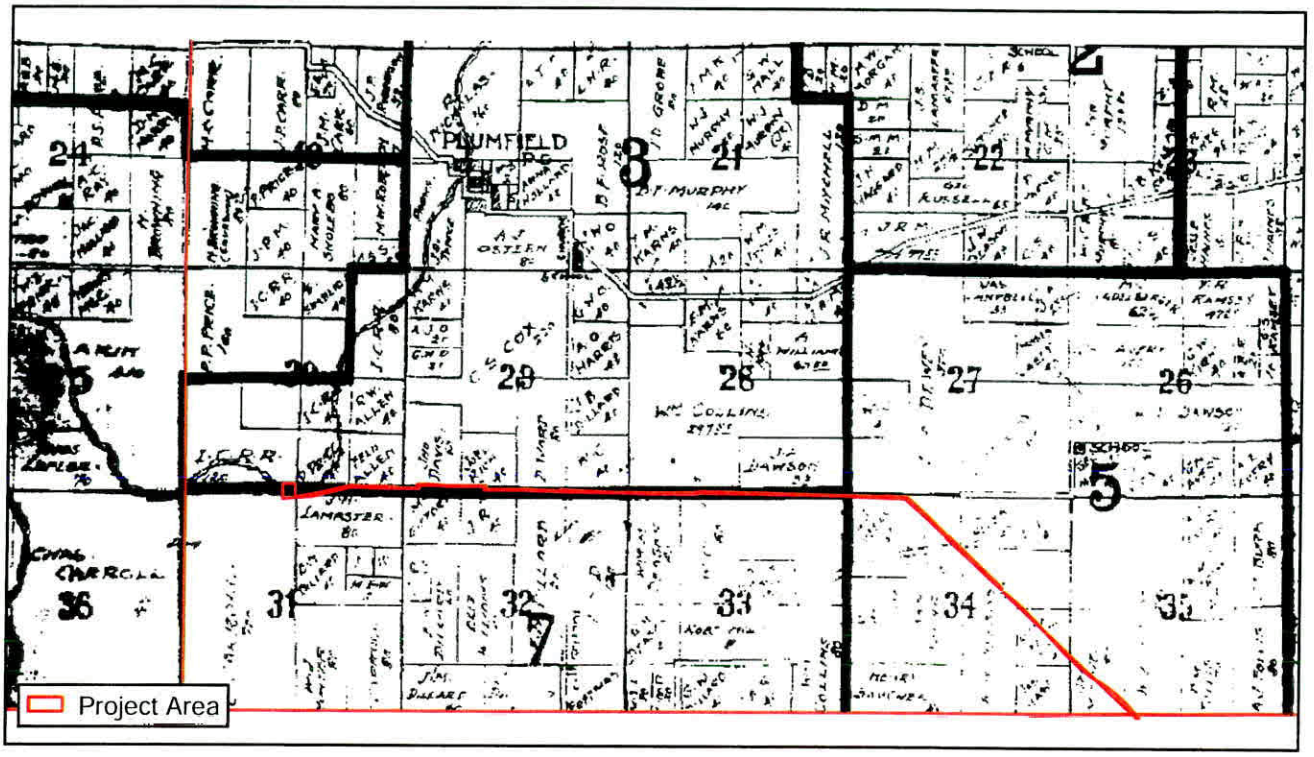


Figure B-3. Portion of the 1900 Map of Franklin County, Illinois, illustrating the project area (Guy Beauman 1900).

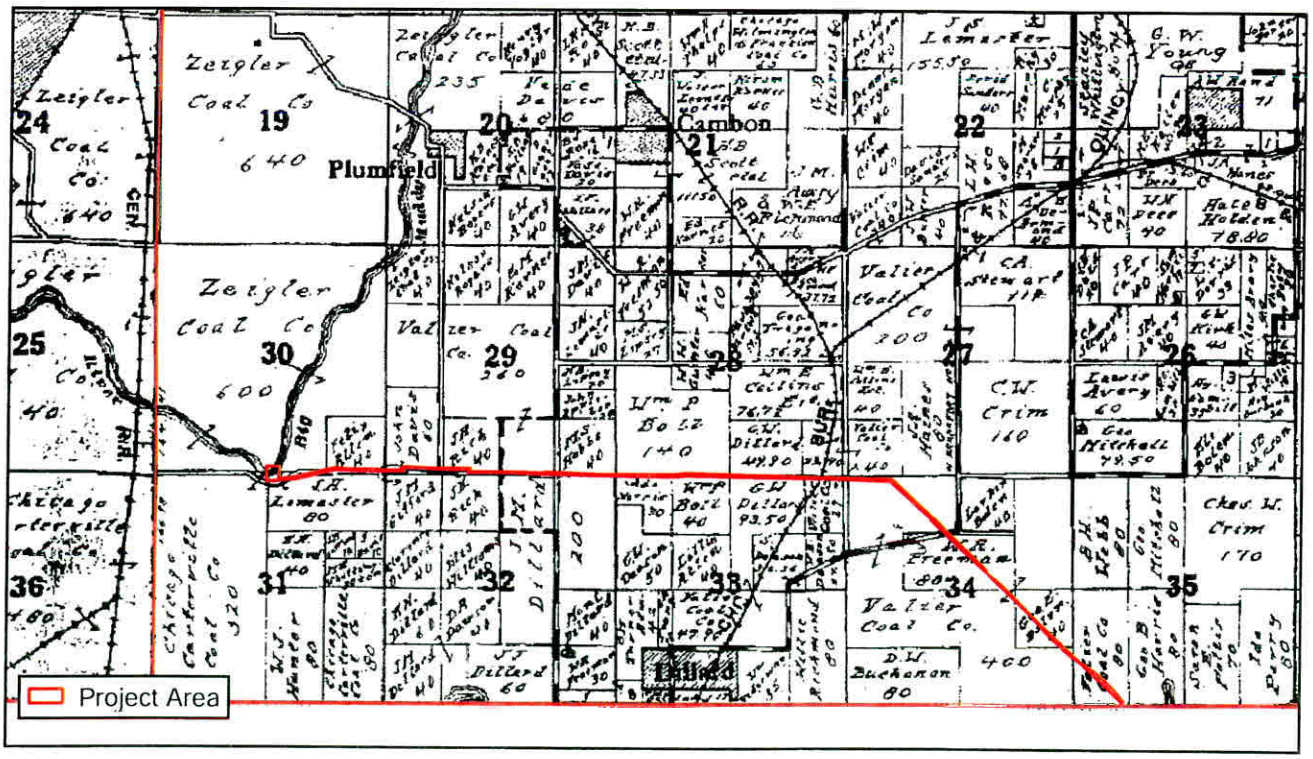


Figure B-4. Portion of the 1918 Standard Atlas of Franklin County, Illinois, illustrating the project area (Sims and Sons Publishers 1918).

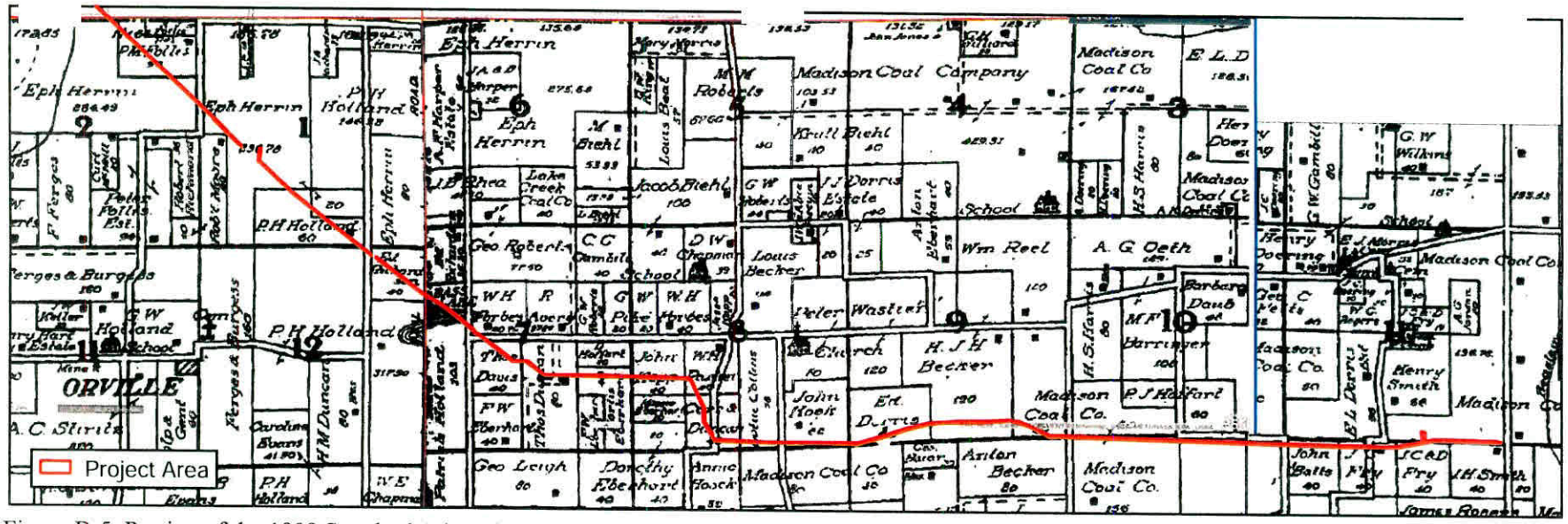


Figure B-5. Portion of the 1908 Standard Atlas of Williamson County, Illinois, illustrating the project area (George A. Ogle and Company 1908).

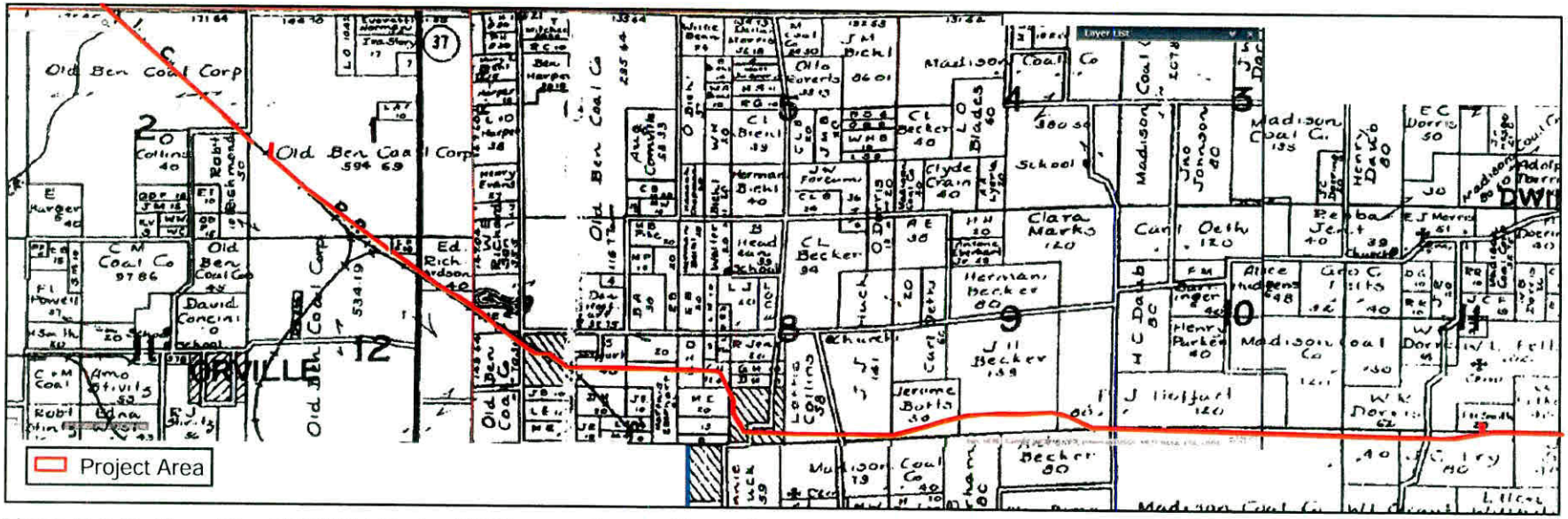


Figure B-6. Portion of the 1939? Plat Book of Williamson County, illustrating the project area (W.W. Hixson and Company 1939?).

R07561

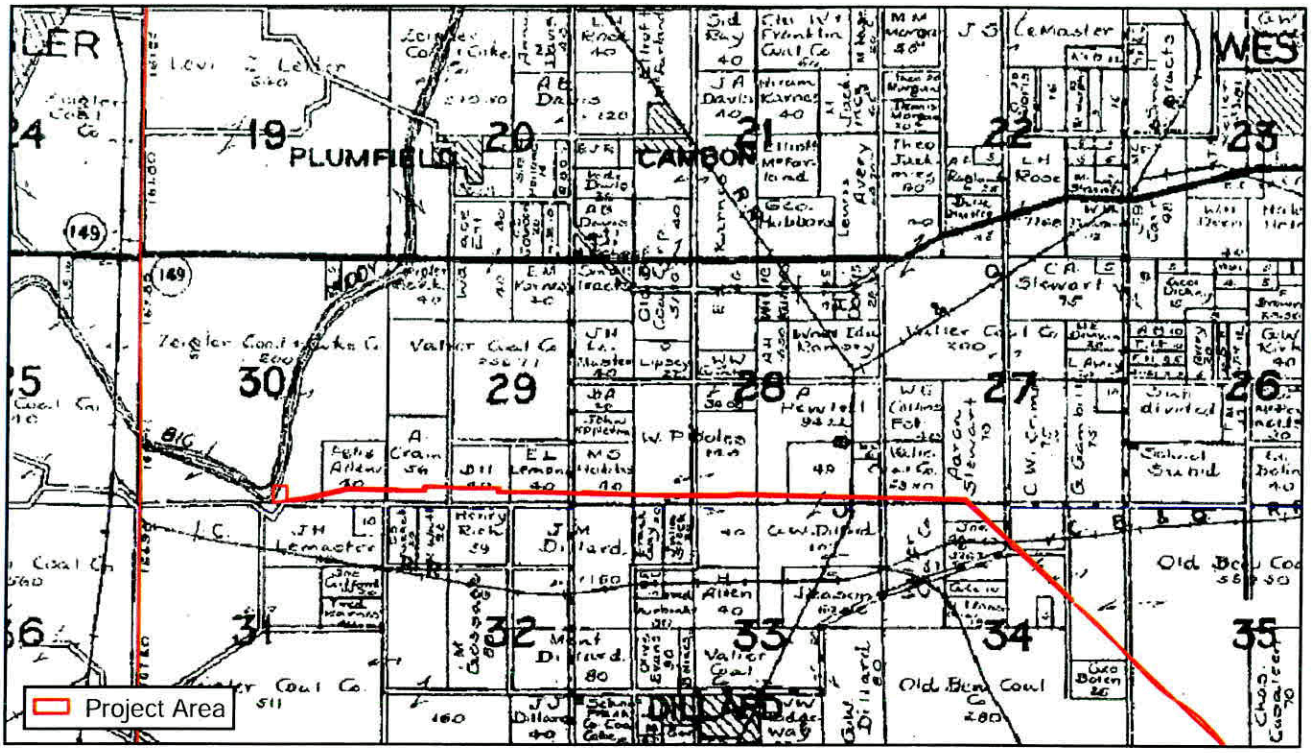


Figure B-7. Portion of the 1937? Plat Books of Franklin and Hamilton Counties, illustrating the project area. (W.W. Hixson and Company 1937?).

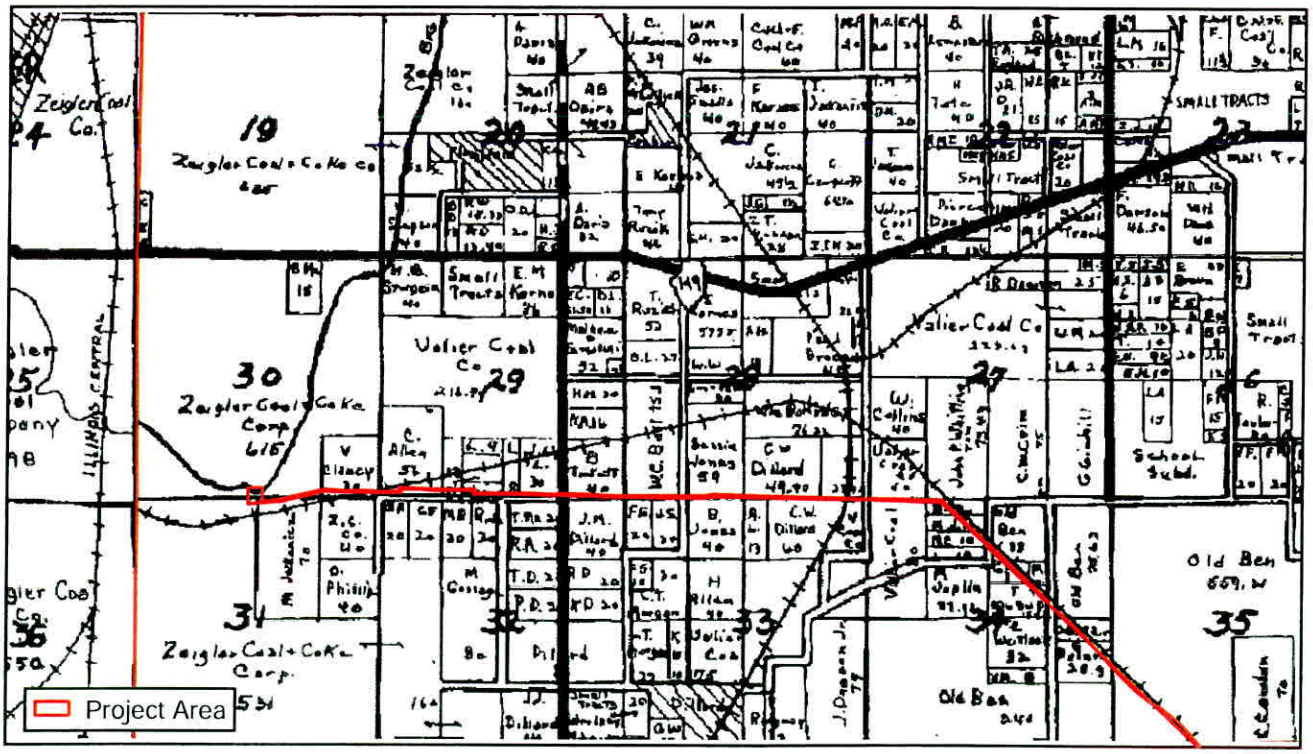


Figure B-8. Portion of the 1951? Franklin County Plat Book, illustrating the project area (Dudley Darrell 1951?).

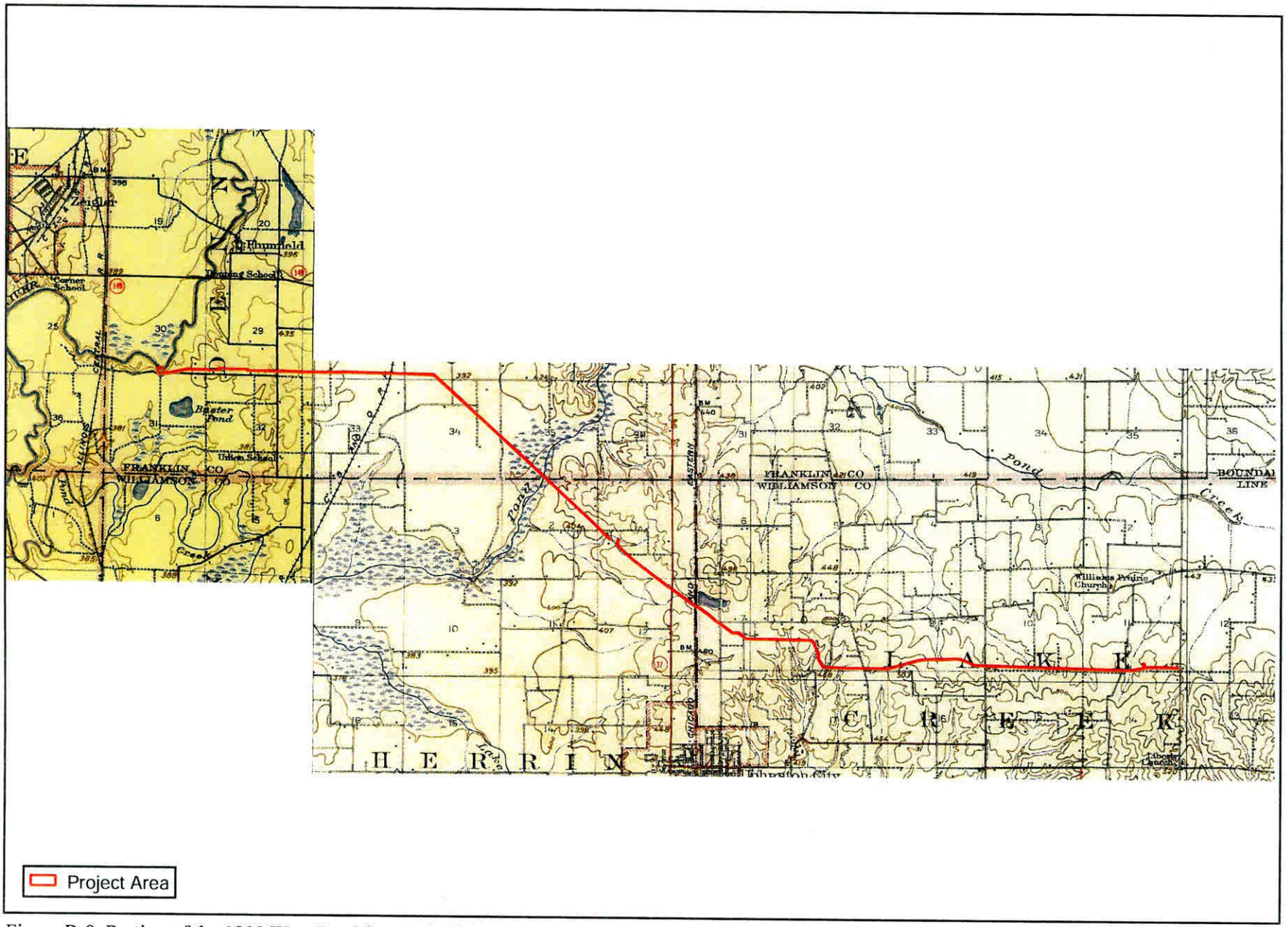


Figure B-9. Portion of the 1909 West Frankfort, and 1910 Herrin, Illinois, USGS 15' series topographic quadrangles illustrating the project area.

R07563

This page intentionally blank

Attachment C

Comments and Site Descriptions

American Resources Group recently completed an intensive, Phase I cultural resources survey of the project corridor of a proposed waterline for Williamson Energy, LLC. The project corridor is approximately 12 miles long, and extends from an existing mine to the Big Muddy River in northern Williamson and southern Franklin counties, Illinois. The nearest cities are West Frankfort to the north and Johnston City to the south (Attachment A, Figure A-1). The survey was conducted by a three-person crew on May 24 and 25, 2017.

The site-file search and architectural records review conducted prior to beginning the field survey revealed that the easternmost 2 miles of the current survey corridor has been previously surveyed (Attachment A, Figure A-2). A 1981 survey by Espey, Huston and Associates recorded sites 11WM145, 11WM150, 11WM151, and 11WM152 (Vander Leest 1981); at the request of IHPA, much of this survey area (located within the current Permit 375 area) was re-surveyed by ARG in 2005 (Ensor et al. 2005). Only sites 11WM150 and 11WM152 were relocated during subsequent surveys. In 2001, a 100-foot-wide corridor was surveyed in and adjacent to the current project area in advance of a methane pipeline installation (Shah 2001). Site 11WM150 was revisited within and adjacent to the project area during this survey. In 2005, much of this corridor was resurveyed as part of a proposed rail line for current Permit 375 (Ensor et al. 2005) (Attachment A, Figure A-1). Again, site 11WM150 was revisited, and site 11WM152 was relocated. Site 11WM150, a mid-nineteenth- to mid-twentieth-century farmstead containing a small family cemetery was evaluated as potentially eligible for NRHP listing and was subsequently tested in later in 2005 (Ensor and Lence 2005). The results of the Phase II testing suggested the site was not eligible (the Phase II testing and archival research had exhausted the research potential of the site) and it was subsequently cleared for construction. However, a small family cemetery, the Fry Cemetery, was to be avoided by any ground-disturbing activities. As a result of the above-mentioned cultural resources surveys between 1981 and 2005, each of the five sites located in or adjacent to the current project area has been evaluated as not eligible for NRHP listing, and only the family cemetery located at site 11WM150 remained at issue. This cemetery will be avoided buy the current survey; the current project corridor is located approximately 43 m (141 feet) south of the cemetery, which is located on private land.

Farther west along the current project corridor, a 2001 Phase I survey for Illinois Methane also paralleled a good portion of the current survey area, particularly along the northwest-southeast-aligned portion (Shah 2001). Three of the sites that were recorded adjacent to the project corridor during that survey—11FK200–11FK202—

were evaluated as potentially eligible for NRHP listing outside of the 2001 survey corridor. However, because the current survey corridor within this area is located within the disturbed, abandoned railroad grade, the extant portions of each of the three sites (primarily located to the southwest of the survey area) will not be impacted by the current project. No portions of these sites were observed within the current project area.

The results of the pre-field records and literature review suggested that prehistoric site density was apt to be moderately low in the project corridor due to relatively great distance from perennial streams, with the exception of the western areas near Big Muddy River and Pond Creek, though much of the area encompassed by the project area near these water sources is floodplain and low uplands and located within the existing railaroad grade. The pre-field review of historic maps also suggests that the project corridor had a relatively low potential for containing historic sites (Attachment B, Figures B-1–B-9).

The width of the majority of the project corridor is 15 m (50 feet) wide, though small portions near the western end along Lake Creek Road were only 9 m (30 feet) wide. A block area for a pump station was also surveyed at the western terminus; this area is approximately 90 m x 100 m (300 feet x 330 feet). The total area surveyed in the course of the current investigation is 72 acres.

A large portion of the project corridor consists of an abandoned railroad grade with weeds, trees and secondary growth. This portion of the project corridor was subject to systematic walkover survey along a single transect. The railroad was built in the early twentieth century. The remainder of the project area consisted of grass, hay fields, woods and newly planted crops. Only the newly planted agricultural fields exhibited good ground surface visibility and were consequently surface surveyed along transects spaced 5 m apart. The remaining areas were subject to systematic, screened shovel testing along transects spaced 15 m apart.

Though the eastern two miles of the project corridor was not resurveyed during the current investigation, the Fry Cemetery at site 11WM150 was visited. Both previously reported grave stones at site 11W150 were relocated as part of the current investigation (Attachment D, Figures D-1–D-3). These stones are located at 4189085N 357558E (Zone 16S) which is 43 m (141 feet) north of the newly relocated ROW (Attachment D, Figure D-3). At the time of the visit, the cemetery area was in tall grass making the stones hard to find. Of the two grave stones previously documented at the site, one has been highly damaged by bush hogging equipment; there have been no activities related to mining in this area and the cemetery is located on private property. This stone was found lying flat on the ground approximately 3 m (10 feet) northeast of its original location.

Two cultural properties were recorded during the present survey: 11WM402 and 11FK301. The sites are described below.

Site 11WM402

Field Number: 1981-2
Site Type: Isolated cistern
Component: Mid- to late twentieth century
Site Location: SE¼, NE¼, SE¼, Section 7, Township 8 South, Range 3 East, Johnstone City Quadrangle, Williamson County, Illinois
UTM at Main Datum (NAD 83): 4189532N 331722E, Zone 16S
Approximate Site Area: 121 m^2
Topographic Location: Flat uplands
Elevation: 143 m (470 feet) amsl
Soil Type: Ava silt loam, 2–5 percent slopes
Nearest Water: Unnamed intermittent stream (170 m east) which empties into Lake Creek.
Survey Method: Systematic shovel testing at 5 m intervals
Site Condition: The site has been impacted by cultivation and most likely by the placement of two gas pipelines to the south of the well feature.
NRHP Evaluation: Not eligible

Site Description

Site 11WM402 is a historic site defined by the occurrence of a capped cistern (Feature 1) in the northern portion of the proposed waterline ROW. The site is located in the uplands 1,300 feet north of Eberhardt Road (Attachment A, Figure A-2), a location that is 0.9 mile northeast of Johnston City, Illinois. The site limits as defined through shovel testing and visible surface features covered an area measuring roughly 14 m by 9 m (Attachment A, Figure A-6).

At the time of survey, the ground surface on the landform containing site 11WM402 was completely obscured by grass with 0 percent ground surface visibility. The site perimeter was defined through systematic shovel testing, which produced a single positive test, and by the location of the cistern (Feature 1).

The soil profile observed in a shovel test excavated within site limits exhibited a dark yellowish brown (10YR 4/4) silt loam to a depth of 20 cm below surface, over a yellowish brown (10YR 5/6) silt loam subsoil that extending to at least 30 cm bs.

Feature Description

Feature 1

A single feature was noted in the eastern portion of the site. This feature consists of a wet-laid brick-lined cistern which had been capped with a large tile culvert and a tin-covered wooden frame (Attachment D, Figures D-4 and D-5). It has a diameter of 70 cm (2.2 feet) and a measured depth of 4 m (ca. 13 feet). The feature bells out approximately half way down its base. Water was present at the base of the cistern at the time of definition.

Artifacts

Only two cultural materials were excavated in a single shovel test: a small, unidentified brick fragment, and a fragment of small pebble aggregate mortar/concrete.

Interpretation

Site 11WM402 is an isolated cistern that was probably constructed in the mid- or late twentieth century. No temporally diagnostic artifacts were found in association, and all historic maps and atlases show no structures at or near the site. The cistern appears fairly modern and was probably constructed at a field edge for livestock/ farming purposes.

Site 11FK301

Field Number: 1981-1
Site Type: Historic dump
Component: Early to mid-twentieth century
Site Location: NW¼, NW¼, NE¼, Section 31, Township 7 South, Range 2 East, Christopher Quadrangle, Franklin County, Illinois
UTM at Main Datum (NAD 83): 4194049N 321489E, Zone 16S
Approximate Site Area: 687 m^2
Topographic Location: Terrace
Elevation: 116 m (382 feet) amsl
Soil Type: Hurst silt loam, 0–2 percent slopes
Nearest Water: Big Muddy River (10 m north)
Survey Method: Systematic shovel testing at 5 m intervals.
Site Condition: The site has been impacted by soil erosion.
NRHP Evaluation: Not eligible

Site Description

Site 11FK301 is a historic dump site discovered during shovel testing on a high terrace south of the Big Muddy River (Attachment A, Figure A-2). The site is 164 feet (50 m) north of an unnamed road which follows an old railroad grade, a location that is about 1.6 miles northwest of Freeman Spur, Illinois. The site limits as defined

through shovel testing and surface material covers an area along the river bank measuring roughly 57 m by 12 m (Attachment A, Figure A-7).

At the time of survey, ground surface visibility in the site area was completely obscured by leaf litter (Attachment D, Figure D-6). The site perimeter was defined through systematic shovel testing. In the northern half of the site boundary was defined by the steep bank which extends down to the Big Muddy River (Attachment D, Figure D-7).

The soil profile observed in a shovel test excavated within site limits exhibited a very dark grayish brown (10YR 3/2) silty clay loam which extends to a depth of 10 cm below surface, over a pale brown (10YR 6/3) clay loam subsoil that extending to at least 30 cm below the ground surface.

Artifacts

Thirty-five historic artifacts were collected from 10 positive shovel tests at site 11FK301 (Table C-1). Kitchenwares comprise the majority of artifacts recovered at the site, and include only two refined ceramics, both appearing to date to the very late nineteenth or early twentieth century. Seventeen fragments of kitchen glass were recovered, including aqua fruit jar glass melted and unmelted colorless glass, and one fragment of an opaque green glass bowl, typical of a 1940s or 1950s manufacture. The architectural group is comprised of architectural remnants, such as nails and flat glass (window) fragments. All 10 of the nails are wire-drawn examples that date to the late nineteenth or twentieth century. Activities- and personal group artifacts consist of a terra cotta planter fragment, barbed wire, and a colorless, mid-twentieth-century perfume bottle.

Interpretation

Site 11FK301 is interpreted as an early to mid-twentieth-century historic dump/discard area located at an old crossroads overlooking a steep slope down to the Big Muddy River, a typical location for historic trash dumping. There is no structure at or near the site location on any of the historic atlases or maps consulted (Attachment B, Figures B-1 to B-9).

Site Evaluations and Project Recommendation

Two cultural properties were recorded during the current investigation. Both are small twentieth-century sites with little to no potential to contain significant cultural deposits and are evaluated as ineligible for NRHP listing. The Fry Cemetery at site 11WM150 will be avoided by the current project.

The proposed project will not have an adverse effect on significant cultural properties. It is recommended that the proposed undertaking be allowed to proceed as planned without further archaeological investigation.

Table C-1.Historic Artifact Inventory, Site 11FK301.

Description	Date Range	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9	ST10	Total	Reference
KITCHEN													
CERAMIC													
TABLEWARE													
Plate													
white ironstone rim fragment with lightly embossed pattern, burned	1880+			1								1	
Unknown												0	
floral decal-decorated whiteware body fragment	1890+					1						1	
GLASS												0	
CONTAINER												0	
Fruit/Food Jars												0	
aqua jar base fragment with Owen's scar, embossed "4"	1910-1982						1					1	Lindsey 2017
aqua jar body fragment										1		1	
Unknown												0	
melted colorless body fragment				1								1	
colorless curved body fragment					8	2			1		2	13	
TABLEWARES												0	
opaque green (Jadeite) ribbed bowl rim/body fragment	1940s-1950s						1					1	
KITCHEN TOTAL		*0*	*0*	*2*	*8*	*3*	*2*	*0*	*1*	*1*	*2*	*19*	
ARCHITECTURE													
CONSTRUCTION MATERIALS													
wire nail fragment	1880+	6	1	2		1						10	
FLAT GLASS												0	
colorless flat glass fragment				1		1						2	
ARCHITECTURE TOTAL		*6*	*1*	*3*	*0*	*2*	*0*	*0*	*0*	*0*	*0*	*12*	
ACTIVITIES													
OTHER													
terra cotta flowerpot rim fragment with green painted exterior						2						2	
FENCING												0	
barbed wire fragment	1873+							1				1	
ACTIVITIES TOTAL		*0*	*0*	*0*	*0*	*2*	*0*	*1*	*0*	*0*	*0*	*3*	
PERSONAL													
HEALTH AND GROOMING													
machine-made colorless perfume/cologne bottle with narrow-mouth continuous screw finish, embossed "PAT D-117024"	mid-20th c.						1					1	
PERSONAL TOTAL		*0*	*0*	*0*	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*1*	
OVERALL TOTAL		*6*	*1*	*5*	*8*	*7*	*3*	*1*	*1*	*1*	*2*	*35*	

R07569

This page intentionally blank

Attachment D

Project Photographs



Figure D-1. Headstone of Anna M. Dorthea Fry, Fry Cemetery, site 11WM150, view north.



Figure D-2. Headstone of Mary and Malinda Fry, Fry Cemetery, site 11WM150.



Figure D-3. View north from northern edge of project corridor toward Fry Cemetery (Bob Sadler in orange shirt is standing at cemetery), view north.



Figure D-4. Site 11WM402, cistern, view north-northwest.



Figure D-5. Site 11WM402 cistern interior.



Figure D-6. Site 11FK301 overview, view northeast.



Figure D-7. Northern edge of site 11FK301 at Big Muddy River, view northwest.

This page intentionally blank

Attachment E

References Cited

Anderson, J.M.
2010 *A Cultural Resource Survey for the Williamson Energy Concrete Borehole and Access Road in Williamson County, Illinois.* Archaeological Survey Short Report, Cultural Resource Analysts, Inc., Lexington, KY.

Beauman, Guy
1900 *Map of Franklin County, Illinois 1900.* Guy Beauman. Vienna, Illinois.

Burrow, J., and G. Aberle
2001 *Phase I Cultural Resources Survey and Assessment for 17 Miles of Pipeline in Franklin County, Illinois.* Cultural Resources Management Report No. 1105, American Resources Group, Carbondale, Illinois.

Craig, J., and J. Rein
2011 *Phase I Cultural Resource Survey of 1048-Acre Woolard Property Project Area, Williamson County, Illinois.* Prairie Archaeology and Research, Springfield, Illinois.

2014 *Phase I Cultural Resource Survey of 13-Acre Mach Mining IBR Project, Williamson County, Illinois.* Prairie Archaeology and Research, Springfield, Illinois.

Darrell, D.
1951? *Franklin County Plat Book.* Drawn by Dudley Darrell.

Ensor, H.B., C. Lence, and S. Titus
2005 *Phase I Cultural Resources Survey of the Steelhead Development Corporation, LLC, Williamson County Project Area.* Cultural Resources Management Report No. 1324, American Resources Group, Carbondale, Illinois.

George A. Ogle and Company
1908 *Standard Atlas of Williamson County, Illinois*. George A. Ogle and Company, Chicago.

Halpin, D.
2002 *Archaeological Reconnaissance Survey for Proposed Telecommunications Tower #8192 at 17695 Route 37, Williamson County, Illinois.* Archaeological Survey Short Report, Cultural Resource Services, Springfield, Illinois.

Illinois State Archives
2017 1807 GLO Township Plats, Township 7 South, Range 2 East, Township 8 South, Range 2 East, and Township 8 South, Range 3 East. In Illinois Secretary of State, Federal Township Plats of Illinois website http://landplats.ilsos.net/

Lindsey, B.
2017 Historic Glass Bottle Identification and Information Website. https://sha.org/bottle/ Bureau of Land Management and Society for Historical Archaeology.

McNerney, M.
1990 *Construction of Recreational and Camping Facilities at Arrowhead Lake, Johnston City, Illinois.* Archaeological Survey Short Report, American Resources Group, Carbondale, Illinois.

Penman, J.T.
1998 *FAS 876 Freeman Spur Road.* Illinois Transportation Archaeological Research Program, University of Illinois at Urbana-Champaign.

Rubach, B.
1993 Corinth Water District: Phase I Survey for Proposed New Water Distribution System. Archaeological Survey Short Report, American Resources Group, Carbondale, Illinois.

Shah, M.
2001 *Phase I Cultural Resources Survey and Assessment of a Proposed Gas Gathering Pipeline and Gas Plant Location for Illinois Methane, LLC.* Archaeological Survey Short Report, American Resources Group, Carbondale, Illinois.

Simon, M.
1992 *I-57, I-57, X1-4VB-1, NHI-57-2(129)59, "Abba" and "Fox" Borrow Pits 1 of 1.* Illinois Transportation Archaeological Research Program, University of Illinois at Urbana-Champaign.

Sims and Sons, Publishers
1918 *Atlas of Franklin County, Illinois, containing Map of County, Plats of all Townships with Owners' names, Illinois State Map, Map of the United States, population tables, and charts on treatment of domestic animals*. Sims and Sons, Christopher, Illinois.

Stratton, C., and F. Mansberger
2005 *Illinois Department of Natural Resources Cultural Resource Management Program Abandoned Mined Lands Reclamation Cultural Resources Evaluation, Taylor No. 5 Mine Site (11FK215) (Franklin County Coal Corporation No. 5 Mine) Freeman Spur, Franklin County, Illinois.* Archaeological Survey Short Report, Fever River Research, Springfield, Illinois.

United States Geological Survey (USGS)
1909 West Frankfort, Illinois, 15 minute topographic map.

1910 Herrin, Illinois, 15 minute topographic map.

University of Illinois
1966 *General Soil Map of Illinois.* Agricultural Experiment Station, University of Illinois, Urbana. In cooperation with U.S. Department of Agriculture, Soil Conservation Service.

Vander Leest, B.
1981 *A Cultural Resource Survey of The Proposed Zeigler #6 Mine in Williamson County, Illinois.* Espey, Huston and Associates, Austin, Texas. Document No. 81283, EH&A Job No. 1317.

Warner and Beers
1876 *Atlas of the State of Illinois.* Warner and Beers, Chicago.

Witty, C.
2003 *FAU 9481 & HAS 2887 IL 37 from West Frankfort to Johnston City.* Illinois Transportation Archaeological Research Program, University of Illinois at Urbana-Champaign.

W.W. Hixson and Company
1939? *Plat Book of Williamson County, Illinois.* W.W. Hixson and Company. Rockford, Illinois.

1937? *Plat Books of Franklin and Hamilton Counties, Illinois.* W.W. Hixson and Company. Rockford, Illinois.

This page intentionally blank

Attachment F

Site Forms

ILLINOIS ARCHAEOLOGICAL SITE RECORDING FORM

County: Franklin
Site Name:
Revisit: N
Field Number: 1981-1
State Site No.: 301
Quadrangle (7.5'): Christopher
Date Recorded: 2017.06.06

LEGAL DESCRIPTION (to quarter quarter quarter section)

Align: NW	1/4s: NWNWNE	Section: 31	Township: 7	S	Range: 2	E
Align:	1/4s:	Section: 0	Township: 0		Range: 0	
Align:	1/4s:	Section: 0	Township: 0		Range: 0	
Align:	1/4s:	Section: 0	Township: 0		Range: 0	

UTM Coordinates (by ISM): UTM Zone: 16 UTM North: 4193841 UTM East: 321482

Ownership: Private

ENVIRONMENT

Topography: Terrace
Elevation (in meters): 116
Nearest Water Supply: Big Muddy River
Drainage: Big Muddy
Soil Association: Markland-Colp-Del Rey
Description: The site is located on the margin of a terrace overlooking the Big Muddy River to the north.

SURVEY

Project Name: Williamson Franklin Water
Site Area (square meters): 680
Ground Cover (List up to 3): Forest
Visibility (%): 0
Survey Methods (List up to 2): Shovel Test Pedestrian
Standing Structures: N
Site Type (List up to 2): Other (Dump)

SITE CONDITION

Extent of Damage: Moderate
Main Cause of Damage: Erosion

MATERIAL OBSERVED

Number of Prehistoric Artifacts (count or estimate): 0
Number of Historic Artifacts (count or estimate): 35
Prehistoric Diagnostic Artrifacts: N
Historic Diagnostic Artifacts: Y
Prehistoric Surface Features: N
Historic Surface Features: N
Description: 1 ironstone plate fragment, 1 whiteware fragment, 16 glass container fragments, 1 glass tableware fragment, 10 wire nails, 2 flat glass, 2 terra cotta, 1 barbed wire fragment, 1 perfume/cologne bottle.

TEMPORAL AFFILIATION (check all that apply)

Prehistoric Unknown:	Late Archaic:	Mississippian:	Colonial (1673-1780):
Paleoindian:	Woodland:	Upper Mississippian:	Pioneer (1781-1840):
Archaic:	Early Woodland:	Protohistoric:	Frontier (1841-1870):
Early Archaic:	Middle Woodland:	Historic Native American:	Early Industrial (1871-1900):
Middle Archaic:	Late Woodland:	Historic (generic):	Urban Industrial (1901-1945): Y
			Post-War (1946-present): Y

Description: The site is interpreted as an early- to mid-twentieth-century dump. The artifacts depict a date range of early- to mid-twentieth century. No structures are depicted on any historic maps.

Surveyor: John Schwegman
Institution: ARG
Survey Date: 05/25/2017
Curation Facility: ISM
Site Report by: Robert Sadler
Institution: ARG
Date: 06/01/2017
IHPA Log No.:
IHPA First Sur. Doc. No.:
Compliance Status:
NRHP Listing: N

ILLINOIS ARCHAEOLOGICAL SITE RECORDING FORM

County: Williamson
Site Name:
Revisit: N
Field Number: 1981-2
State Site No.: 402
Quadrangle (7.5'): Johnston City
Date Recorded: 2017.06.06

LEGAL DESCRIPTION (to quarter quarter quarter section)

Align: SE	1/4s: SENESE	Section: 7	Township: 8	S	Range: 3	E
Align:	1/4s:	Section: 0	Township: 0		Range: 0	
Align:	1/4s:	Section: 0	Township: 0		Range: 0	
Align:	1/4s:	Section: 0	Township: 0		Range: 0	

UTM Coordinates (by ISM): UTM Zone: 16 UTM North: 4189321 UTM East: 331724

Ownership: Private

ENVIRONMENT

Topography: Upland Ridge
Elevation (in meters): 143
Nearest Water Supply: intermittent
Drainage: Big Muddy
Soil Association: Ava-Bluford-Wynoose
Description: The site is located on the southwestern edge of a broad, southeasterly trending ridge spur.

SURVEY

Project Name: Williamson Franklin Water
Site Area (square meters): 123
Ground Cover (List up to 3): Grass
Visibility (%): 0
Survey Methods (List up to 2): Shovel Test
Standing Structures: N
Site Type (List up to 2): Other

SITE CONDITION

Extent of Damage: Severe
Main Cause of Damage: Development

MATERIAL OBSERVED

Number of Prehistoric Artifacts (count or estimate): 0
Number of Historic Artifacts (count or estimate): 2
Prehistoric Diagnostic Artrifacts: N
Historic Diagnostic Artifacts: N
Prehistoric Surface Features: N
Historic Surface Features: Y
Description: 1 brick fragment, 1 mortar fragment

TEMPORAL AFFILIATION (check all that apply)

Prehistoric Unknown:	Late Archaic:	Mississippian:	Colonial (1673-1780):
Paleoindian:	Woodland:	Upper Mississippian:	Pioneer (1781-1840):
Archaic:	Early Woodland:	Protohistoric:	Frontier (1841-1870):
Early Archaic:	Middle Woodland:	Historic Native American:	Early Industrial (1871-1900):
Middle Archaic:	Late Woodland:	Historic (generic):	Urban Industrial (1901-1945): Y
			Post-War (1946-present): Y

Description: The site is interpreted as a twentieth-century isolated cistern. No structures are depicted on any of the 20th-century historic maps or aerial maps.

Surveyor: John Schwegman
Institution: ARG
Survey Date: 05/25/2017
Curation Facility: ISM
Site Report by: Robert Sadler
Institution: ARG
Date: 06/01/2017
IHPA Log No.:
IHPA First Sur. Doc. No.:
Compliance Status:
NRHP Listing: N

PART II ATTACHMENT II.13.A
SOIL RESOURCES REPORT

United States Department of Agriculture

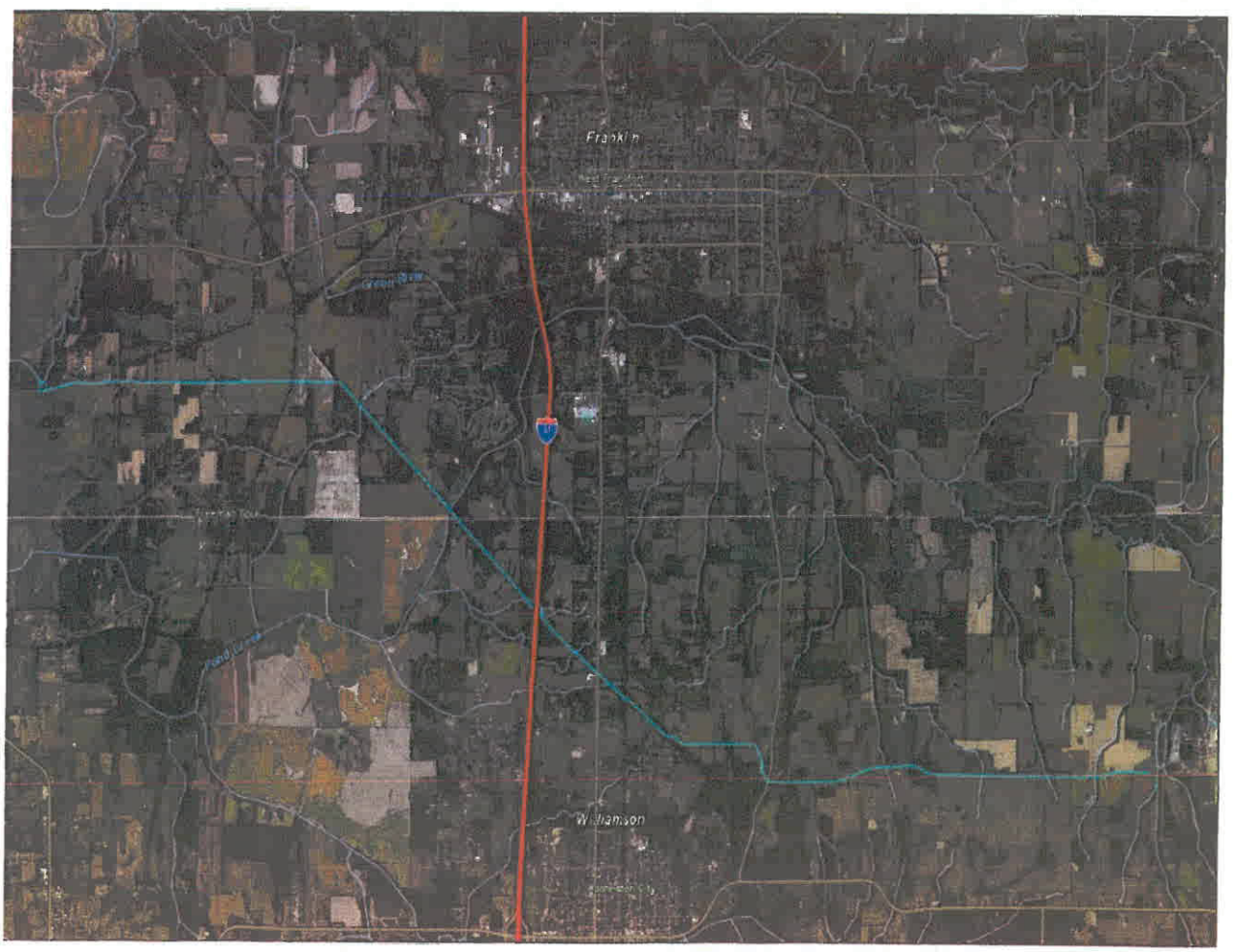
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Franklin County, Illinois, and Williamson County, Illinois

Williamson Energy, LLC - Proposed Water Management Pipeline Permit



April 26, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

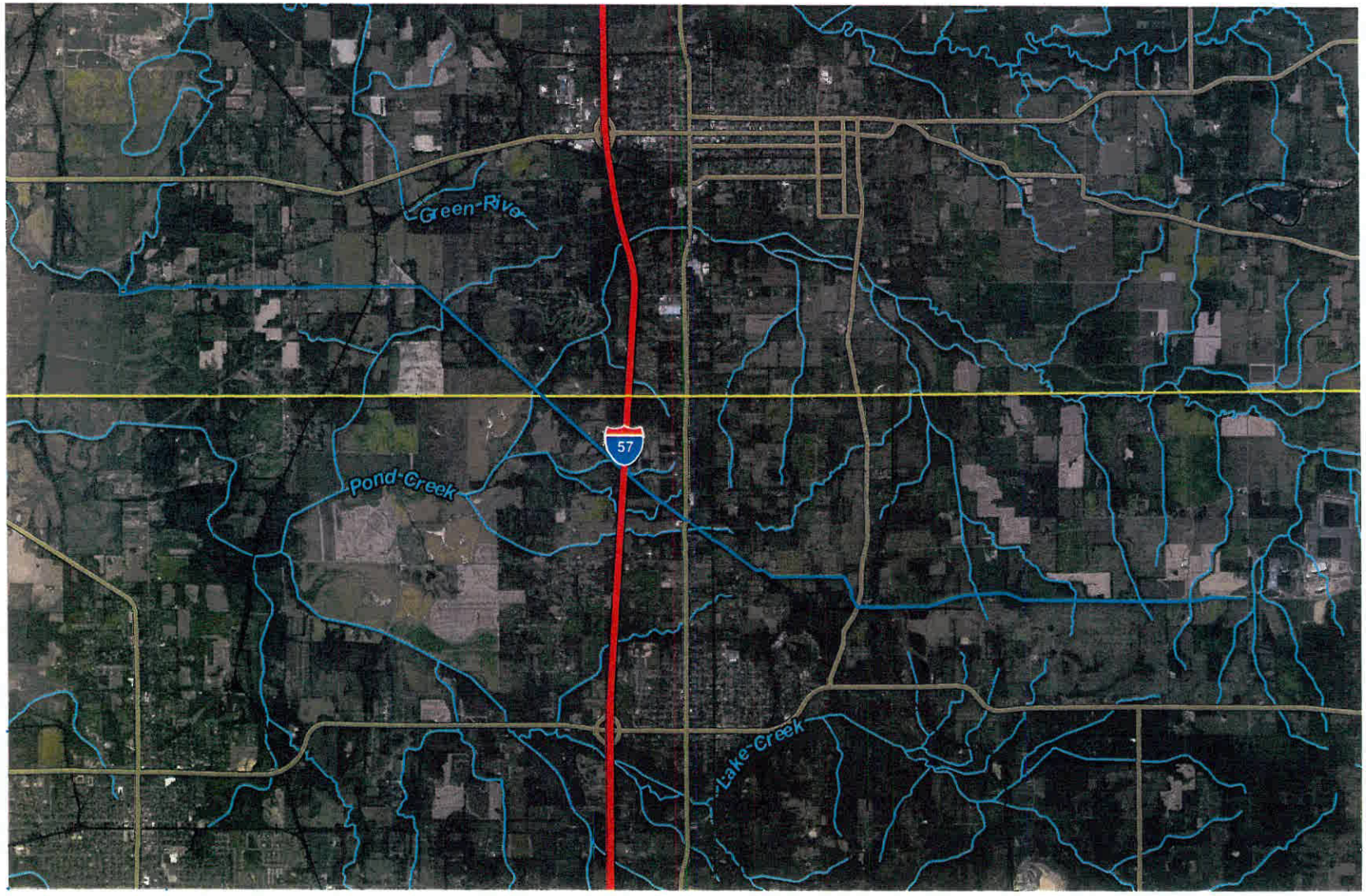
Contents

Preface 2
How Soil Surveys Are Made 5
Soil Map 8
Soil Map 9
Legend 10
Map Unit Legend 12
Map Unit Descriptions 18
Franklin County, Illinois 20
13A—Bluford silt loam, 0 to 2 percent slopes 20
13B2—Bluford silt loam, 2 to 5 percent slopes, eroded 21
14B—Ava silt loam, 2 to 5 percent slopes 22
14C2—Ava silt loam, 5 to 10 percent slopes, eroded 24
84A—Okaw silt loam, 0 to 2 percent slopes 25
109A—Racoon silt loam, 0 to 2 percent slopes 26
338A—Hurst silt loam, 0 to 2 percent slopes 27
640A—Bluford silt loam, bench, 0 to 2 percent slopes 28
908F—Hickory-Kell silt loams, 18 to 35 percent slopes 30
3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded 31
3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded 32
W—Water 34
Williamson County, Illinois 35
10C—Plumfield silty clay loam, 5 to 10 percent slopes 35
10D—Plumfield silty clay loam, 10 to 18 percent slopes 36
12A—Wynoose silt loam, 0 to 2 percent slopes 38
13A—Bluford silt loam, 0 to 2 percent slopes 39
13B—Bluford silt loam, 2 to 5 percent slopes 40
13B2—Bluford silt loam, 2 to 5 percent slopes, eroded 42
14B—Ava silt loam, 2 to 5 percent slopes 43
14B2—Ava silt loam, 2 to 5 percent slopes, eroded 44
14C2—Ava silt loam, 5 to 10 percent slopes, eroded 46
14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded 47
518B—Rend silt loam, 2 to 5 percent slopes 48
518C2—Rend silt loam, 5 to 10 percent slopes, eroded 49
518C3—Rend silty clay loam, 5 to 10 percent slopes, severely eroded 50
640B—Bluford silt loam, bench, 2 to 5 percent slopes 51
640B2—Bluford silt loam, bench, 2 to 5 percent slopes, eroded 52
802B—Orthents, loamy, undulating 53
871B—Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony 54
871D—Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony 55
3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded 56
3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded 57
3420A—Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded 58
References 60

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:93,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 1000 2000 4000 6000

Feet
0 4500 9000 18000 27000

Map projection: Web Mercator Corner coordinates: WGS84

R07590

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Survey Areas
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Franklin County, Illinois
Survey Area Data: Version 10, Sep 16, 2016

Soil Survey Area: Williamson County, Illinois
Survey Area Data: Version 11, Sep 16, 2016

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 13, 2011—Jun 10, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

R07591

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

R07592

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
10C	Plumfield silty clay loam, 5 to 10 percent slopes	6.5	9.2%
10D	Plumfield silty clay loam, 10 to 18 percent slopes	2.3	3.3%
12A	Wynoose silt loam, 0 to 2 percent slopes	0.9	1.3%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	0.7%
13B	Bluford silt loam, 2 to 5 percent slopes	3.1	4.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4.0	5.7%
14B	Ava silt loam, 2 to 5 percent slopes	5.4	7.6%
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	0.9	1.3%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	2.5	3.5%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3.6	5.1%
518B	Rend silt loam, 2 to 5 percent slopes	1.1	1.6%
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	0.1	0.1%
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2.0	2.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	1.6	2.3%
802B	Orthents, loamy, undulating	1.7	2.4%
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3.1	4.4%
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	0.6	0.8%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	3.2	4.5%
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
Subtotals for Williamson County		**44.5**	**62.9%**

Franklin County, Illinois (IL055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
13A	Bluford silt loam, 0 to 2 percent slopes	1.0	1.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	1.7	2.4%
14B	Ava silt loam, 2 to 5 percent slopes	3.8	5.4%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
84A	Okaw silt loam, 0 to 2 percent slopes	5.5	7.8%
109A	Racoon silt loam, 0 to 2 percent slopes	2.8	4.0%
338A	Hurst silt loam, 0 to 2 percent slopes	1.8	2.5%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	2.3	3.3%
908F	Hickory-Kell silt loams, 18 to 35 percent slopes	1.5	2.1%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	1.8	2.5%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	2.7	3.8%
W	Water	0.1	0.1%
Subtotals for Franklin County		**26.2**	**37.1%**
Totals for Area of Interest		**70.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named

and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous

areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can
be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Franklin County, Illinois

13A—Bluford silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t95c
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

13B2—Bluford silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95f
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 9 inches: silt loam
Btg - 9 to 32 inches: silty clay
2Btgx - 32 to 47 inches: silty clay loam
2Btg - 47 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 5 to 20 inches to abrupt textural change; 19 to 45 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Ava
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wynoose
Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

14B—Ava silt loam, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: 2t95h
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Ava and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 14 inches: silt loam
Bt - 14 to 34 inches: silty clay loam
2Btx - 34 to 50 inches: silty clay loam
3Btb - 50 to 79 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

14C2—Ava silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95l
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ava, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Eroded

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 9 inches: silt loam
Bt and E - 9 to 28 inches: silty clay loam
Btx - 28 to 36 inches: silty clay loam
2Btx - 36 to 64 inches: silt loam
3Btb - 64 to 78 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford, eroded
Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

84A—Okaw silt loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: w3zc
Elevation: 340 to 500 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 180 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Okaw and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Okaw

Setting
Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin loess over clayey lacustrine deposits

Typical profile
H1 - 0 to 7 inches: silt loam
H2 - 7 to 15 inches: silt loam
H3 - 15 to 54 inches: silty clay
H4 - 54 to 80 inches: stratified silty clay loam to silty clay

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 20 inches to abrupt textural change
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)

Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Hydric soil rating: Yes

109A—Racoon silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t960
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Racoon and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Racoon

Setting

Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Mixture of loess and/or local silty alluvium

Typical profile

Ap - 0 to 6 inches: silt loam
Eg - 6 to 30 inches: silt loam
Btg - 30 to 59 inches: silty clay loam
Cg - 59 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None

Frequency of ponding: Occasional
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Bluford

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bonnie, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

338A—Hurst silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tbsb
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Hurst and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hurst

Setting

Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over clayey lacustrine deposits

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 12 inches: silt loam
2Btg - 12 to 53 inches: silty clay
2BCg - 53 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Okaw

Percent of map unit: 5 percent
Landform: Terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

640A—Bluford silt loam, bench, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: w2vt
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford, bench, and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 20 inches: silt loam
H3 - 20 to 35 inches: silty clay
H4 - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose, bench

Percent of map unit: 5 percent
Landform: Structural benches
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

908F—Hickory-Kell silt loams, 18 to 35 percent slopes

Map Unit Setting

National map unit symbol: w2y7
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hickory and similar soils: 50 percent
Kell and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hickory

Setting

Landform: Till plains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 16 inches: silt loam
H3 - 16 to 43 inches: clay loam
H4 - 43 to 80 inches: loam

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Kell

Setting

Landform: Till plains
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

H1 - 0 to 3 inches: silt loam
H2 - 3 to 7 inches: silt loam
H3 - 7 to 13 inches: clay loam
H4 - 13 to 35 inches: very channery silt loam
Cr - 35 to 60 inches: bedrock

Properties and qualities

Slope: 18 to 35 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrr
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Bonnie, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Cg1 - 10 to 27 inches: silt loam
Cg2 - 27 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Belknap

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrv
Elevation: 330 to 490 feet

Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Belknap, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belknap, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 59 inches: silt loam
Bg - 59 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Bonnie, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Piopolis, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform: Oxbows, channels, drainageways, lakes, perenial streams, rivers

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w

Williamson County, Illinois

10C—Plumfield silty clay loam, 5 to 10 percent slopes

Map Unit Setting

National map unit symbol: 2wk1l
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Plumfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plumfield

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 5 inches: silty clay loam
2Btx1 - 5 to 12 inches: silty clay loam
2Btx2 - 12 to 36 inches: silt loam
3Btgb - 36 to 70 inches: silty clay loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 5 to 20 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Passport, eroded

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Belknap, occasionally flooded

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bluford

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

10D—Plumfield silty clay loam, 10 to 18 percent slopes

Map Unit Setting

National map unit symbol: 2wk1m
Elevation: 330 to 820 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Plumfield and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plumfield

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope, side slope
Down-slope shape: Convex

Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 5 inches: silty clay loam
2Btx1 - 5 to 12 inches: silty clay loam
2Btx2 - 12 to 36 inches: silt loam
3Btgb - 36 to 70 inches: silty clay loam

Properties and qualities

Slope: 10 to 18 percent
Depth to restrictive feature: 5 to 20 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Belknap, occasionally flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bluford

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

12A—Wynoose silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t959
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wynoose and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wynoose

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over sangamon age paleosol till

Typical profile

Ap - 0 to 7 inches: silt loam *Eg*
- 7 to 19 inches: silt loam *Btg -*
19 to 36 inches: silty clay
2Btg - 36 to 66 inches: silty clay loam
3Btgb - 66 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 13 to 24 inches to abrupt textural change
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.02 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

13A—Bluford silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t95c
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

13B—Bluford silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t95d
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Ava

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

13B2—Bluford silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95f
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 9 inches: silt loam
Btg - 9 to 32 inches: silty clay
2Btgx - 32 to 47 inches: silty clay loam
2Btg - 47 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 5 to 20 inches to abrupt textural change; 19 to 45 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Ava

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Wynoose

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

14B—Ava silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t95h
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ava and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 6 inches: silt loam

E - 6 to 14 inches: silt loam
Bt - 14 to 34 inches: silty clay loam
2Btx - 34 to 50 inches: silty clay loam
3Btb - 50 to 79 inches: loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

14B2—Ava silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95j
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ava and similar soils: 90 percent
Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 4 inches: silt loam
Bt and E - 4 to 30 inches: silty clay loam
2Btx - 30 to 60 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

14C2—Ava silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95l
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ava, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Eroded

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 9 inches: silt loam
Bt and E - 9 to 28 inches: silty clay loam
Btx - 28 to 36 inches: silty clay loam
2Btx - 36 to 64 inches: silt loam
3Btb - 64 to 78 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford, eroded
Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: 1lm1b
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Ava, severely eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Severely Eroded

Setting
Landform: Till plains
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Peoria and roxana loess over glacial drift

Typical profile
H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 28 inches: silty clay loam
H3 - 28 to 64 inches: silt loam
H4 - 64 to 78 inches: silt loam

Properties and qualities
Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)

Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

518B—Rend silt loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1lm63
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rend and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rend

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 11 inches: silt loam
H3 - 11 to 23 inches: silty clay loam
H4 - 23 to 77 inches: silt loam
H5 - 77 to 80 inches: silt loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None

Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

518C2—Rend silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 1lm65
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Rend, eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rend, Eroded

Setting

Landform: Structural benches
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 23 inches: silty clay loam
H3 - 23 to 77 inches: silt loam
H4 - 77 to 80 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

518C3—Rend silty clay loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 1nbkr
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Rend, severely eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rend, Severely Eroded

Setting

Landform: Structural benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 8 inches: silty clay loam
H2 - 8 to 23 inches: silty clay loam
H3 - 23 to 77 inches: silt loam
H4 - 77 to 80 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Hydric soil rating: No

640B—Bluford silt loam, bench, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1n88v
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford, bench, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 20 inches: silt loam
H3 - 20 to 35 inches: silty clay
H4 - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D

Hydric soil rating: No

640B2—Bluford silt loam, bench, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 1n88t
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford, bench, eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench, Eroded

Setting

Landform: Structural benches
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 27 inches: silty clay
H3 - 27 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

802B—Orthents, loamy, undulating

Map Unit Setting

National map unit symbol: 1lm68
Elevation: 330 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 52 to 57 degrees F
Frost-free period: 170 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Orthents, loamy, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Orthents, Loamy

Setting

Landform position (two-dimensional): Backslope, shoulder, summit
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Earthy fill

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

871B—Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony

Map Unit Setting

National map unit symbol: 1lm6d
Elevation: 360 to 820 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenzburg and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenzburg

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex

Typical profile

H1 - 0 to 3 inches: gravelly silty clay loam
H2 - 3 to 26 inches: silty clay loam
H3 - 26 to 60 inches: gravelly silty clay loam

Properties and qualities

Slope: 2 to 7 percent
Percent of area covered with surface fragments: 0.1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Hydric soil rating: No

871D—Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony

Map Unit Setting

National map unit symbol: 1lm6f
Elevation: 360 to 820 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenzburg, stony, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenzburg, Stony

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mine spoil

Typical profile

H1 - 0 to 3 inches: gravelly silty clay loam
H2 - 3 to 26 inches: silty clay loam
H3 - 26 to 60 inches: gravelly silty clay loam

Properties and qualities

Slope: 7 to 20 percent
Percent of area covered with surface fragments: 0.1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Available water storage in profile: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Hydric soil rating: No

3108A—Bonnie silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrr
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Bonnie, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

Ap - 0 to 10 inches: silt loam
Cg1 - 10 to 27 inches: silt loam
Cg2 - 27 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Belknap

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2tbrv
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Belknap, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belknap, Frequently Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 59 inches: silt loam
Bg - 59 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent

Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Bonnie, frequently flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Piopolis, frequently flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

3420A—Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting
National map unit symbol: 1lm1t
Elevation: 340 to 500 feet
Mean annual precipitation: 38 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 180 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition
Piopolis, frequently flooded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Piopolis, Frequently Flooded

Setting
Landform: Flood plains

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 7 inches: silty clay loam
H2 - 7 to 37 inches: silty clay loam
H3 - 37 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

PART III

Part III

HYDROGEOLOGIC INFORMATION

1) Regional Hydrogeologic Characteristics
As described in Illinois State Geological Survey Circulars 192, 198, 207, 212, 222, 225, 232, 248, Coop 1, etc., other sources or personal knowledge provide the following required hydrogeologic information.

A) Describe the major and minor surficial aquifers of the permit area and adjacent areas.

RESPONSE: **Major surficial aquifers – None**
Minor surficial aquifers - Scattered sand and gravel in the Big Muddy River valley and larger tributaries.

B) List the major and minor drift, bedrock valley, and buried bedrock valley aquifers of the area.

RESPONSE: **Major drift aquifers - None.**
Minor drift aquifers - Drift filled valleys associated with the Big Muddy River and the larger tributaries; and isolated sand and gravel lenses contained within glacial till.
Major bedrock valley aquifers - None.
Minor bedrock valley aquifers – None.
Major buried bedrock valley aquifers – None.
Minor buried bedrock valley aquifers - Big Muddy River Buried Valley system.

C) List the major and minor bedrock aquifers in the area.

RESPONSE: **Major bedrock aquifers - None.**
Minor bedrock aquifers - Pennsylvanian age coal seams, limestones and sandstones; and Mississippian age limestones.

D) List the generalized water yield, supply, and potential use of these aquifers.

RESPONSE: **The proposed Water Management Pipeline permit is located in the glaciated upland area of northwestern Williamson County and southwestern Franklin County. The intake of the Water Management Pipeline is situated at the headwaters of the major drainage system (Pond Creek) of the region. The remaining portion of the Water Management Pipeline continues through the Pond Creek drainage system and crosses into the Big Muddy River drainage system. The outlet of the Water Management Pipeline will be in the Big Muddy River.**

In these areas, no specific geologic unit has been identified as a major surficial aquifer. According to Illinois State Geological Survey (ISGS) Circular 212, "the best potential sources of large supplies of water are sand and gravel deposits in the major valley systems. Unfavorable conditions generally prevail elsewhere because water yielding sand and gravel is absent, the bedrock formations are tight, or the available groundwater is of poor quality". No major aquifers exist in the permit or adjacent area. However, minor surficial aquifers associated with a few drift-filled valleys north and west of the permit area may, in some instances, be capable of supplying enough water for relatively small commercial, industrial, municipal or irrigation purposes. Sand and gravel aquifers, where present, generally yield 20 gallons per minute or more. The Pennsylvanian and Mississippian age bedrock

aquifers can usually provide only enough water for individual domestic supplies. Yields from wells completed in these formations are usually less than 10 gallons per minute with yields less than 5 gallons per minute common. The low permeabilities of the Pennsylvanian System rocks cause the water in the deeper formations to be highly mineralized. Therefore, some deeper bedrock aquifers may contain water whose quality is unsatisfactory without expensive treatment and, generally, are not developed. Recharge to these bedrock aquifers is primarily from precipitation which percolates into and through the overlying unconsolidated materials. Recharge primarily takes place at outcrop areas for the various bedrock units.

2) Area Specific Hydrogeologic Characteristics

A) 1) Provide a description of the areal and structural geology of the permit, shadow area and adjacent areas for the deeper of either the stratum immediately below the lowest coal seam to be mined, or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining. Provide logs showing the lithologic characteristics including physical properties and thickness of each stratum and the location of groundwater where encountered. Provide location and elevations of test borings or core samplings on pre-mining land use map or other designated map.

RESPONSE: N/A. The installation of the pipeline will be a continuous operation of trenching, installation of the pipeline, backfilling the trench and seeding the disturbance. Boring beneath major streams, roads or the interstate will occur in areas where it is not feasible to excavate a trench for the pipeline. No drilling is proposed along the pipeline permit boundary, therefore no disturbance of the bedrock strata is proposed.

Refer to Part IV for additional information concerning the pipeline installation and operation.

2) Provide chemical analyses of each stratum down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining.

The analyses shall identify those strata that may contain acid or toxic-forming or alkalinity-producing materials and determine their content.

RESPONSE: N/A. No coal seam will be mined by this proposed permit.

3) Provide coal seam(s) name and number and an analysis of the coal seam(s) as to total sulfur and pyritic sulfur. On the pre-mining land use, operation, or other designated map show all coal crop lines and the strike and dip of the coal to be mined.

RESPONSE: N/A. No coal seam will be mined by this proposed permit.

4) For room and pillar mining operations, the thickness and engineering properties of clay or soft rocks such as clayshale, if any, in the stratum immediately above and below each coal seam to be mined.

RESPONSE: N/A. No coal seam will be mined by this proposed permit.

5) Applicants may request that the Department waive in whole or in part the information required under questions 2 thru 4 above. Waiver requests should be submitted to the Department for review prior to submission of an application. Applications containing unapproved waiver requests may result in prolonging the application review or in application denial.

RESPONSE: N/A

B) Ground Water Information

1) Provide the location on the hydrologic map or other designated map, and ownership of existing wells, springs, and other ground water resources for the permit area and adjacent area.

RESPONSE: No known existing wells, springs, or other ground water resources are within or adjacent to the Water Management Pipeline permit boundary.

2) Provide a description of seasonal ground water quality including at a minimum the following:

pH
total dissolved solids
hardness
alkalinity
acidity
sulfates
total iron
total manganese
total chlorides

RESPONSE: N/A. No known groundwater monitoring wells are in existence along the proposed permit boundary and no groundwater monitoring wells are proposed by this permit application.

3) Provide a description of seasonal ground water quantity including at a minimum the appropriate rates of discharge or usage and the elevation of potentiometric surface of the coal to be mined, and in each water-bearing stratum above the coal to be mined, and in each water-bearing stratum below the coal to be mined which may be potentially impacted.

RESPONSE: No domestic groundwater users have been identified in the area. Minor surface watercourses characteristically exhibit significant periods of no flow, which is indicative of none to only very limited timeline groundwater contribution to surface water flow at/near the proposed permit boundary. Major surface watercourses characteristically exhibit significant periods of low flow, which is indicative of limited timeline groundwater contribution to surface water flow at/near the proposed permit boundary. Clayey till is deposited across the area, and the till is characteristically underlain by shale. This geologic setting impedes productive groundwater recharge, and inherently provides a hydrogeologic setting where both horizontal and vertical permeabilities are low/very low.

C) Surface Water Information

1) Provide the name, location, ownership, and description of all surface water bodies, lakes, streams, impoundments, and springs within and adjacent to the proposed permit and shadow areas. Provide the location of any discharge or drainage into any surface water bodies listed above.

RESPONSE: There are no known lakes, impoundments or springs within the proposed permit area. Lakes, impoundments, Pond Creek and the Big Muddy River are within 1000 feet of the proposed permit boundary. Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16) for additional information.

2) Provide for surface water bodies listed under 2)(c)(1) above information on surface water quality and quantity sufficient to demonstrate seasonal variation and water usage.

a) Water quality description shall include at a minimum, baseline information as follows:

pH
total suspended solids
total dissolved solids
alkalinity
acidity
sulfates
total iron
total manganese
total chlorides

RESPONSE: No sampling has been collected from outlying lakes, impoundments, springs, Pond Creek or the Big Muddy River.

b) Water quantity description shall include at a minimum base information on seasonal flow rates.

RESPONSE: Refer to Attachment III.2.C.2. for information on flow rates for the Big Muddy River collected by the USGS gaging station upstream of the Water Management Pipeline discharge point. No gaging station is located on Pond Creek.

D) Protection of Hydrologic Balance

1) The applicant shall provide a determination of the probable hydrologic consequences, (PHC) on the proposed permit area, proposed shadow area, and adjacent areas with respect to the hydrologic regime and water quality and quantity in surface and ground water systems under all seasonal conditions. The determination of PHC shall include findings on the following:

a) Will the proposed operation have adverse impacts to the hydrologic balance;

RESPONSE: Existing surface water runoff from the Water Management Pipeline permit area is primarily through unnamed tributaries of Pond Creek, Pond Creek, unnamed tributaries of Big Muddy River and Big Muddy River. Minimal disturbance will be involved with the trenching operation and installation of the pipeline, so there will be no changes to the surface water and ground water systems, drainage patterns and storm water runoff characteristics.

Water Management Pipeline Impacts to Groundwater

It is not anticipated that the Water Management Pipeline will impact groundwater resources. The HPDE pipe will have a minimum pressure rating of 125 psi, heat fused joints and limited mechanical connections. A leak detection system will be incorporated into the installation of the pipeline. See Attachment IV.1 for pipeline and installation details.

Existing Groundwater Quality

No groundwater quality information is available for the Water Management Pipeline permit area.

Adjacent Permits 375 and 417

As part of the underground mining operation for Permit 375, native groundwater is produced from overlying sandstone units, allowing this water to infiltrate into the mine (mine infiltration water). The majority of the mine infiltration water is believed to be coming from the Anvil Rock or Gimlet Sandstone units. The vertical stratigraphic interval between the Herrin No. 6 Coal Seam roof and the base of the Anvil Rock Sandstone varies between approximately 10 feet and 60 feet. The unit is normally discontinuous and is commonly thin with thicknesses within the mining area ranging between 0 feet thick to a very rare excursion thickness of 48 feet. As would be expected, the smallest vertical intervals between the seam roof and base of that sandstone characteristically occur at those few locations where the Anvil Rock Sandstone attains its greater thickness. During longwall panel extraction the caved zone above the mined panels most likely extend into the Anvil Rock Sandstone horizon. The Anvil Rock Sandstone is normally discontinuous, and it does not have a significant potential to be a hydrostratigraphic unit that provides water sufficient for consideration as an aquifer. As even further evidence of this assertion, the inventory of groundwater users within the area has identified no water supply well penetrating down into or anywhere in close proximity above the Anvil Rock Sandstone horizon.

aThe vertical stratigraphic interval between the Herrin No. 6 seam roof and the The vertical stratigraphic interval between the Herrin No. 6 seam roof and the base of the Gimlet Sandstone varies between approximately 78 and 131½ feet, and averages 103 feet. This sandstone characteristically appears shortly above the top of the Piasa Limestone. However, in a few locations it seems that this sandstone truncates the Piasa Limestone and may extend to depths approaching 15 feet below the base of the Piasa horizon. The locations at which these very infrequent and localized occurrences are evident are where the Gimlet Sandstone attains its greatest thickness. Potentially, these localized thicknesses may be indicative of relict sandstone channel deposits.

The typically thin sandstone deposition, the occurrence of multiple sandstone/shale interbeds, the lack of lateral continuity of sandstone bedding across the focus area, and the very localized presence of any areas of appreciable sandstone thickening are not conducive for portraying the Gimlet Sandstone as having potential to be a hydrostratigraphic unit that may provide water sufficient for consideration as an aquifer. The inventory of groundwater users within the general area has identified only one well as potentially penetrating down near the Gimlet Sandstone horizon. That well, reported to be 350 feet deep, is envisioned to have only been drilled to such a depth in order to provide additional reservoir storage either because the well yield was low or else the owner wanted to attempt further measures toward

increasing general storage capacity. The water well use for this well is "Gardening", and the primary water supply for the residents is denoted as being from a public water source.

The infiltrating groundwater is from a saline zone and the chloride and sulfate content of this water typically exceeds the water quality standard allowed to be discharged into receiving waters. The chloride concentration values of the mine water range between 1,099 mg/L and 2,799 mg/L, depending on the location of the water underground. The average chloride concentration of the samples taken is 2,237 mg/L. The sulfate concentration of the infiltrating water also depends upon the location of the water underground. The sulfate values range between 1,720 mg/L and 2,120 mg/L. The average sulfate concentration of the samples taken is 1,940 mg/L.

The current total daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2,700,000 gallons per day. An anticipated maximum flow rate of infiltration water from the mine is 3,500,000 gallons per day. This water will continue to be managed through water management processes. Mine infiltration water will be pumped to the proposed Permit 375 Water Holding Cells for discharge through the diffuser at the Big Muddy River (Outfall 011). As alternatives, the infiltration water can be pumped to the Fresh Water Lake for use in the Preparation Plant or the Slurry Impoundment if needed.

Due to the finite capacity to store water, a mixing zone is being requested in the Big Muddy River to optimize the water management system onsite. An inability to dispose of water infiltrating the mine poses a serious safety risk to the miners working underground, a serious environmental risk in holding back water properly, and a serious risk of property damage due to the potential of flooding the mine, which has cost hundreds of millions of dollars to develop.

<u>Cumulative Hydrologic Impact Area</u> – The cumulative impact area (CIA) is defined as the area, including the proposed permit area, within which impacts resulting from the proposed mining operation may interact with the impact of all anticipated mining on surface and groundwater systems. The Cumulative Impact Area (existing and proposed) is broken down into four areas as shown on Drawing No. B17-222-E2 entitled "Cumulative Impact Areas – Proposed Water Management Pipeline, Permit 375, Permit 375 IBR and Permit 417.

- **Area No. 1 is the proposed Water Management Pipeline and is a total of 70.7 acres.**
- **Area 2 is the currently permitted area for Permit 375 which is contiguous to the 417 permit area and is 554.94 acres of the 703.3, and consists of a deep mine opening, preparation plant, coal refuse disposal facility, and associated structures.**
- **Area No. 3 is the proposed Permit 375 IBR for the proposed Water Holding Cells and is a total of 17.7 acres.**
- **Area No. 4 is the area permitted for Permit 417 and is 229.78 acres.**

- **The surface water Cumulative Impact Area for the Williamson Energy's Pond Creek Mine permit areas are established as these four areas plus the upstream drainage area associated with the unnamed tributary to Pond Creek as well as the downstream watershed of these areas to PC-2. PC-2 is the most downstream point in Pond Creek that mining related impacts are expected to occur.**

- **The groundwater Cumulative Impact Area for the Pond Creek Mine permit areas are the same area as the surface water Cumulative Impact Area. Shallow groundwater flow mimics the surface water flows and the delineated impact area includes the areas in which the potential groundwater flow paths could be impacted. Furthermore, low permeability liners have been installed for all areas within the permit area which come in contact with coarse or fine coal refuse and for drainage structures which receive runoff from coarse or fine coal refuse. This low permeability liner will inhibit the vertical migration of contaminants associated with coarse and fine coal refuse and will therefore lessen the potential for groundwater contamination from the permit area. A low permeability liner is proposed for the Water Holding Cells proposed by the Permit 375 IBR application.**

- **The Water Management Pipeline area has been included in this analysis, however no impacts are anticipated to surface water and groundwater qualities and quantities. Therefore no changes will occur to the currently approved Cumulative Impact Area.**

- **Although the Cumulative Impact Area Map indicates surface mining in the southern area below Herrin, IL, the area have been reclaimed for several years. The only current mining operations in the Pond Creek watershed is the Permit 375, Permit 417 and the proposed Water Management Pipeline.**

Receiving Streams

The primary receiving stream for the proposed Water Management Pipeline, Permit 375, Permit 375 IBR and Permit 417 is Pond Creek of the Big Muddy River. All the permit areas are located near the headwaters of Pond Creek, except for the Water Management Pipeline, which traverses across the watershed.

Water Management

Alternate sediment control measures in the form of silt fence, hay bales and vegetation will be used for the proposed Water Management Pipeline.

The drainage area for Pond Creek watershed and including the Cumulative Impact Areas is estimated to be approximately 64,591 acres. Considering a total proposed Water Management Pipeline permit area located within watershed of 70.7 acres, the proposed permit area represents approximately 0.1% of the Pond Creek drainage area. The short-term disturbance associated with the pipeline installation will not impact the surface water and ground water systems, drainage patterns and storm water runoff characteristics.

Surface Water Sampling Points

There are six surface water sampling points associated with the proposed Cumulative Impact Area, which are described as follows.

Sites C1 and C2 are in two forks of the eastern unnamed tributary of Pond Creek. These sites are south of the proposed permit area and are upstream of any proposed disturbance.

Site PC-4 is an unnamed tributary of Pond Creek below the confluence of C1 and C2 and is on the southeast corner of the Permit 417 area and is upstream of any proposed disturbance.

Site PC-3 is Pond Creek upstream of the confluence of the eastern unnamed tributary of Pond Creek.

Site PC-1 is Pond Creek downstream of the eastern unnamed tributary which flows through Permit 375 area and the upstream site for the proposed Permit 375 Water Holding Cells IBR.

Site PC-2 is Pond Creek downstream of the western unnamed tributary which flows through the Permit 375 area and the downstream site for the proposed Permit 375 Water Holding Cells IBR.

Sites PC-1 and PC-2 are the only sites that will be associated with the Water Management Pipeline permit area.

No other surface water monitoring sites are known to exist.

Groundwater Monitoring Sites

There are 18 groundwater wells in the vicinity of the Permits 375, Permit 375 IBR and 417. The following is a description of each:

- **GW-1 is northwest of the Permit 375 area and is down gradient of all surface disturbance and is associated with Permit 375.**
- **GW-2 is northwest of Refuse Area No. 1 and Refuse Area No. 2 and is associated with Permit 375.**
- **GW-1 and GW-2 are down gradient wells which are not located near any coal stockpiles, sediment control structures or coal refuse facilities, and is associated with Permit 375.**
- **GW-4 is on the southwest corner of the permit area near the railroad loop and is associated with Permit 375.**
- **GW-5 is on the south side of permit area between the railroad loop and soil stockpile and is associated with Permit 375.**
- **GW-4 and GW-5 are up gradient wells that are not located near any coal stockpiles, sediment control structures or coal refuse disposal facilities, and is associated with Permit 375.**
- **GW-8R is on the south side of Refuse Area No. 1 and will be at the intersection of the proposed Refuse Facility No. 3 when constructed, and is associated with Permit 375.**

- **GW-9 is on the west side of Refuse Facility No. 2 and is associated with Permit 375.**
- **GW-10 is on the west side of Refuse Facility No. 2 and is associated with Permit 375.**
- **GW-11 is located on the north side of Refuse Area No. 2, and is associated with Permit 375.**
- **GW-12 is located on the north side of the proposed Refuse Facility No. 3 at the intersection of Refuse Area No. 2, and is associated with Permit 417.**
- **GW-13 is located on the north side of Refuse Area No. 3 and adjacent to a proposed sediment control structure, and is associated with Permit 417.**
- **GW-28 is located near the south east corner of Refuse Area No. 3, and is associated with Permit 375.**
- **GW-9, GW-12, GW-13, and GW-28 are wells around the perimeter and in close proximity to the coal refuse disposal facility.**
- **GW-29 through GW-32 are located on the corners of the area where geotextile tubes were used for coal refuse disposal.**
- **GW-33 through GW-35 are located upstream (up dip) and downstream (down dip) of the proposed Permit 375 Water Holding Cells IBR.**

No other ground water monitoring sites are known to exist.

b) Are acid forming or toxic forming materials present that could result in contamination of surface and/or ground water supplics;

RESPONSE: **No known potentially acid-forming material is present within the boundary of the proposed permit area.**

c) Will the proposed operation result in contamination, diminution or interruption of an underground or surface source of water within the proposed permit or adjacent areas which is used for legitimate purposes; and

RESPONSE: **As stated in Part III.2.D.1.a. and b. above, the proposed Water Management Pipeline is not expected to contaminate, reduce, or interrupt any underground or surface source of water of anyone within the proposed permit or adjacent areas.**

d) What impact(s) will the proposed operation have on including, but not limited to the following parameters:

i) Sediment yield from the disturbed area;

RESPONSE: **Sediment yield will increase somewhat from the disturbed area during construction of the Water Management Pipeline. However, alternate sediment control measures will limit the off-site sediment movement to an acceptable amount. With the completion of the pipeline installation, reclamation will be completed as well. Upon achieving vegetative cover, sediment yield is expected to return to approximate pre-mining levels.**

ii) Acidity;

RESPONSE: **Acidity levels are not expected to increase by the proposed Water Management Pipeline.**

iii) Total suspended solids;

RESPONSE: **Total suspended solids, like sediment yields, will increase somewhat during construction and early reclamation activities. However, drainage from disturbed areas will be passed through alternate sediment control measures. With the completion of the pipeline installation, reclamation will be completed as well. Upon achieving vegetative cover, total suspended solids should return to approximate pre-mining levels.**

iv) Total dissolved solids;

RESPONSE: **Since long-term disturbance is not prpopsed, total dissolved solids should not increase in both groundwater and surface water.**

v) Flooding or stream flow alterations;

RESPONSE: **The proposed Water Management Pipeline should not cause or aggravate downstream flooding. A relatively small area of the Pond Creek watershed will be affected.**

vi) Availability of surface and ground water; and

RESPONSE: **The proposed Water Management Pipeline is not expected to alter the availability of surface or ground water.**

2) The Department will review permit revision applications to determine whether a new or updated PHC determination will be needed. Prior to submission of a permit revision application, applicants must contact the Department for this determination. Sufficient information on the proposed revision must be submitted with the request for the PHC determination to allow the Department to make its determination.

RESPONSE: **This application is for a new permit.**

3) Surface Water Monitoring Program

a) Has an N.P.D.E.S. permit been applied for? Yes ___X___ No _____

RESPONSE: **A NPDES permit modification has been submitted to IEPA for review.**

b) 1) Has an N.P.D.E.S. permit been obtained? Yes _____ No ___X___

If yes, give the permit number, the date issued, the expiration date, and the number of discharge points monitored. If additional discharge points are proposed by this application, list discharge numbers. Locate on the Water Monitoring Map and number all discharge points for the proposed permit area.

2) In accordance with 35 Ill. Adm. Code 406.101(b), is the applicant requesting that monitoring and reporting be on the basis of grab samples?

Yes ___X___ No _____

c) Are N.P.D.E.S. reports to be submitted to satisfy the reporting requirements?

Yes ___X___ No _____

If yes, provide the NPDES monitoring program including sampling method, sampling frequency and parameters to be analyzed. If not, submit a proposed monitoring and reporting program. Discharge information sheet is given in Schedule A and/or form 2C or 2D. Schedule A should be completed for all proposed discharge points. An estimate of the expected discharge concentration for each listed parameter must be indicated (or marked N/A) and a basis for that estimation provided.

RESPONSE: **No discharges are proposed for the Water Management Pipeline, except for the discharge from the diffuser located in the Big Muddy River. Refer to Part IV of the application on how this will be accomplished.**

Refer to Attachment III.2.D.3.c for the Schedule A information.

If ammonia is to be utilized in wastewater treatment, indicate the discharge(s) resulting from this treatment and provide an estimate of the expected concentration (mg/l) of ammonia nitrogen (as N) from the discharge(s).

RESPONSE: **N/A. Ammonia will not be used for the treatment of wastewater.**

d) Give a brief description of the water sampling and flow measurement equipment which will be used to monitor the discharges.

RESPONSE: **No discharges are proposed for the Water Management Pipeline.**

e) List the name and address of the laboratories which will perform the effluent and ground water sampling analyses.

RESPONSE: **N/A. No discharges are proposed for the Water Management Pipeline, except at the diffuser site.**

f) Discuss the expected impact this mining operation will have on surface water flows and quality and the effect this will have on downstream water uses.

RESPONSE: **It is not anticipated that the Water Management Pipeline will have any impact on surface water flows and/or quality and currently there are no known downstream water users on the Pond Creek and Big Muddy River receiving streams.**

g) Is this proposed mining area covered by existing IEPA Subtitle D permits?

Yes _____No ___X___

If yes,

1) List the permit number(s)

_____

_____

_____

2) Do the proposed mining boundaries exactly coincide with IEPA permitted boundaries?

Yes ___X___ No _____

(If no, delineate the IEPA Subtitle D permitted boundaries on the Water Monitoring Map).

h) Are the TDS related conditions requested under 35 Ill. Adm. Code 406.203 (from water quality requirements of Subtitle 3 for the discharge of total dissolved solids, chloride, sulfate, iron and manganese)?

Yes _____ No ___X___

If yes, provide the following:

1) Show that the discharge(s) will not cause an adverse effect on the environment in and around the receiving stream, by either:

RESPONSE: N/A. Code 406.203 was repealed effective September 8, 2008.

a) Demonstrating that the discharge will contain a concentration less than or equal to 3,500 mg/l sulfate and 1,000 mg/l chloride; or,

RESPONSE: The purpose of the Water Management Pipeline and the diffuser is to discharge high concentrations of sulfates and chlorides. Sampling location for the diffuser discharge will be based on the IEPA requirements. There are no public water supplies are near the proposed Water Management Pipeline discharge; therefore no adverse effects are anticipated.

b) through actual stream studies.

RESPONSE: N/A. There are no stream studies in the vicinity of the Water Management Pipeline.

2) Show that the discharge(s) will not adversely affect any public water supply.

RESPONSE: There no known public water supplies located near the Water Management Pipeline. The public water supply for this area originates from Rend Lake, over 10 miles to the northwest.

3) Provide a detailed discussion of how you intend to comply with the good mining practices of 35 Ill. Adm. Code 406.204.

RESPONSE: The Water Management Pipeline will have minimal disturbance and will be reclaimed as part of the installation operation. The only discharge associated with the pipeline will be the diffuser located in the Big Muddy River.

4) Ground Water Monitoring Program

a) Describe in detail a proposed monitoring plan that will measure the amount and duration of any changes to the ground water system resulting from the mining operation.

Parameters to be monitored are given in Schedule B. Monitoring should be on a quarterly basis with reports due within one month of the end of each quarter as follows:

Quarter	Report Due
January, February, March	May 1
April, May, June	August 1
July, August, September	November 1
October, November, December	February 1

RESPONSE: **No groundwater monitoring sites are proposed for the Water Management Pipeline.**

b) Provide a drilling log and completion information and/or a diagram of each well proposed as a monitoring well.

RESPONSE: **N/A. There are no wells existing or proposed, therefore there are no logs or completion forms.**

c) Locate wells and springs, on or within 1/2 mile of the permit area and shadow area on a hydrologic map. If any of these wells are to be employed for monitoring, designate on hydrologic map and complete Schedule B.

RESPONSE: **There are no known wells and springs on or within ½ mile of the Water Management Pipeline permit boundary.**

d) Discuss any reported problems of maintenance, or ground water quantity and quality which have occurred at the wells and springs listed above.

RESPONSE: **There are no known or reported water quality problems that have occurred.**

e) Will this operation have any discharges to, or pump water from abandoned underground mines?

Yes _____ No __X_____

If yes, submit a detailed discussion.

5) Identify the general land uses of the watersheds upstream of the proposed permit area and any potential pollution sources which could significantly affect the stream quality at the mine area.

RESPONSE: **The upstream and adjacent land uses include industrial (mining operations), forest, cropland and rural residential. Runoff from agricultural fields could contain herbicides and pesticides used in the farming operations. In relation to the Water Management Pipeline, Pond Creek stream quality should not affected because mine water will be pumped to the diffuser site located in the Big Muddy River. Refer to Attachment IV.1 for additional information.**

6) Provide names and addresses of all public water supplies within ten miles of the proposed permit boundaries.

Name	Location	Distance from Mine Boundary	Type (surface or well)
Corinth Water District	**21551 Corinth Rd. Thompsonville, IL 62890**	**10 miles**	**Surface**
Plumfield Water District	**2092 Plumfield Road West Frankfort, IL 62896**	**1.5 miles**	**Surface**

RESPONSE: **The proposed permit area is served with public utility water by the Corinth Water District and the Plumfield Water District. The source of the water supply for both districts is Rend Lake, which is approximately 11 miles from the Water Management Pipeline and is located in the Big Muddy River upstream of the Water Management diffuser site.**

7) Discuss the possible effects that this mining operation will have on the above-listed public water supplies and explain what precautions will be taken to prevent an adverse impact from occurring.

RESPONSE: **No impacts are expected from the Water Management System. The Corinth and Plumfield Water Districts receive water from Rend Lake, which is located upstream of the Water Management diffuser site.**

8) Locate on the hydrologic map or other designated map all private water supplies and private water wells within 1/2 mile of permit area and within the permit and shadow areas itself.

RESPONSE: **Refer to the Hydrologic - Mining Operations Map – Sheet 1 (Drawing No. B17-222-M13).**

9) Locate on the hydrologic map existing surface and ground water discharges into underground mines.

RESPONSE: **Infiltration of groundwater enters the Pond Creek 1 mine (adjacent Permit 375). Currently, no surface or groundwater discharges are pumped into the underground mine.**

10) Provide the locations of water supply intakes for current users of surface water flowing into, out of, and within a hydrologic area defined by the Department.

RESPONSE: **There are no known water supply intakes for current users of surface water flowing into, out of, and within a hydrologic area defined by the Department.**

R07655

PART III
ATTACHMENT III.2.A.1
FOUNDATION SOIL BORINGS

STRUCTURE FOUNDATION SOIL BORINGS
BIG MUDDY MIXING ZONE DISCHARGE SITE
FREEMAN SPUR, ILLINOIS

Prepared for:

Williamson Energy, LLC
211 North Broadway, Suite 2600
St. Louis, Missouri 63102

Prepared by:

HOLCOMB FOUNDATION ENGINEERING CO.
Carbondale, Illinois

May 11, 2016

HFE File Number: H-16080

TABLE OF CONTENTS

	PAGE
REPORT	1-4
BORING LOCATION DIAGRAM	5
BORING LOGS (3)	6-8
SEISMIC RESPONSE SPECTRUM	9
GENERAL NOTES	10
UNIFIED SOIL CLASSIFICATIONS	11

Holcomb Foundation Engineering Co., Inc.

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

393 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

May 11, 2016

Williamson Energy
211 North Broadway, Suite 2600
St. Louis, Missouri 63102

Attention: Mr. Josh Phillips, P.E.

Re: Structure Foundation Soil Borings
Big Muddy Mixing Zone Discharge Site
Freeman Spur, Illinois
HFE File H-16080
Purchase Order No. 4500124452

Dear Sir:

In accordance with your instructions, we have performed the soil borings and engineering analysis for the above referenced project. This project is to consist of construction of a new discharge site for Mach Mine on the east side of Lake Creek Road northwest of Freeman Spur, Illinois.

On May 4, 2016, we drilled three soil borings for the new discharge site. The borings were staked by Mach Mine personnel prior to our arrival on site. The borings were advanced into bedrock. During drilling operations, the subsoils were sampled with a split barrel-sampling device (ASTM D-1586) at 2.5 and 5.0 foot intervals. The existing ground water depths in the boreholes were also measured, if encountered.

In our laboratory, the soil samples were subjected to visual classifications and moisture content determinations. Unconfined compressive strength tests were performed on all cohesive soil samples. The results of all field and laboratory tests are summarized on the enclosed Boring Logs.

The subsurface profile at this site consists of 3.5 to 4.0 inches of topsoil overlying 38 feet of gray mottled brown fat clay to silty clay (CH to CL classification). Below the fat clay lies gray sandy clay (CL) and sand (SP), that overlies gray shale bedrock. The shale lies at depths of about 45 to 48 feet. All borings were terminated in the dense shale bedrock. During drilling operations, groundwater was encountered at a depth of about 23.5 feet during drilling operations and at about 18 feet upon completion.

The gray mottled brown fat clay is firm to stiff, with unconfined compressive strengths ranging from 0.4 to 4.6 tons per square foot, averaging 2.3 tsf. Moisture contents vary from 25 to 42 percent, averaging 33 percent. These soils have a medium to high settlement potential due to their high plasticity.

The gray sandy clay is soft to firm, with unconfined compressive strengths ranging from 0.3 to 0.6 tons per square foot, averaging 0.5 tsf. Moisture contents vary from 23 to 24 percent. These soils have a moderate settlement potential.

The sand encountered below about 43 to 44 feet has a firm relative density, with standard penetration test values of 21 to 24 blows per foot, averaging 22 bpf. Moisture contents vary from 20 to 23 percent, averaging 22 percent. These soils have a low settlement potential.

The shale is very dense, with standard penetration test values in excess of 60 blows per foot. Moisture contents average 10 percent. The shale has a very low settlement potential.

Based upon the seismic design criteria provided by the I.B.C., the subsoils have a site classification type "D" profile. Based upon this profile, the spectral response acceleration coefficients have been determined as follows:

0.2 Second Period: $S_{Ms} = 0.797$ g x 1.182 (Soil Factor F_a) = 0.942

1.0 Second Period: $S_{M1} = 0.273$ g x 1.857 (Soil Factor F_v) = 0.507

The recommended design spectral response factors are as follows:

$S_{DS} = 0.628$ g $\qquad$ $S_{D1} = 0.338$ g

It is understood the project will include construction of a new discharge facility at this location. The surface structures at this site may be supported upon isolated spread and continuous wall footings. A maximum net allowable soil bearing pressure of up to 2000 pounds per square foot may be used to dimension footings founded at a minimum depth of 2.5 feet for frost protection. The footings should also have a minimum width of 24 inches to avoid a punching type failure of the foundations.

Settlements of the footings founded on the clayey subsoils are dependent upon the structural loadings. The settlements can be estimated if the weight of the structure is provided, but preliminary estimates indicate a 50-kip load will experience settlements ranging from about 1.5 to 3.0 inches. This is due to the highly plastic clay encountered at this site.

Prior to placement of concrete in the footing excavations, it is recommended all foundation excavations are probed by a representative of the geotechnical engineer to assure the footings are founded on competent subsoils. If undercut, the excavations may be backfilled with a lean concrete, flowable fill, or a well compacted CA-6 crushed limestone. Any free water should also be removed from the excavations prior to concrete placement.

The proposed heavy structures at this site may be supported upon steel H piling. The most common piling used in this area consists of 10" x 42 lb., 12" x 53 lb., 12" x 63 lb. or 14" x 73 lb. steel HP piles. The piles should be sized and spaced according to current LRFD design in coordination with the pile tables enclosed. Once the necessary factored resistance available (Rf) is determined from the structural loadings, the nominal required bearing (Rn) can be determined using these tables. If driven into the bedrock at this site, factored resistances and pile tip elevations are estimated as follows:

Pile Factored Resistances:

Pile Size	Rn (kips)	Seismic Rf (kips)	Rf (kips)
HP 10 x 42	335	184	335
HP 12 x 53	418	230	418
HP 12 x 63	497	273	497
HP 14 x 73	578	318	578

Pile tip depths for the above resistances are estimated at each boring location as follows:

Boring No.	Pile Tip Depth (ft.)
1	332.5
2	333.0
3	331.0

Our experience in this area has been pile tip elevations have been seated at about three feet into shale bedrock. However, the bearing resistance should be determined for each pile based upon the WSDOT Pile Driving Formula.

Enclosed herewith are the Boring Location Diagram, Boring Logs, and Seismic Response Spectrum sheet. If you should have any questions, or if we can be of further assistance, please feel free to contact us at your convenience.

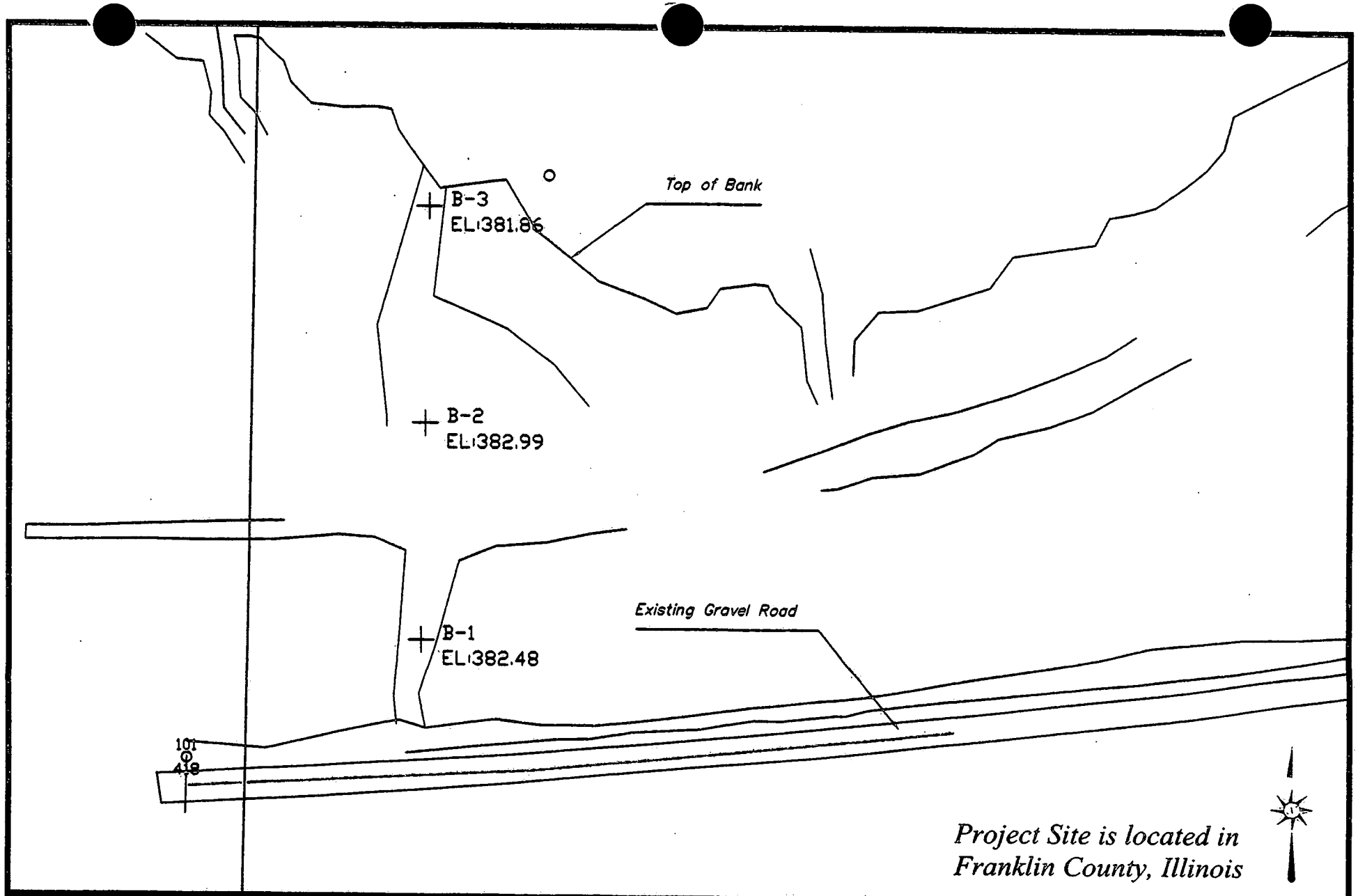
Sincerely,

HOLCOMB FOUNDATION ENGINEERING CO.

Scott G. Holcomb, E.I.

Timothy J. Holcomb, P.E.





WILLIAMSON ENERGY LLC
POND CREEK #1 MINE
PO BOX 99, JOHNSTON CITY, ILLINOIS 62951

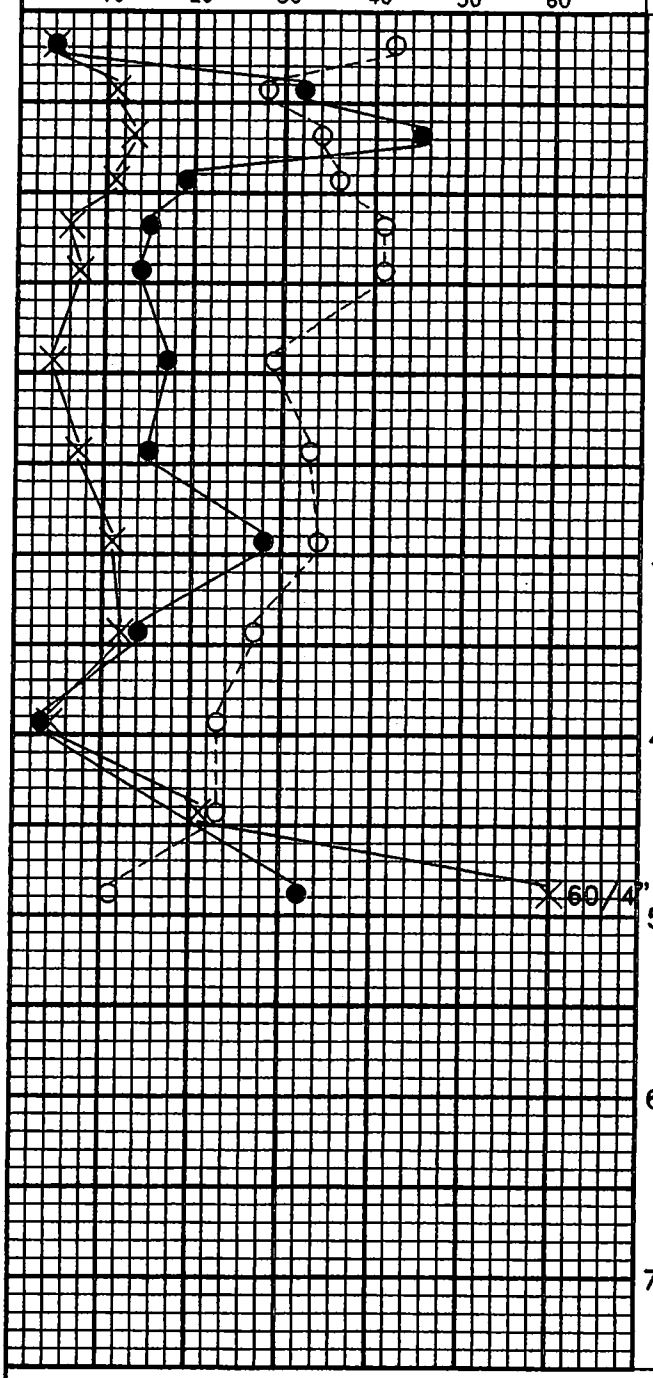
BIG MUDDY MIXING ZONE DISCHARGE SITE - BORINGS

Drawn By: JLP
Date: May 11, 2016

R07663

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING 1



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation **382.48**
	1	ss		3.5" Topsoil
				Gray Mottled Brown CLAY (CH)
	2	ss		
	3	ss		
10	4	ss		
	5	ss		
	6	ss		
20	7	ss		Brown Silty CLAY (CL)
	8	ss		Brown Mottled Gray CLAY (CH)
30	9	ss		
	10	ss		
40	11	ss		Gray Sandy CLAY (CL)
	12	ss		Gray SAND (SP)
				Gray SHALE
50	13	ss		End of Boring @ -49.0'
60				
70				

Ground Water Data
Water Encountered @ -23.5' During Drilling and @ -18.0 feet Upon Completion

Project: Mach Mine Discharge Site Freeman Spur, Illinois	Date of Boring May 4, 2016
Client: Williamson Energy St. Louis, Missouri	Project No. H-16080

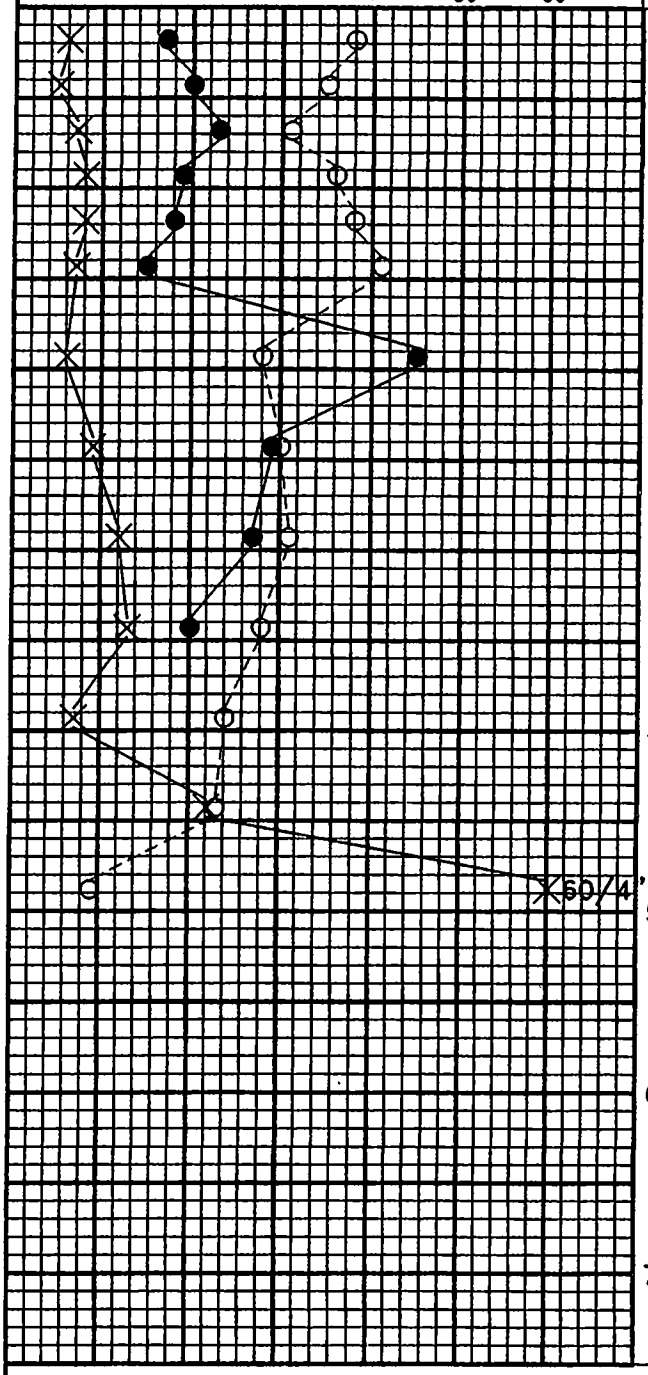
Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING 2

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation **382.99**
	1	ss		4" Topsoil
				Gray Mottled Brown CLAY (CH)
	2	ss		
	3	ss		
10	4	ss		
	5	ss		
	6	ss		
20	7	ss		Brown Silty CLAY (CL)
	8	ss		
30	9	ss		Gray Mottled Brown Silty CLAY (CL)
	10	ss		Brown Silty CLAY (CL)
40	11	ss		Gray Sandy CLAY (CL)
	12	ss		Gray SAND (SP)
	13	ss		Gray SHALE
50				End of Boring @ -49.0'
60				
70				

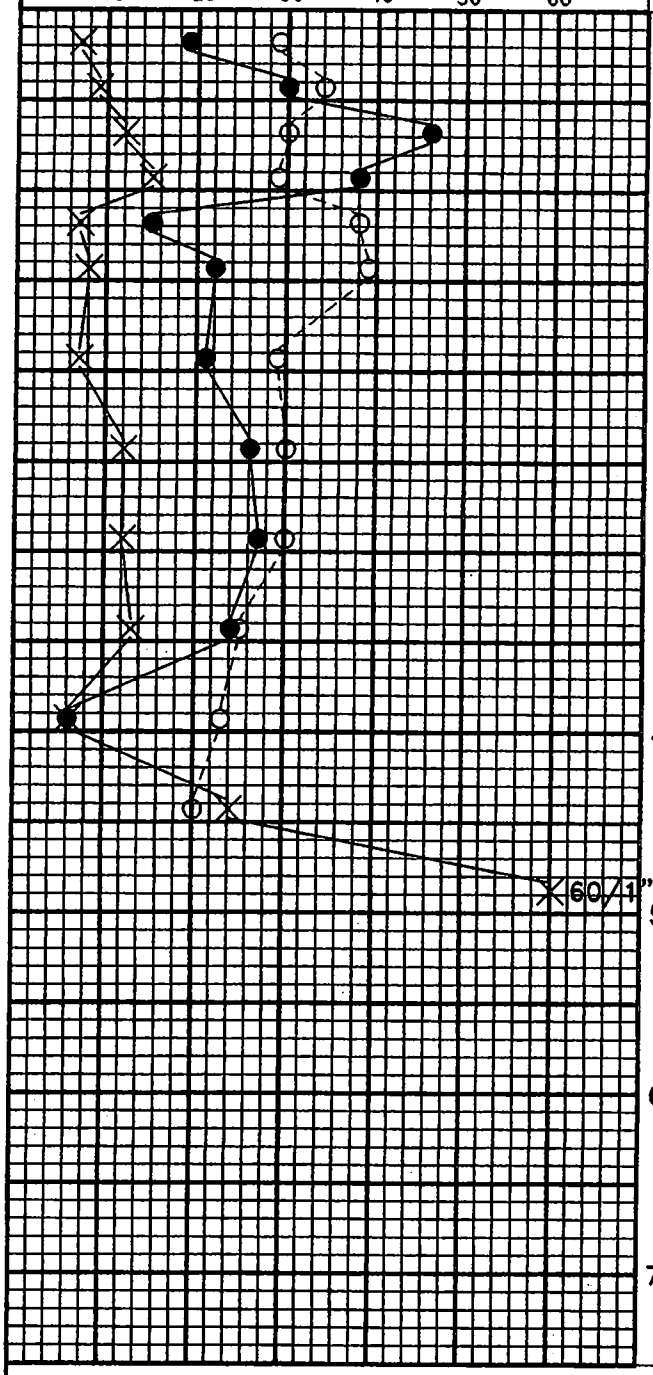
Ground Water Data
Water Encountered @ -23.5' During Drilling and @ -19.0 feet Upon Completion

Project: Mach Mine Discharge Site Freeman Spur, Illinois	Date of Boring May 4, 2016
Client: Williamson Energy St. Louis, Missouri	Project No. H-16080

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING 3

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6
Water Content (%)
Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 381.86
	1	ss		4" Topsoil
	2	ss		Gray Mottled Brown CLAY (CH)
	3	ss		
10	4	ss		
	5	ss		
	6	ss		
	7	ss		Brown Silty CLAY (CL)
20				
	8	ss		Gray Mottled Brown Silty CLAY (CL)
30	9	ss		
	10	ss		
	11	ss		Gray Sandy CLAY (CL)
40				
	12	ss		Gray SAND (SP)
	13	ss		Gray SHALE
50				End of Boring @ -49.0'
60				
70				

Ground Water Data
Water Encountered @ -23.5' During Drilling and @ -18.0 feet Upon Completion

Project: Mach Mine Discharge Site
Freeman Spur, Illinois

Date of Boring
May 5, 2016

Client: Williamson Energy
St. Louis, Missouri

Project No.
H-16080

R07667

USGS Design Maps Summary Report

User-Specified Input

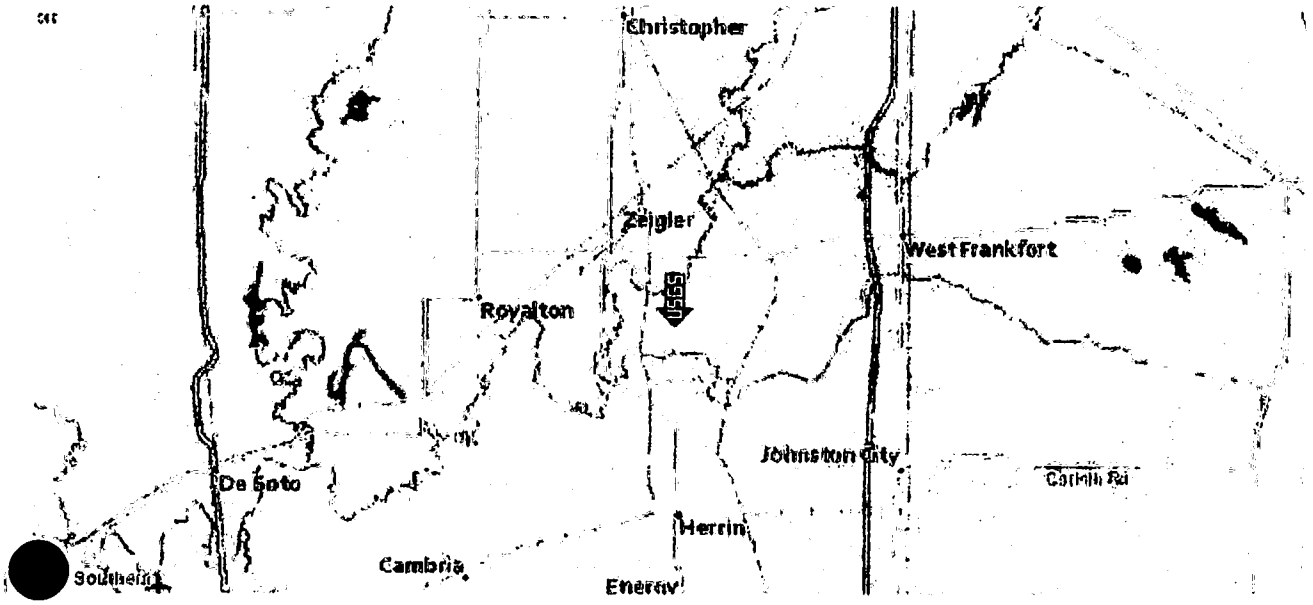
Report Title H-16080 Mach Mine Discharge Site
Mon May 9, 2016 16:22:55 UTC

Building Code Reference Document 2012 International Building Code
(which is based on USGS hazard data available in)

Site Coordinates 37.87606°N, 89.03025°W

Site Soil Classification Site Class D – "Stiff Soil"

Risk Category I/II/III

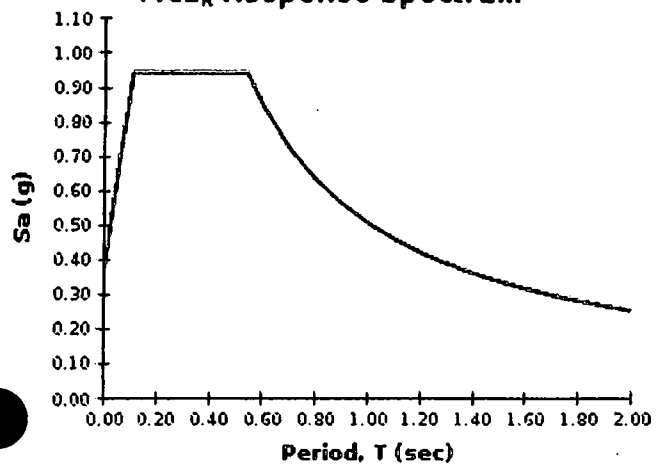


USGS-Provided Output

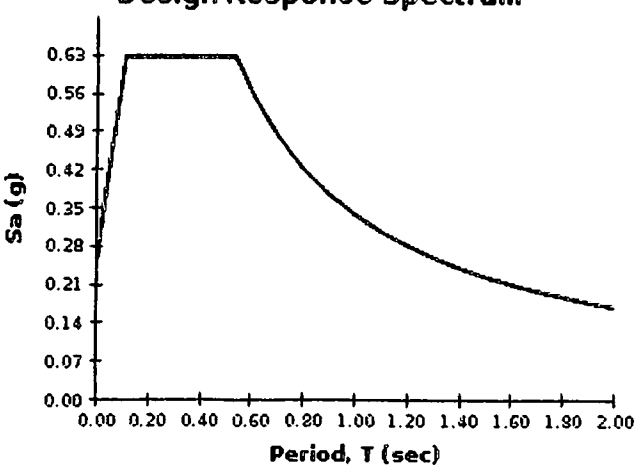
S_S =	0.797 g	S_{MS} =	0.942 g	S_{DS} =	0.628 g
S_1 =	0.273 g	S_{M1} =	0.507 g	S_{D1} =	0.338 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



GENERAL NOTES

SAMPLE INDENTIFICATION

The Unified Classification System is used to indentify the soil unless othwerwise noted.

RELATIVE DENSITY & CONSISTENCY CLASSIFICATION

TERM (NON-COHESIVE SOILS)	BLOWS PER FOOT
Very Loose	0-4
Loose	5-10
Firm	11-30
Dense	31-50
Very Dense	Over 50

TERM (COHESIVE SOILS)	QU (tsf)
Very Soft	0.00- 0.25
Soft	0.25-0.50
Firm	0.50-1.00
Stiff	1.00-2.00
Very Stiff	2.00-4.00
Hard	4.00+

DRILLING & SAMPLING SYMBOLS

ss:	Split Spoon-	1 3/8" I.D., 2" O.D.
st:	Shelby Tube-	2.80" I.D., 3" O.D.
au:	Auger Samples	
cs:	Continuous Sampling	2.0" I.D

SOIL PROPERTY SYMBOLS

●	Unconfined Compressive Strength, Qu (tsf)
+	Penetrometer Value, (tsf)
	Plastic Limit (%)
O	Water Content (%)
	Liquid Limit (%)
X	Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2" O.D. Split Spoon

PARTICLE SIZE

Boulders	8in +	Medium Sand	0.6mm to 0.2mm
Cobbles	8in to 3in	Fine Sand	0.2mm to 0.74 mm
Gravel	3in. to 5mm	Silt	0.074mm to 0.0005mm
Coarse Sand	5mm to 0.6mm	Clay	Less Than 0.005mm

UNIFIED SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		GRAVELS WITH FINES	GM	Silty gravels, gravels-sand silt mixtures
			GC	Clayey gravels, gravel-sand clay mixtures
		CLEAN SANDS	SW	Well-graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, clay-sand mixtures
FINE GRAINED SOILS	SILTS AND CLAYS LOW PLASTICITY		ML	Inoganic silts of clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity
	SILTS AND CLAYS HIGH PLASTICITY		OL	Organic silts and organic silty clays of low plasticity
			MH	Inorganic clays of high plasticity
			CH	Organic clays of high plasticity
HIGHLY ORGANIC SOILS			OH	Organic clays of medium to high plasticity
			PT	Peat, humus, swamp soils with high organic contents

PART III
ATTACHMENT III.2.C.2
BASELINE MONITORING INFORMATION OF SURFACE WATER STREAMS

PC 1 Pond Creek Below Unnamed Tributary PC 1										
SAMPLE DATE	Lab PDL	Hardness (as CaCO3) (mg/L)	pH	Alkalinity, total (as CaCO3) (mg/L)	Acidity, total (as CaCO3) (mg/L)	Solids, total suspended (mg/L)	Chloride (as Cl) (mg/L)	Sulfate, total (as SO4) (mg/L)	Iron, total (as Fe) (mg/L)	Manganese, total (as Mn) (mg/L)
05/29/2009	13850	208	7.5	147	<10	26	16.8	120	0.02	0.073
08/27/2009	13981	192	7.9	137	<10	391	9.6	60	0.642	<0.002
11/30/2009	14094	304	8.0	103	<10	1	29.6	250	0.486	0.602
02/26/2010	14185	304	6.9	83	<10	6	26	220	0.456	0.505
08/20/2010	14408	*	*	*	*	*	*	*	*	*
05/19/2011	14738	325	7.9	95	<10	56	11	300	0.031	0.052
08/15/2011	14840	*	*	*	*	*	*	*	*	*
11/17/2011	14967	168	7.6	136	<10	18	18	80	<0.006	<0.002
02/22/2012	15077	266	8.1	71	<10	6	35	420	0.255	0.178
05/25/2012	15173	*	*	*	*	*	*	*	*	*
08/15/2013	15716	316	7.6	78	<10	12	15	183	0.281	0.067
11/07/2013	15812	176	7.7	68	10	5	28	260	0.344	0.26
02/27/2014	15923	232	7.7	60	10	13	64	296	0.456	0.462
05/30/2014	16038	260	7.6	120	<10	10	43	333	0.258	0.357

PC 2 Pond Creek										
SAMPLE DATE	Lab PDL	Hardness (as CaCO3) (mg/L)	pH	Alkalinity, total (as CaCO3) (mg/L)	Acidity, total (as CaCO3) (mg/L)	Solids, total suspended (mg/L)	Chloride (as Cl) (mg/L)	Sulfate, total (as SO4) (mg/L)	Iron, total (as Fe) (mg/L)	Manganese, total (as Mn) (mg/L)
05/29/2009	13850	204	8.4	82	<10	33	282.0	269	1.100	0.309
08/27/2009	13981	288	7.7	174	<10	75	9.6	110	0.250	0.104
11/30/2009	14094	380	8.3	178	<10	3	1890.0	800	0.097	0.308
02/26/2010	14185	288	7.9	197	<10	10	529.0	480	0.371	0.428
08/20/2010	14408	800	7.3	78	No Flow	72	860.0	580	0.082	0.011
05/19/2011	14738	463	7.7	134	<10	13	103	300	<0.006	0.015
08/15/2011	14840	223	7.9	69	<10	13	1597	600	0.185	<0.002
11/17/2011	14967	268	7.5	128	<10	23	309	450	<0.006	<0.002
02/22/2012	15077	574	7.7	269	<10	7	647	930	0.072	0.233
05/25/2012	15173	426	8.1	188	<10	23	2773	2300	0.175	0.597
08/15/2013	15716	952	8.4	266	<10	40	4120	3400	<0.006	<0.002
11/07/2013	15812	136	7.9	84	12	4	28	169	0.429	0.217
02/27/2014	15923	238	7.6	124	10	6	400	668	0.306	0.677
05/30/2014	16038	260	7.6	110	<10	5	470	750	0.279	0.138

Pond Creek at Herrin, IL USGS Site 05597050*

SAMPLE DATE	Agency Collecting Sample	Hardness (as CaCO3) (mg/L)	pH	Alkalinity, total (as CaCO3) (mg/L)	Acidity, total (as CaCO3) (mg/L)	Solids, total suspended (mg/L)	Chloride (as Cl) (mg/L)	Sulfate, total (as SO4) (mg/L)	Iron, total (as Fe) (mg/L)	Manganese, total (as Mn) (mg/L)
05/14/1975	-		6.9	-						
06/17/1975	-		6.7	-						
07/11/1979	USGS-GAL		7	-		56				
07/31/1979	USGS-GAL		7	-		44				
10/17/1979	USGSILWC		5.9	-		37				
03/31/1980	USGSILWC	130	6.6	-	54	168	12	6.1		
08/14/1980	USGSILWC	980	7	-			54	8.3		
11/18/1980	USGSILWC	910	7	-			44	8.9		
05/21/1981	USGSILWC	160	6.6	-		74	15	8.3		

Big Muddy River at Plumfield, IL USGS Site 05597000*

SAMPLE DATE	Agency Collecting Sample	Hardness (as CaCO3) (mg/L)	pH	Alkalinity, total (as CaCO3) (mg/L)	Acidity, total (as CaCO3) (mg/L)	Solids, total suspended (mg/L)	Chloride (as Cl) (mg/L)	Sulfate, total (as SO4) (mg/L)	Iron, total (as Fe) (mg/L)	Manganese, total (as Mn) (mg/L)
12/11/1978	IL-EPA		7.2	-		59	28	116		
03/20/1979	IL-EPA		6.7	-	0	18	34	70		
04/26/1979	IL-EPA		7	-	0	42	18	61		
03/31/1980	USGSILWC	110	6.9	-	18		26	81		
08/14/1980	USGSILWC	130	6.8	-	7		39	80		
11/17/1981	IL-EPA	120	7	-		43	55	87		
07/20/1988	IL-EPA	85	7.6	-		910	39	54		
08/10/1988	IL-EPA	120	7	-		94	40	61		
08/31/1988	IL-EPA	160	6.9	-		106	111	90		
07/17/1995	IL-EPA	86	6.8	-		57	18.9	42		
03/05/1996	IL-EPA	190	7.4	-		45	63.3	159		

* NOTE: Data for the Big Muddy River taken from the USGS website - waterdata.usgs.gov.

IL-EPA - Illinois Environmental Protection Agency (IEPA)

USGS-GAL - USGS-Atlanta Central Laboratory, GA

USGSILWC - USGS - Illinois Water Science Center

R07674

USGS
science for a changing world

StreamStats Data-Collection Station Report

Upstream

USGS Station Number 05597000
Station Name BIG MUDDY RIVER AT PLUMFIELD, IL

Click here to link to available data on NWIS-Web for this site.

Descriptive Information

Station Type	Streamgage, continuous record
Location	
Gage	
Regulation and Diversions	
Regulated?	True
Period of Record	1908-1913, 1914-PRESENT
Remarks	Flow regulated since October 1970 by Rend Lake (station 05595950), 18.6 mi upstream from gage. DISCHARGE: June 1+F431908 to September 1910 and December 1910 to December 1912 (published as "near Cambon"), August 1914 to current year.
Latitude (degrees NAD83)	37.90143887
Longitude (degrees NAD83)	-89.01396219
Hydrologic unit code	07140106
County	055-Franklin
HCDN2009	No

Physical Characteristics

Characteristic Name	Value	Units	Citation Number
Descriptive Information			
State_Code	17	dimensionless	64
Datum_of_Latitude_Longitude	NAD83	dimensionless	30
District_Code	17	dimensionless	64
Begin_date_of_record	6/16/1908	days	41
End_date_of_record	9/30/2003	days	41
Number_of_days_of_record	34081	days	41
Number_of_days_GT_0	33765	days	41
Precipitation Statistics			
24_Hour_2_Year_Precipitation	3.28	inches	64
Mean_Annual_Precipitation	40.600	inches	31
Temperature Statistics			
Mean_Min_January_Temperature	24.000	degrees F	31
Topographical Characteristics			
Azimuth	171.837	decimal degrees	64
Mean_Basin_Elevation	475.000	feet	31
Mean_Basin_Slope_ft_per_mi	47.663	feet per mi	64
Relative_Relief	1.817	feet per mi	64
Relief	293.03	feet	64
Ruggedness_Number	433.833	feet per mi	64
Slope_Ratio	0.039	dimensionless	64
Land Cover Characteristics			
Percent_Forest	40.275	percent	64
Percent_Storage	4.4100	percent	31
Percent_Open_Water_&_Herb_Wetland	2.22	percent	64
Soil Properties			

Average_Soil_Permeability	0.7095065	inches per hour	64
Least_Permeable_Layer_Permeability	0.302677	inches per hour	64
Soil_Infiltration	0.8000	inches	31
Most_Permeable_Layer_Permeability	1.116336	inches per hour	64
Stream Channel Properties			
Main_Channel_Length	59.799	miles	64
Stream_Slope_10_and_85_Method	1.862	feet per mi	64
Total_Stream_Length	1172.672	miles	64
Stream_Density	1.481	miles per square mile	64
Main_Channel_Sinuosity_Ratio	1.313	dimensionless	64
Main_Channel_Slope_Proportion	43.818	dimensionless	64
Number_of_First_Order_Streams	428	dimensionless	64
Basin_Stream_Order	5	dimensionless	64
Basin Dimensional Characteristics			
Compactness_Ratio	1.617	dimensionless	64
Contributing_Drainage_Area	794.000	square miles	31
Drainage_Area	794.000	square miles	31
Elongation_Ratio	0.699	dimensionless	64
Shape_Factor_from_Basinsoft	2.617	dimensionless	64
Rotundity_of_Basin_from_Basinsoft	2.054	dimensionless	64
Constant_of_Channel_Maintenance	0.675	square mile per mile	64

Streamflow Statistics

Statistic Name	Value	Units	Citation Number	Preferred?	Years of Record	Standard Error, percent	Variance log-10	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Start Date	End Date	Remarks
Peak-Flow Statistics												
Mean_Annual_Flood	4224	cubic feet per second	64	Y								
2_Year_Peak_Flood	7570	cubic feet per second	64	Y	60							
5_Year_Peak_Flood	12800	cubic feet per second	64	Y	60							
10_Year_Peak_Flood	16400	cubic feet per second	64	Y	60							
25_Year_Peak_Flood	21100	cubic feet per second	64	Y	60							
50_Year_Peak_Flood	24600	cubic feet per second	64	Y	60							
100_Year_Peak_Flood	28100	cubic feet per second	64	Y	60							
500_Year_Peak_Flood	36100	cubic feet per second	64	Y	36							
Regression_2_Year_Peak_Flood	10200	cubic feet per second	64	Y	1.8							
Regression_5_Year_Peak_Flood	16000	cubic feet per second	64	Y	2.2							
Regression_10_Year_Peak_Flood	20100	cubic feet per second	64	Y	2.6							
Regression_25_Year_Peak_Flood	25500	cubic feet per second	64	Y	3.2							
Regression_50_Year_Peak_Flood	29700	cubic feet per second	64	Y	3.6							
Regression_100_Year_Peak_Flood	33900	cubic feet per second	64	Y	3.8							
Regression_500_Year_Peak_Flood	44000	cubic feet per second	64	Y	4.3							
Weighted 5 Year Peak Flood	12900	cubic feet per	64	Y	62.2							

		second			
Weighted_10_Year_Peak_Flood	16600	cubic feet per second	64	Y	62.6
Weighted_25_Year_Peak_Flood	21400	cubic feet per second	64	Y	63.2
Weighted_50_Year_Peak_Flood	24900	cubic feet per second	64	Y	63.6
Weighted_100_Year_Peak_Flood	28500	cubic feet per second	64	Y	63.8
Weighted_500_Year_Peak_Flood	36700	cubic feet per second	64	Y	64.3
WRC_Skew	0.383	Log base 10	64	Y	60
Systematic_peak_years	60	years	64	Y	60
Peak_years_with_historic_adjustment	60	years	64	Y	60
Weighted_2_Year_Peak_Flood	7640	cubic feet per second	64	Y	61.8
Sample_Skew	-0.961	Log base 10	64	Y	60
Maximum_Peak_Flood	42,900	cubic feet per second	64	Y	60
Year_of_Maximum_Flood	1961	years	64	Y	60
Flood-Volume Statistics					
1_Day_2_Year_Maximum	7658.50	cubic feet per second	31	Y	
1_Day_10_Year_Maximum	16046.0	cubic feet per second	31	Y	
1_Day_25_Year_Maximum	19412.0	cubic feet per second	31	Y	
1_Day_50_Year_Maximum	21520.0	cubic feet per second	31	Y	
3_Day_2_Year_Maximum	7390.00	cubic feet per second	31	Y	
3_Day_10_Year_Maximum	14100.0	cubic feet per second	31	Y	
3_Day_25_Year_Maximum	17141.0	cubic feet per second	31	Y	
3_Day_50_Year_Maximum	19500.0	cubic feet per second	31	Y	
7_Day_2_Year_Maximum	5900.00	cubic feet per second	31	Y	
7_Day_10_Year_Maximum	11410.0	cubic feet per second	31	Y	
7_Day_25_Year_Maximum	13900.0	cubic feet per second	31	Y	
7_Day_50_Year_Maximum	15600.0	cubic feet per second	31	Y	
15_Day_2_Year_Maximum	4410.00	cubic feet per second	31	Y	
15_Day_10_Year_Maximum	8180.00	cubic feet per second	31	Y	
15_Day_25_Year_Maximum	9600.00	cubic feet per second	31	Y	
15_Day_50_Year_Maximum	10200.0	cubic feet per second	31	Y	
30_Day_2_Year_Maximum	3183.30	cubic feet per second	31	Y	
30_Day_10_Year_Maximum	5415.50	cubic feet per second	31	Y	
30_Day_25_Year_Maximum	6400.00	cubic feet per second	31	Y	
30_Day_50_Year_Maximum	6900.00	cubic feet per second	31	Y	
Low-Flow Statistics					
7_Day_2_Year_Low_Flow	2.0500	cubic feet per	31	Y	

		second			
7_Day_10_Year_Low_Flow	0.0120	cubic feet per second	31	Y	
Flow-Duration Statistics					
1_Percent_Duration	6700	cubic feet per second	41	Y	94
5_Percent_Duration	3170	cubic feet per second	41	Y	94
10_Percent_Duration	2000	cubic feet per second	41	Y	94
20_Percent_Duration	1050	cubic feet per second	41	Y	94
25_Percent_Duration	799	cubic feet per second	41	Y	94
30_Percent_Duration	585.2	cubic feet per second	41	Y	94
40_Percent_Duration	300	cubic feet per second	41	Y	94
50_Percent_Duration	136	cubic feet per second	41	Y	94
60_Percent_Duration	70	cubic feet per second	41	Y	94
70_Percent_Duration	40	cubic feet per second	41	Y	94
75_Percent_Duration	30	cubic feet per second	41	Y	94
80_Percent_Duration	19	cubic feet per second	41	Y	94
90_Percent_Duration	6.1	cubic feet per second	41	Y	94
95_Percent_Duration	3	cubic feet per second	41	Y	94
99_Percent_Duration	0.13	cubic feet per second	41	Y	94
Annual Flow Statistics					
Mean_Annual_Flow	685.400	cubic feet per second	31	Y	
Stand_Dev_of_Mean_Annual_Flow	377.800	cubic feet per second	31	Y	
Monthly Flow Statistics					
January_Mean_Flow	1182.00	cubic feet per second	31	Y	
January_STD	1644.00	cubic feet per second	31	Y	
February_Mean_Flow	1082.00	cubic feet per second	31	Y	
February_STD	1053.00	cubic feet per second	31	Y	
March_Mean_Flow	1390.00	cubic feet per second	31	Y	
March_STD	1119.00	cubic feet per second	31	Y	
April_Mean_Flow	1244.00	cubic feet per second	31	Y	
April_STD	1191.00	cubic feet per second	31	Y	
May_Mean_Flow	1066.00	cubic feet per second	31	Y	
May_STD	1312.00	cubic feet per second	31	Y	
June_Mean_Flow	470.900	cubic feet per second	31	Y	
June_STD	584.900	cubic feet per second	31	Y	
July_Mean_Flow	238.400	cubic feet per	31	Y	

July_Mean_Flow	290.400	cubic feet per second	31	Y	
July_STD	365.100	cubic feet per second	31	Y	
August_Mean_Flow	262.300	cubic feet per second	31	Y	
August_STD	705.300	cubic feet per second	31	Y	
September_Mean_Flow	118.900	cubic feet per second	31	Y	
September_STD	163.900	cubic feet per second	31	Y	
October_Mean_Flow	167.800	cubic feet per second	31	Y	
October_STD	381.500	cubic feet per second	31	Y	
November_Mean_Flow	405.000	cubic feet per second	31	Y	
November_STD	667.600	cubic feet per second	31	Y	
December_Mean_Flow	617.300	cubic feet per second	31	Y	
December_STD	733.300	cubic feet per second	31	Y	
General Flow Statistics					
Minimum_daily_flow	0	cubic feet per second	41	Y	94
Maximum_daily_flow	40200	cubic feet per second	41	Y	94
Std_Dev_of_daily_flows	1371.539	cubic feet per second	41	Y	94
Average_daily_streamflow	700.637	cubic feet per second	41	Y	94
Base Flow Statistics					
Number_of_years_to_compute_BFI	93	years	42	Y	94
Average_BFI_value	0.277	dimensionless	42	Y	94
Std_dev_of_annual_BFI_values	0.196	dimensionless	42	Y	94

Citations

Citation Number	*Citation Name and URL*
31	Imported from Basin Characteristics file
41	Wolock, D.M., 2003, Flow characteristics at U.S. Geological Survey streamgages in the conterminous United States: U.S. Geological Survey Open-File Report 03-146, digital data set
42	Wolock, D.M., 2003, Base-flow index grid for the conterminous United States: U.S. Geological Survey Open-File Report 03-263, digital data set
64	Soong, D.T., Ishii, A.L., Sharpe, J.B., and Avery, C.F., 2004, Estimating Flood-Peak Discharge Magnitudes and Frequencies for Rural Streams in Illinois, U.S. Geological Survey Scientific Investigations Report 2004-5103, 147 p.

USGS
science for a changing world

StreamStats Data-Collection Station Report

Downstream

USGS Station Number	**05599500**
Station Name	**BIG MUDDY RIVER AT MURPHYSBORO, IL**

Click here to link to available data on NWIS-Web for this site.

Descriptive Information

Station Type	Streamgage, continuous record
Location	
Gage	
Regulation and Diversions	
Regulated?	False
Period of Record	1916-PRESENT
Remarks	Flow regulated since October 1970 by Rend Lake (station 05595950), 67.8 mi upstream from gage. DISCHARGE: December 1916 to current year (fragmentary prior to 1931).
Latitude (degrees NAD83)	37.74866191
Longitude (degrees NAD83)	-89.34592275
Hydrologic unit code	07140106
County	077-Jackson
HCDN2009	No

Physical Characteristics

Characteristic Name	Value	Units	Citation Number
Descriptive Information			
State_Code	17	dimensionless	64
Datum_of_Latitude_Longitude	NAD83	dimensionless	30
District_Code	17	dimensionless	64
Begin_date_of_record	12/6/1916	days	41
End_date_of_record	9/30/2003	days	41
Number_of_days_of_record	28129	days	41
Number_of_days_GT_0	28015	days	41
Precipitation Statistics			
24_Hour_2_Year_Precipitation	3.35	inches	64
Mean_Annual_Precipitation	40.700	inches	31
Temperature Statistics			
Mean_Min_January_Temperature	25.000	degrees F	31
Topographical Characteristics			
Azimuth	194.544	decimal degrees	64
Mean_Basin_Elevation	467.000	feet	31
Mean_Basin_Slope_ft_per_mi	45.854	feet per mi	64
Relative_Relief	1.993	feet per mi	64
Relief	546.578	feet	64
Ruggedness_Number	787.918	feet per mi	64
Slope_Ratio	0.024	dimensionless	64
Land Cover Characteristics			
Percent_Forest	52.354	percent	64
Percent_Storage	4.1400	percent	31
Percent_Open_Water_&_Herb_Wetland	4.219	percent	64
Soil Properties			

Average_Soil_Permeability	0.748725	inches per hour	64
Least_Permeable_Layer_Permeability	0.318596	inches per hour	64
Soil_Infiltration	0.8000	inches	31
Most_Permeable_Layer_Permeability	1.178854	inches per hour	64
Stream Channel Properties			
Main_Channel_Length	108.937	miles	64
Stream_Slope_10_and_85_Method	1.098	feet per mi	64
Total_Stream_Length	3115.152	miles	64
Stream_Density	1.442	miles per square mile	64
Main_Channel_Sinuosity_Ratio	1.882	dimensionless	64
Main_Channel_Slope_Proportion	103.962	dimensionless	64
Number_of_First_Order_Streams	1146	dimensionless	64
Basin_Stream_Order	6	dimensionless	64
Basin Dimensional Characteristics			
Compactness_Ratio	1.664	dimensionless	64
Contributing_Drainage_Area	2169.00	square miles	31
Drainage_Area	2169.00	square miles	31
Elongation_Ratio	0.907	dimensionless	64
Shape_Factor_from_Basinsoft	1.551	dimensionless	64
Rotundity_of_Basin_from_Basinsoft	1.217	dimensionless	64
Constant_of_Channel_Maintenance	0.694	square mile per mile	64

Streamflow Statistics

Statistic Name	Value	Units	Citation Number	Preferred?	Years of Record	Standard Error, percent	Variance log-10	Lower 95% Confidence Interval	Upper 95% Confidence Interval	Start Date	End Date	Remarks
Peak-Flow Statistics												
Mean_Annual_Flood	7308	cubic feet per second	64	Y								
2_Year_Peak_Flood	12500	cubic feet per second	64	Y	43							
5_Year_Peak_Flood	20400	cubic feet per second	64	Y	43							
10_Year_Peak_Flood	25800	cubic feet per second	64	Y	43							
25_Year_Peak_Flood	32700	cubic feet per second	64	Y	43							
50_Year_Peak_Flood	37800	cubic feet per second	64	Y	43							
100_Year_Peak_Flood	42800	cubic feet per second	64	Y	43							
500_Year_Peak_Flood	54300	cubic feet per second	64	Y	25							
Regression_2_Year_Peak_Flood	15700	cubic feet per second	64	Y	1.5							
Regression_5_Year_Peak_Flood	23800	cubic feet per second	64	Y	1.9							
Regression_10_Year_Peak_Flood	29400	cubic feet per second	64	Y	2.3							
Regression_25_Year_Peak_Flood	36600	cubic feet per second	64	Y	2.8							
Regression_50_Year_Peak_Flood	42100	cubic feet per second	64	Y	3.1							
Regression_100_Year_Peak_Flood	47600	cubic feet per second	64	Y	3.3							
Regression_500_Year_Peak_Flood	60700	cubic feet per second	64	Y	3.6							
Weighted_5_Year_Peak_Flood	20500	cubic feet per	64	Y	44.9							

		second			
Weighted_10_Year_Peak_Flood	26000	cubic feet per second	64	Y	45.3
Weighted_25_Year_Peak_Flood	33000	cubic feet per second	64	Y	45.8
Weighted_50_Year_Peak_Flood	38100	cubic feet per second	64	Y	46.1
Weighted_100_Year_Peak_Flood	43300	cubic feet per second	64	Y	46.3
Weighted_500_Year_Peak_Flood	55100	cubic feet per second	64	Y	46.6
WRC_Skew	-.357	Log base 10	64	Y	43
Systematic_peak_years	43	years	64	Y	43
Peak_years_with_historic_adjustment	43	years	64	Y	43
Weighted_2_Year_Peak_Flood	12600	cubic feet per second	64	Y	44.5
Sample_Skew	-.956	Log base 10	64	Y	43
Maximum_Peak_Flood	33,300	cubic feet per second	64	Y	43
Year_of_Maximum_Flood	1961	years	64	Y	43
Flood-Volume Statistics					
1_Day_2_Year_Maximum	11693.0	cubic feet per second	31	Y	
1_Day_10_Year_Maximum	23946.0	cubic feet per second	31	Y	
1_Day_25_Year_Maximum	30014.0	cubic feet per second	31	Y	
1_Day_50_Year_Maximum	34387.0	cubic feet per second	31	Y	
3_Day_2_Year_Maximum	11441.0	cubic feet per second	31	Y	
3_Day_10_Year_Maximum	23259.0	cubic feet per second	31	Y	
3_Day_25_Year_Maximum	28915.0	cubic feet per second	31	Y	
3_Day_50_Year_Maximum	32907.0	cubic feet per second	31	Y	
7_Day_2_Year_Maximum	10702.0	cubic feet per second	31	Y	
7_Day_10_Year_Maximum	21371.0	cubic feet per second	31	Y	
7_Day_25_Year_Maximum	26116.0	cubic feet per second	31	Y	
7_Day_50_Year_Maximum	29322.0	cubic feet per second	31	Y	
15_Day_2_Year_Maximum	8796.00	cubic feet per second	31	Y	
15_Day_10_Year_Maximum	17903.0	cubic feet per second	31	Y	
15_Day_25_Year_Maximum	22034.0	cubic feet per second	31	Y	
15_Day_50_Year_Maximum	24851.0	cubic feet per second	31	Y	
30_Day_2_Year_Maximum	6760.40	cubic feet per second	31	Y	
30_Day_10_Year_Maximum	13350.0	cubic feet per second	31	Y	
30_Day_25_Year_Maximum	15979.0	cubic feet per second	31	Y	
30_Day_50_Year_Maximum	17637.0	cubic feet per second	31	Y	
Low-Flow Statistics					
7_Day_2_Year_Low_Flow	13.700	cubic feet per	31	Y	

		second			
7_Day_10_Year_Low_Flow	1.5000	cubic feet per second	31	Y	
Flow-Duration Statistics					
1_Percent_Duration	15000	cubic feet per second	41	Y	68
5_Percent_Duration	8460	cubic feet per second	41	Y	68
10_Percent_Duration	5490	cubic feet per second	41	Y	68
20_Percent_Duration	2910	cubic feet per second	41	Y	68
25_Percent_Duration	2150	cubic feet per second	41	Y	68
30_Percent_Duration	1620	cubic feet per second	41	Y	68
40_Percent_Duration	874.9	cubic feet per second	41	Y	68
50_Percent_Duration	461	cubic feet per second	41	Y	68
60_Percent_Duration	263	cubic feet per second	41	Y	68
70_Percent_Duration	142	cubic feet per second	41	Y	68
75_Percent_Duration	105	cubic feet per second	41	Y	68
80_Percent_Duration	79	cubic feet per second	41	Y	68
90_Percent_Duration	33	cubic feet per second	41	Y	68
95_Percent_Duration	17	cubic feet per second	41	Y	68
99_Percent_Duration	2.7	cubic feet per second	41	Y	68
Annual Flow Statistics					
Mean_Annual_Flow	1627.00	cubic feet per second	31	Y	
Stand_Dev_of_Mean_Annual_Flow	955.100	cubic feet per second	31	Y	
Monthly Flow Statistics					
January_Mean_Flow	2114.00	cubic feet per second	31	Y	
January_STD	3194.00	cubic feet per second	31	Y	
February_Mean_Flow	2133.00	cubic feet per second	31	Y	
February_STD	1879.00	cubic feet per second	31	Y	
March_Mean_Flow	4057.00	cubic feet per second	31	Y	
March_STD	3261.00	cubic feet per second	31	Y	
April_Mean_Flow	3638.00	cubic feet per second	31	Y	
April_STD	3503.00	cubic feet per second	31	Y	
May_Mean_Flow	2827.00	cubic feet per second	31	Y	
May_STD	3547.00	cubic feet per second	31	Y	
June_Mean_Flow	1100.00	cubic feet per second	31	Y	
June_STD	1570.00	cubic feet per second	31	Y	
July_Mean_Flow	709.500	cubic feet per	31	Y	

July_Mean_Flow	709.000	cubic feet per second	31	Y	
July_STD	1224.00	cubic feet per second	31	Y	
August_Mean_Flow	494.700	cubic feet per second	31	Y	
August_STD	831.200	cubic feet per second	31	Y	
September_Mean_Flow	291.100	cubic feet per second	31	Y	
September_STD	413.600	cubic feet per second	31	Y	
October_Mean_Flow	217.400	cubic feet per second	31	Y	
October_STD	297.300	cubic feet per second	31	Y	
November_Mean_Flow	770.100	cubic feet per second	31	Y	
November_STD	1131.00	cubic feet per second	31	Y	
December_Mean_Flow	1193.00	cubic feet per second	31	Y	
December_STD	1719.00	cubic feet per second	31	Y	
General Flow Statistics					
Minimum_daily_flow	-4400	cubic feet per second	41	Y	68
Maximum_daily_flow	33500	cubic feet per second	41	Y	68
Std_Dev_of_daily_flows	3157.091	cubic feet per second	41	Y	68
Average_daily_streamflow	1840.537	cubic feet per second	41	Y	68
Base Flow Statistics					
Number_of_years_to_compute_BFI	67	years	42	Y	68
Average_BFI_value	0.319	dimensionless	42	Y	68
Std_dev_of_annual_BFI_values	0.143	dimensionless	42	Y	68

Citations

Citation Number	*Citation Name and URL*
31	Imported from Basin Characteristics file
41	Wolock, D.M., 2003, Flow characteristics at U.S. Geological Survey streamgages in the conterminous United States: U.S. Geological Survey Open-File Report 03-146, digital data set
42	Wolock, D.M., 2003, Base-flow index grid for the conterminous United States: U.S. Geological Survey Open-File Report 03-263, digital data set
64	Soong, D.T., Ishii, A.L., Sharpe, J.B., and Avery, C.F., 2004, Estimating Flood-Peak Discharge Magnitudes and Frequencies for Rural Streams in Illinois, U.S. Geological Survey Scientific Investigations Report 2004-5103, 147 p.

PART III
ATTACHMENT III.2.D.3.c
SCHEDULE A – SURFACE WATER DATA COLLECTION

Attachment III.2.D.3.c

DISCHARGE LOCATION AND CHARACTERISTICS FOR NEW AND EXISTING MINES
SCHEDULE A *

Discharge # **	011
Latitude	37° 52' 37"
Longitude	89° 01' 49"
Quarter Section	NW
SECTION	31
Township	T7S
Range	R2E
County	Franklin
Average Flow (gpd) **if discharge does not result from precipitation.**	Precipitation
Max Flow (gpd) **if discharge does not result from precipitation.**	5,000gpm
Source of Discharge **(e.g. pit pumpage, processing plant circuit, surface runoff, etc.)**	Mine Water pumpage, Prep Plant process water and surface runoff
Sampling Method **(24 hr. composite, grab, est., etc.)**	Grab
Acidity (mg/l)	30-905
Alkalinity (mg/l)	200
Lead (mg/l)	0.5
Iron (mg/l)	3 - 6
Manganese (mg/l)	4
pH (range)	7.7***
Zinc (mg/l)	0.5 – 1.0
Fluoride (mg/l)	1.0
Total Suspended Solids (mg/l)	35 - 70
Sulfate (mg/l)	2100
Total Dissolved Solids (mg/l)	3500
Chloride (mg/l)	1000
Receiving Stream	Big Muddy River
Tributary to	Mississippi River
Tributary to	N/A
Tributary to	N/A

* If application is for NPDES permit USEPA form 2C or 2D may also be required.
** Discharge # should correspond with NPDES discharge number and shall be shown on the mine operations map.
*** Note: pH is based on average of seven ponds located on the adjacent Permit 375 sampled on 01/05/2015.

Attachment III.2.D.3.c

Surface Water Data Collection

1. Name of persons/organizations that collected surface water well data:

   Tim Garland with Delta Engineering & Associates Inc. in Marion Illinois

2. Name of persons/organizations that analyzed surface water well data:

   Data has consistently been analyzed by Summit Environmental Services, Inc. in Marion, Illinois.

3. Dates of collection of the data:

   See the attached spreadsheets

4. Dates of the analysis of the surface water data:

   See the attached spreadsheets

5. Description of the methodology used to collect the data:

   Samples have been consistently collected using the grab method.

6. Description of the methodology used to analyze the data:

   The samples have been analyzed using the EPA Method – see the attached lab data sheets for code for each sample.

PART IV

PART IV

PART IV

OPERATIONS PLAN

1) Proposed Operational Procedures and Methods for the Mine Over Its Projected Life

Describe the type and method of mining procedures and proposed engineering techniques to be employed in the operation of the proposed mine. Describe the major equipment to be employed and how such equipment will be used in the different aspects of the mining operation. Provide an estimation of the anticipated annual coal production and anticipated coal production by tonnage once the mine is at full operational capacity.

RESPONSE: **This permit application is for the development of a Water Management Pipeline. Specifically, the Water Management Pipeline will consist of a pipeline for the transportation of underground mine infiltration water and stormwater to a mixing zone on the Big Muddy River. No surface and/or underground mining is proposed in this permit application. Equipment to be used could include excavators, dozers, compactors, and/or trucks for the construction of the installation of the HDPE pipeline.**

Refer to the independent operations plan in Attachment IV.1 for additional details.

2) Mining Operations Plan for the Proposed Permit Area

Describe the proposed mining operations plan for the permit area in terms of the mining sequence, the employment of facilities, establishment and maintenance of erosion control facilities, air pollution control facilities, coal storage, cleaning and loading areas, location and placement of topsoil, spoil, coal waste, or other storage facilities.

A) 1) Describe how each type of overburden (soil horizons, glacial drift and consolidated material) will be handled with regards to shaft excavations.

RESPONSE: **There will be no shaft excavation associated with this permit.**

2) If toxic materials have been identified as occurring in the overburden, describe how these materials will be handled to insure proper disposal.

RESPONSE: **No toxic materials have been identified.**

B) 1) Locate on the operations map all soil horizon storage areas and/or root medium stockpiles. Identify each storage area as to its content.

RESPONSE: **Soils excavated for the installation of the pipeline will be utilized to backfill the trench once the pipeline is installed. Therefore, no stockpile areas are proposed in this permit application.**

2) Describe measures to be employed to prevent or minimize exposure of soil stockpiles to excessive water and wind erosion, unnecessary compaction and contamination by undesirable materials.

RESPONSE: **No soil stockpile area are proposed by this permit. Temporary stockpiling of soil will be conducted in a manner to minimize exposure to excessive water and wind erosion and prevent unnecessary compaction. Measures that will be taken to minimize sediment loss include silt fencing and straw bales around the perimeter of soil stockpile areas. If windblown silt becomes a problem, water will be applied to the dust generating area as necessary. Exposed areas will be seeded as soon as practical upon completion of final grading to establish vegetation.**

3) Describe methods and treatment measures to be used on exposed areas where topsoil has been removed to prevent excess air and water pollution.

RESPONSE: **Limited topsoil removal is proposed in conjunction with development activities since areas of limited disturbance are planned in particular with the pipeline installation. In agricultural areas where pipe burial will occur, pipeline installation is to be completed in accordance with the following guidelines as outlined in the Topsoil Replacement section of the Illinois Department of Agriculture's Pipeline Construction Standards and Policies for Agricultural Impact Mitigation:**

- **The topsoil depth shall be determined by a qualified person who sets stakes or flags every 200 feet along the right-of-way identifying the depth of topsoil to be removed.**
- **Topsoil will first be stripped from the area to be excavated above the pipeline and from the adjacent subsoil. The topsoil will be temporarily stored in a windrow parallel to the pipeline trench in such a manner that it will not become intermixed with subsoil materials.**
- **All subsoil material that is removed from the trench will be placed in a second windrow parallel to the pipeline trench that is separate from the topsoil windrow.**
- **In backfilling the trench, the stockpiled subsoil material will be placed back into the trench before replacing the topsoil.**
- **The topsoil must be replaced so that after settling occurs, the topsoil's original depth and contour (with an allowance for settling) will be restored. The same shall apply where excavations are made for road, stream, drainage ditch, or other crossings. In no instance will the topsoil materials be used for any other purpose.**

Refer to Attachment IV.2.B.3 for the complete construction standards and policies.

C) The permit map and plans shall show the lands proposed to be affected within the proposed permit through the operation, according to the sequence of mining and reclamation and any change in a facility or feature to be caused by the proposed operations if the facility or feature was shown under 62 Ill. Adm. Code Sections 1783.24 through 1783.25.

RESPONSE: **Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16).**

D) Show on the permit map or other designated map each area of land for which a performance bond will be posted under 62 Ill. Adm. Code 1800.

RESPONSE: **Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16).**

E) Mining Operations Plan for the Proposed Shadow Area

RESPONSE: **No surface and/or underground mining are proposed by this permit.**

1) Provide a map at a scale of 1 inch to 1,000 feet or other scales as approved by the Department identifying the limits of the proposed shadow area (area from which coal is proposed to be extracted by underground mining methods).

2) Within the limits of the proposed shadow area identify all areas projected to be mined, at a minimum, during the term of the permit showing the proposed size, sequence and yearly projections for the development of underground workings.

3) Subsidence Control Plan

RESPONSE: **No surface and/or underground mining are proposed by this permit.**

A) General Requirements

1) Within the permit, shadow and adjacent areas are there structures or renewable resource lands?

Yes _____ No _____

If yes, on the shadow area map described in 2.E. above, or other designated map, provide survey information which identifies all structures and renewable resource lands. Include all topographic features at a maximum contour interval of 10 feet. Identify all surface and subsurface man made features within, passing through, or passing over the area in which underground mining operations are located or will be projected to be located. Such features shall include but are not limited to all buildings, facilities, roads, bridges, major electric transmission lines, pipelines, agricultural drainage tile fields, gas and oil wells and water wells.

If no, provide evidence and support documentation that no structures or renewable resource lands exist as a result of a survey conducted within these areas.

2) Within the proposed permit, shadow or adjacent areas does the applicant intend to adopt mining technologies which provide for planned subsidence in a predictable and controlled manner?

Yes _____ No _____

If yes, provide information requested under "Planned Subsidence", Subsection B.
If no, provide information requested under "Subsidence Unplanned", Subsection C.
If the applicant intends to conduct both planned and unplanned subsidence mining operations both subsections B and C must be addressed.

RESPONSE: **No surface and/or underground mining are proposed by this permit.**

3) Provide geologic descriptions characterizing the thickness and lithology of the coal and overburden geological units throughout the shadow area. Provide stratigraphy test boring and core sampling log descriptions from the shadow area. Include the elevation and locations of the boring logs.

RESPONSE: No surface and/or underground mining are proposed by this permit.

B) Planned Subsidence

1) Provide a detailed description of the mining technology used to produce planned and predictable subsidence?

RESPONSE: No underground mining is proposed by this permit application.

2) Provide a description of factors (i.e. drift thickness variations, expected variations in extraction height, or presence of faults and their direction (strike & dip) in relation to mine panels, etc.) with supporting documentation which may influence the magnitude, extent and predictability of planned subsidence. Include data on predicted subsidence profiles and post-subsidence contours, including calculations on the predicted angle of draw. Provide a description of measures taken in the field to confirm the accuracy and reliability of predicted subsidence profiles.

RESPONSE: No underground mining is proposed by this permit application.

3) On a plan base map(s), at a map scale of 1 inch to 400 feet provide a map of underground workings which locates all areas where planned subsidence mining operations are to be conducted. Include detailed information in regard to the location, length, width and height of projected panel development and extraction areas. Give typical percentage of coal removed in planned subsidence extraction areas.

RESPONSE: No underground mining is proposed by this permit application.

4) On the 1 inch to 400 feet plan base map(s) the information regarding the location of features required in Parts a-d below is to be provided in relation to areas of planned subsidence.

RESPONSE: No underground mining is proposed by this permit application.

a) Identify all topographic features at a maximum contour interval of 10 feet.

RESPONSE: No underground mining is proposed by this permit application.

b) Identify and label all impoundments with a storage capacity of 20 acre-feet or more, or bodies of water with a volume of 20 acre feet or more. In a written narrative provide information which assures compliance with the requirement of Title 62 Ill. Adm. Code 1817.121(d) to permit such proposed mining operations. If no such features exist provide a specific statement indicating such.

RESPONSE: **Compliance with the requirement of Title 62 Ill. Adm. Code 1817.121(d) will be obtained. No underground mining is proposed by this permit application and no subsidence is planned or predicted in conjunction with the proposed operations.**

c) Identify and label all public road right-of-ways and cemeteries located within 100 feet measured horizontally of surface areas of predicted planned subsidence. In a written narrative provide information which assures compliance with the requirements of Title 62 Ill. Adm. Code 1761.11 and 12 as may be necessary to permit planned subsidence mining operations within the prohibited area. If no such features exist provide a specific statement indicating such.

RESPONSE: **No underground mining is proposed by this permit application and no subsidence is planned or predicted in conjunction with the proposed operations.**

d) Identify and label all occupied dwellings, public buildings and facilities, schools, churches, hospitals, community or institutional buildings, or public parks located within 300 feet measured horizontally of surface areas of predicted planned subsidence. If no such features exist provide a specific statement indicating such. If such features do exist include the following information as may be necessary:

i) Provide a written narrative with support documentation which assures compliance with the requirements of Title 62 Ill. Adm. Code 1761.11 and 12 as may be necessary to permit planned subsidence mining operations within the prohibited area.

RESPONSE: **No underground mining is proposed by this permit application.**

ii) Provide a written narrative which assures compliance with the requirements of Title 62 Ill. Adm. Code 1817.121(d) as may be necessary to permit such proposed mining operations in relation to public buildings and facilities, schools, churches and hospitals.

RESPONSE: **No underground mining is proposed by this permit application.**

5) Describe the anticipated effects of planned subsidence.

a) Using the predicted magnitude, extent of planned subsidence profiles, post-subsidence contours and angle of draw provided in response to 4.B. above, provide a list of all structures and facilities located within the projected area of influence of the planned subsidence. The list provided must correspond to each panel or extraction area to be mined by planned subsidence mining methods and must cross-reference with surface structures and feature map(s).

RESPONSE: **No underground mining is proposed by this permit application and no subsidence is planned or predicted in conjunction with the proposed operations.**

b) Using the predicted magnitude, extent of planned subsidence profiles and post-subsidence contours provided in response to B, 2, above, locate and identify all areas of where surface subsidence impacts are projected to cause disruptions of surface drainage or drainage problems on a map(s) at a 1" to 400' scale.

RESPONSE: No underground mining is proposed by this permit application.

c) Describe any other anticipated effects of planned subsidence.

6) Describe, if any, measures to be taken on the surface to prevent or minimize the effects of planned subsidence.

RESPONSE: No underground mining is proposed by this permit application.

7) Describe measures to be taken to mitigate or remedy any subsidence-related material damages.

a) Provide a description of mitigation measures to be taken to repair or compensate the owners of structures or facilities which sustain material damage caused by subsidence, including but not limited to the following:

i) Compensate the owner of structures or facilities in the full amount of the diminution in value resulting from the subsidence.

ii) Repair, restore, rehabilitate or replace damaged structures or facilities.

iii) Compensation may be accomplished by the purchase prior to mining of a noncancelable premium prepaid insurance policy payable to the surface owner in the full amount of the possible material damage. Documentation of the purchase of such qualifying insurance must be provided.

RESPONSE: No underground mining is proposed by this permit application.

b) Provide a description of measures adopted to control and correct material damage resulting from subsidence caused to surface lands, to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonable foreseeable uses which it was capable of supporting before subsidence. Also provide descriptions of specific repair measures recommended to remedy anticipated material damages detailed in 7.a above.

RESPONSE: No underground mining is proposed by this permit application.

c) to mitigate subsidence-related material damage to land and structures, provide a description of measures to be taken to determine the degree of material damage or diminution of value or reasonable foreseeable use of the surface.

RESPONSE: No underground mining is proposed by this permit application.

C) Subsidence Unplanned (Maximize Mine Stability)

1) Describe the method of coal removal which is designed consistent with known technology to maximize mine stability to prevent or minimize subsidence and subsidence related damage so that if subsidence does occur it cannot be considered planned subsidence.

RESPONSE: No surface and/or underground mining are proposed by this permit.

2) On the shadow area map(s) describe in 2.E. above, or other designated map show all areas where coal extraction as described above in 3.C.1 is to occur. Include the following detailed information:

a) Provide the location of mains, submains and extraction panels giving geometric sizes, dimensions and orientation including lengths, widths, and extraction heights of each.

RESPONSE: No surface and/or underground mining are proposed by this permit.

b) Identify and label all impoundments with a storage capacity of 20 acre-feet or more, or bodies of water with a volume of 20 acre feet or more, public buildings and facilities, churches, schools and hospitals. In a written narrative provide information which assures compliance with the requirements of Title 62 Ill. Adm. Code 1817.121(d) as may be necessary to permit such proposed mining operations. If no such features exist provide a specific statement indicating such.

RESPONSE: No surface and/or underground mining are proposed by this permit.

c) Provide calculations for the estimated potential angle of draw.

RESPONSE: No surface and/or underground mining are proposed by this permit.

3) Provide information regarding proposed mining extraction geometries, including information on the dimensions of pillars, extraction widths of rooms, entries, and crosscuts, etc., for all mains, submains, panel entries and all development areas. Provide information regarding the highest extraction percentage for each of the mining geometries proposed by the operator, if variations are proposed. Information is to include specific details of the effects of any proposed second mining operations on final mining geometries and extraction percentages. Map(s) at a scale of 1 inch to 400 feet (other scales as approved by the Department) are to be provided representing all proposed extraction geometries, including any proposed second mining.

RESPONSE: No surface and/or underground mining are proposed by this permit.

Provide information regarding the design engineering of the various mining geometries proposed in 3.C.3 above in maximizing mine stability to prevent subsidence. Include the following:

i) Detailed information regarding the specific methodology used to calculate mine stability with support documentation and design calculations.

ii) Data concerning actual coal strengths typical of the coal to be mined and as this information relates to pillar design and stability.

iii) Data regarding the strength and geotechnical characteristics of the actual mine floor and subfloor as it relates to mine design and stability. Information is to be included describing the thickness and lithology of the floor and subfloor units.

RESPONSE: No surface and/or underground mining are proposed by this permit.

4) Provide detailed descriptions of subsidence control measures that will be taken to prevent or minimize subsidence and subsidence-related damage which includes, but is not limited to the following:

RESPONSE: No surface and/or underground mining are proposed by this permit.

a) Backstowing or backfilling, include map locations;

b) Leaving areas in which no coal is removed within the shadow area, including a description of the overlying area to be protected by solid coal blocks left in place. Identify any such areas by map locations;

c) Surface measures taken to prevent material damage or lessening of the value of reasonably foreseeable uses of the surface;

d) Monitoring, if any, to determine the commencement and degree of subsidence so that other appropriate measures can be taken to prevent or reduce material damage. Include map locations of any proposed monitoring sites.

5) Describe measures to be taken to mitigate or remedy any subsidence-related material damages.

a) Provide a description of mitigation measures taken to repair or compensate the owners of structures or facilities which may be materially damaged by subsidence, including but, not limited to the following:

i) Compensate the owner of structures or facilities in the full amount of diminution in value resulting from the subsidence.

ii) Repair, restore, rehabilitate or replace damaged structures or facilities.

iii) Compensation may be accomplished by the purchase prior to mining of a noncancelable premium prepaid insurance policy payable to the surface owner in the full amount of the possible material damage. Documentation of the purchase of such qualifying insurance must be provided.

RESPONSE: No surface and/or underground mining are proposed by this permit.

b) Provide a description of measures adopted to control and correct material damage resulting from subsidence caused to surface lands, to the extent technologically and economically feasible, by restoring the land to a condition capable of maintaining the value and reasonably foreseeable uses which it was capable of supporting before subsidence.

RESPONSE: No surface and/or underground mining are proposed by this permit.

c) In conjunction with the requirements to mitigate subsidence-related material damage to land, and structures provide a description of measures to be taken to determine the degree of material damage or diminution of value or reasonable foreseeable uses of the surface.

RESPONSE: No surface and/or underground mining are proposed by this permit.

4) Existing Structures

A) Provide a description of each existing structure proposed to be used in connection with or to facilitate the surface coal mining and reclamation operations. The description shall include the following:

1) Locate the structure on the operations map or other designated map,

2) provide plans of the structure detailing its current, pre-mining condition,

3) provide approximate dates, beginning and completion for construction of the structure, and

4) provide a showing that the structure meets the performance standards of either 62 Ill. Adm. Code Sections 1810 through 1828 or 62 Ill. Adm. Code Sections 280-300 (Interim Regulation Program). The showing shall monitor data or other substantiating evidence.

RESPONSE: No existing structures are proposed to be used in connection with this permit.

B) For each structure proposed to be modified or reconstructed for use in connection with or to facilitate the surface coal mining and reclamation operations a compliance plan is required which shall include the following:

1) Design specifications for reconstruction or modification of the structure to meet the design and performance standards of 62 Ill. Adm. Code Sections 1810 through 1828.

2) A schedule for reconstruction or modification of the structure showing dates for beginning and completing interim steps as well as final reconstruction,

3) provisions for monitoring the structure during and after modification to ensure that the performance standards of 62 Ill. Adm. Code Sections 1810 through 1828 are met, and

4) a showing that the risk of harm of the environment or to public health or safety is not significant during the period of modification or reconstruction.

RESPONSE: No existing structures are proposed to be used in connection with this permit.

5) Support Facilities

A) Locate on a mining operations map each of the areas to be permitted for surface disturbance to facilitate the mining operation. Map shall include all support facilities including buildings, structures, conveyors, parking areas, coal preparation plants, yards, railroad spurs, on-site rail yards, each air pollution collection and control facility, each facility to be used to protect and enhance fish and wildlife and related environmental values, and each explosive storage and handling facility.

RESPONSE: Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16).

B) Indicate acreage of each type of facility within permit area such as: buildings, roads, railroads, parking areas, pavements, loading and unloading facilities, sanitary facilities, and undeveloped areas. (Summation of above areas should equal total support facility area.)

RESPONSE: Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16).

SUPPORT AREA		ACRES
Mine Buildings		0.0
Mine Office Parking		0.0
Mine Yard		0.0
Preparation Plant Buildings		0.0
Prep Plant Parking		0.0
Prep Plant Yard		0.0
Refuse Area		0.0
Railroad		0.0
Access Roads (Roads and Shoulders)		0.0
Topsoil Storage		0.0
Dirt Stockpile		0.0
Drainage Facilities		0.0
Coal Storage		0.0
Mine Support Areas		**70.7**
Plant Support Areas		0.0
Other		0.0
Undeveloped Areas		0.0
TOTAL		**70.7**

C) Transportation Facilities

1) Provide a detailed description on mining operations map or other map and show location of the following:

a) Proposed road(s), conveyor system(s), or rail system.

b) Related sediment control facilities.

c) Earth borrow locations and/or locations for deposition of excess excavation.

RESPONSE: **The alignment of the proposed Water Management Pipeline is shown on the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16). Where feasible and permissible, existing farm access field roads (e.g., field entrances, field edges, etc.) will be used to access areas for the pipeline installation. Where necessary, aggregate may be placed to facilitate access in persistently wet areas or areas with greater topographical relief. These areas will be developed by removing vegetative cover and topsoil and installing a geotextile fabric and/or large aggregate layer to stabilize the surface. Small pipe culverts may be installed as necessary to maintain existing drainage patterns. All areas disturbed by placement fabric, aggregate and/or pipe culverts will be covered with available topsoil, seeded and mulched following construction activities. The extent of aggregate placement and/or installation of small pipe culverts throughout the added permit area is expected to be minimal.**

2) Provide specifications and plan-profiles of existing gradeline, proposed road centerline, ditch flow lines, road cut, fill embankment, culvert, bridge and drainage structures. Provide typical cross sections where appropriate.

RESPONSE: **No roads, ditches, road cuts, fill embankment, culverts, bridges or drainage structures are proposed by this application. The proposed permit area will be traversed during the construction stage of the pipeline project. Upon completion of the construction stage of the project, access to the site will be minimal. The majority of the proposed permit is aligned with an abandoned railroad grade. Other portions of the proposed permit will be accessed from state and county road systems or local farm access roads.**

Water Management Pipeline - The design of the pumping and piping systems used for the transport of the discharge water includes pipe sizing(s), pump(s) sizing and specifications, air release valve locations, monitoring and detection procedures, and provisions for draining and flushing the transmission pipe. The design includes the use of 45 degree elbows in lieu of 90 degree elbows, utilizing manufactured elbows and tees, if needed, in lieu of field constructed connections, and installing thrust blocks, where necessary, to support joints and fittings.

Refer to Attachment IV.5.C.2 for additional information.

3) For all transportation facilities to be constructed, provide construction details for all sediment control facilities to be constructed to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area.

RESPONSE: **Drainage control will be provided silt fence or other alternative sediment control measures.**

No transportation facilities or associated permanent sediment control facilities or structures are proposed nor warranted for this project. Temporary sediment control

features in the form of silt fence and/or hay bales will be used within the immediate vicinity of trenching/boring sites.

4) Discuss the revegetation of ditch and borrow areas involved in construction.

RESPONSE: No ditches or borrow areas are proposed by this permit application.

5) Discuss the estimated life of each facility and how materials will be removed when the facility becomes inactive.

RESPONSE: The life of the Water Management Pipeline proposed in this application is expected to have the same operating life of the mine facility associated with Permit 375. Water is expected to be pumped to the surface for the safe operation of the mine as long as it is in production. The pipeline to the Big Muddy River is the best alternative to maintain compliance with the Good Mining Practices outlined in Section 406.204 of the Illinois Administrative Code. Other than the roads, the only other materials to be removed will be the water pumps and HDPE pipe located on the surface.

6) Provide a report of appropriate geo-technical analysis where approval from the Department is required for alternative specifications or steep cut slopes under 62 Ill. Adm. Code 1817.150.

RESPONSE: No alternative specifications or steep cut slopes are proposed.

7) Provide a description of measures to be taken to protect the inlet end of a ditch relief culvert, other than use of a rock headwall, and for alteration or relocation of a natural drainageway for approval by the Department under 62 Ill. Adm. Code 1817.150.

RESPONSE: No culverts are proposed. However, if a temporary drainage relief culvert is necessary, it will only be in place until the Water Management Pipeline is being installed, backfilled and reclaimed.

6) Waste Material

A) Identify the nature of all waste material including shaft excavation material and non-coal waste to be disposed of within the permit area. Give the net neutralization potential.

RESPONSE: No waste material and/or non-coal waste is expected to be generated from the proposed activities or disposed of within the permit area.

B) Coal processing waste bank dams shall be designed to comply with requirements of 62 Ill. Adm. Code 1817.81 through 1817.84. For coal processing waste dams and embankments each plan shall comply with the requirements of MSHA, 30 CFR 77.216-1 and 77.216-2, and shall contain the results of a geo-technical investigation as prescribed under 62 Ill. Adm. Code 1784.16(e).

RESPONSE: No coal processing waste bank dams are proposed by this permit.

C) Indicate location of all areas in which such materials including shaft excavation material and non-coal waste (including those under Subtitle C of RCRA) are to be disposed of on the mining operations map. Indicate all streams, creeks, and surface water impoundments within such areas or which receive runoff from such areas. Provide acreage of disposal area and borrow areas. Indicate location of borrow area on mining operations map.

RESPONSE: No waste material is expected to be generated as a result of development activities for this project.

D) Provide construction details for all impoundments and structures to contain such waste material. Provide typical cross-sections of all proposed levees, dams and excavations.

RESPONSE: No excavated material and/or non-coal waste will be disposed of within the boundaries of this proposed permit.

E) Indicate location and provide details for diversions as necessary to divert surface water around such areas on the mining operations map.

RESPONSE: No diversions are proposed.

F) Provide details of diversions or other devices designed to collect surface runoff from waste disposal sites and transport same to appropriate treatment facility.

RESPONSE: No diversions or other devices are proposed to collect surface runoff from waste disposal sites.

G) Provide details of such treatment facilities and identify points of discharge.

RESPONSE: No diversions or other devices are proposed to collect surface runoff from waste disposal sites.

H) For disposal areas explain measures to be taken to avoid pollution of surface or groundwater due to leaching through levees or dams and through underlying soil.

RESPONSE: No excavated material and/or non-coal waste will be disposed of within the boundaries of this proposed permit.

I) Describe estimated life of each area.

RESPONSE: The life of the Water Management Pipeline proposed in this application is expected to have the same operating life of the mine facility associated with Permit 375.

J) Coal preparation:

1) Give a general description of the coal processing operation at this facility.

RESPONSE: **No coal processing operation is proposed by this permit. Refer to Williamson Energy's Permit No. 375.**

2) Describe the fresh water (makeup) and slurry circuits for this operation and indicate if a discharge occurs. If a discharge does occur, it should be included on Schedule A. If a discharge does not occur, a detailed description of how this will be accomplished must be submitted.

RESPONSE: **Refer to the independent operations plan in Attachment IV.1 for additional details.**

2) What safeguards are provided to prevent the discharge of slurry fines and untreated slurry water during emergency situations (e.g. power outages, mechanical equipment breakdown, plant shutdowns, etc.)? Also indicate where the slurry would go by gravity flow in the event of an emergency discharge, and the environmental impact this would have.

RESPONSE: **N/A. No slurry fines and/or untreated slurry water will be transported by the proposed Water Management Pipeline.**

7) Surface Drainage Control

A) 1) Locate on the mining operations map or on a separate drainage map all proposed drainage control systems. Show drainage patterns of all affected mining areas.

RESPONSE: **Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16) for drainage patterns.**

2) Will all surface drainage from the affected mining area be collected and treated prior to leaving the permit area?

Yes _____ No ___X_____

If yes, delineate how and where surface drainage will be collected and treated, and list permit numbers and type of permit that the drainage control systems are operated under. If above answer is no, explain how regulatory compliance will be achieved without treatment, i.e., address the requirements of Section 1817.46(e).

RESPONSE: **Compliance with Section 1817.46(e) will be maintained. Alternate sediment control measures will be used in lieu of a siltation structure for affected areas. Areas associated with the Water Management Pipeline will be disturbed for a limited amount of time. The construction associated with the Water Management Pipeline will be an installation/reclamation operation. The operation will consist of excavating a trench, installing a section of pipeline, backfilling the trench, grading the trench to approximate original contour, spreading any available topsoil and vegetating the disturbance with a permanent seed mix.**

B) Will all surface drainage from unaffected areas be intercepted and diverted around the affected mining area?

Yes_____ No ___X_____

If no, please discuss.

RESPONSE: The reclamation of the Water Management Pipeline site will re-establish any natural flow path.

C) Describe the timing in which all construction of the sediment ponds and surface drainage control structures will be complete. Include a discussion of the vegetation stabilization of these structures.

RESPONSE: N/A. No sediment ponds and surface drainage control structures are proposed by this permit application.

D) Overland Flow Diversions

For all diversions of overland flow, shallow groundwater flow, and ephemeral streams which divert surface water around the mining area, and all collection drains that transport affected area runoff into water-treatment facilities, provide the following:

RESPONSE: No overland flow diversions are proposed by this permit application.

1) Typical cross sections bottom width, side slopes and depth.

2) Proposed flow line slopes.

3) Runoff and diversion capacity calculations.

4) Details of proposed erosion and sediment control measures to be employed.

For permanent diversion also include:

5) Watershed limits upstream from the diversions.

6) Plan profile drawings of the proposed diversion showing existing gradeline, proposed diversion bottom gradeline and water surface at design storm.

E) Sediment pond Design:
NPDES
MSHA#
Total Drainage Area (Acres)
Total Disturbed Drainage Area (Acres)
Total Calculated Inflow From Design Storm (AC-FT)
Sediment Storage Volume (AC- FT)
Total Volume Below Primary Spillway Elevation (AC-FT)
Total Volume Below Emerg. Spillway Elevation (AC-FT)

RESPONSE: No sediment ponds are proposed by this permit application.

NPDES	MSHA #	Total Drainage Area (ac.)	Total Disturbed Area (ac.)	Total Calculated Inflow from Design Storm (ac-ft)	Sediment Storage Volume (ac-ft)	Total Volume Below Primary Spillway (ac-ft)	Total Volume Below Emergency Spillway (ac-ft)	Embankment Height from Upstream Toe to Emergency Spillway (ft)

F) 1) Discuss the design basis for the sediment pond(s) calculations.

Submit calculations used in spillway designs and determination of inflow volume and pond volume.

RESPONSE: N/A. No spillways are proposed by this permit application.

2) Submit a typical section of the embankment(s), details of the principal and emergency spillways and a plan view of each pond at a scale of 1 inch = 200 ft. or larger showing pond bottom contours and points of inflow.

RESPONSE: No sediment ponds or spillways are proposed by this permit application.

3) For all sedimentation ponds provide design information showing compliance with the requirements of 62 Ill. Adm. Code 1817.46. Each plan shall, at minimum, comply with the requirements of MSHA, 30 CFR 77.216-1 and 77.216-2.

RESPONSE: No sediment ponds are proposed by this permit application.

G) If sediment removal becomes necessary, explain how the sediment will be removed, where it will be disposed of, and what disposal methods will be used.

RESPONSE: No sediment ponds are proposed by this permit application.

H) Will pH adjustment be necessary on any of the discharges in order to meet the applicable State and Federal Standards?

Yes _____ No X_____

If yes, a discussion of the situation is necessary, along with a detailed basis of design. The basis should include a detailed description of the proposed treatment facilities, process flow diagrams, and design calculations.

RESPONSE: Treatment of discharges to adjust pH is not anticipated.

I) Does a perennial or intermittent stream occur within the proposed permit area?

Yes __X_____ No _____

If yes, is an exception to the 100 foot buffer zone being requested or is a stream diversion being proposed. For exception to the 100 foot buffer zone, indicate how compliance with Section 1817.57 will be assured. For a stream diversion, complete Part V 6) of the application form.

RESPONSE: **All stream buffer zones will be marked along the proposed permit boundary.**

The Water Management Pipeline will be within the 100 foot stream buffer zones of eight (8) intermittent streams and two (2) perennial streams, Pond Creek and the Big Muddy River.

Intermittent Streams - A variance is being requested to be within the 100 foot stream buffer zone of the affected intermittent streams. Trenching through the stream and stream buffer zone will not be conducted when water is present, however if water is present in the channel, a temporary coffer dam will be constructed immediately up stream to allow the stream to be pumped around the trenching area. During this operation, silt fence and/or straw bales will be utilized as sediment control. Upon completion of the trenching and backfilling operation, a 700 gram Coir (coco) mat or equivalent will be installed to protect the bottom of the stream and the stream banks from erosion and all disturbances will be vegetated. Refer to Attachment IV.7.I for additional information on the Coir mat.

During the stream delineation field work along the proposed permit area, six (6) intermittent stream were identified as flowing beneath the abandoned railroad grade through existing culverts. Therefore, the stream buffer zone is shown from the ends of the existing culverts and installation of the pipeline will not affect a stream buffer zone in these areas. During the trenching operation, silt fence and/or straw bales will be utilized as sediment control. Upon completion of the trenching and backfilling operation, all disturbances will be vegetated.

Ephemeral Streams - Other stream crossings are proposed, but based on stream delineations, these streams are considered as ephemeral streams. Trenching through these stream and stream buffer zones will not be conducted when water is present, however if water is present in the channels, a temporary coffer dam will be constructed immediately up stream to allow the stream to be pumped around the trenching area. During this operation, silt fence and/or straw bales will be utilized as sediment control. Upon completion of the trenching and backfilling operation, a 700 gram Coir (coco) mat or equivalent will be installed to protect the bottom of the stream and the stream banks from erosion and all disturbances will be vegetated.

The ephemeral channels were evaluated in accordance with the Operator Memorandum 2017-06 by Alliance Consulting, Inc. personnel and have been summarized below:

Upon review of the ephemeral streams delineated by Alliance in November of 2016, it can be concluded that all ephemeral streams were in fact ephemeral. This conclusion is based upon the consideration of the ephemeral stream characteristics set forth by the Illinois Department of Natural Resources (IDNR) on June 6th 2017 in Operator Memorandum No. 2016-06, pursuant to 62 Ill. Adm. Code 1816/1817.57.

Channel 1

This stream is ephemeral based upon several characteristics. Channel 1, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). The stream bed contains copious amounts of upland vegetation, including trees. This results in an absence of definitive meanders, riffles, and pools, or active erosional features.

Channel 2

This stream is ephemeral based upon several characteristics. Channel 2, similar to Channel 1, has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools or active erosional features.

Channel 6

Channel 6, like the previous channels, is also ephemeral and exhibits the same characteristics. Channel 6, similar to Channel 1 and 2, has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features.

Channel 10

Channel 10 also exhibits the same characteristics. Channel 10 has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features.

Channel 14

Channel 14, similar to the previous channels, exhibits the same characteristics. Channel 14 has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features. Additionally, after review of topographic mapping, it is apparent that Channel 14 is also a 1st order/ headwater stream.

Channel 15

Channel 15, similar to the previous channels, exhibits the same characteristics. Channel 15 has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features. Additionally, after

review of topographic mapping, it is apparent that Channel 15 is in fact a 1st order/ headwater stream.

Channel 16

Channel 16, similar to the previous channels, exhibits the same characteristics. Channel 16 has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features. Additionally, after review of topographic mapping, it is apparent that Channel 16 is in fact a 1st order/ headwater stream.

Channel 19

Channel 19, similar to the previous channels, exhibits the same characteristics. Channel 19 has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features. Additionally, after review of topographic mapping, it is apparent that Channel 19 is in fact a 1st order/ headwater stream.

Channel 20

Channel 20, similar to the previous channels, exhibits the same characteristics. Channel 20 has large amounts of vegetation, including trees rooted where substrate would typically occur within an intermittent stream bed, as seen in the photos (Preliminary Jurisdictional Determination, Appendix B). This results in an absence of definitive meanders, riffles, and pools, or active erosional features. Additionally, after review of topographic mapping, it is apparent that Channel 20 is in fact a 1st order/ headwater stream.

Refer to Table 1 below for additional details:

Table 1. Ephemeral Stream Characteristic Table

Stream Name	1st Order/ Headwater Stream	Presence of Upland Plants in Bed	Absence of Obligate/Facultative Wetland Plants	Presence of Continuous Bed and Bank	Absence of Meanders, Riffles and Pools	Absence of Active Erosional Features	Absence of Base Flow 48 Hours Post Rainfall Event
Channel 1	No	Yes	No	No	Yes	Yes	N/A
Channel 2	No	Yes	No	No	Yes	Yes	N/A
Channel 6	No	Yes	No	No	Yes	Yes	N/A
Channel 10	No	Yes	Yes	No	Yes	Yes	N/A
Channel 14	Yes	Yes	Yes	No	Yes	Yes	N/A

Stream Name	1st Order/ Headwater Stream	Presence of Upland Plants in Bed	Absence of Obligate/Facultative Wetland Plants	Presence of Continuous Bed and Bank	Absence of Meanders, Riffles and Pools	Absence of Active Erosional Features	Absence of Base Flow 48 Hours Post Rainfall Event
Channel 15	Yes	Yes	Yes	No	No	Yes	N/A
Channel 16	Yes	Yes	Yes	No	Yes	Yes	N/A
Channel 19	Yes	Yes	No	No	Yes	Yes	N/A
Channel 20	Yes	Yes	Yes	No	Yes	Yes	N/A

Pond Creek - A variance is being requested to be within the 100 foot stream buffer zone of Pond Creek. The pipeline will be bored under the stream to minimize impact and protect the Hydrologic Balance. For further protection, a secondary containment pipe will be installed on the outside of the transport pipe located within the 100-foot stream buffer zone of Pond Creek. The ends of the secondary pipe will be sealed around the inner pipe. During this boring operation, silt fence and/or straw bales will be utilized as sediment control. Upon completion of the boring and backfilling operation, all disturbances will be vegetated.

Refer to Attachment IV.7.I for the Typical Stream Crossing drawing (Drawing No. B17-222-B3).

Big Muddy River - A variance is being requested to be within the 100 foot stream buffer zone of the Big Muddy River for the buried water transport pipeline, multi-port diffuser in the stream and the stream bank stabilization.

The diffuser will allow for a staged discharge based on flow in the River and the chloride concentration in the effluent. At the lowest flow condition and maximum chloride concentration, only one port will be utilized. As the flow in the River increases or the chloride concentration decreases, the additional ports are brought on-line to use the additional volume. As the flow in the River decreases or the chloride concentration increases, the larger ports are taken off-line so that the water quality standards are maintained.

Stream bank stabilization is also proposed for the top of the bank of the Big Muddy River at the discharge/diffuser location. Bioengineering practices will be utilized to minimize impacts to the stream and enhance aquatic habitat. This will consist of adequately sized riprap keyed into the toe of the slope with native plantings on the banks above. This bank stabilization will help to prevent further erosion due to the stream channel and protect the water management facilities and infrastructure.

During the construction operation, silt fence and/or straw bales will be utilized as sediment control. Upon completion, all disturbances will be backfilling, graded and vegetated.

Other stream crossings are proposed, but based on stream delineations, these streams are considered as ephemeral streams. Trenching through these stream and stream

buffer zones will not be conducted when water is present, however if water is present in the channels, a temporary coffer dam will be constructed immediately up stream to allow the stream to be pumped around the trenching area. During this operation, silt fence and/or straw bales will be utilized as sediment control. Upon completion of the trenching and backfilling operation, a 700 gram Coir (coco) mat or equivalent will be installed to protect the bottom of the stream and the stream banks from erosion and all disturbances will be vegetated.

Refer to the Hydrologic - Mining Operations Maps (Drawing Nos. B17-222-M13, M14, M15 and M16) for the stream buffer zones and the stream buffer zone variance areas.

Water Quantity – Water quantity will not be adversely affected. The applicant does not propose to alter the watershed of the stream; therefore, water quantity should remain unchanged as a result of the operation.

Other Environmental Resources of the Stream - The fish and invertebrate communities in the stream represent a biological community subject to frequent dry channel conditions and which have been subjected to the effects of intense row crop agriculture for decades. As such the organisms found here are environmentally tolerant species (i.e. not sensitive). No adverse impacts to this community are anticipated.

Restoration of Channel and Riparian Vegetation – Woody riparian vegetation will be established in the permitted area within the buffer zone based on pre-disturbance species and quantities.

Based on the above, the applicant requests the exception to the 100 foot buffer zone to the extent required by 1817.57 and in accordance with the provisions of Section 1817.57.

J) Permanent and Temporary Impoundments, Ponds, Banks, Dams and Embankments

1) All temporary and permanent impoundments must meet the requirements of 62 Ill. Adm. Code 1817.49. Will the mining operation involve the construction of any impoundments other than those waste retention?

Yes _____ No __X____

If yes, include the following information:

a) Locate on mining operations map all impoundments, dam locations, and watershed limits, indicate which impoundments are proposed to be permanent and complete Part V 3)D) of the application.

RESPONSE: No permanent impoundments or dams are proposed by this permit application.

b) Provide construction and maintenance details of dams, spillways, seepage control measures, and erosion control measures for inlets and outlets. Employ maps and cross sections where necessary. Where design plans for proposed structures are not provided,

submit a certification statement providing a schedule for submission of detailed design plans for each structure.

RESPONSE: No permanent impoundments or dams are proposed by this permit application.

2) Describe proposed reclamation plans for each structure, including a time table and plans for removal and disposal of material. Each plan shall:

a) Be prepared by or under the direction of, and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act,

b) contain a description, map, and cross-section of the structure and its location,

c) contain preliminary hydrologic and geologic information required to assess the hydrologic impact of the structure,

d) if underground mining has occurred, the plan shall contain a survey describing the potential effect on the structure from subsidence of the subsurface strata resulting from the post underground mining operations,

e) for structures where the detailed design plans are not submitted to the Department with the general plan, the plan shall contain a certification statement which includes a schedule setting forth the dates that detailed design plans are to be submitted. For these structures, the detailed design plans must be submitted to the Department and approved in writing prior to the beginning of construction.

RESPONSE: No permanent impoundments or dams are proposed by this permit application.

3) For each structure that meets or exceeds the size or other criteria of MSHA, 30 CFR 77.216(a), the detailed design plan shall:

a) Be prepared by or under the direction of and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act,

b) include any design and construction requirements for the structure, including any required geo-technical information,

c) describe the operation and maintenance requirements for each structure, and

d) describe the timetable and plans for removal of each structure if appropriate.

RESPONSE: No permanent impoundments or dams are proposed by this permit application.

4) For each structure that does not meet or exceed the size or other criteria of MSHA, 30 CFR 77.216(a), the detailed plan shall:

a) Be prepared by or under the direction of and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act,

b) include any design and construction requirements for the structure, including any required geo-technical information,

c) describe the operation and maintenance requirements for each structure, and d) describe the timetable and plans for removal of each structure if appropriate.

RESPONSE: No permanent impoundments or dams are proposed by this permit application.

K) If any of the following questions are answered yes, a permit may be needed from Illinois Department of Natural Resources, Office of Water Resource Management.

1) Will the mining operation involve the construction of any levees, dikes, haul roads or other similar structures or the placement of any fill along or in the flood plain of any stream serving a drainage area of ten (10) square miles or greater at the point of construction?

Yes _____ No X

2) Will the mining operation involve any relocation or diversion of or any construction activity in, over, under or along the banks of any stream serving a drainage area of ten (10) square miles or greater at the point of construction?

Yes X No_____

RESPONSE: Refer to Attachment IV.1 – Water Management Pipeline for additional information concerning the pipeline boring operation beneath Pond Creek.

3) Is there any urban development (residential, commercial or industrial uses) in the areas immediately surrounding the mining operation?

Yes _____ No X

(If yes, please re-answer questions 1 and 2 above applying a one (1) square mile drainage area limit.)

4) Will the mining operation involve the construction, major modification, or removal of any dam which in the event of failure would have probability for loss of life or additional economic loss in excess of that which would occur downstream of the dam in the absence of the dam?

Yes_____ No X

5) Will the mining operation involve the construction, major modification, or removal of any dam 25 feet or more in height?

Yes _____ No X

6) Will the mining operation involve construction, major modification, or removal of any dam which would have an impounding capacity of 50 acre feet or more?

Yes _____ No ___X_____

8) Provide a plan detailing fugitive dust control practices to be employed during proposed surface coal mining and reclamation operations as required under 62 Ill. Adm. Code 1817.95.

RESPONSE: **Fugitive particulate emissions will be controlled by applying water or other IEPA approved dust suppressants on an as-needed basis. All construction areas will be stabilized with permanent vegetative species, graded stone and/or paving material. Haul roads and other unpaved roads will be sprinkled with water to control fugitive dust.**

R07

PART IV, ATTACHMENT IV.1
WATER MANAGEMENT OPERATIONS

Attachment IV.1

WILLIAMSON ENERGY, LLC'S
POND CREEK MINE
WATER MANAGEMENT OPERATIONS

The following narrative details the water management operations for the Williamson Energy, LLC's Permit 375, Permit 417 and the proposed Water Management Pipeline permit.

Water is used in numerous mining activities and in coal processing. Therefore, water management is of the utmost importance to the success of the Pond Creek Mine. To manage storm water runoff, mine infiltration water, and process wastewater in a manner that will maintain safe conditions onsite, protect aquatic resources, and allow operations to continue at the mine, Williamson Energy, LLC is proposing to construct a new outfall to the Big Muddy River for the discharge of process water and mine infiltration water. The process water and mine infiltration water will no longer be discharged to the unnamed tributary to Pond Creek. The outfall structure will be a multi-port diffuser and a mixing zone will be set up for the discharge.

A mixing zone is allowed under the Clean Water Act and is used by many permittees to meet criteria for salts such as chloride. Discharge will only be allowed when the water quality standards as defined in IL Title 35 Subtitle C Chapter 1 Part 302: Water Quality Standards will be met in the Big Muddy River. Williamson Energy, LLC is proposing an engineered solution that will provide enhanced mixing for the discharge of the excess water onsite to the Big Muddy River through a diffuser. In addition, a pipeline will be constructed to discharge the mine's process water and infiltration groundwater to the Big Muddy River. This is considered the most effective alternative based on the ability to meet the water management needs for the mine, as well as, water quality in both the Big Muddy River and Pond Creek.

The volume of water discharged to the Big Muddy River will be dependent upon the flow in the Big Muddy River and the chloride concentration of the water in the Water Holding Cells and the chloride concentration coming downstream in the River.

The typical water flow diagram for the proposed operations is presented in ***Figure 1***. The proposed typical water management process is described below.

Mine Infiltration Groundwater

The infiltrating groundwater is from a saline zone and the chloride and sulfate content of this water typically exceeds the water quality standard allowed to be discharged into receiving waters. The chloride concentration values of the mine water range between 1,099 mg/L and 2,799 mg/L, depending on the location of the water underground. The average chloride concentration of the samples taken is 2,237 mg/L. The sulfate concentration of the infiltrating water also depends upon the location of the water underground. The sulfate values range between 1,720 mg/L and 2,120 mg/L. The average sulfate concentration of the samples taken is 1,940 mg/L.

The current total daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2,700,000 gallons per day. An anticipated maximum flow rate of infiltration water from

the mine is 3,500,000 gallons per day. This water will continue to be managed through water management processes. Mine infiltration water will be pumped to the Water Holding Cells for discharge through the diffuser at the Big Muddy River (Outfall 011). As alternatives, the infiltration water can be pumped to the Fresh Water Lake for use in the Preparation Plant or the Slurry Impoundment if needed.

Due to the finite capacity to store water, a mixing zone is being requested in the Big Muddy River to optimize the water management system onsite. An inability to dispose of water infiltrating the mine poses a serious safety risk to the miners working underground, a serious environmental risk in holding back water properly, and a serious risk of property damage due to the potential of flooding the mine, which has cost hundreds of millions of dollars to develop.

Big Muddy River

The Big Muddy River is a natural channel river approximately 166 miles long. The River is dammed 103.7 miles from the Mississippi River, creating Rend Lake. The drainage area of the Big Muddy River above Rend Lake is 100.27 square miles. The Big Muddy River Basin is mainly an agricultural area of southern Illinois. Surrounding land that is not being used for agricultural purposes is generally wooded or is residential. In addition, the surrounding area contains other sub-surface coal mines including abandoned mines.

The proposed outfall will be located at approximately 37°52'37"N 89°01'49"W, and will discharge to Big Muddy River Reach Il_N-11, as shown in ***Figure 2***. The outfall location will be approximately 14 miles downstream from the Rend Lake Dam. The Big Muddy River, Reach IL_N-11, is classified as a Category 5 stream, not supporting aquatic life and fish consumption. It has been fully assessed as fully supporting the following uses: primary contact and secondary contact. It has not been assessed for the following use: aesthetic quality. The Big Muddy River is listed in the 2014 Section 303 (d) list for sedimentation/siltation, sulfates, total suspended solids (TSS), mercury, and polychlorinated biphenyl (PCBs). The site is on the 2016 Section 303 (d) list for impaired waters due to sedimentation/siltation, TSS, mercury, PCBs, iron, dissolved oxygen, pH, and fecal coliform.

The flow in the Big Muddy River at the proposed discharge location is controlled by the United States Army Corps of Engineers (USACE) dam at Rend Lake. The minimum flow maintained by the USACE appears to be 30 cfs, although there have been 4 instances with recorded flows less than 30 cfs since the installation of the dam in March 1973. In addition, the United States Geological Survey (USGS) maintains a gage at Plumfield, Illinois and the data from the gauge was evaluated as well.

A conceptual design for a diffuser consists of five individually staged single-port diffusers. The diffuser design concept allows the mine to discharge based on the flow in the River. The mixing zone size will be kept as small as possible while ensuring that water quality standards are met. All of the mixing zone criteria specified in IL Title 35 are met, including the design criteria that the maximum size of the mixing zone will be limited to less than or equal to 25% of the volume of flow or cross-sectional area.

Stream bank stabilization is proposed for the top of the bank of the Big Muddy River at the discharge/diffuser location. Bioengineering practices will be utilized to minimize impacts to the stream and enhance aquatic habitat. This will consist of adequately sized riprap keyed into the toe of the slope

with native plantings on the banks above. This bank stabilization will help to prevent further erosion due to the stream channel and protect the water management facilities and infrastructure.

Small structures are also proposed near the top of the bank. A maintenance building/pump house and water control structures will be necessary for the operations of the Water Management Pipeline. The maintenance building/pump house will serve as the location where the water will be transferred from the Pipeline to the diffuser system. The water control structure will house the flow meter as described below in the Protections and Monitoring section. These structures are to be constructed on shallow concrete footings. A small soil storage area will be located south of the maintenance building/pump house. Temporary sediment control will be provided by silt fence until the area can be vegetated. An electrical power line and power poles will be installed from the intersection of the electrical transmission line along Lake Creek Road to the maintenance building/pump house. The power line/poles will be located within the proposed permit area and along the permit boundary.

Water Holding Cells

Mine infiltration water will continue to be pumped to the Water Holding Cells. Clarified decant water will be able to be pumped from the Slurry Impoundment to the Water Holding Cells as well if needed to maintain appropriate water levels in the impoundment. From the Water Holding Cells, water will continue to be sent to the Fresh Water Lake to be utilized in the Preparation Plant. Williamson Energy, LLC is proposing that a new outfall and diffuser structure be constructed to allow discharge from the Water Holding Cells to the Big Muddy River. As a result, process water and mine infiltration water will not be stored in storm water ponds on-site not designed for this purpose.

Fresh Water Lake

The Fresh Water Lake (FWL) collects water to be used in the Preparation Plant. The water must be maintained at a certain level for operation of the plant. The FWL receives water from the storm water ponds, Ponds 001-004, 006-009, Slurry Impoundment, and the Water Holding Cells.

Preparation Plant

Water used to wash the coal in the Preparation Plant comes from the FWL. The fine material ultimately ends up at the thickener units. The thickener units attached to the Preparation Plant require approximately 1,600 gallons per minute (gpm) or 2,300,000 gallons per day of incoming water while in operation. The makeup water required for the thickener units is pumped to the plant from the FWL. The underflow from the thickeners is pumped to the Slurry Impoundment.

Over time, the fine solid particles present in the thickener underflow that is pumped to the Slurry Impoundment settle to the bottom of the impoundment leaving clarified water on the surface. The clarified water is able to be recycled by pumping it form the impoundment back to the FWL where it can be pumped into the Preparation Plant and reused in the process. As a result, the majority of the wash water is recovered.

There is some loss of water during the washing process. Additionally, since the fines do not all settle immediately in the Slurry Impoundment, the quality of the clarified water results in a need for additional

water for the Preparation Plant. Therefore, Preparation Plant water is supplemented with mine infiltration water and/or storm water.

Slurry Impoundment

The Slurry Impoundment receives coarse and fine coal refuse from the Preparation Plant. The solids in the process water are allowed to settle in the impoundment. Clarified decant water will be pumped directly to the Fresh Water Lake to be reused in the coal cleaning process in the Preparation Plant. Clarified decant water may also be pumped to the Water Holding Cells (Permit 375) to be staged prior to discharge to the Big Muddy River. If necessary to manage water volume on-site, the slurry impoundment may also receive mine infiltration water or water from Pond 009.

Pond 009

The storm water runoff from the slopes of RDA No. 3 is collected in Pond 009. Construction of Pond 009 was approved in Permit 417. Solids settle in the pond prior to discharge. Excess water in Pond 009 may directly discharge to Pond Creek mixing zone through Outfall 010. Water from Pond 009 may be pumped to the FWL where it can be used in the Preparation Plant. It can also be pumped to the Slurry Impoundment if necessary or discharge via Outfall 009 if water quality standards will be met.

Ponds 001, 002, 003, 004

Ponds 001, 002, 003, and 004 will continue to collect storm water runoff from undeveloped areas, the mine yard, the raw coal pile, and access roads. Solids settle in the ponds prior to discharge. If additional water is needed at the Preparation Plant, water from the ponds can be pumped to the Fresh Water Lake or water can be discharged from the ponds to the unnamed tributary to Pond Creek via Outfalls 001, 002, 003, and 004, respectively.

Pond 005

Pond 005 will continue to collect storm water from undeveloped areas, the clean coal pile, and access roads. Solids settle in the pond prior to discharge. In addition to the storm water runoff, water from the Johnston City Lake will continue to be pumped to Pond 005 to supply water for mining operations. If needed to control water levels in the ponds at appropriate levels and if water quality standards will be met, water can be released to the unnamed tributary to Pond Creek via Outfall 005.

Pond 006

Pond 006 receives storm water runoff from the raw coal pile. Solids settle in the pond prior to discharge. Water can be pumped from Pond 006 to the FWL if necessary to supply water to the Preparation Plant. Water can be discharged from Pond 006 to the unnamed tributary to Pond Creek via Outfall 006 if needed to maintain appropriate water levels in the pond.

Pond 007/008

The storm water runoff from the slopes of slurry impoundments RDA No. 1 and RDA No. 2 will continue to be collected in Pond 007/008. Solids settle in the ponds prior to discharge. Water will be pumped form Pond 007/008 to the FWL to be used in the Preparation Plant. Water may also be pumped to Pond

009 to be discharged through the Pond Creek Mixing Zone via Outfall 010. Excess water may be discharged through Outfalls 007 and 008 to the unnamed tributary of Pond Creek if necessary and as long as appropriate water quality standards are met in the receiving stream.

Water Management Pipeline

Williamson Energy, LLC's Pond Creek Mine is proposing to install a Water Management Pipeline (Pipeline) from the mine site to a diffuser site on the Big Muddy River to manage the water balance on-site. The proposed Pipeline is approximately 12.5 miles in length. The amount of water that could be discharged through the Pipeline will be dependent upon the chloride concentration in the discharge stream, the background chloride content and the flow in the Big Muddy River. The upper limit to the discharge will be based on the pumping capacity of the facility. The mine has set a maximum pumping rate of 5,000 gallons per minute from the facility. There is additional allocation in the Big Muddy River at higher flow events, but model predictions have been made for a maximum effluent total flow rate of 5,000 gpm or 11.1 cfs.

The pipeline will be a high-density polyethylene (HDPE) pipe continuous from the pump discharge located at the Water Holding Cells (Permit 375) to the water management/diffuser structure at the Big Muddy River discharge site. The pipeline will be completely buried with the exception of the pump site and the discharge site. Final design of the pumping and piping systems used for the transport of the water is to be completed prior to installation. Final design will include pipe sizing, pump sizing and specifications, air release valve locations, finalizing monitoring and detection procedures, and developing provisions for draining and flushing the transmission pipe. Other provisions to be considered in conjunction with final design include the use of 45 degree wyes in lieu of 90 degree elbows, utilizing manufactured elbows and tees in lieu of field constructed connections, and installing thrust blocks where deemed necessary to support joints and fittings.

The pipe size will consist of a minimum 18" diameter SDR-17 pipe with a wall thickness of 1.059" and a pressure rating of 125 psi. A larger diameter pipe may be used as long as a minimum wall thickness of 1" and designed working pressure rating of 125 psi is maintained. The pumping system will consist of pump(s) capable of pushing the desired flow from the water holding cells to the Big Muddy River. A pressure gauge will be installed at the pump discharge to monitor the internal pressure of the pipe and ensure the burst pressure of the pipe is not exceeded.

Buried pipe installation will be completed using an open trench and boring methods. The Pipeline will be bored under roads unless an open trench installation is permitted by the road authority and specified in the agreement.

The Pipeline will be bored under the Union Pacific and BNSF railroads so as to not damage or destroy the railway.

A majority of the propose Pipeline, it will be installed next to the existing DTE gas transmission line. The DTE line will be located every 50 feet with pipe locator and the line will be proof located as needed to ensure safety of the pipe and public. Williamson Energy will maintain a minimum of five feet of separation from the DTE line unless the DTE line is physically located prior to getting close than 5 feet.

The Pipeline will be bored under at the Pond Creek crossing. A secondary containment pipe will be installed on the outside of the transport pipe located within the 100-foot stream buffer zone of Pond Creek. The ends of the secondary pipe will be sealed around the inner pipe and a pressure gauge will be installed to monitor the pressure in the annulus between the pipes.

Boring operations beneath railroads will comply with the requirements of the owner. Boring beneath state highways and interstates will abide by the requirements of the construction permits applied for by the permittee.

The installation of the pipeline will consist of removing the available topsoil and storing on the permit area. Subsoil material will be place near the pipeline trench and will be used as cover material after the pipeline is installed. Alternate methods of sediment control, such as but not limited to, silt fence, hay bales, gravel and vegetation. To protect stream banks at stream crossings, disturbed areas will be lined with Coir mat material to protect vegetation and trees seedlings. Refer to the Attachment IV.7.I for Coir Mat Detail (Drawing No. B17-222-A1) and product information.

The Office of Water Resources will be contacted to discuss the permitting requirements of the agency.

When trenching in crop production areas, provisions outlined in the Illinois Department of Agriculture's Pipeline Construction Standards and Policies for Agricultural Impact Mitigation (**Attachment IV.2**) are to be followed to minimize impacts to agricultural land including drainage tile if present.

Protections and Monitoring

Protections and monitoring systems will be installed on and in the Water Management Pipeline to prevent pipeline breaks/leaks and minimize damage in the event of a pipeline break or leak. Air release valves will be installed within the pipe mainly located at high points to remove trapped air and prevent vacuum conditions. Air can become trapped in a pipeline which can restrict the water flow. This effectively increases the pressure inside the pipe. The air release valves will eliminate these potential air pockets. Pump pressure will also be monitored with a pressure gauge as described above and by electronic monitoring. In the event the pressure in the pipe exceeds the burst pressure of the pipe, the pump will be shut off and the issue corrected.

Flow meters will also be used to monitor flow from the Water Holding Cells (Permit 375) to the Big Muddy River discharge site. The instrumentation will be used to assess potential problems within the pumping systems and/or to assess possible leaks within the pumping systems. Ultrasonic (or other similar technology) flow meters will be utilized. These flow meters typically clamp on the pipe and can be wired into a communications system to relay the flow data back to the mine. A telemetric monitoring system will be utilized at the mine site to relay the signal. Telemetry or fiber network will be utilized at the Water Holding Cell. The flow meters will be capable of monitoring flow to within 1% or less accuracy. The instrumentation will be tied to an alarm system and flow data will be transmitted to a central location for tracking and assessing system operations. A specified differential in flow rates at the pump and discharge ends of the Pipeline will be established to execute an alarm signal and automatic shutdown of pumping operations from the Water Holding Cell. Specific flow variances which trigger system shutdown cannot be established at this time as applicable variances will be based on system components, piping distance and terrain, pump cycling, etc., however it is anticipated no more than a 5% variance

within a 15 min to 20 min interval will be established. Variances are to be established after system calibration and are to be adjusted after initial system operation for each phase. The activated monitoring system is to be tested and recalibrated annually while the system is in operation. Testing is to include validating accuracy of the flow measurement devices.

Should leakage or rupture occur, pumping systems are to be shut down and spill containment provisions are to be put in place as necessary.

Maintenance

System performance and operation will be continuously monitored with the installed instrumentation designed to provide warning of potential problems. The entire system will be inspected monthly while in operation. The inspection will consist of a visual evaluation of each road and highway crossing, the Pond Creek crossing, and the Big Muddy River discharge site. It will also include a physical inspection of the monitoring equipment. All inspections are to be documented with a written report which is to be maintained in the operating record at the mine site and be made available for review by IDNR representatives. The reports may be maintained in digital format at the discretion of the mine operator.

Any items of concern noted from the system inspections are to be addressed immediately; and, if necessary, pumping operations are to be suspended until the issue is resolved.

FIGURES

R07723

Slope Bottom VTP - 120,000 gpd

District #1 Bleeder Shaft VTP - 0 gpd

TG#1 XC 136 VTP - 432,000 gpd

DISTRICT 1 (SEALED) TURBINE PUMPS

DISTRICT 2 (ACTIVE) TURBINE PUMPS

District #2 Bleeder Shaft VTP - 1,145,000 gpd

TG#2 XC 142 VTP - 495,000 gpd

TG#2 XC 104 VTP - 397,374 gpd

TG#2 2 XC 49 VTP - 120,000 gpd

TG#2 XC 27 VTP - - 80,000 gpd

Pond pumps run as necessary to supply additional processing water for the preparation plant.

Not permitted to discharge.

009

POND 009

001
37°50'59.2"
88°49'37.5"

POND 001

003
37°50'26"
88°49'58"

POND 003

004
37°50'25"
88°49'56.6"

POND 004

002
37°50'26"
88°49'51.5"

POND 002

006
37°50'28.4"
88°50'40.6"

POND 006

008
37°50'31.4"
88°49'33.9"

007
37°50'29.5"
88°49'34"

POND 007/008

Decant Pump(s) on RDA No. 1 and RDA No. 2 utilized for stormwater evacuation

WATER HOLDING CELL

RDA No. 1 and RDA No. 2

RDA No. 3 (East of Dwina Refuse Area)

Groundwater Infiltration - Approx. 2.7 million gpd

Prep Plant Supply - 2,880,000 gpd

SHUT-OFF VALVE

PREPARATION PLANT

FLOAT SYSTEM TO CONTROL POOL LEVEL

FRESH WATER LAKE

Mine

Mine Intake - 720,000 gpd

005
37°50'09.1"
88°50'00"

POND 005

Johnston City Lake Pumps - 720,000 gpd

LEGEND

- Mine/Plant Fresh Water Supply
- Pond Dewatering
- Fresh Water Intake Supply
- Mine Pumpage
- RDA Decant Water
- Plant Slurry Pumpage
- Water Holding Cell

Williamson Energy, LLC
P.O. Box 99
Johnston City, IL 62951

FIGURE 1
WATER FLOW DIAGRAM
CURRENT SYSTEM

DATE: 04/25/17

SCALE: NTS

DRAWING NO. B17-222-B1

R07724

Mine Intake - 720,000 gpd

Mine

Anticipated Maximum Combined for All Turbine Pumps - 3,500,000 gpd

Stormwater pond dewatering pumps run as necessary to supply additional processing water for the preparation plant.

Proposed NPDES Outlet 010-0
Lat: / Long: 37°51'19" 88°49'36"

Pond Creek Stormwater Mixing Zone

010

001
37°50'59.2"
88°49'37.5"

POND 001

POND 009

009
37°50'52.3"
88°48'43.7"

003
37°50'26"
88°49'58"

POND 003

POND 004

004
37°50'25"
88°49'56.6"

POND 002

002
37°50'30"
88°49'51.5"

006
37°50'28.4"
88°50'40.6"

POND 006

008
37°50'31.4"
88°49'33.9"

007
37°50'29.5"
88°49'34"

POND 007/008

RDA No. 1 and RDA No. 2

RDA No. 3 (East of Dwina Refuse Area)

005
37°50'09.1"
88°50'00"

POND 005

Prep Plant Supply - 2,880,000 gpd

SHUT-OFF VALVE

PREPARATION PLANT

FRESH WATER LAKE

Johnston City Lake Pumps - 720,000 gpd

Proposed NPDES Outlet 011-0
Lat: /Long: 37°52'37" 89°01'49"

011

Big Muddy River Mixing Zone

WATER HOLDING CELLS

LEGEND

- Mine/Plant Fresh Water Supply
- Pond Dewatering / Stormwater Mixing Zone
- Fresh Water Intake Supply
- Mine Pumpage
- RDA Decant Water
- Plant Slurry Pumpage
- Big Muddy River Mixing Zone
- Existing NPDES Outlet
- Proposed NPDES Outlet

Williamson Energy, LLC
P.O. Box 99
Johnston City, IL 62951

FIGURE 2
WATER FLOW DIAGRAM
PROPOSED SYSTEM

DATE: 04/25/17

SCALE: NTS

DRAWING NO. B17-222-B2

PART IV, ATTACHMENT IV.2.B.3
PIPELINE INSTALLATION DETAILS

PIPELINE CONSTRUCTION STANDARDS AND POLICIES
for
Agricultural Impact Mitigation

Recommended by the
Illinois Department of Agriculture

The following pipeline construction standards and policies are recommended by the Illinois Department of Agriculture (IDOA) to help preserve the integrity of any agricultural land that is impacted by pipeline construction. They were developed with the cooperation of agricultural agencies, organizations, landowners, tenants, drainage contractors, and pipeline companies.

The below prescribed construction standards and policies are applicable to construction activities occurring partially or wholly on privately owned agricultural land. With the exception of Item No. 3, they are not intended to apply to construction activities occurring entirely on public right-of-way, railroad right-of-way, publicly owned land, or privately owned land that is not agricultural land.

Conditions

The mitigative actions specified in the construction standards and policies set forth below will be implemented in accordance with the conditions listed below:

A. All mitigative actions are subject to modification through negotiation by landowners and a representative of the Company, provided such changes are negotiated in advance of any construction, maintenance, or repairs.

B. The Company may negotiate with landowners to carry out the mitigative actions that landowners wish to perform themselves.

C. All mitigative actions employed by the Company, unless otherwise specified in these construction standards and policies or in an easement negotiated with an individual landowner, will be implemented within 45 days of completion of the pipeline facilities on any affected property, weather and landowner permitting. Temporary repairs will be made by the Company during the construction process as needed to minimize the risk of additional property damage that may result from an extended construction time period. If weather delays the completion of any mitigative action beyond the 45 day period, the Company will provide the affected landowner(s) with a written estimate of the time needed for completion of the mitigative action.

D. All mitigative actions will extend to associated future construction, maintenance, and repairs by the Company.

E. Every effort will be made by the Company to determine all affected tenants along the route of the pipeline. The Company will endeavor to keep the tenants informed of the project's status, meetings, and other factors that may have an impact upon their farming operations.

F. The Company agrees to include a statement of its adherence to the construction standards and policies in any environmental assessment and/or environmental impact statement that may be prepared on the project.

G. The Company will implement all mitigative actions to the extent that they do not conflict with the requirements of any applicable federal, state and local rules and regulations and other permits and approvals that are obtained by the Company for the project.

H. If any mitigative action(s) is held to be unenforceable, no other provision shall be affected by that holding, and the remainder of the mitigative actions shall be interpreted as if they did not contain the unenforceable provision.

Definitions

Agricultural land - Land used for cropland, hayland, pasture land, managed woodlands, truck gardens, farmsteads, commercial ag-related facilities, feedlots, livestock confinement systems, land on which farm buildings are located, and land in government set-aside programs.

Company - Pipeline company, utility company, and any contractor or sub-contractor in the employ of the Company for the purpose of completing the pipeline or any mitigative actions contained herein.

Cropland - Land used for growing row crops, small grains, or hay; includes land which was formerly used as cropland, but is currently in a government set-aside program and pastureland comprised of prime farmland.

Pipeline - Includes the pipeline and its related appurtenances.

Landowner - Person(s) holding legal title to property on the pipeline route from whom the Company is seeking, or has obtained, a temporary or permanent easement, or any person(s) legally authorized by a landowner to make decisions regarding the mitigation or restoration of agricultural impacts to such landowner's property.

Prime farmland - Agricultural land comprised of soils that are defined by the USDA Natural Resources Conservation Service as being "prime" soils (generally considered the most productive soils with the least input of nutrients and management).

Right-of-way - Includes the permanent and temporary easements that the Company acquires for the purpose of constructing and operating the pipeline.

Topsoil - The uppermost layer of the soil that has the darkest color or the highest content of organic matter, more specifically defined as the "A" horizon.

Pipeline Construction Standards and Policies

1. Pipeline depth

A. Except for aboveground piping facilities, such as mainline block valves, tap valves, meter stations, etc., the pipeline will be buried with:

1. a minimum of 5 feet of top cover where it crosses cropland.

2. a minimum of 5 feet of topcover where it crosses pasture land or other agricultural land comprised of soils that are classified by the USDA as being prime soils.

3. a minimum of 3 feet of top cover where it crosses pasture land and other agricultural land not comprised of prime soils.

4. a minimum of 3 feet of top cover where it crosses wooded/brushy land.

5. substantially the same topcover as an existing parallel pipeline, but not less than 3 feet, where the route parallels an existing pipeline within a 100 foot perpendicular offset.

B. Notwithstanding the foregoing, in those areas where (i) rock in its natural formation and/or (ii) a continuous strata of gravel exceeding 200 feet in length are encountered, the minimum top cover will be 30 inches.

C. When the pipeline requires weights to keep it from floating, the pipeline will be buried deep enough to maintain the depth of topcover above the weights as specified in 1.A. above.

D. On agricultural land subject to erosion, the Company will patrol the pipeline right-of-way with reasonable frequency to detect areas of erosion of the top cover. In no instance will the Company knowingly allow the amount of top cover to be less than 36 inches as a result of natural erosion, except as stated in 1.B. above.

2. Topsoil Replacement

A. The topsoil depth shall be determined by a properly qualified soil scientist or soil technician who will set stakes or flags every 200 feet along the right-of-way identifying the depth of topsoil to be removed.

B. The actual depth of the topsoil, not to exceed 36 inches, will first be stripped from the area to be excavated above the pipeline and from the adjacent subsoil storage area. The topsoil will be stored in a windrow parallel to the pipeline trench in such a manner that it will not become intermixed with subsoil materials.

C. All subsoil material that is removed from the trench will be placed in a second windrow parallel to the pipeline trench that is separate from the topsoil windrow.

D. In backfilling the trench, the stockpiled subsoil material will be placed back into the trench before replacing the topsoil.

E. Refer to Items No. 5.A. and 5.B. for procedures pertaining to rock removal from the subsoil and topsoil.

F. Refer to Items No. 7.A. through 7.C. for procedures pertaining to the alleviation of compaction of the topsoil.

G. The topsoil must be replaced so that after settling occurs, the topsoil's original depth and contour (with an allowance for settling) will be restored. The same shall apply where excavations are made for road, stream, drainage ditch, or other crossings. In no instance will the topsoil materials be used for any other purpose.

3. Repair of Damaged Tile Lines

If underground drainage tile is damaged by the pipeline's construction, it will be repaired in a manner that assures the tile line's proper operation at the point of repair. The following standards and policies shall apply to the tile line repair:

A. The Company will endeavor to locate all tile lines within the right-of-way prior to the pipeline's installation so repairs can be made if necessary. The Company will contact affected landowners/tenants for their knowledge of tile line locations prior to the pipeline's installation. All identified tile lines will be staked or flagged prior to construction to alert construction crews to the possible need for tile line repairs.

B. All tile lines that are damaged, cut, or removed shall be staked or flagged with the stakes or flags placed in such a manner they will remain visible until the permanent repairs are completed.

C. If water is flowing through any damaged tile line, the tile line will be immediately and temporarily repaired until such time that permanent repairs can be made. If the tile lines are dry and water is not flowing, temporary repairs are not required if the permanent repairs can be made within 14 days of the time damage occurred; however, the exposed tile lines will be screened or otherwise protected to prevent the entry of foreign materials, small mammals, etc. into the tile lines.

D. Where tile lines are severed by the pipeline trench, repairs shall be made using Standard Drawing IL-ENG-150, dated 12/98, by the USDA Natural Resources Conservation Service (attached).

E. There will be a minimum of one foot of separation between the tile line and the pipeline whether the pipeline passes over or under the tile line.

F. The original tile line alignment and gradient shall be maintained. A laser transit shall be used to ensure the proper gradient is maintained. A laser operated tiling machine shall be used to install or replace tiling segments of 100 linear feet or more.

G. Before completing permanent tile repairs, all tile lines will be probed or examined by other suitable means on both sides of the trench for their entire length within any work areas to check for tile that might have been damaged by vehicular traffic or construction equipment. If tile lines are found to be damaged, they must be repaired so they operate as well after construction as before the construction began.

H. All permanent tile line repairs must be made within 14 days of the pipeline being laid in the trench on the landowner's property, weather and soil conditions permitting.

I. Following completion of the pipeline, the Company will be responsible for correcting all tile line repairs that fail due to pipeline construction, provided those repairs were made by the Company. The Company will not be responsible for tile line repairs that the Company pays the landowner to perform.

4. Installation of Additional Tile Lines

A. The Company shall be responsible for installing such additional drainage tile and other drainage measures as are necessary to properly drain wet areas on the permanent and temporary easements caused by the construction and/or existence of the pipeline.

B. Where the pipeline's route parallels an existing pipeline within a 200-foot perpendicular offset, the Company shall be responsible for installing tile and/or other drainage measures, as necessary, to properly drain the area between the two pipelines to the extent the wet areas between the pipelines are caused by the construction and/or existence of the pipeline.

C. It is presumed that any wet areas located in permanent and temporary easements and/or between the two parallel pipelines are caused by the construction and/or existence of the new pipeline unless the Company can prove that the construction and/or existence of the new pipeline is not the cause of the wet areas.

5. Rock Removal

The following rock removal procedures only pertain to rocks found in the uppermost 42 inches of soil, the common freeze zone in Illinois.

A. Before replacing any topsoil, all rocks greater than 3 inches in any dimension will be removed from the surface of all exposed subsoil and from all subsoil that is replaced back in the trench.

B. As the topsoil is replaced, all rocks greater than 3 inches in any dimension will be removed from the topsoil.

C. If trenching, blasting, or boring operations are required through rocky terrain, suitable precautions will be taken to minimize the potential for oversized rocks to become interspersed with adjacent soil material.

D. Rocks and soil containing rocks removed from the subsoil areas, topsoil, or from any excavations, will be hauled off the landowner's premises or disposed of on the landowner's premises at a location that is mutually acceptable to the landowner and the Company.

6. Removal of Construction Debris

All construction-related debris and material that are not an integral part of the pipeline will be removed from the landowner's property. Such material to be removed would include litter generated by the construction crews.

7. Compaction, Rutting, Fertilization, Liming

A. After the topsoil has been replaced, all areas that were traversed by vehicles and construction equipment will be ripped at least 18 inches deep and all pasture and woodland will be ripped at least 12 inches deep. The existence of tile lines or underground utilities may necessitate less depth. The entire right-of-way will then be disked.

B. Three passes will be made across any agricultural land that is ripped.

C. All ripping and disking will be done at a time when the soil is dry enough for normal tillage operations to occur on undisturbed farmland adjacent to the areas to be ripped.

D. The Company will restore all rutted land to its original condition.

E. The cost of applying fertilizer, manure, and/or lime will be included in the damages paid to the landowner, thereby allowing the landowner to apply the appropriate type and amounts of fertilizer, manure, and/or lime as needed depending on the crops contemplated and the construction schedule.

F. If there is any dispute between the landowner and the Company as to what areas need to be ripped, the depth at which compacted areas should be ripped, or the necessity or rates of lime and fertilizer application, the appropriate county Soil and Water Conservation District's opinion shall be considered by the Company and the landowner.

8. Land Leveling

A. Following the completion of the pipeline, the Company will restore any right-of-way to its original pre-construction elevation and contour should uneven settling occur or surface drainage problems develop as a result of pipeline construction.

B. The Company will provide the landowners with a telephone number and address that may be used to alert the Company of the need to perform additional land leveling services.

C. If, in the future, uneven settling occurs or surface drainage problems develop as a result of the pipeline construction, the Company will provide such land leveling services within 45 days of a landowner's written notice, weather and soil conditions permitting.

D. If there is any dispute between the landowner and the Company as to what areas need additional land leveling beyond that which is done at the time of construction, it shall be the Company's responsibility to disprove the landowner's claim that additional land leveling is warranted.

9. Prevention of Soil Erosion

A. The Company will work with landowners to prevent excessive erosion on right-of-way that has been disturbed by construction. Reasonable methods will be implemented to control erosion. This is not a requirement, however, if the land

across which the pipeline is constructed is bare cropland that the landowner intends to leave bare until the next crop is planted.

B. If the landowner and Company cannot agree upon a reasonable method to control erosion on the landowner's right-of-way, the recommendations of the appropriate county Soil and Water Conservation District shall be considered by the Company and the landowner.

10. Repair of Damaged Soil Conservation Practices

All soil conservation practices (such as terraces, grassed waterways, etc.), which are damaged by the pipeline's construction, will be restored to their pre-construction condition.

11. Damages to Private Property

A. The Company will reasonably compensate landowners for any construction-related damages caused by the Company that occur on or off of the established pipeline right-of-way.

B. Compensation for damages to private property caused by the Company shall extend beyond the initial construction of the pipeline, to include those damages caused by the Company during future construction, operation, maintenance, and repairs relating to the pipeline.

12. Clearing of Trees and Brush from the Easement

A. If trees are to be removed from the right-of-way, the Company will consult with the landowner to determine if there are trees of commercial or other value to the landowner.

B. If there are trees of commercial or other value to the landowner, the Company will allow the landowner the right to retain ownership of the trees with the disposition of the trees to be negotiated prior to the commencement of land clearing.

C. Unless otherwise restricted by federal, state or local regulations, the Company will follow the landowner's desires regarding the removal and disposal of trees, brush, and stumps of no value to the landowner by burning, burial, etc., or complete removal from any affected property.

13. Interference with Irrigation Systems

A. If the pipeline and/or temporary work areas intersect an operational (or soon to be operational) spray irrigation system, the Company will establish with the landowner an acceptable amount of time the irrigation system may be out of service.

B. If, as a result of pipeline construction activities, an irrigation system interruption results in crop damages, either on the pipeline right-of-way or off the right-of-way, the landowner will be reasonably compensated for all such crop damages.

C. If it is feasible and mutually acceptable to the Company and the landowner, temporary measures will be implemented to allow an irrigation system to continue to operate across land on which the pipeline is also being constructed.

14. Ingress and Egress Routes

Prior to the pipeline's installation, the Company and the landowner will reach a mutually acceptable agreement on the route that will be utilized for entering and leaving the pipeline right-of-way should access to the right-of-way not be practical or feasible from adjacent segments of the pipeline right-of-way or from public highway or railroad right-of-way.

15. Temporary Roads

A. The location of temporary roads to be used for construction purposes will be negotiated with the landowner.

B. The temporary roads will be designed to not impede surface drainage and will be built to minimize soil erosion on or near the temporary roads.

C. Upon abandonment, temporary roads may be left intact through mutual agreement of the landowner and the Company unless otherwise restricted by federal, state, or local regulations.

D. If the temporary roads are to be removed, the rights-of-way upon which the temporary roads are constructed will be returned to their previous use(s) and restored to equivalent condition(s) as existed prior to their construction. All temporary access roads that are removed shall be ripped to a depth of 18 inches. All ripping will be done consistent with Items 7.A. through 7.C.

16. Weed Control

A. On any right-of-way over which the Company has jurisdiction as to its surface use, (i.e., valve sites, metering stations, compression stations, etc.), the Company will provide for weed control in a manner that prevents the spread of weeds onto adjacent lands used for agricultural purposes. Spraying will be done by a pesticide applicator who is appropriately licensed for doing such work in the state of Illinois.

B. The Company will be responsible for reimbursing all reasonable costs incurred by owners of land adjacent to surface facilities when the landowners must control weeds on their land which can be determined to have spread from land accommodating pipeline surface facilities, should the Company fail to do so after being given written notice and a 45-day opportunity to respond.

17. Pumping of Water from Open Trenches

A. In the event it becomes necessary to pump water from open trenches, the Company will pump the water in a manner that will avoid damaging adjacent agricultural land, crops, and/or pasture. Such damages include, but are not limited to: inundation of crops for more than 24 hours, deposition of sediment in ditches and other water courses, and the deposition of subsoil sediment and gravel in fields and pastures.

B. If it is impossible to avoid water-related damages as described in Item 17.A. above, the Company will reasonably compensate the landowners for the damages or will correct the damages so as to restore the land, crops, pasture, water courses, etc. to their pre-construction condition.

C. All pumping of water shall comply with existing drainage laws, local ordinances relating to such activities, and provisions of the Clean Water Act.

18. Aboveground Facilities

Locations for aboveground facilities shall be selected in a manner so as to be as unobtrusive as reasonably possible to on-going agricultural activities occurring on the land adjacent to the facilities. First priority shall be made to locating aboveground facilities on right-of-way that is not used as cropland. If this is not feasible, such facilities shall be located so as to incur the least hindrance to the adjacent cropping operations (i.e., located in field corners or areas where at least one side is not used for cropping purposes).

19. Advance Notice of Access to Private Property

A. The Company will provide the landowner or tenant with a minimum of 24 hours prior notice before accessing his/her property for the purpose of constructing the pipeline.

B. Prior notice shall first consist of a personal contact or a telephone contact, whereby the landowner or tenant is informed of the Company's intent to access the land. If the landowner or tenant cannot be reached in person or by telephone, the Company will mail or hand deliver to the landowner or tenant's home a dated, written notice of the Company's intent. The landowner or tenant need not acknowledge receipt of the written notice before the Company can enter the landowner's property.

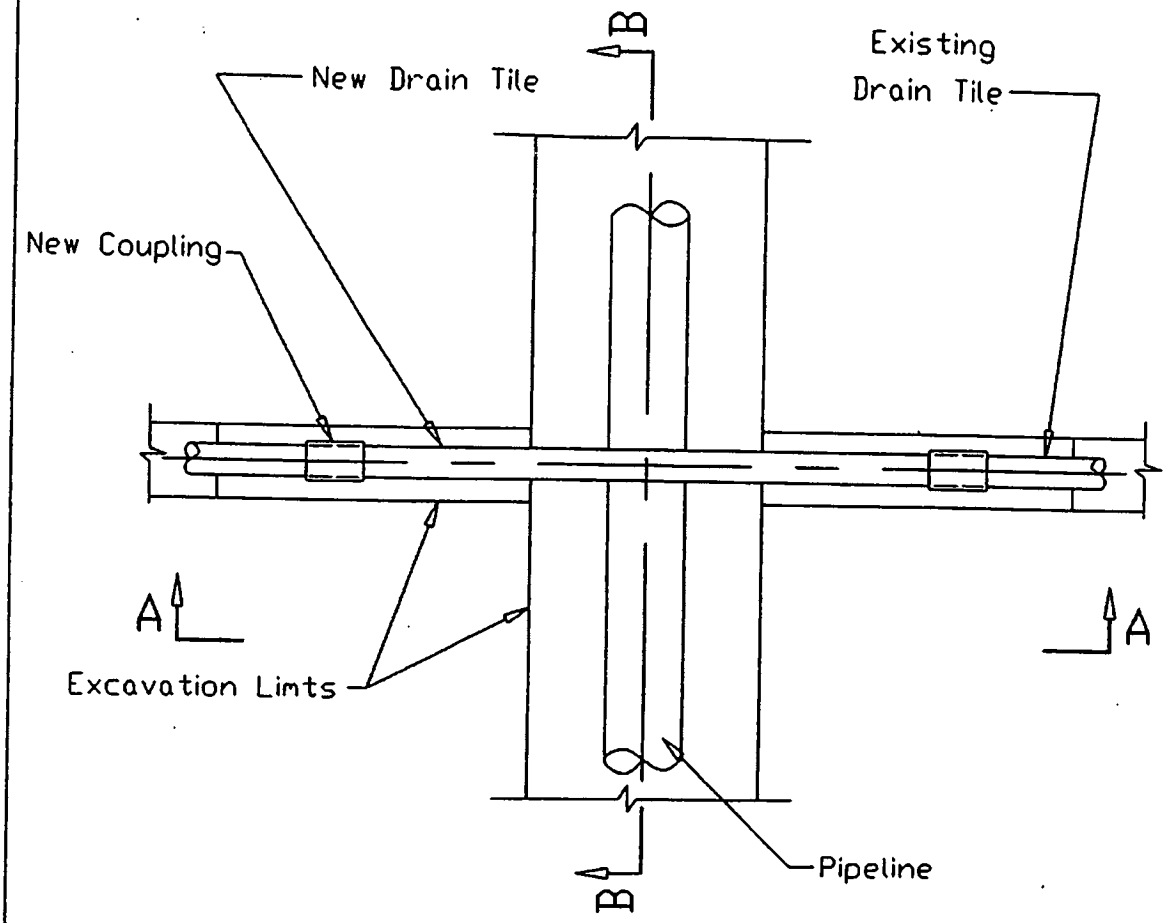
20. Reporting of Inferior Agricultural Impact Mitigation Work

No later than 45 days prior to the commencement of the pipeline construction across a landowner's property, the Company will provide the landowner with a toll-free number the landowner can call to alert the Company should the landowners observe inferior agricultural impact mitigation work which is being done or has been carried out on his/her property.

21. Indemnification

The Company will indemnify all owners of agricultural land upon which such pipeline is installed, their heirs, successors, legal representatives, and assigns from and against all claims, injuries, suits, damages, costs, losses, and reasonable expenses resulting from or arising out of the laying, maintenance, removal, repair, use or existence of such pipeline, whether heretofore or hereafter laid, including damage to such pipeline or any of its appurtenances and the leaking of its contents, except where claims, injuries, suits, damages, costs, losses, and expenses are caused by the negligence or intentional acts, or willful omissions of such owners, their heirs, successors, legal representatives, and assigns.

FIELD TILE REPAIR



EXCAVATION PLAN

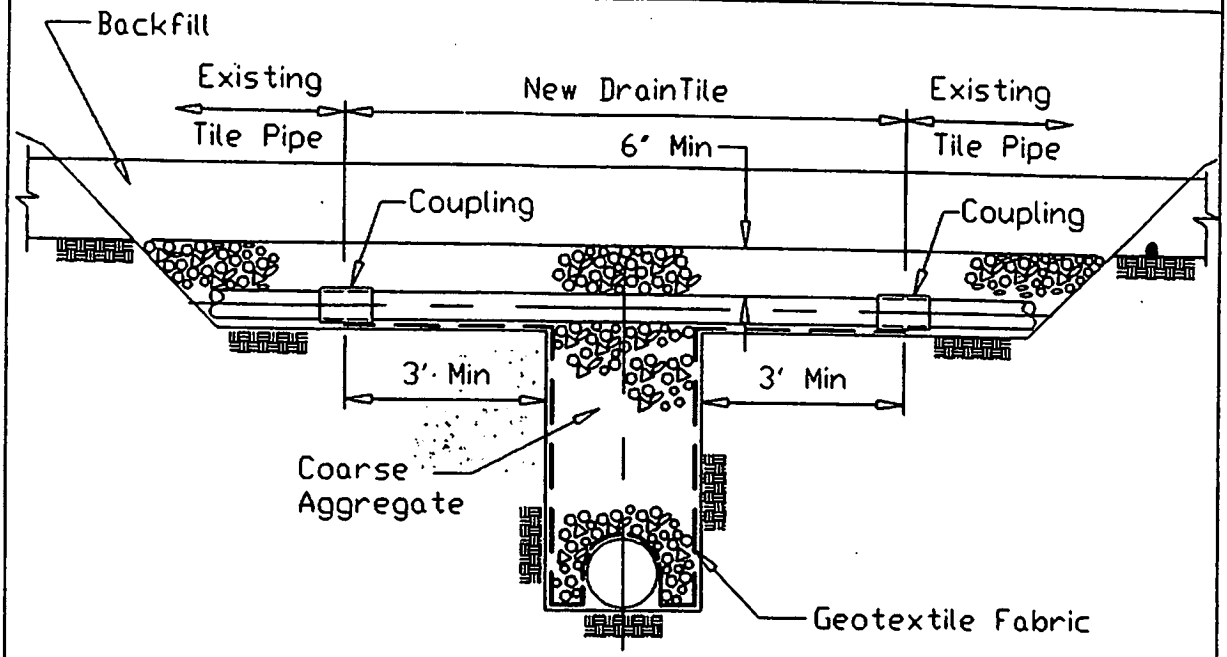
NOTES:

1. Coarse aggregate shall be gravel, crushed gravel, pit run gravel or crushed stone and shall conform to the requirements of IDOT Standard Specification for Road and Bridge Construction Article 1004.01 and CA-18 gradation.
2. Geotextile may be woven or non-woven and shall conform to the requirements of Class 1 in the attached table 1 or 2. In addition, when pipleline trench depth exceeds 10 feet, puncture strength (ASTM D 483) shall be 150 lbs or greater.
3. New tile should be equal to or better than existing tile. Dual Wall polyethylene tubing conforming to ASHTO M-252 or M-294 may be used where existing tile is rigid conduit (clay or concrete).

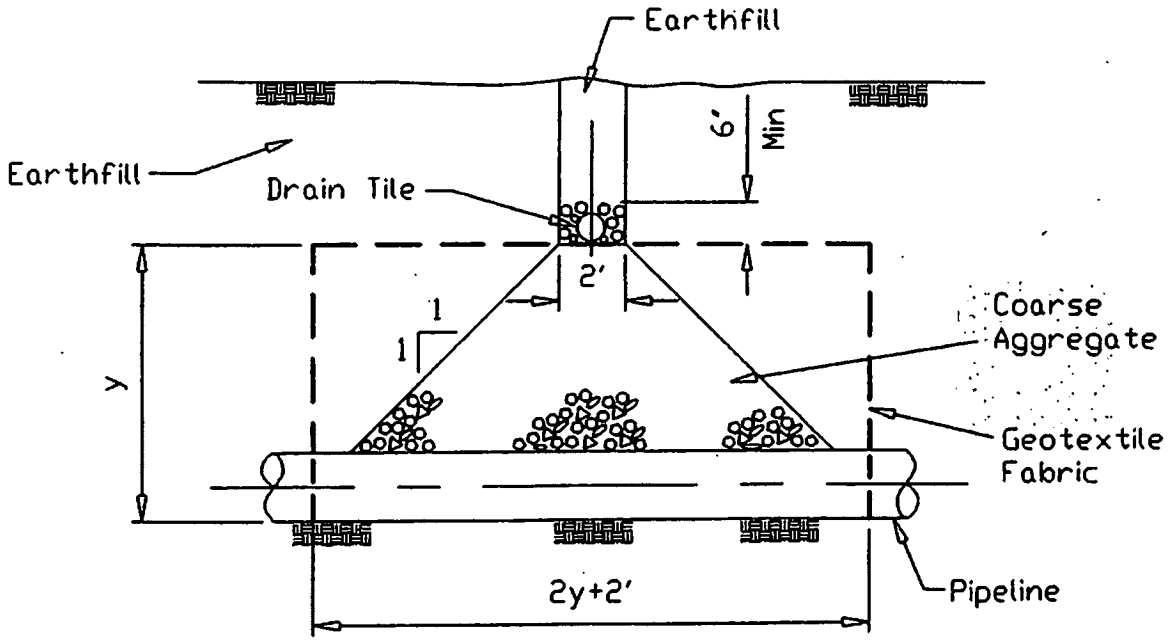
AUTOCAD2000

REFERENCE		USDA NATURAL RESOURCES CONSERVATION SERVICE ILLINOIS	STANDARD DWG. NO. IL-ENG-150A
Project			SHEET 1 OF 2
Designed	Date		DATE: 12/98
Checked	Date		
Approved	Date		

FIELD TILE REPAIR



SECTION A-A



SECTION B-B

AUTOCAD2000

REFERENCE
Project
Designed Date
Checked Date
Approved Date

USDA NATURAL RESOURCES CONSERVATION SERVICE ILLINOIS

STANDARD DWG. NO.
IL-ENG-150B
SHEET 2 OF 2
DATE: 12/98

Material Specification 592—Geotextile

1. Scope

This specification covers the quality of geotextiles.

2. General requirements

Fibers (threads and yarns) used in the manufacture of geotextile shall consist of synthetic polymers composed of a minimum of 85 percent by weight polypropylenes, polyesters, polyamides, polyethylene, polyolefins, or polyvinylidene-chlorides. They shall be formed into a stable network of filaments or yarns retaining dimensional stability relative to each other. The geo-textile shall be free of defects and conform to the physical requirements in tables 592–1 and 592–2. The geotextile shall be free of any chemical treatment or coating that significantly reduces its porosity. Fibers shall contain stabilizers and/or inhibitors to enhance resistance to ultraviolet light.

Thread used for factory or field sewing shall be of contrasting color to the fabric and made of high strength polypropylene, polyester, or polyamide thread. Thread shall be as resistant to ultraviolet light as the geotextile being sewn.

3. Classification

Geotextiles shall be classified based on the method used to place the threads or yarns forming the fabric. The geotextiles will be grouped into woven and nonwoven types.

Woven—Fabrics formed by the uniform and regular interweaving of the threads or yarns in two directions. Woven fabrics shall be manufactured from monofilament yarn formed into a uniform pattern with distinct and measurable openings, retaining their position relative to each other. The edges of fabric shall be selvedged or otherwise finished to prevent the outer yarn from unraveling.

Nonwoven—Fabrics formed by a random placement of threads in a mat and bonded by heat-bonding, resin-bonding, or needle punching. Nonwoven fabrics shall be manufactured from individual fibers formed into a random pattern with distinct, but variable small openings, retaining their position relative to each other when bonded by needle punching, heat, or resin bonding. The use of nonwovens other than the needle punched geotextiles is somewhat restricted (see note 3 of table 592–2).

4. Sampling and testing

The geotextile shall meet the specified requirements (table 592–1 or 592–2) for the product style shown on the label. Product properties as listed in the latest edition of the "Specifiers Guide," Geotechnical Fabrics Report, (Industrial Fabrics Association International, 1801 County Road BW, Roseville, MN 55113-4061) and that represent minimum average roll values, are acceptable documentation that the product style meets the requirements of these specifications.

For products that do not appear in the above directory or do not have minimum average roll values listed, typical test data from the identified production run of the geotextile will be required for each of the specified tests (tables 592–1 or 592–2) as covered under clause AGAR 452.236-76.

5. Shipping and storage

The geotextile shall be shipped/transported in rolls wrapped with a cover for protection from moisture, dust, dirt, debris, and ultraviolet light. The cover shall be maintained undisturbed to the maximum extend possible before placement.

Each roll of geotextile shall be labeled or tagged to clearly identify the brand, class, and the individual production run in accordance with ASTM D 4873.

Table 592–1 Requirements for woven geotextiles

Property	Test method	Class I	Class II & III	Class IV
Tensile strength (pounds) 1/	ASTM D 4632 grab test	200 minimum in any principal direction	120 minimum in any principal direction	180 minimum in any principal direction
Elongation at failure (percent) 1/	ASTM D 4632 grab test	<50	<50	<50
Puncture (pounds) 1/	ASTM D 4833	90 minimum	60 minimum	60 minimum
Ultraviolet light (% residual tensile strength)	ASTM D 4355 150-hr exposure	70 minimum	70 minimum	70 minimum
Apparent opening size (AOS)	ASTM D 4751	As specified, but no smaller than 0.212 mm (#70) 2/	As specified, but no smaller than 0.212 mm (#70) 2/	As specified, but no smaller than 0.212 mm (#70) 2/
Percent open area (percent)	CWO-02215-86	4.0 minimum	4.0 minimum	1.0 minimum
Permitivity sec^{-1}	ASTM D 4491	0.10 minimum	0.10 minimum	0.10 minimum

1/ Minimum average roll value (weakest principal direction).
2/ U.S. standard sieve size.
Note: CWO is a USACE reference.

Table 592–2 Requirements for nonwoven geotextiles

Property	Test method	Class I	Class II	Class III	Class IV 3/
Tensile strength (lb) 1/	ASTM D 4632 grab test	180 minimum	120 minimum	90 minimum	115 minimum
Elongation at failure (%) 1/	ASTM D 4632	≥ 50	≥ 50	≥ 50	≥ 50
Puncture (pounds)	ASTM D 4833	80 minimum	60 minimum	40 minimum	40 minimum
Ultraviolet light (% residual tensile strength)	ASTM D 4355 150-hr exposure	70 minimum	70 minimum	70 minimum	70 minimum
Apparent opening size (AOS)	ASTM D 4751	As specified max. #40 2/	As specified max. #40 2/	As specified max. #40 2/	As specified max. #40 2/
Permittivity sec^{-1}	ASTM D 4491	0.70 minimum	0.70 minimum	0.70 minimum	0.10 minimum

1/ Minimum average roll value (weakest principal direction).
2/ U.S. standard sieve size.
3/ Heat-bonded or resin-bonded geotextile may be used for classes III and IV. They are particularly well suited to class IV. Needle-punched geotextiles are required for all other classes.

PART IV ATTACHMENT IV.5.C.2
PIPELINE/DIFFUSER DETAILS

Water Management Pipeline
Typically, up to five 20 foot long joints of HDPE pipe will be electro-fused together before a flange is fused on the end of the pipe for a mechanical coupling. On-site equipment can be used to pull the pipe into the proper location for installation.

Proposed Multiport Outfall Diffuser Design and Construction:
The proposed new multiport outfall diffuser design, the port quantity, size, configuration, and direction of diffusion have been designed in order to provide the correct dispersion, mixing, and rate of diffusion based on the design flows. The diffuser was sized to accommodate a range of flows between 800 GPM – 5,000 GPM, based on a variable flow through the Big Muddy River and an assumed effluent chloride concentration of 12,000 mg/L.

A total of five (5) separate outfall diffuser branches (consisting of three 8-inch, one 12-inch, and one 16-inch diameter pipes) will extend from the Outfall Control Building down the river bank and in to the river. The pipe material for the outfall piping between the control building and diffuser header pipe will be HDPE. Based on previous experience with other diffusion system designs and other river facilities, it is recommended that the outfall pipe and diffusion header be welded steel pipe with minimum 0.5-inch thick walls. The diffusion ports would also be constructed of steel and have "semi-flared" ends sized to reduce existing head loss, but at the same time sized not to change the overall dispersion characteristics and flow momentum. The diffusion header pipes and diffusion ports will be coated with a protective coating system inside and out for corrosion protection. Cradles on a steel frame will support the diffusion branch pipes. The submerged diffuser assembly will be placed and supported by steel piles driven into the river bottom. Final sizing of the pile diameter and required length of embedment will be further evaluated during the design process.

Proposed materials of construction: Outfall Diffuser Branches & Ports

- Steel Pipe: Steel pipe shall conform to the requirements of AWWA C200-86 and ASTM A139, Grade B. Steel pipe shall be fabricated with a minimum thickness of 0.500 inch.
- Joints: Welded pipe joints shall conform to ASTM A139. Flanged joints may be allowed to facilitate installation.
- Coating: Exterior shall be coal tar epoxy system or equivalent; interior shall be high solids catalyzed epoxy system or equivalent.

Hydraulic Analysis:
General:
The purpose of the hydraulic evaluation is two-fold: to determine system operating pressures proposed discharge flows and to determine equipment sizing. As a component of equipment sizing, this analysis evaluated the option of re-purposing one (1) existing 250 hp vertical turbine pumps currently owned by the Facility as an alternative to purchasing and installing new pumps sized specifically for this application. For the evaluation of the Facility's existing 250 hp pump, it is assumed that this pump will be installed in parallel with one (1) new identical 250 hp pump. For the analysis presented herein, the proposed outfall system was broken into two separate parts:

- The pipeline segment between the Effluent Outfall Pump Station and the Outfall Control Building;
- The pipeline segment between the Outfall Control Building and the Multiport Diffuser.

Pipeline Hydraulic Evaluation:

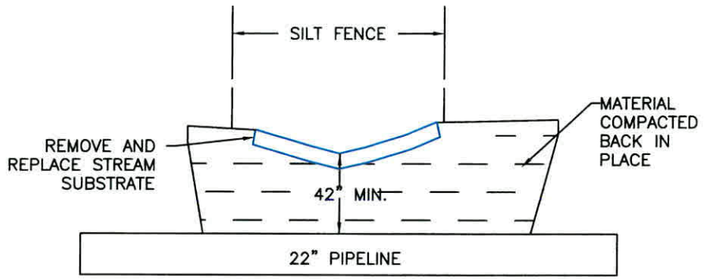
Friction losses in the 66,800± feet of the HDPE pipeline from the Outfall Pump Station (Permit 375 Water Holding Cells) to the Outfall Control Building (Diffuser Site). Friction loss for the total length, friction loss to the high point, and friction loss from the high point (STA 184+00 Elev. 501') to the end (STA 668+20 Elev. 392.0). There is 115 feet (50 psi equivalent) of available static head from the pipeline high point to the Outfall Control Building. Assuming 25 psig of pressure is needed at the Outfall Control Building, a flow of up to 2,000-2,500 GPM can be readily achieved by gravity; above 2,000-2,500 GPM constant pumping will be required to overcome the friction losses generated by these higher flows. At a 5,000± GPM discharge flow rate the pump total discharge head (TDH) required is approximately 309.4 ft. of friction head plus 25 psig (57.7 feet) needed at the Outfall Control Building, minus 60 feet of available static head, or 307.1± feet.

Due to the capacity of the new pipeline for gravity flow, the system can be operated in manner similar to that of an elevated storage tank during periods of low discharge flows. During this mode of operation, the pump can cycle on/off at 100% speed to fill/drain (respectively) the theoretical "elevated tank." This eliminates the need for a smaller pump to accommodate lower flows. When the discharge flow becomes such that the friction losses exceed the available negative static pressure differential, the system must be operated as a pressurized forcemain with the pump(s) varying its(their) speed to maintain a system process setpoint.

Refer to the Water Management Pipeline Details (Drawing No. B17-222-E3) for additional information concerning the pipeline profile, diffuser details and pump specifications.

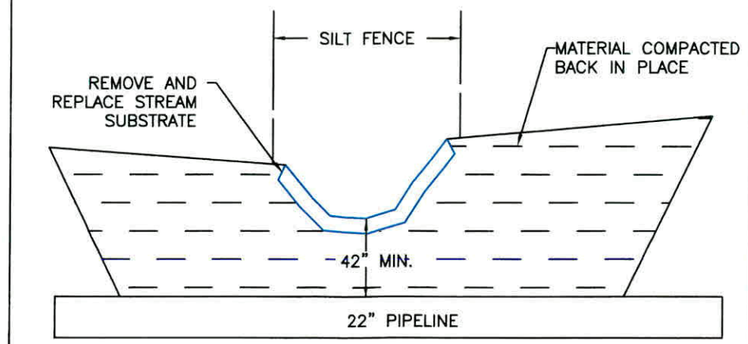
PART IV, ATTACHMENT IV.7.I
COIR MAT DETAILS AND PRODUCT INFORMATION

R07744



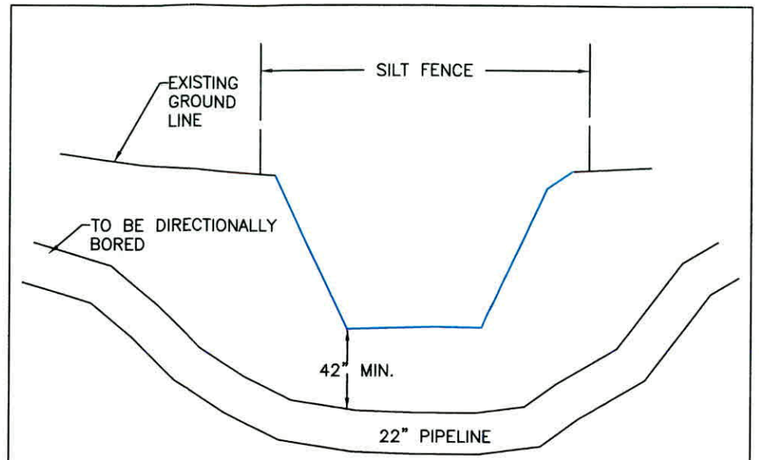
TRENCHED EPHEMERAL STREAM CROSSING (TYP)

*Note: If water is present is stream at time of construction water will be collected and pumped around the work area.

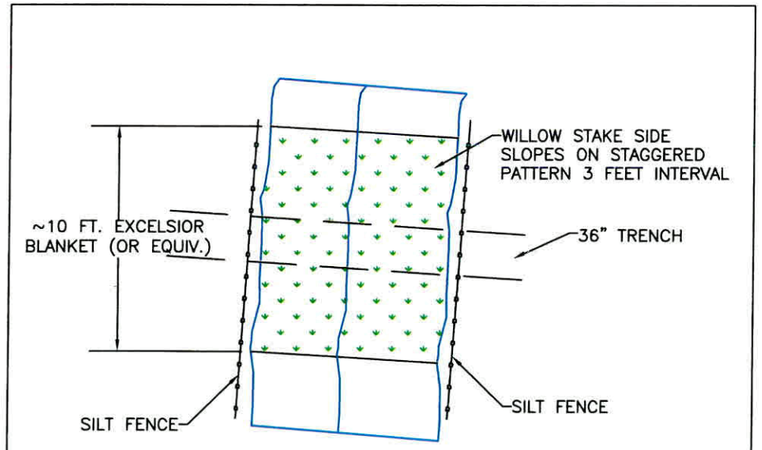


TRENCHED INTERMITTENT STREAM CROSSING (TYP)

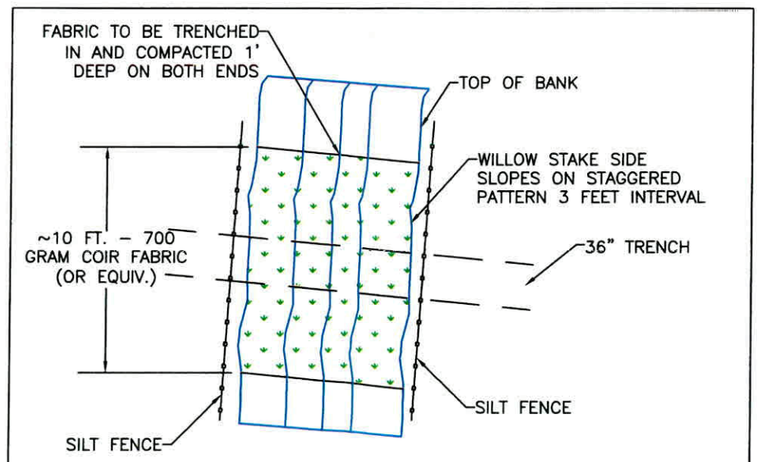
*Note: If water is present is stream at time of construction water will be collected and pumped around the work area.



BORED PERENNIAL/INTERMITTENT STREAM CROSSING (TYP)



TRENCHED EPHEMERAL STREAM CROSSING (TYP)



TRENCHED INTERMITTENT STREAM CROSSING (TYP)

DETAILS NOT TO SCALE

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491 CANONSBURG, PA (724) 745-3630 CHARLESTON, WV (681) 217-2090

TYPICAL STREAM CROSSING

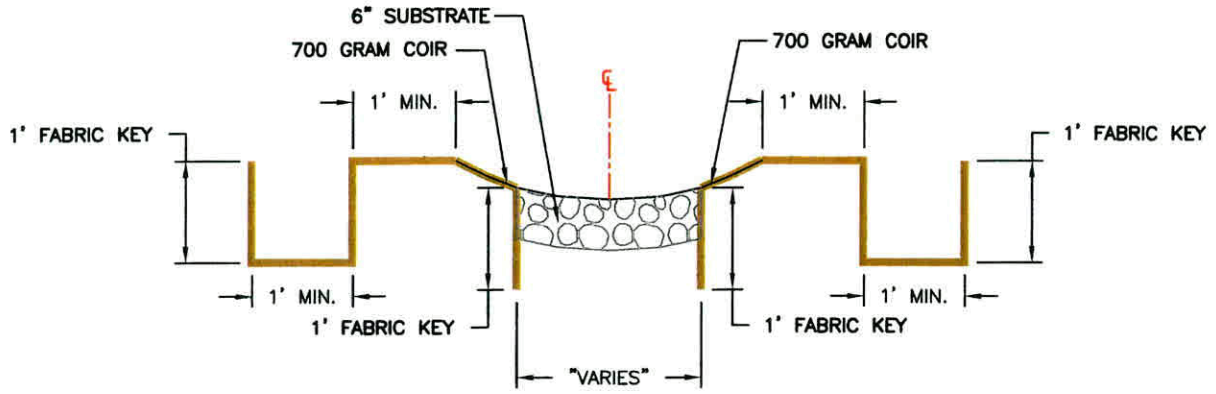
WATER MANAGEMENT PIPELINE
CROSSINGS FOR EPHEMERAL, INTERMITTENT & PERENNIAL STREAMS

Prepared For

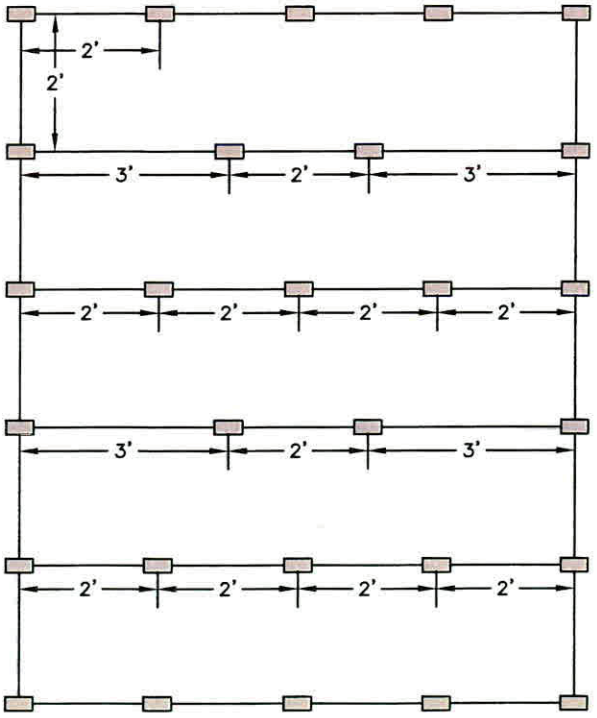
WILLIAMSON ENERGY LLC
FRANKLIN & WILLIAMSON COUNTIES, IL

CAD BY	JL	05/25/18	PROJECT NO. B17-222-1413	
CHECKED BY	JLP	05/31/18		
APPROVED BY	JLP	05/31/18	DRAWING NO. B17-222-B3	

Printed By: ssutphin
Date : Jun 21, 2018
Time : 11:30 AM
\\Acd-acadcaddrawings\...\17222B3.dwg



TYPICAL CROSS SECTION



COIR MATTING STAKING DIAGRAM
8' WIDE EROSION CONTROL BLANKET

NOTE: NOT TO SCALE

Alliance Consulting, Inc.
Engineers
Constructors
Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630
CHARLESTON, WV (681) 217-2090

COIR MAT DETAILS

WATER MANAGEMENT PIPELINE
STREAM CROSSINGS

PREPARED FOR

WILLIAMSON ENERGY LLC
FRANKLIN & WILLIAMSON COUNTIES, IL

DRAWN BY	–	02/06/08
CHECKED BY		
APPROVED BY		
DRAWING NUMBER		FIGURE NUMBER
B17–222–A1		

Erosion Supply Company
8817 Midway West Rd., Raleigh, NC 27617

700 GRAM COIR MATTING

EROSION SUPPLY CERTIFIES THIS BLANKET TO MEET THE FOLLOWING SPECIFICATIONS:

PROPERTIES:

Weight	**23 Ounces Per Sy**
Thickness	**0.35 Inch**
Composition	**100% Coconut Fibers**
Tensile Strength (lbs/ft)	**1488MD x 1032CD**
Elongation	**(34% x 38%)**
Open Area	**50%**
Flexibility	**65030X29590**
"C" Factor	**0.002**
Recommended Slope	**>1:1**
Recommended Flow (fps)	**12**
Recommended Shear Stress (lbs/sq.ft.)	**4.5**
Life Expectancy	**24-36 Months**
Roll Sizes	**2m/3m/4mx25m/50m**

The coir fiber blankets are made by hand from the highest quality coir available on the market. The coir fiber is twisted into a high strength rope and then woven into the matting.

INFORMATION ONLY

Phone: (919)787-0334 • Fax: (919)787-0335 • Email: erosionsupply@nc.rr.com

PART V

PART V

PART V

RECLAMATION PLAN

1) Provide a reclamation plan outlining proposed reclamation of the lands within the proposed permit area. The reclamation plan shall include the following:

A) Provide for each major step in the proposed reclamation plan a detailed timetable for completion.

RESPONSE: **When permanent cessation of operations occurs, final reclamation of the permit area is to commence immediately and be completed in accordance with the approved reclamation plan and the permit conditions developed in accordance with 62 IAC 1817.100 through 1817.117.**

Backfilling and regrading of the Water Management Pipeline will be achieved as part of the installation of the pipeline. All available subsoil and topsoil will be used and the site will be revegetated using the approved seed mixture and tree species.

Reclamation of the diffuser site will require the removal of the operations and control building from the site and diffuser removed from the Big Muddy River. All salvageable material will be hauled off-site. All reinforced concrete material will be broken up and either buried on-site or place within the bank protection area.

B) Provide a detailed estimate of the cost of reclamation for the proposed surface mining operation required to be covered by a performance bond. Provide calculations and/or drawings, cross sections, maps, etc. to support the reclamation cost estimate.

Response: **Refer to Attachment V.1.B for the detailed itemization of the cost of reclamation for the proposed surface mining operations to be covered by a performance bond.**

Provide extra calculations for multiple portals or refuse areas.
The estimate of the cost of reclamation should be based on the following:

1)	REFUSE		
a.	Gob Pile(s)	N/A	
	Initial Height	N/A	
	Final Height	N/A	
	Average Bottom Diameter	N/A	
	Lime Appl. (Tons/Ac)	N/A	
	Cover Thickness	N/A	
	Method of Replacement	N/A	
	Average Haul Distance	N/A	
b.	Gob and Slurry Disposal * Below grade or in levees		
	Cover Thickness	N/A	

Method of Replacement	N/A	
Average Haul Distance	N/A	
Lime Appl. to refuse (Tons/Ac)		
Slurry surface area	N/A	

RESPONSE: Refer to Attachment V.I.B

2) SUPPORT AREAS (Use separate sheets for each portals)

a.

Structure	Support Structure Dimensions Height ft.	Width ft.	Length ft.
Prep Plant			
Prep Plant			
Pole Barn 1			
Pole Barn 2			
Pole Barn 3			
Misc. Bldg Wood & Metal 1			
Misc. Bldg Wood & Metal 2			
Misc. Bldg Wood & Metal 3			
Misc. Bldg Masonry 1	16	22	26
Misc. Bldg Masonry 2			
Misc. Bldg Masonry 3			
Misc. Bldg Steel 1			
Misc. Bldg Steel 2			
Misc. Bldg Steel 3			

b.

Concrete Structures	Struct ID	Height ft.	Width ft.	Length ft.
Reinforced	Building Foundation	1	22	26

c.

Silos	Struct ID	Height ft.	Width ft.	Length ft.
	N/A			

d.

Paving	Struct ID	Width ft.	Length ft.
Concrete	N/A		
Asphalt	N/A		

e.

Conveyors	Length
Refuse Conveyor	N/A

3)

Railroads to be Removed	Length
	N/A

4)

Haul Road to be Removed	Width	Length	Thickness
N/A			

5) **NONE**

Support Area Liming (Acres)	Non-Refuse (for areas required to have more than topsoil replaced)
Lime Appl. (Tons/Ac)	
Subsoil Cover Thickness	
Method of Replacement	
Average Haul Distance	

6) Indicate location and size of buried volatile material storage facilities.

Response: There are no buried volatile material storage facilities on the proposed permit area.

C) Backfilling and Grading

Provide a plan for backfilling, soil stabilization, compacting and grading, with contour map or cross-sections showing the anticipated final surface configuration of the proposed permit area (in accordance with 62 Ill. Adm. Code 1817.102 through 1817.107). The plan shall include the following:

1) Describe how approximate original contour will be achieved. Discuss method(s) to be employed for overburden removal, spoil placement, and grading, including the removal and redistribution of soil. Mention type of equipment to be used for each phase of work.

RESPONSE: Backfilling and regrading of the Water Management Pipeline will be achieved as part of the installation of the pipeline and all areas disturbed by the removal of the diffuser structures will be graded to the approximate original contour. The reclamation procedure will be accomplished by using scrapers, dozers, loaders, and/or trucks.

2) Provide sufficient contour maps and cross-sections to show the anticipated final surface configuration of the proposed permit area when reclamation work is completed.

RESPONSE: Refer to Pre & Post Mining Lands Use Map (Drawing Nos. B17-222-M5, M6, M7 and M8).

3) The areas other than those reclaimed to the standards of high capability lands and prime farmlands, describe all water and erosion control structures to be constructed such as terraces, diversions, etc.

RESPONSE: **To deter erosion of reclaimed area, the area will include, but not limited to, the use of hay bales, silt fence, and vegetation. Other methods may be used for site-specific situations. Design criteria for these alternate means of sediment control will be in accordance with the NRCS design criteria and shall meet post construction certification requirements.**

4) Describe the timing in which all grading and the construction and removal or renovation of water and erosion control structures will be complete and the sequence for accomplishing the work in relation to seasonal weather conditions.

RESPONSE: **Backfilling and regrading of the Water Management Pipeline will be achieved as part of the installation of the pipeline. The diffuser site will be reclaimed upon completion of the associated mining operations. All areas will be returned to the pre-mining land use. Silt fence and/or straw bales and temporary vegetation will be used until permanent vegetation can be established in the area being returned to a vegetated state.**

5) Are any roads constructed to facilitate surface coal mining operations proposed to be permanent?
Yes _____ No ___X___
If yes, locate on the reclamation map. Provide the information required for Part IV 5)C)2) to describe each post-mining road if it is to be modified. Include appropriate discussion how modifications will be accomplished including the removal and disposition of any excess road material.

D) Provide a plan for revegetation of the proposed permit area including but not limited to the following:

1) Provide a schedule of revegetation for each reclamation area or subarea within the permit area.

RESPONSE: **Upon completion of grading activities, areas will be stabilized using cover crops, as listed in Attachment V.1.D.2.b. and/or by applying mulch. The approved species will then be seeded to provide vegetative cover in accordance with the post-mining land use.**

Wetland Reclamation Plan – Material resulting from trench excavation shall not be placed within a wetland for a period longer than twenty (20) calendar days. Such sidecast material shall either be removed from the site or used as backfill.

Backfill used within trenches passing through wetland areas shall consist of clean material which will not cause siltation, pipe damage during placement, or chemical corrosion in place. Excavated material shall be used to the extent practicable, with the upper six (6) to twelve (12) inches backfilled with the topsoil obtained during trench excavation. The top 6-12" of topsoil from within the wetland will be stockpiled separately so that it can be replaced as the upper layer of the wetland. This will serve to preserved the hydric soils to the extent possible and provide a natural seed bank for the restored wetlands.

All areas affected by construction shall be mulched and seeded as soon after construction as possible. Williamson Energy, LLC shall undertake necessary measures and procedures to reduce erosion during construction. The affected areas of the wetland shall be restored

to the approximate original ground surface and special care will be taken to not interrupt or disrupt the hydrology sources in and around the wetlands. Upon completion of grading, the wetland limits will be seeded with a native wetland seed mix as outlined in Attachment V.1.D.2.b. Interim measures to prevent erosion during construction shall be taken and may include the installation of erosion control measures such as compost filter sock, silt fencing, and swamp matting.

2) a) For areas other than forest and/or wildlife habitat planting, list the species and seeding rates on a per acre basis for each species proposed to be utilized.

RESPONSE: **Refer to Attachment V.1.D.2.b**

b) For forestry and/or wildlife habitat areas, list the planned species and density on a per acre basis of trees, shrubs and herbaceous cover to be seeded and planted.

RESPONSE: **Refer to Attachment V.1.D.2.b**

3) Describe the methods to be used in planting and seeding. Include the type of equipment to be used for seeding and seedbed preparation.

RESPONSE: **The method of application will include the use of conventional seed drills, Brillion seeders, broadcast seeders or aerial seeding, depending upon soil conditions. Fertilization rates will typically include agricultural lime at 3 ton/acre, phosphorus (P_2O_5) at 150 lbs./acre, potassium (K_2O) at 200 lbs./acre, and nitrogen at 120 lbs./acre. These are typical cover crop application rates and will be adjusted based upon soil chemical analysis and yield requirements. The areas shall be mulched as per Part V.1.D.5 of this permit application and fertilizer/lime shall be applied as per recommendations from soil testing to be performed as per V.1.D.9 of this permit application.**

A cool season grass mixture is being proposed for the Fish and Wildlife - Herbaceous planting areas and are shown on the Pre & Post Mining Lands Use Map (Drawing Nos. B17-222-M5, M6, M7 and M8).

- **Prior to conventional seeding of the cool season grass mixture areas, the areas will be worked by disking and/or harrowing. Refer to Part V.1.D.2.b for the cool season grass mixture and Part V.1.D.9 for information pertaining to the fertilization rate.**
- **The gently sloping top of the proposed refuse disposal area shall be planted to warm season grasses which are harder to establish. Some items which should be considered and performed as the site is prepared for revegetation are as follows:**
- **Two important factors in establishing native grasses is to have good seed to soil contact and to minimize weed competition as much as possible.**
- **An even application of clean straw mulch at a rate of 2 ton per acre is recommended.**

- **It should be is noted that these species come up slow so the straw cover would be a big help in protecting the seed during germination.**
- **Optimum planting time is late April until the first of July. In areas where there is a concern or need to plant in the fall, wait until late October or November to plant. Late planted native species will not be established enough to survive the winter.**
- **If drilling, (*conventional* or *no-till*), there needs to be a smooth weed free, uniform, clod free seedbed.**
- **For *conventional seeding*, the area should be disked a couple of times, mulched and crimped.**
- **For *no-till seeding*, deep rillls and gullies should be filled in.**
- **The drill must be equipped with warm season attachments with a positive feed.**
- **Seed need to be placed about 3/8" to 1/2" deep.**
- **For *broadcast seeding*, disc as above and broadcast using the manufactures settings. After seeding, mulching and crimping the seed in to firm the seedbed being careful not to place the seed to deep.**

4) Is irrigation proposed? If so discuss. Are pest and disease control measures proposed? If so discuss.

RESPONSE: **No irrigation is proposed. No pest or disease control measures are proposed other than the typical agronomic practices employed for production of agricultural crops.**

5) Are areas to be temporarily seeded and/or mulched to control erosion?

Yes__X__ No _____

If no, explain. If yes discuss in detail, including species, seeding rate by species per acre, mulching methods, mulching rates and type of mulch.

RESPONSE: **Straw mulch will be spread by hand or mechanically at a rate of about 1.5 tons per acre. Where the situation dictates, straw and hay mulch will be applied between the dates of November 1 through March 1. Between March 1 and November 1, areas will be protected with quick-growing standing mulch (annual ryegrass, spring oats, pearl millet, etc.). During the growing season, straw or hay mulch will be applied as needed or as directed by the Department.**

6) Provide Measures proposed to be used to determine success of revegetation required under 62 Ill. Adm. Code 1817.117.

RESPONSE: **The approved Illinois Productivity Formula will be used to determine success for cropland. A minimum of 250 live stems per acre and sufficient herbaceous cover to control erosion will be used as the success criteria for wildlife land use areas. A minimum of 450 live stems per acre and sufficient herbaceous cover to control erosion will be used as the success criteria for reclaimed forestry land use.**

7) If any of the post-mining land uses are to include industrial or residential uses, describe revegetation measures to control erosion.

RESPONSE: **All industrial/commercial and residential land use area will be returned to their pre-mining state.**

8) Are there any plans to use nurse crops or crop rotations to improve future rowcrop productivity?
Yes _____ No __X___
If yes describe type, duration and management of these areas.

9) Describe soil testing plan for evaluation of soil nutrients and amendments necessary for revegetation.

RESPONSE: **Composite soil samples will be collected and analyzed for pH, P1, and K. One representative composite sample will be collected from approximately every four acres. Laboratory analyses of the samples combined with the vegetative being planted will be used to determine the appropriate amendments and quantities to be applied to the reclaimed areas.**

E) Describe measures to be employed to maximize the use and conservation of the coal resources per regulation Section 1817.59.

RESPONSE: **N/A. No mining of coal is proposed by this permit application.**

F) Describe measures to be employed to ensure that all debris, acid-forming and toxic-forming materials, and materials constituting a fire hazard are disposed of in accordance with Section 1817.89 and 1817.102(f). Provide a description of contingency plans which have been developed to preclude sustained combustion of such materials.

RESPONSE: **This permit is for an associated mining activity and no non-coal mining waste will be collected on-site.**

G) Describe the measures including cross-sections and maps to be used to seal or manage mine openings, and to plug, case, or manage exploration holes, other bore holes, wells and other openings within the proposed permit area.

RESPONSE: **No mine openings and exploration holes, bore holes wells, or other openings are proposed by this permit application.**

H) Provide a description of the steps to be taken to comply with the requirements of the Clean Air Act (42 U.S.C. 7401 et seq.), and other health and safety standards.

RESPONSE: **Controlling fugitive dust at the operations should not be an issue since there are no conveyors, transfer points or haul roads proposed by the permit application.**

2) Post Mining Land Use

A) Provide a detailed description of proposed post-mining land uses employing the land use categories listed below. Provide acreage figures for each post-mining land use proposed and designate the post-mining land uses on the Post Mining Land Use Map.

RESPONSE: **All Water Management Pipeline areas will be returned to the pre-mining land use condition during the installation of the pipeline.**

	CAPABILITY		
	POST MINING (AC)		
Land Use	**Prime Farmland (Acres)**	**High Capability (Acres)**	**Non-Crop (Acres)**
Cropland	**11.5**	**5.9**	**0**
Pasture Land	**0.0**	**0.0**	**0.0**
Residential	**0.1**	**0.0**	**0.0**
Industrial/Commercial	**9.2**	**0.0**	**0.0**
Recreation	**0.0**	**0.0**	**0.0**
Fish & Wildlife – Woody	**8.8**	**5.2**	**8.1**
Fish & Wildlife – Herbaceous (Cool Season Grasses)	**8.3**	**2.0**	**10.7**
Fish & Wildlife - Water	**0.0**	**0.0**	**0.4**
Fish & Wildlife – NWI Wetland	**0.2**	**0.0**	**0.0**
Fish & Wildlife – Field Delineated Wetland	**1.0**	**2.0**	**0.1**
Developed Water Resources	**0.0**	**0.0**	**0.2**
Undeveloped Land	**0.0**	**0.0**	**0.0**
SUB-TOTAL	**38.1**	**13.1**	**19.5**
TOTAL	**70.7**		

B) 1) Provide a description of how the proposed post-mining land uses are to be achieved, and describe any necessary support activities which will be needed to achieve the proposed land uses.

RESPONSE: **The post-mining land use will be achieved by a coordinated effort combining the operational aspects of site reclamation, landowner comments, and Department suggestions and regulations. The Water Management Pipeline permit area will be returned to the pre-mining land use as part of the installation/construction operation.**

Areas identified as cropland will be returned to cropland and the property owner plant the area as he will the adjacent areas.

2) Discuss the utility and capacity of the reclaimed lands to support a variety of alternative uses and the relationship of the proposed uses to existing land use policies and plans.

RESPONSE: **N/A. The post mining land use will be the same as the pre-mining land use. Refer to the Pre & Post Mining Lands Use Map (Drawing Nos. B17-222-M5, M6, M7 and M8).**

3) Where grazing is the proposed post-mining land use, explain the detailed management plans to be implemented, if any.

RESPONSE: **Grazing is not proposed as a post-mining land use.**

4) Where a post-mining land use different from a pre-mining land use is proposed alternate post-mining land uses may be approved by the Department after considering the relationship of the intended uses to the existing land use policies and plans and the comments of any owner of the surface, and land use agency having jurisdiction over the land.

Provide a discussion explaining the consideration which has been given to making all of the proposed surface mining activities consistent with surface owner plans and applicable State and local land use plans and programs.

RESPONSE: **The permit area will be returned to the pre-mining land and the landowners are in agreement.**

C) Provide a copy of the comments concerning the proposed land use by the owner of the surface of the proposed permit area and by the State or local government agencies which would have to initiate, implement, approve or authorize the proposed uses of the land following reclamation.

RESPONSE: **The landowners and applicant are in agreement with the post mining land. No state or local government holds jurisdiction over land use planning for the permit area.**

3) A) Provide a fish and wildlife protection and enhancement plan meeting the requirements of 62 Ill. Adm. Code 1817.97 and which shall include the following:

1) A statement of the protective measures that will be used to minimize disturbances and adverse impacts on fish and wildlife and related environmental values during surface coal mining operations.

RESPONSE: **Mining operations at this facility will be carried out in compliance with 62 IAC 1700-1850, which specifies a comprehensive set of environmental protection measures for the control of adverse ecological impacts resultant from coal mining. Included are considerations for air, water, acid and toxic materials, soils, landform, vegetation, etc., in**

both special and temporal capacities. As such, general protective measures for all environmental values are inherent within the regulatory program. Specific to this facility, the expanse of mining and mining-related disturbances will be limited to that acreage necessary for conducting mining operations in compliance with the applicable land reclamation regulatory requirements. Disturbances to sites not required for mining or mining-related activities will be held to a minimum.

2) Discuss the enhancement measures that will be used during the reclamation and post mining phase of the operation to develop aquatic and terrestrial habitat.

RESPONSE: **During reclamation, an integrated wildlife habitat enhancement plan with upland and lowland habitat types will be reconstructed to provide food, cover, and maximum edge. These habitat enhancement features include the type and configuration of vegetative components reestablished. These efforts will provide food, water, and cover for wildlife.**

Woody plants will be arranged in two forms: (1) strip plantings and (2) group plantings. Strip plantings will be composed of desirable deciduous trees on a 8' x 8' spacing, with associated rows of wildlife type shrubs. The strip plantings are intended to break up large open areas, furnish travel lanes, and provide food and cover. They will be established along field drain ways, fence rows, and property lines. Group plantings will be composed of deciduous trees on 8' x 8' spacing, or a combination of wildlife shrubs. Group plantings will be of random species mix and pattern. The groupings may be of variable size and furnish islands and blocks of habitat. Plant species will be chosen from the list provided in Attachment V(1)(D)(2)(b).

3) If the applicant's fish and wildlife plan finds it impracticable to provide for enhancement of fish and wildlife and related environmental values, the applicant shall provide a statement which establishes why it is not practical to achieve enhancement.

RESPONSE: **The fish and wildlife plan in this section is practicable and will provide for the enhancement of fish and wildlife and related environmental values.**

B) The applicant shall provide a statement explaining how impact control measures, management techniques, and monitoring methods will be utilized to protect or enhance the following, if they are to be affected by the proposed surface coal mining and reclamation operations:

1) Threatened or endangered species of plants or animals listed by the Secretary of the United States Department of the Interior (Secretary) under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) and their critical habitats.

RESPONSE: **Refer to Attachment II.8; IDNR EcoCAT Report.**

The installation and reclamation of the Water Management Pipeline project will occur simultaneously as the pipeline is constructed. Therefore, no toxic or hazardous discharges from the site are anticipated that could affect threatened or endangered species outside of the project area.

2) Species such as eagles, migratory birds or other animals protected by State or Federal law, and their habitats; or other species identified through the consultation process pursuant to 62 Ill. Adm. Code 1784.21; or

RESPONSE: **Refer to Attachment II.8; IDNR EcoCAT Report.**

Williamson Energy, LLC is not aware of any bald or golden eagle nests within one mile of the project. However, if they are encountered, a protection and enhancement plan will be developed utilizing "*Reducing Avian Collisions with Power Lines: The State of the Art in 2012*" as a base is for the PEP. All other migratory species are protected by game and nongame laws within the state of Illinois. Based upon the current EcoCAT report, no bird or raptor species were identified within.

3) Habitats of unusually high value for fish and wildlife, such as wetlands, riparian areas, cliffs supporting raptors, areas offering special shelter or protection, reproduction and nursery areas, and wintering areas.

RESPONSE: **Refer to Attachment II.8; IDNR EcoCAT Report.**

No habitats of unusually high value for fish and wildlife have been observed within the project area. The majority of the project area follows along an old abandoned railroad bed. In areas not located within the railroad bed, the majority of the area is being utilized in row crop agriculture and does not provide diverse habitat for fish and wildlife. Multiple stream channels will be affected by this project; however, the majority have been severely degraded, and in some cases ditched or straightened to expedite farming activities, the old abandoned railroad bed or township, county, state or interstate roads.

4) For the Indiana Bat, *Myotis sodalis*, include an assessment of potential or known breeding and/or wintering habitat in the proposed permit area. Identify any mitigation measures necessary to prevent loss of critical habitat, and to prevent potential "taking" (killing) of the animal, i.e., restricting timber removal to those seasons when the bat is not present in Illinois.

RESPONSE: **Refer to Attachment II.8; IDNR EcoCAT Report. The Water Management Pipeline was surveyed for threatened and endangered bat species during the summer of 2017. Refer to Attachment V.3.4 for the survey results. As discussed in this document, one female Indiana bat was captured within the waterline right-of-way. This bat was tracked approximately 2 miles from the project area to its roosting location near west Frankfort. Given the distance to the identified roost locations and the applicant's willingness to only clear trees within the 2.5 mile buffer of the roost location during winter hibernation of the bats, it is felt that the proposed tree clearing would not result in the taking of any individual Indiana bats. Refer to Attachment II.8 for the Protection and Enhancement Plan – Indiana Bats for further details. A request for incidental take authorization for the 3.9 acres of known Indiana Bat summer roosting habitat is being requested. Refer to the Incidental Take Form located at the end of the Indiana Bat Protection and Enhancement Plan.**

Additionally, please note that the project area was surveyed for endangered bats and that the Northern Long-Eared bat was not captured anywhere within the project. Therefore, the area is considered to not be habitat for the Northern Long-Eared bat and the 4(d) rule is not applicable.

4) Pond, impoundments, banks, dams and embankments.
   A) Permanent impoundments, including sedimentation ponds, must be authorized by the Regulatory Authority based upon the requirements of Section 1817.49(a) and (b).

RESPONSE: No permanent impoundments or ponds are proposed by this application.

1) Include sufficient design data and calculations to substantiate that the design is in accordance with SCS engineering standard 378 "Ponds" or SCS technical release #60 "Earth Dams and Reservoirs".
2) Provide evidence that water quality is to be suitable for the intended use.
3) Indicate the relationship of the impoundment to the post-mining land use.
4) Describe methods of dropping surface runoff over excavated impoundment sideslopes. Discuss design criteria to be employed for downdrain structures and perimeter diversions.
5) Provide plans of access roads and other use related facilities.

B) Describe proposed reclamation for all refuse disposal areas including timing of final coverage, depth of final cover, restoration planned for disposal area and restoration planned for borrow areas.

RESPONSE: No permanent impoundments or ponds are proposed by this application.

C) If any structure is 20 feet or higher or impounds more than 20 acre-feet, provide a stability analysis of each structure which shall include strength parameters, pore pressures, and long-term seepage conditions. Also, to be included is a description of each engineering design assumption and calculation with a discussion of each alternative considered in selection design parameters and construction methods.

RESPONSE: No permanent impoundments or ponds are proposed by this application.

D) Submission of MSHA certification documents for a detailed design plan shall satisfy the requirements, in so far as, the MSHA informational and design standard requirements are duplicative of the requirements.

RESPONSE: No permanent impoundments or ponds are proposed by this application.

5) Area closure or abandonment.
   A) Describe all reclamation efforts to be expended to satisfy the requirements of abandonment. If an exemption request is to be made, it should be included.
      1) Include the timing to meet the final grading and revegetation requirements.
      2) Include a description of the final graded slopes, and the type of seed and seeding.
      3) Explain final coverage of treatment of toxic areas and locate all borrow pits.

RESPONSE: **Reclamation of the Water Management Pipeline will occur during the construction/installation phase of the project. Any disturbance present at that time of closure or abandonment will be graded and vegetated.**

B) Describe in detail a rehabilitation design plan for each siltation structure, diversion, impoundment and treatment facility to be implemented and completed prior to abandonment. Any departures from detailed design plan requirements must be designated as such and be accompanied by supporting documentation.

RESPONSE: **N/A. No siltation structures, diversion, impoundments or treatment facilities will associated with this permit.**

6) Perennial and Intermittent Stream Diversion Note: If stream diversion is not planned, indicate N/A.

RESPONSE: **N/A. Diversions of perennial and intermittent streams are not proposed.**

A) Overview, Alternative, Justification:
   1) Discuss in detail the reasons for diverting the stream. Include justification and possible alternatives to relocating it.
   2) Discuss the general overview of the proposed diversion project. General information should include: temporary, permanent; time length of diversion; single phase, multiphase; restore on placeland, restore in approximately original location after mining; etc.

B) Pre-disturbance information
   1) The following general information shall be provided for the stream to be diverted:
      a) Name of the stream to be diverted,
      b) Classification (intermittent, perennial),
      c) Total length of segment affected,
      d) Total drainage area of existing stream at the point where relocation begins (miles) and ends (miles),
      e) Depth of the water table adjacent to the stream and yearly fluctuation.

   2) An aerial photograph or map (scale at 1 in = 400 ft or other approved scale) shall be provided illustrating the following for the existing stream:
      a) Existing stream channel and adjacent land use,
      b) Watershed limits upstream of the proposed relocation,
      c) Proposed permit area; property boundaries,
      d) An outline of the 100-year and 2-year frequency flood plains along the existing channel; include the acreage inundated by each storm event,
      e) Locations where representative cross-sections have been taken
      f) Riparian habitat (vegetation),
      g) Riffles, list total number and locate on the map or photo,
      h) Pools; list total number and locate on the map or photo,
      i) Meanders; list total number and locate on the map or photo.

3) Plan-profile and cross-sectional drawings of the existing stream shall be provided showing the following information:
   a) Stream bed and significant drops,
   b) Water surface at low flow,
   c) Water surface at the 100 year and 2 year flood event.
   Include the calculated flow rate (cfs) and velocity (ft/sec) at the representative locations for low flow and the 100-year flood conditions.

4) Describe the habitat of the existing stream including the following information at a minimum:
   a) Channelization or other disturbances,
   b) Shade provided by stream bank vegetation, c) Stream substrate composition,
   d) Steepness and elevation of the banks,
   e) Riparian vegetation (species, relative abundance),
   f) Aquatic vegetation (species, relative abundance),
   g) Potential Indiana bat habitat shall be addressed with a plan to prevent "taking" of the animal during breeding seasons.

C) The following design and construction plan information shall be provided for TEMPORARY STREAM CHANNEL DIVERSIONS. If none are proposed, indicate N/A.

RESPONSE: **N/A. Temporary stream channel diversions are not proposed.**

1) The following estimated construction planting dates shall be provided:
   a) Begin construction _____.
   b) End construction _____.
   c) Begin planting _____.
   Give a detailed description of the construction practices to be followed, and the equipment to be employed.

2) After stabilization of the temporary diversion and prior to diversion of the existing stream into the temporary stream channel, the applicant will be required to contact the Department and gain approval. The applicant shall provide an estimation of the date when erosion control structures and vegetation will be sufficiently established to allow diversion of the water into the temporary channel.

3) Discuss the erosion control practices to be followed during construction of the temporary diversion and the features of the proposed channel which will help minimize erosion of the stream banks in the future. Discuss the necessity, if any, of using a stilling basin to aid in reducing siltation.

4) Discuss the impacts the temporary diversion ditch will have on downstream water quality, biological communities and water users and describe a monitoring program to measure these impacts.

5) Describe reclamation of temporary stream diversions when no longer needed.

6) A detailed revegetation plan shall be proposed, including soil preparation procedures, plant species and rates, fertilizer rates and mulching rates.

7) Describe how the temporary diversion ditch spoil will be handled to minimize the impact on the surrounding area.

8) Provide an aerial photo or map (scale of 1 in = 400 ft) illustrating the following:
   a) Proposed temporary stream channel diversion.
   b) Proposed spoil locations.
   c) An outline of the 10-year frequency flood plain along the proposed temporary diversion.
   d) Locations where representative cross-sections have been taken.

9) Design information shall be provided as follows:
   a) Plan-profile drawings clearly depicting locations and flow line slopes.
   b) Sufficient cross-sections to depict side slopes and inflection points such as cuts and fills.
   c) A clearly outlined drainage area which the temporary diversion ditch will serve including hydrologic characteristics such as slopes, soil types, vegetative cover, etc.
   d) Detailed calculations of runoff volumes from the drainage area upon which to base ditch sizing calculations.
   e) Detailed ditch sizing calculations to demonstrate the projected temporary stream channel diversion ditch is adequate to convey the 10-year 24 hour storm event pursuant to Sections 1817.43(c).

D) The following design, construction and restoration plan information shall be provided for the PERMANENT RESTORED STREAM (_____) or the PERMANENT RELOCATED STREAM CHANNEL (_____), whichever is applicable. Check the appropriate category.

RESPONSE: **N/A. No permanent restored stream or permanent relocated stream channel are not proposed.**

1) The following estimated construction dates shall be provided:
   a) Begin construction _____.
   b) End construction _____.
   c) Give a detailed description of the construction practices to be followed, and the equipment to be employed.
   d) A program shall be established to regularly report on the progress of the permanent stream channel reconstruction including as-built designs of the channel and flood plain and a description of habitat restoration. Discuss the timing and content of the proposed restoration progress report program.

2) Describe how the new channel spoil will be graded and handled to minimize the impact on the surrounding area, including the flood plain capacity, flooding and the riparian zone.

3) After the restored channel is adequately stabilized and prior to diversion of the temporary diversion ditch into the permanently restored stream channel, the applicant will be required to contact the Department and gain approval. The applicant shall provide an estimation of the date when erosion control structures and vegetations will be sufficiently established to allow diversion of the water into the permanent channel.

4) Discuss the erosion control practices to be followed during construction of the permanent stream restoration and the features of the proposed channel when will help minimize erosion and enhance stability of the stream banks in the future.

5) Discuss the impacts the permanently restored stream channel will have on downstream water quality, biological communities and water users and describe a monitoring program to measure these impacts.

6) Provide an aerial photo or map (scale of 1 in = 400 ft) illustrating the following:
   a) Proposed permanently restored stream channel,
   b) Proposed spoil locations,
   c) An outline of the 100-year and 2-year frequency flood plains along the proposed permanent restored channel,
   d) Locations where representative cross-sections have been taken,
   e) Riparian habitat (vegetation),
   f) Riffles; list total number and locate on the map or photo,
   g) Pools; list total number and locate on the map or photo,
   h) Meanders; list total number and locate on the map or photo,

7) Design information shall be provided as follows:
   a) Stream bed and significant drops,
   b) Water surface elevations at low flow,
   c) Water surface elevations at the 100-year and 2-year floods,
   d) Gradeline for the proposed restored stream channel,
   e) Plan-profile drawings clearly depicting locations and flow line slopes,
   f) Sufficient cross-sections to depict side slopes and inflection points such as cuts, fills, curves and straight sections,
   g) A clearly outlined drainage area which the permanent channel will serve including hydrologic characteristics such as slopes, soil types, vegetative cover, etc.,
   h) Detailed calculations of runoff volumes from the drainage area upon which to base channel sizing calculations,
   i) Detailed channel sizing calculations to demonstrate the projected permanent channel and flood plain are adequate to convey the 100-year 24 hour storm event.
   j) Include the calculated flow rate (cfs) and velocity (ft/sec) at the representative locations for low flow and the 100-year flood condition.

8) Describe other habitat restoration methods to be employed as follows:

a) Provide typical plans, maps and drawings for boulder deflectors, checkdams, current deflectors or other in-stream habitat structures, if any,

b) Provide typical plans, profiles and cross-sections for proposed floodplain potholes and/or wetlands, if any,

c) A detailed revegetation plan shall be proposed, including soil preparation procedures, plant species and rates, fertilizer rates and mulching rates. Provide details on riparian habitat revegetation including a discussion of the herbaceous ground cover, woody species to be planted and the number and distribution of the stems to be planted. The riparian zone must be reclaimed to forest with a minimum of 450 trees/acre necessary for bond release,

d) If the restored stream will traverse inclines or final cuts, provide measures to be employed to enhance the diversity of the impoundments.

7) Are coal processing wastes proposed to be returned to abandoned underground workings?

Yes _____ No ___X_____

If the response above is yes, provide information required under 62 Ill. Adm. Code 1784.25(a) through (f).

R07

PART V ATTACHMENT V.1.B
RECLAMATION COST ESTIMATE

ATTACHMENT V.1.B

RECLAMATION ESTIMATE

Structure	Quantity	Unit	Description	Price	Estimated Cost (Rounded to nearest $100)
Operations and Control Building	572	Sq. Ft.	Demolition of Structure	$8.5/Sq. Ft.	$4,900.00
Rough Grading and Root Medium/Vegetation	2	Ac.	Replacement of Subsoil and Topsoil	$6,900/Ac.	$13,800.00
Mobilization	1		Base Rate	$2,800.00	$2,800.00
			TOTAL		$21,500.00

R07768

PART V ATTACHMENT V.1.D.2.b
PLANTING PLAN SEEDING RATES

ATTACHMENT V.1.D.2.b
SEEDING AND PLANTING PLAN

Temporary Vegetation

Cover Crop

Plant Species*	Seeding Rate PLS	Method of Application
Spring Oats	2.0 bu./acre	Drilled or Broadcast
Ryegrass (annual)	20.0 lbs./acre	Drilled or Broadcast
Sunflower	10.0 lbs./acre	Drilled or Broadcast
German Millet	20.0 lbs./acre	Drilled or Broadcast
Sorghum/Sudan/Sudex	32.0 lbs./acre	Drilled or Broadcast
Wheat	1.5 bu./acre	Drilled or Broadcast
Ryegrass (perennial)	10.0 lbs./acre	Drilled or Broadcast

* Grasses shown above are suggested grasses which may be planted for temporary cover. Any of the grasses may be planted at the recommended rate to achieve a temporary vegetative cover.

Permanent Vegetation

Herbaceous Wildlife Area and Woody Wildlife Areas
(Cool Season Seed Mix Augmented with Warm Season Species)

Plant Species	Seeding Rate PLS	Method of Application
Purpletop	20 lbs./acre	Broadcast
Virginia Wildrye	10 lbs./acre	Broadcast
Deer-Tongue Grass	10 lbs./acre	Broadcast
Switchgrass	3 lbs./acre	Broadcast
Hairy Woodland Brome	5 lbs./acre	Broadcast
White Dutch Clover	5 lbs./acre	Broadcast
Red Clover	8 lbs./acre	Broadcast

* NON-NATIVE SPECIES JUSTIFICATION: White Dutch Clover, Red Clover, Spring Oats and Winter Wheat are non-native species. Although they are non-native, their use in grass establishment is necessary to achieve the desired post mining land use. The oats and wheat are easy and fast to establish, and provide temporary erosion control. The proposed native species are perennial grasses. The oats and wheat are annuals that are not persistent and will be replaced by the native grasses.

The proposed cool season seed mix will contain cool season non-native "pasture" grass species, a cool season native species and warm season native species. The combination seed mix will provide adequate cover for soil and moisture retention and will be used on all areas designated as herbaceous wildlife planting areas.

ATTACHMENT V.1.D.2.b
SEEDING AND PLANTING PLAN (continued)

Tree and Shrub Planting

Woody Wildlife Areas

Wildlife Trees	% Planting
Red/Silver/Sugar Maple	20%
River Birch	20%
Sycamore	20%
Oaks (Red, Black, Scarlet, Shingle, White)	15%
Other* (Wildlife Shrubs)	25%

Other* (Wildlife Shrubs) [To be selected from the following list dependent on availability and conditions.]

Buttonbush	Gray Silky Dogwood
Serviceberry	Red Bud
Crabapple	Sumac
Hawthorne	Streamco Purple Osier Willow

Density per acre: wildlife tree plantings will be made on an 8' x 8' spacing, for a planting rate of 680 trees per acre.

Wildlife Wetland Mix

Forb Species
Sweet Flag
Angelica
Swamp Milkweed
Stemmed Aster
Beggarticks
Spotted Joe-Pye Weed
Boneset
Autumn Sneeze Weed
Blue Glag Iris
Cardinal Flower
Great Blue Lobelia
Winged Loosestrife
False Dragonhead
Smartweed
Water Smartweed
Mountain Mint
Cut Leaf Coneflower
Riddel Goldenrod
Giant Burweed

ATTACHMENT V.1.D.2.b
SEEDING AND PLANTING PLAN (continued)

Wetland Grass & Sedge Species
Blue Joint Grass
Lake-Bank Sedge
Awl-Fruited Sedge
Tussock Sedge
Fox Sedge
Needle Spike Rush
Blunt Spike Rush
Fowl Manna Grass
Common Rush
Slender Rush
Torrey's Rush
Rice Cut Grass
Hard-Stemmed Bulrush
Dark Green Rush
River Bulrush
Softstem Bulrush
Cord Grass

Density per acre:

Wetland plantings will be conducted as per supplier recommendation for the selected seep species.

A total of 6-8 different species will be selected from the above list and placed per supplier recommendation.

PART V ATTACHMENT V.3.B.4
BAT SURVEY RESULTS

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

A SUMMER SURVEY FOR THE FEDERALLY ENDANGERED INDIANA BAT (*MYOTIS SODALIS*) AND THE THREATENED NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*)

MACH WATER LINE
NEAR JOHNSTON CITY,
FRANKLIN AND WILLIAMSON COUNTIES, ILLINOIS

Prepared for:
WILLIAMSON ENERGY, LLC
JOHNSTON CITY, ILLINOIS

ALLIANCE PROJECT NO. B16-454-1413
AUGUST 2017

Charleston, WV
928 Cross Lanes Drive, Suite 300
Charleston, WV 25313
Telephone: (681) 217-2090
Fax: (681) 217-2092

Beckley, WV
Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA
3 Four Coins Drive, Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

A SUMMER SURVEY FOR THE FEDERALLY ENDANGERED INDIANA BAT (*MYOTIS SODALIS*) AND THE THREATENED NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*)

MACH WATER LINE
NEAR JOHNSTON CITY,
FRANKLIN AND WILLIAMSON COUNTIES, ILLINOIS

Prepared for:

WILLIAMSON ENERGY, LLC
JOHNSTON CITY, ILLINOIS

ALLIANCE PROJECT NO. B16-454-1413
AUGUST 2017

A SUMMER SURVEY FOR THE FEDERALLY ENDANGERED INDIANA BAT (*MYOTIS SODALIS*) AND NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*) FRANKLIN AND WILLIAMSON COUNTIES, ILLINOIS WILLIAMSON ENERGY, LLC

1.0 INTRODUCTION

Alliance Consulting, Inc. (Alliance) was contracted by Williamson Energy, LLC (Williamson) to assess the presence or absence of the federally endangered, Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*) at the proposed Mach Water Line (Project) located in Franklin and Williamson Counties, Illinois. The project is the proposed Mach Water Line. The mist net survey site locations are shown on Drawing No. B16-454-B41 contained within this submittal. This report is hereby submitted on behalf of Williamson to fulfill the requirements set forth by the United States Fish and Wildlife Service (USFWS) and the Illinois Department of Natural Resources (IDNR).

The Indiana bat survey was conducted by Alliance biologists from May 18, 2017 through May 25, 2017; however, tracking persisted through July 1, 2017. The Indiana bat survey services were completed in accordance with our proposal for professional ecological services and Williamson's subsequent authorization to proceed.

The purpose of this survey was to confirm the presence/probable absence of the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*) and to determine tree clearing restrictions or lack thereof. The survey was based on Alliance's professional judgment and interpretation of the technical criteria outlined in the USFWS (Region 3) agency document entitled "2017 Range-Wide Indiana Bat Summer Survey Guidelines", dated May 2017. During this survey, one (1) Indiana bat was captured and tracked to a roost north of this project placing in part of the project in a 2.5 mile buffer (Drawing No. B16-454-B42).

2.0 SITE LOCATION

The center point of the project area is located north of Johnston City in Williamson County, Illinois and has its approximate center at Latitude 37° 50' 49.25" and Longitude 88° 56' 9.16". The Mist Net Site Location Map (Drawing No. B16-454-B41) shows the general area where the study took place.

2.1 Watershed Information

The proposed project lies within the Pond Creek and the Big Muddy River watershed in Illinois. Pond Creek is a perennial tributary of the Big Muddy River. The primary receiving waterway, Big Muddy River, is a perennial stream which flows to the Mississippi River. All of which are traditional navigable waters of the United States.

3.0 INDIANA BAT INFORMATION

3.1 Species Status and Conservation

The Indiana bat (*Myotis sodalis*) was one of the first bat species in the United States to be recognized as endangered by the U.S. Fish and Wildlife Service Endangered Species Act (ESA). It was listed as a federally endangered species on March 11, 1967 under the ESA. This listing was largely due to declines recorded at winter hibernation sites in caves, which until very recently were the only known roosts for this species. It is now known that in summer, Indiana bats roost and rear their young under loose bark or in tree hollows. In order to outline habitat requirements, critical habitat, potential causes for the bats' decline, and recovery objectives, the USFWS published a recovery plan in 1983. An agency Draft of a Revised Recovery Plan was distributed by the USFWS in 1999. This document was re-circulated in 2002 for further comments and a first revision was available in 2007. The objectives of the Indiana Bat Recovery Plan include: (1) protect hibernacula, (2) maintain, protect, and restore summer maternity habitat, (3) monitor population trends through winter censusing, (4) educate the public, and (5) continue research. Most recently the USFWS released the "2017 Range-Wide Indiana Bat Summer Survey Guidelines" that outline the specific efforts that should be undertaken during a survey (USFWS 2017).

The Indiana bat was listed as endangered by the federal government because of declines in their numbers that were documented at seven major hibernacula in the Midwest. At the time of the federal listing, about 85% of the entire population hibernated at only seven sites, and nearly half of the entire population hibernated in only two caves. Populations across the species range (as recorded from counts in hibernacula) have declined since the late 1950s. Human disturbance, collapse, and flooding of hibernacula are considered to be major factors in the bats' population decline. Suspected contributing factors include loss of suitable summer habitat and contamination by pesticides (USFWS, 1999). Since then, steps have been taken to protect most of the major as well as minor hibernation sites.

3.2 Distribution

The Indiana bat is a migratory species found throughout much of the eastern half of the United States (Figure 1). They are found from Oklahoma, Iowa, Wisconsin east to Vermont, and south to northwestern Florida (Barbour and Davis 1969). As this species is migratory, this range includes both summer and winter habitat. During winter, the Indiana bat primarily hibernates in caves and abandoned mines. Within these hibernacula, Indiana bats congregate in tightly packed clusters and are easily counted; therefore, winter census data is the most reliable method for documenting population trends range-wide. Consequently, winter distribution of the Indiana bat is well documented. During the summer maternity season, the bats are much more scattered and difficult to locate, so there is much less known about summer distribution. Data on summer distribution may reflect lack of search effort in some areas (USFWS, 1999). Also, even less is known about the migratory habits of the Indiana bat.

3.2.1 Winter Distribution and Habitat

Indiana bats hibernate from October to April, depending on climatic conditions. Specific roost

sites in caves or mines that attain temperatures appropriate for hibernation serve as winter habitat for Indiana bats. The preferred hibernacula have temperatures averaging 37 degrees to 43 degrees Fahrenheit in midwinter, and a relative humidity averaging 87 percent. The 2017 winter census estimate of the population was 530,205 individuals (USFWS, 2017). The current population is less than half the estimated population of 1960, even though there were fewer known hibernacula at that time (USFWS, 2002). However, the populations for the state of Illinois have shown a nearly -2.9% decrease in populations since 2015 with the 2017 estimate including approximately 52,354 individuals.

3.2.2 Summer Distribution and Habitat

Reproductive female Indiana bats typically form maternity colonies in trees during the summer. Most records of reproductively active females come from the Midwest: southern Iowa, northern Missouri, northern Illinois, northern Indiana, southern Michigan, and western Ohio (Gardner and Cook, 2002). This area is considered to be the core summer range for the species.

Typically, Indiana bats use the space under exfoliating bark of trees in riparian, bottomland, and upland forest to day roost in the summer. Maternity colonies of females may congregate under this loose tree bark. Because these bats are roosting mainly under exfoliating tree bark, their summer roosts are short-lived. Maternity colonies appear to have at least one "primary roost" that is used by the majority of the colony. Portions of the colony may use over a dozen different "alternate roosts" intermittently.

3.3 Reproduction

Most bats of the United States, including the Indiana bat, mate in the fall. Between early August and mid-September, Indiana bats arrive near their hibernation caves and engage in swarming and mating activity. Swarming at cave entrances continues into mid- or late October. Limited observations indicate that birth and development occur in very small, widely scattered colonies consisting of 25 or so females and their young. Females give birth to a single young in late May to early July. Young Indiana bats are capable of flight within a month of birth, and may mate their first autumn (USFWS, 2002).

3.4 Food Habits

Indiana bats forage in and around the tree canopy of flood plains, riparian areas, and upland forests (USFWS, 1999). They eat a variety of soft-bodied, flying insects found along rivers and lakes in these habitats. Consistently, food habits studies conducted throughout the species range reveal that small moths are important prey items. However, components of diet vary depending on habitat, region, season, and sex or age of the bat. Some researchers have labeled the Indiana bat as a "selective opportunist" feeder due to the abundant occurrence in the diet of one particular insect for brief, unpredictable periods, corresponding with the hatch or mating swarms (Brack and LaVal, 1985).

3.5 Reasons for Current Status

Causes for the overall decline of the Indiana bat are not fully understood or have not been

determined. The decline of the species at its current rate is unknown, although it is rapid in certain areas of it range, due the onset of "white-nose syndrome". Originally, cave disturbance by humans was thought to be the primary reason for the decline, and thought to transmit the fungus that causes "white nose" called *Pseudogymnoascus destructans*. Therefore, habitat protection for these bats has primarily focused on the caves where they hibernate, such as gating of the opening, fencing of the surrounding land, and generally protecting the hibernacula. However, as evidenced by the still-declining population numbers, these measures have not produced the desired result of recovery of the species (USFWS, 1999). Other potential causes for the decline include loss of summer habitat, improper cave gate construction, loss of forest cover, stream channelization, severe weather, and range-wide pesticide poisoning (USFWS, 2002). Presently, white-nose syndrome has devastated bat populations across the eastern United States, not excluding the already endangered Indiana bat (BCI, 2010).

4.0 NORTHERN LONG-EARED BAT INFORMATION

4.1 Species Status and Conservation

The northern long-eared bat is currently listed as federally threatened under the ESA due to significant population declines throughout the bat's range. This species was proposed for listing in October of 2013, and was added as a threatened species on April 2, 2015.

4.2 Distribution

The Northern Long-eared has an extensive range (Figure 4), from Canada down to North Carolina, and from the Atlantic coasts to as far west as the Yukon territory in Canada and Montana and Wyoming in the United States (USFWS, 2014).

5.0 METHODS

5.1 Level of Survey Effort

The level of survey effort for this project was based upon survey guidelines developed by the Indiana Bat Recovery Team (USFWS, 2017; Appendix A).

5.2 Site Selection

Using a topographic map, aerial photographs, and field reconnaissance of the proposed project area, field personnel identified areas for possible mist net site placement. Alliance corresponded with USFWS for concurrence on these projected mist net sites, prior to implementing the survey (Appendix B). Actual mist net sites for this survey were selected during field reconnaissance (Drawing No. B16-454-B41). Field reconnaissance was completed in order to establish mist net sites that would maximize the success of the survey. Additionally, each net site was assessed individually. Photographs were taken (Appendix D) and sketches were made of each net site to show net placement and surrounding habitat features, and habitat characteristics near each net site were recorded (Appendix C).

5.3 Mist Net Survey

Alliance conducted the mist netting survey following the guidelines (Appendix A) outlined in the 2017 Range Wide Indiana Bat Summer Survey Guidelines. Mist nets were composed of 2-ply, 50-denier nylon construction with a mesh size of 38 millimeters. Mist net sizes were 2.6 to 7.8 meters high (approximately 9 to 27 feet) in height, and were 2.6, 6, 9, 12 or 18 meters (approximately 9, 20, 30, 36 or 54 feet) in width.

Nine (9) out of the twelve (12) proposed sites were surveyed for endangered bats by Alliance biologists from May 18th through May 25th, 2017. Sites 7 – 9 were not surveyed due to an Indiana bat being captured at Site 6, placing this area in a 2.5 mile buffer. Two (2) net sets were operated for two calendar nights at each site. This resulted in a total of 18 net nights for the entire survey. A "net night" is defined as the operation of one net set for one night. To the extent possible, nets were placed in a location where they would be bordered on top and sides by vegetation to create a funneling effect to facilitate the capture of bats. Mist nets were deployed at dusk (approximately 20:00 hours) and monitored every 10 minutes for at least five hours.

It is not recommended that Indiana bat surveys be conducted when temperatures drop below 50 degrees Fahrenheit or during rainy, foggy, or windy conditions (USFWS, 2014). To ensure that surveys were not conducted during inclement weather, temperature, wind speed, percent cloud cover, rainfall and moon phase were monitored and recorded hourly (Appendix C).

Captured bats were carefully removed from the nets and then identified. The age, sex, reproductive condition, weight, and forearm length were then determined and recorded for all bats. Any notable bands, parasites or deformities were also recorded. After all information had been collected, the bats were released at the sight of capture.

5.4 Telemetry

Alliance biologists used Wildlife Materials, Inc. SOPB 2011 SC (Bat) transmitters in the 151 MHz range. Each transmitter weighed 0.5 grams or less and had a transmitter life expectancy of 23 days. When an endangered bat was captured the transmitter was activated by removing the magnetic switch and tested for signal quality at 500 meters. Both TRX-48S and TRX-1000S telemetry receivers paired with folding 3 element Yagi directional antennas from Wildlife Materials, Inc. were used to locate and track the activated transmitters. The active and tested transmitter was then affixed to the back of the bat using Perma-Type Surgical Cement. Once the adhesive was dry the bat was released in a relative open area so the biologist could ensure that the bat flew unimpeded.

Once a transmitted bat was released the biologist monitored its activity to obtain a direction of flight from the release point and to ensure that the bat was active. Following release of a transmitted bat and upon verification that the bat was flying unimpeded, a telemetry crew of 2 to 4 biologists would search for the transmitter frequency. Once the transmitter frequency was located its general position was triangulated using a compass and handheld gps unit.



The biologist then proceeded to home in on the transmitter frequency until they found the exact tree that the radio signal was coming from. The determination of the roost tree was confirmed by circling the tree and approaching the tree from multiple angles with the telemetry receivers. If the transmitter frequency was not located, the telemetry crew would begin searching for the bats and continue for a minimum of eight hours.

5.5 Roost Tree Emergence Survey

Once a roost tree was identified and its location was recorded with a sub-meter gps unit the biologists would record the tree DBH, height, percent of exfoliating bark, approximate location on the tree of the transmitter, species of tree, and solar exposure. The biologists would then leave the area to keep disturbance to a minimum around the roost tree. The biologists would then return to the roost tree approximately 1 hour before sunset. They would approach quietly to the general area of the roost tree and check that the radio signal was still present. The biologists would then find a place where they could see the most actual roosting locations on the tree with the sky as a back drop. If multiple roosting locations or debris were encountered then the biologists would split up to cover multiple angles of observation. Please refer to Appendix C for the roost tree and emergence data forms.

Each biologist watched the roost tree to document the total number of bats that emerged, as well as when the first bat emerged, when the transmitted bat emerged, and when the final bat emerged. The biologists stayed in position until they could no longer see the roost tree due to darkness.

Each transmitted bat was tracked for a minimum of seven (7) days. Each identified roost tree was surveyed for a minimum of two (2) evenings.

6.0 RESULTS

6.1 Summer Habitat Survey

From May 18th through May 25th, 2017, Alliance biologists evaluated the project area for potential Indiana bat summer habitat. The forested areas were dominated by an overstory of red oak (*Quercus rubra*), various hickory species (*Carya spp.*), and silver maple (*Acer saccharinum*). The area is covered with a mixed mesophytic forest of primarily second or third growth timber.

6.2 Mist Net Survey

Mist nets were set primarily along corridors through forested areas, as well as forest/field interfaces and ponds. Old roads and stream corridors provide foraging areas or travel corridors for bats as they move between roosts and feeding areas. Streams and ponds attract insects and provide drinking areas as well. The forest/field interfaces offer some protection for the bats while flying from field to field, as well as providing foraging areas.

6.3 Mach Water Line Results

A total of thirty-nine (39) bats of three (3) species were captured during the 18 net nights of

effort for the Mach Water Line. Of the twelve (12) sites proposed, Sites 7 – 9 were not surveyed due to an Indiana bat being capture nearby, and therefore placing these sites in a 2.5 mile buffer. The eastern red bat (*Lasiurus borealis*) was the most common species encountered, making up 95 percent of the total capture (Figure 2). Other bats captured were the Indiana bat (*Myotis sodalis*) and the little brown bat (*Myotis lucifugus*). Refer to Table No. 1. Bat survey forms were completed for each night of mist netting and are contained in Appendix C. Representative photographs of bat species caught in the project area are located in Appendix D.

Table No. 1 – Mach Water Line

Site	Eastern Red Bat	Indiana Bat	Little Brown Bat
1	2	0	0
2	4	0	0
3	1	0	0
4	6	0	0
5	5	0	0
6	4	1	1
7*	--	--	--
8*	--	--	--
9*	--	--	--
10	8	0	0
11	0	0	0
12	7	0	0
Total	***37***	***1***	***1***
% Total	***95***	***2.5***	***2.5***

*Sites 7, 8, and 9 were not surveyed due to the capture of an Indiana bat at Site 6. These sites were within the 2.5 mile buffer, and Williamson Energy elected to not complete these locations.

6.4 Telemetry and Tracking

The mist net surveys for the Mach Water Line includes the capture of one Indiana bat (Table No. 2). The captured bat was a pregnant adult female. A radio transmitter was affixed on the captured bat, and the bat was banded. The band number and frequency of the transmitter can be found in Table No. 2.

Table No. 2 Tracking Summary

Species	Age/Sex/Condition	Transmitter Frequency	Band No.	Capture Site
Myotis sodalis	Adult/Female/Pregnant	151.046	A0015	06

The bat was captured on May 20, 2017 and tracking began the next day. The bat could not be located from May 21, 2017 through May 27, 2017. Extensive efforts were undertaken to locate the bat, including both terrestrial tracking on foot and in a vehicle, and also in the air as a

helicopter was utilized in attempts to locate the bat. On May 28, 2017, the bat was located in a roost approximately 2 miles from its capture location. On May 29th, the bat could not be located. On May 30th, the bat was found in a new roost and was located there again on May 31, 2017. On June 1st, the bat could not be located and tracking concluded.

6.5 Roost Emergence

The tracking efforts were carried out from May 21 to June 1, 2017. The radio tagged bat used two roost trees approximately 2 miles from the capture location. On May 28th, Roost 01 was observed and one bat emerged. On May 29th, Roost 01 was observed again and no bats emerged. On May 30th, Roost 02 was observed and two bats emerged. On May 31st, Roost 02 was observed again and three bats emerged (Table No. 3). Roost and emergence datasheets can be found in Appendix C. Photos of roost trees can be found in Appendix D.

Table No. 3 Roost Emergence Counts

Bat	Date	Roost 01	Roost 02
151.046	5/28/2017	1	N/A
151.046	5/29/2017	0	N/A
151.046	5/30/2017	N/A	2
151.046	5/31/2017	N/A	3

7.0 DISCUSSION

7.1 Bats Captured

The eastern red bat (*Lasiurus borealis*) was the most common species of bat captured during the survey. Its distribution includes southern Canada, the eastern United States (except the Florida peninsula), and northeastern Mexico (Harvey et al., 1999). In colder parts of their range, they are known to migrate south in winter or hibernate in hollow trees or leaf litter. The eastern red bat is common throughout most of its range.

Myotis sodalis, the Indiana bat, was also captured within the project area, and along with the little brown bat was the second most abundant bat species captured during this survey at 2.5%. The Indiana bat was one of the first bat species in the United States to be recognized as endangered by the U.S. Fish and Wildlife Service Endangered Species Act (ESA). This bat spends the winter at hibernation sites in caves, which, until very recently, were the only known roosts for this species. It is now known that in summer, Indiana bats roost and rear their young under loose bark or in tree hollows. Indiana bats forage in and around the tree canopy of flood plains, riparian areas, and upland forests (USFWS, 1999). They eat a variety of soft-bodied, flying insects found along rivers and lakes in these habitats. Consistently, food habits studies conducted throughout the species range reveal that small moths are important prey items. However, components of diet vary depending on habitat, region, season, and sex or age of the bat.

The little brown bat (*Myotis lucifugus*) was also captured in the project area, and along with the Indiana bat was the second most abundant species of bat captured at 2.5%. These were once one of the most common bats within their range, which includes southern Canada, most of the



northern half of the United States (Harvey et al., 1999). Winter roosts include caves, mines, and rock crevices, while summer is spent in trees within the forest (Harvey et al., 1999).

8.0 CONCLUSION

It should be noted that no northern long-eared bats (*Myotis septentrionalis*) were captured during this survey. The northern long-eared bat has been listed as threatened. One female Indiana bat was captured at Site 6 near the crossing with Interstate 57. This bat was tracked to three different roost tree locations near West Frankfort which resulted in the creation of a 2.5 mile marginal area that encompasses portions of the waterline. It is Williamson Energy's understanding that all locations outside of this buffer zone can be considered to have the probable absence of endangered bats, and therefore clearing can occur at any time upon concurrence from the US Fish and Wildlife Service. No open mine portals or other potential hibernacula were observed in the proposed project area by Alliance or reported by Williamson personnel.

In preparing this document, our professional services have been performed with the care and skill ordinarily exercised by reputable members of the profession practicing under similar conditions at the same time and the same or similar locality. We reserve the right to revise or amend our opinion in this report in the event new information, documentation or evidence becomes available.

Respectfully submitted,

ALLIANCE CONSULTING, INC.

Alex J. Patterson
Staff Scientist

Braden A. Hoffman
Senior Project Manager

AJP/BAH:kjs

File: \\Aci-zeus\projects\Projects\Williamson Energy (1413)\2016\B16-454-1413\Bat Report\Report.doc

9.0 LITERATURE CITED

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Press Kentucky, Lexington. 286 pp.

BCI (Bat Conservation International). 2007. Species profiles. http://batcon.org.

BCI (Bat Conservation International). 2010. What We DO/White-Nose Syndrome. http://batcon.org.

Brack, W., Jr., and R.K. LaVal. 1985. Food habits of the Indiana bat in Missouri. Journal of Mammalogy. 66:308-315.

Gardner and Cook. 2002. Seasonal and geographic distribution and quantification of potential summer habitat. Bat Conservation International. Austin, Texas.

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. Bats of the United States. Arkansas Game & Fish Commission. 64 pp.

U.S. Fish and Wildlife Service (USFWS). 1999. Agency Draft: Indiana Bat (*Myotis sodalis*) Revised Recovery Plan. Region 3 U.S. Fish and Wildlife Service, Ft. Snelling, Minnesota. March 1999.

U.S. Fish and Wildlife Service (USFWS). 2002. Indiana bat (*Myotis sodalis*) revised recovery plan, Agency Draft. Ft. Snelling, Minnesota. 69 pp.

U.S. Fish and Wildlife Service (USFWS). 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. Region 3 U.S. Fish and Wildlife Service. Fort Snelling, Minnesota. 258 pp.

U.S. Fish and Wildlife Service (USFWS). 2014. 2014 Rangewide Indiana Bat Summer Survey Guidelines. http://www.fws.gov/northeast/virginiafield/pdf/endspecies/2014_IBat_Summer_Survey_Guidelines.pdf

APPENDIX A

MIST NETTING GUIDELINES RATIONALE

(AS CONTAINED WITHIN APPENDIX B OF 2017 INDIANA BAT SUMMER SURVEY GUIDANCE)

APPENDIX B
PHASE 2 or 3 MIST-NETTING

Mist-netting can be used as a presence/probable absence method (Phase 2 surveys) or it can be conducted for the purpose of attempting to capture Indiana bats after detection during acoustic presence/probable absence surveys (Phase 3 surveys). The same recommendations (e.g., season, personnel, equipment, net placement, checking nets) apply for either use of mist-netting surveys.

SUMMER MIST-NETTING SEASON: May 15[28] – August 15[29]

Capture of reproductive adult females (i.e., pregnant, lactating, or post-lactating) and/or young of the year during May 15 – August 15 confirms the presence of a maternity colony in the area. Since adult males and non-reproductive females have commonly been found summering with maternity colonies, radio-tracking results will be relied upon to help determine the presence or absence of a maternity colony or large concentrations of bats in the area when only males and/or non-reproductive females are captured.

PERSONNEL

A qualified biologist(s)[30] must (1) select/approve mist-net set-ups in areas that are most suitable for capturing Indiana bats, (2) be physically present at each mist-net site throughout the survey period, and (3) confirm all bat species identifications. This biologist may oversee other biological technicians and manage mist-net set-ups in close proximity to one another as long as the net-check timing (i.e., every 10 minutes) can be maintained while walking between nets.

COORDINATION WITH USFWS FO(s)

If not already required by federal permit, we recommend that applicants submit a draft study plan for all survey phases to the USFWS FO(s) for review and approval. Study plans should include a map/aerial photo identifying the proposed project area boundaries, suitable bat habitats and acreages within the project area, and the proposed number and tentative locations of net sites.

EQUIPMENT

Use the finest, lowest visibility mesh mist-nets commercially available, as practicable. Currently, the finest net on the market is 75 denier, 2 ply, denoted 75/2 (Arndt and Schaetz

---

[28] Due to concerns with transmission of white-nose syndrome, some USFWS FO(s) and state natural resource agencies have delayed the start of the Indiana bat summer field survey season/mist-netting until June 1. Surveyors/applicants should always coordinate with local USFWS FO(s) and state natural resource agencies before beginning surveys.

[29] With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15.

[30] A qualified biologist is an individual who holds a USFWS Recovery Permit (Federal Fish and Wildlife Permit) for Indiana bats in the state/region in which they are surveying and/or has been authorized by the appropriate state agency to net and handle Indiana bats. Several USFWS offices maintain lists of qualified bat surveyors, and if working in one of those states with authorizations in lieu of a Recovery Permits, the individual will either need to be on that list or submit qualifications to receive USFWS approval prior to conducting any field work.

2009); however, the 50 denier nets are still acceptable for use at this time. The finest mesh size available is approximately 1½ inches (38 millimeters).

No specific hardware is required. There are many suitable systems of ropes and/or poles to hold nets. The system of Gardner et al. (1989) has been widely used. See NET PLACEMENT for minimum net heights, habitats, and other netting requirements that affect the choice of hardware.

To minimize potential for disease transmission, any equipment that comes in contact with bats should be kept clean and disinfected, following approved protocols; this is particularly a concern relative to white-nose syndrome (WNS). Disinfection of equipment to avoid disease transmission (e.g., WNS) is required; protocols are posted at http://www.whitenosesyndrome.org/. Federal and state permits may also have specific equipment restrictions and disinfection requirements.

MINIMUM PRESENCE/ABSENCE MIST-NETTING LEVEL OF EFFORT (PHASE 2)

The level of netting survey effort required for a non-linear project will be dependent upon the overall acreage of suitable habitat that may be impacted by the action (directly or indirectly). To determine the survey effort, quantify the amount of suitable summer habitat within the project area. NOTE: for projects where other impacts than tree removal are likely (e.g., collision), ensure that presence/probable absence surveys are designed to cover all suitable habitat within the entire project area (where exposure to any kind of impacts may be anticipated) and NOT just the locations where tree removal is planned. Additional guidance for linear project is in Appendix F.

Conduct Mist-Netting Surveys following Recovery Unit-based protocols[31]

Northeast and Appalachian Recovery Units (CT, DE, MA, MD, NC, NJ, NY, PA, eastern TN, WV, VA, VT):

Linear projects: a minimum of 6 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 42 net nights per 123 acres[32] (0.5 km^2) of suitable summer habitat.

For example:

- 7 sites[33], 2 nets[34]/site for 3 calendar nights = 42 net nights

[31] The Indiana bat populations in the Northeast and Appalachian Recovery Units have been most heavily impacted by white-nose syndrome; therefore, we recommend higher survey effort when compared to the Midwest and Ozark-Central Recovery Units.

[32] We have no recommendations for reducing the minimum level of effort required to demonstrate probable absence for projects <123 acres in size. Detection probabilities and occupancy estimates were derived from past survey efforts that used the same acreage threshold (see Niver et al. 2013).

[33] A site is defined as a geographic area to be sampled. It can include one or more nets that can be managed by one Qualified Biologist.

APPENDIX B
PHASE 2 or 3 MIST-NETTING

- 7 sites, 3 nets/site for 2 calendar nights = 42 net nights
- 3 sites, 2 nets/site for 7 calendar nights* = 42 net nights

Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

a) If no capture of Indiana bats, then no further summer surveys are necessary[35].
b) If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

Midwest and Ozark-Central Recovery Units (AL, AR, GA, IA, IL, IN, KY, MI, MO, MS, OH, OK, and central & western TN):

Linear projects: a minimum of 4 net nights per km (0.6 miles) of suitable summer habitat (see Appendix F).

Non-linear projects: a minimum of 9 net nights per 123 acres (0.5 km^2) of suitable summer habitat.

- 3 sites, 1 nets/site for 3 calendar nights = 9 net nights
- 1 sites, 3 nets/site for 3 calendar nights = 9 net nights

Maximum of 3 nights of consecutive netting at any given net location. After 3 consecutive nights of netting at the same location, you must change net locations or wait at least 2 calendar nights before resuming netting at the same location.

a) If no capture of Indiana bats, then no further summer surveys are necessary.
b) If capture of Indiana bat(s), then stop or proceed to **Phase 4** as previously decided in coordination with the FO(s).

MIST-NETTING SURVEYS TO CAPTURE INDIANA BATS AFTER ACOUSTICS WERE USED AS P/A METHOD (PHASE 3)

If netting was not conducted as the P/A method, then netting may be conducted to capture and characterize (e.g., sex, age, reproductive condition) the Indiana bats (documented

---

[34] A net is defined as any combination of individual panels and poles (e.g., single, double, triple high) to fill the area (e.g., corridor) being sampled.
[35] NOTE: For Phase 2 Presence/Absence Surveys, wherever the phrase "no further summer surveys are necessary" occurs within this document, the USFWS FO(s) is in affect assuming probable absence of Indiana bats during the summer.

through the Phase 2 acoustic P/A survey) present in an area and to facilitate radio-tracking (Phase 4) efforts. We encourage working with the FO(s) to develop Phase 3 netting plans based on best available information (e.g., positive acoustic locations). There are no minimum requirements for this phase as this is not a P/A phase.

a) If no Indiana bats are captured, then coordinate with the USFWS FO.
b) If Indiana bats are captured, then proceed to **Phase 4** as previously decided in coordination with the FO(s).

NET PLACEMENT

Potential travel corridors (e.g., streams, logging trails) typically are the most effective places to net (although other places may also be productive; see Carroll et al. 2002). Place nets approximately perpendicular across the corridor. Nets should fill the corridor from side to side, extending beyond the corridor boundaries when possible, and from stream (or ground) level up to the overhanging canopy. Nets of varying widths and heights may be used as the situation dictates. A typical set is at least 5 m to 9 m high consisting of two or more nets stacked on top one another and from 6 m to 18 m wide. If netting over water, ensure there is enough space between the net and the water so that captured bats will not get wet.

Occasionally it may be necessary or desirable to net where a suitable corridor is lacking. The typical equipment described in the section above may be inadequate for these situations, requiring innovation on the part of the surveyor (see Humphrey et al. 1968). See Kiser and MacGregor (2005) for additional discussion about net placement.

Although no minimum spacing between mist-nets is being specified, surveyors should attempt to evenly distribute net set-ups throughout suitable habitat and must provide written justification in their report if net set-ups were not distributed throughout suitable habitat (i.e., why were they clumped?). Net set-ups can be repeatedly sampled throughout the project, but generally no more than 2-3 nights at a single location is recommended. In addition, changing locations within a project area may improve capture success (see Robbins et al. 2008; Winhold and Kurta 2008). Photo-document placement of nets.

SURVEY PERIOD

The survey period for each net shall begin at sunset[36] and continue for at least 5 hours (longer survey periods may also improve success).

CHECKING NETS

[36] Surveys may need to start a little earlier or later than official sunset times (i.e., at "dusk") in some settings such as a deep/dark forested valleys or ridge tops to avoid missing early-flying bats or capturing late-flying birds, respectively. Sunset tables for the location of survey can be found at: http://aa.usno.navy.mil/data/docs/RS_OneYear.php.

APPENDIX B
PHASE 2 or 3 MIST-NETTING

Each net set-up should be checked approximately every 10 minutes (Gannon et al. 2007). If surveyors monitor nets continuously, take care to minimize noise, lights and movement near the nets. Monitoring the net set-up continuously with a bat detector (ideally using ear phones to avoid alerting bats) can be beneficial: (a) bats can be detected immediately when they are captured, (b) prompt removal from the net decreases stress on the bat and potential for the bat to escape (MacCarthy et al. 2006), and (c) monitoring with a bat detector also allows the biologist to assess the effectiveness of each net placement (i.e., if bats are active near the net set-up but avoiding capture), which may allow for adjustments that will increase netting success on subsequent nights. There should be no other disturbance near the nets, other than to check nets and remove bats. Biologists should be prepared to cut the net if a bat is severely entangled and cannot be safely extracted within 3 or 4 minutes (CCAC 2003; Kunz et al. 2009).

Capture and handling are stressful for bats. Emphasis should be on minimizing handling and holding bats to as short a time as possible to achieve field study objectives. Indiana bats should not be held for more than 30 minutes after capture, unless the individual is targeted for radio-tracking. Bats targeted for radio-tracking should be released as quickly as possible, but no longer than 30 minutes[37] after capture, or as allowed in federal and state permits. See Kunz and Kurta (1988) for general recommendations for holding bats.

WEATHER, LIGHTING, AND OTHER ENVIRONMENTAL CONDITIONS

Severe weather adversely affects capture of bats. Some Indiana bats may remain active despite inclement weather and may still be captured while others in the same area become inactive. Therefore, negative surveys combined with any of the following weather conditions throughout all or most of a sampling period are likely to require an additional night of mist-netting[38]: (a) temperatures that fall below 50°F (10°C)[39]; (b) precipitation, including rain and/or heavy fog, that exceeds 30 minutes or continues intermittently during the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/seconds; 3 on Beaufort scale) for 30 or more minutes.

NOTE: Provided that nets are not dripping wet, surveyors can resume netting to meet the minimum 5-hour requirement after short periods of adverse weather. If nets are under good cover, light rain may not alter bat behavior. However, if no bats are being captured during marginal weather, coordinate with the USFWS FO(s).

---

[37] Current standard federal Section 10 bat permit conditions require prior written approval from the Field Supervisor in the USFWS FO(s) if capture times may exceed 30 minutes.

[38] With prior USFWS FO approval, a survey may be completed after August 15 if it was initiated in time to be completed by August 15 and extenuating weather circumstances resulted in delaying completion. Delays as a result of not meeting the acceptable weather requirements are the ONLY valid justification for surveying after August 15.

[39] If using this guidance for NLEB: Overnight survey temperatures may be lower in northern portions of the NLEB range, please coordinate with the local USFWS FO in the northern portion of the range for any variation in temperature requirements.

APPENDIX B
PHASE 2 or 3 MIST-NETTING

It is typically best to place net set-ups under the canopy where they are out of moonlight, particularly when the moon is half-full or greater. Net set-ups illuminated by artificial light sources should also be avoided.

The shining of lights, and noise should be kept to a minimum with no smoking around the survey sites. In addition, the use of radios, campfires, running vehicles, punk sticks, citronella candles and other disturbances will not be permitted within 300 feet of mist nets (or acoustic detectors) during surveys.

DOCUMENTATION OF INDIANA BAT CAPTURES

If an Indiana bat(s) is captured during mist-netting, protocols for radio-tracking and emergence survey requirements, as provided in Appendix D and E, respectively, should be followed. In addition, the appropriate USFWS FO(s) must be notified of the capture within 48 hours (or in accordance with permit conditions), and the sex and reproductive condition of the bat and GPS coordinates of the capture site should be provided. Ensure GPS coordinates are recorded for each individual net set on datasheets.

Several species of bats from the genus *Myotis* share common features which can make identification difficult; Indiana bats and little brown bats (*Myotis lucifugus)* can be particularly difficult to distinguish. Photo-documentation of all bats captured and identified as Indiana bats and the first 10 little brown bats per project are requested to verify the identifications made in the field.

Photo-documentation should include diagnostic characteristics:

- a ¾-view of face showing ear, tragus, and muzzle
- view of calcar showing presence/absence of keel
- a transverse view of toes showing extent of toe hairs

If a bat from the genus *Myotis* is captured during mist netting that cannot be readily identified to the species level, then species verification may be attempted through fecal DNA analysis. Collect one or more fecal pellets (i.e., guano) from the bat in question by placing it temporarily in a holding bag (15 minutes is usually sufficient, no more than 30 minutes is recommended). The pellet (or pellets) collected should be placed in a small vial (e.g., 1.5 ml) with silica gel desiccant; pellets from each individual bat should be stored in separate vials and out of direct light. Fees charged by independent laboratories for sequencing fecal DNA samples is generally inexpensive (approx. $50 per guano sample), however, it has been challenging to identify labs willing to consistently conduct these analyses. Any additional information and a list of available laboratories will be made available on the Indiana bat webpage on the USFWS's Region 3 website (http://www.fws.gov/midwest/Endangered/mammals/inba/index.html).

APPENDIX B
PHASE 2 or 3 MIST-NETTING

SUBMISSION OF MIST-NETTING RESULTS

Provide results of netting surveys to the appropriate USFWS FO(s) in accordance with previously agreed upon[40] timeframes and formats[41]. If Indiana bats are captured, this report should also include the results of subsequent radio-tracking and emergence counts. Reports should include the following:

1. Copy of prior phase reports (if not previously provided).
2. Explanation of any modifications from original survey plan (e.g., altered net locations).[42]
3. Description of net locations (including site diagrams), net set-ups (include net heights), survey dates, duration of surveys, weather conditions, and a summary of findings.
4. Map identifying netting locations and information regarding net set-ups, including lat/long or UTM, individual net placement, net spacing (i.e., include mist-netting equipment in photographs of net locations), and adequate justification if net set-ups are not evenly distributed across suitable habitat within the project area.
5. Full names of mist-netting personnel attending each mist-net site during an operation, including the federally-permitted/qualified biologist present at each mist-net site. Indicate on the field data sheet the full name of person who identified bats each night at each site.
6. Legible copies of all original mist-netting datasheets (see example datasheet below) and a summary table with information on all bats captured during the survey including, but not limited to: capture site, date of capture, time of capture, sex, reproductive condition, age, weight, right forearm measurement, band number and type (if applicable), and Reichard's wing damage index score (Reichard and Kunz. 2009).
7. Photographs of all net set-ups, as well as all Indiana bats and the first 10 little brown bats captured from each project, so that the placement of netting equipment and identification of species can be verified. Photographs of bats should include all diagnostic characteristics that resulted in the identification of the bat to the species level.
8. Any other information requested by the local USFWS FO(s) related to the project.

---

[40] As discussed in the Introduction, we encourage coordination with USFWS FO(s) prior to implementation of any surveys to ensure that all parties agree upon the need for surveys, the methods proposed, and the decisions from various survey results.

[41] In 2016, the USFWS implemented a new standardized approach for reporting of bat survey data. In addition to a traditional written report, federal permit holders are now required to submit their survey data using the standardized permit reporting spreadsheets available on the R3 Indiana Bat Summer Survey Guidance webpage (http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html).

[42] If the USFWS previously agreed upon the study plan we need to understand whether the revised work still accomplished the agreed upon methods

APPENDIX B
PHASE 2 or 3 MIST-NETTING

REFERENCES

Arndt, R.J. and B.A. Schaetz. 2009. A tale of two deniers: nylon versus polyester mist nets. Bat Research News 50(3):57.

Carroll, S.K., T.C. Carter, and G.A. Feldhamer. 2002. Placement of nets for bats: effects on perceived fauna. Southeastern Naturalist 1:193-198.

Canadian Council on Animal Care (CCAC). 2003. CCAC species-specific recommendations on bats. 9pp. Available at: http://www.ccac.ca/en/CCAC_Programs/Guidelines_Policies/GDLINES/BatsFinal20May03.htm (Accessed October 30, 2008).

Gannon, W.L., R.S. Sikes, and the Animal Care and Use Committee of the American Society of Mammologists. 2007. Guidelines of the American Society of Mammologists for the use of wild mammals in research. Journal of Mammalogy 88:809-823.

Gardner, J. E., J.D. Garner, and J.E. Hofmann. 1989. A portable mist-netting system for capturing bats with emphasis on *Myotis sodalis* (Indiana bat). Bat Research News 30:1-8.

Humphrey, P.S., D. Bridge, and T.E. Lovejoy. 1968. A technique for mist-netting in the forest canopy. Bird-Banding 39(1): 43-50.

Kiser, J.D. and J.R. MacGregor. 2005. Indiana bat (*Myotis sodalis*) mist net surveys for coal mining activities. Pp. 169-172 *in* K.C. Vories and A. Harrington (eds.), The Proceedings of the Indiana bat and coal mining: a technical interactive forum Office of Surface Mining, U.S. Department of the Interior, Alton, IL. Available at: http://www.mcrcc.osmre.gov/MCR/Resources/bats/pdf/Indiana_Bat_and_Coal_Mining.pdf. (Accessed October 06, 2011).

Kunz, T.H. and A. Kurta. 1988. Capture methods and holding devices. Pp. 1-29 *in* T.H. Kunz (ed.), Ecological and behavioral methods for the study of bats. Smithsonian Institution Press, Washington, D.C.

Kunz, T.H., R. Hodgkison, and C.D. Weise. 2009. Methods of capturing and handling bats. Pp. 3-35 *in* T.H. Kunz and S. Parsons (eds.), Ecological and behavioral methods for the study of bats, second edition. The Johns Hopkins University Press, Baltimore, Maryland.

MacCarthy, K.A., T.C. Carter, B.J. Steffen, and G.A. Feldhamer. 2006. Efficacy of the mist-net protocol for Indiana bats: A video analysis. Northeastern Naturalist 13:25-28.

Reichard, J.D., and T.H. Kunz. 2009. White-nose syndrome inflicts lasting injuries to the wings of little brown myotis (Myotis lucifugus). Acta Chiropterologica 11: 457-464.

APPENDIX B
PHASE 2 or 3 MIST-NETTING

Robbins, L.W., K.L. Murray, and P.M. McKenzie. 2008. Evaluating the effectiveness of the standard mist-netting protocol for the endangered Indiana bat (*Myotis sodalis*). Northeastern Naturalist 15:275-282.

Winhold, L. and A. Kurta. 2008. Netting surveys for bats in the Northeast: differences associated with habitat, duration of netting, and use of consecutive nights. Northeastern Naturalist 15:263-274.

APPENDIX B

REQUIRED PERMITS AND USFWS CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Illinois – Iowa Field Office
1511 47th Avenue
Moline, Illinois 61265
Phone: (309) 757-5800 Fax: (309) 757-5807

IN REPLY REFER TO:

Mr. Alex J. Patterson
Alliance Consulting Inc.

May 30, 2017
Electronic Mail

Mr. Patterson,

Braden A. Hoffman and Neil Bossart (and other permittees under permit TE06801A-4) are authorized to conduct northern long-eared bat and Indiana bat mist netting surveys for the Mach Mine Water Line in Franklin and Williamson counties, Illinois, as outlined in the study plans submitted by you on May 10, 2017. All activities should conform to the conditions of the U.S. Fish and Wildlife Service (Service) permits TE98296A-2 (Braden A. Hoffman) and TE06801A-4 (Neil Boassart).

We strongly encourage you to report data from this survey to the Illinois - Iowa Field Office utilizing the 2017 Bat Reporting Spreadsheets for Region 3, to fulfill the reporting requirements of your permit. The spreadsheet and instructions can be found on the Service's website http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html.

Kristen Lundh
U.S. Fish & Wildlife Service
Illinois – Iowa Ecological Services Field Office
1511 47th Ave
Moline, IL 61265
ph: 309-757-5800 x 215
fax: 309-757-5807

DEPARTMENT OF THE INTERIOR
U.S. FISH & WILDLIFE SERVICE
Endangered Species Permit Office
5600 American Boulevard, West, Suite 990
Bloomington, MN 55437-1458
permitsR3ES@fws.gov

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

BRADEN A HOFFMAN
dba ALLIANCE CONSULTING INC
167 OLD ANTLER WAY
DANIELS, WV 25832
U.S.A.

2. AUTHORITY-STATUTES
16 USC 1538(a)
16 USC 1539(a)

REGULATIONS
50 CFR 17.22
50 CFR 17.32

50 CFR 13

3. NUMBER: TE98296A-2 — AMENDMENT

4. RENEWABLE: [X] YES [ ] NO

5. MAY COPY: [X] YES [ ] NO

6. EFFECTIVE: 02/29/2016

7. EXPIRES: 12/31/2020

8. NAME AND TITLE OF PRINCIPAL OFFICER (If 21 is a business)

9. TYPE OF PERMIT
NATIVE ENDANGERED & THREATENED SP. RECOVERY - E & T WILDLIFE

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

C.1. VALID FOR USE BY PERMITTEE NAMED ABOVE (BRADEN HOFFMAN). UNAMED ASSISTANTS MAY WORK ON PERMITTED ACTIVITES UNDER THE DIRECT AND ON-SITE SUPERVISION OF BRADEN HOFFMAN. **At least one named permittee must remain present at each mist-net site while it is being operated.**

D. ACCEPTANCE OF THIS PERMIT SERVES AS EVIDENCE THAT THE PERMITTEE AND ITS AUTHORIZED AGENTS UNDERSTAND AND AGREE TO ABIDE BY THE TERMS OF THIS PERMIT AND ALL SECTIONS OF TITLE 50 CODE OF FEDERAL REGULATIONS, PARTS 13 AND 17, PERTINENT TO ISSUED PERMITS. SECTION 11 OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED, PROVIDES FOR CIVIL AND CRIMINAL PENALTIES FOR FAILURE TO COMPLY WITH PERMIT CONDITIONS.

E. Permittee is authorized to take (capture, handle, radio-tag, and release) the Indiana bat (*Myotis sodalis*), gray bat (*Myotis grisescens*), Northern long-eared bat (*Myotis septentrionalis*), and Virginia big-eared bat (*Corynorhinus townsendii virginianus*) for scientific research aimed at recovery of the species: presence/absence surveys, studies to document habitat use, population monitoring, and to evaluate potential impacts. This permit does not authorize the collection of voucher specimens.

F. Activities are authorized at the following locations:

F.1. Locations within Oklahoma (Region 2) upon receipt of written concurrence from the Field Supervisor, and upon coordination with Ozark Plateau National Wildlife Refuge prior to 1) surveys of caves known to be used by federally-listed bats, and 2) examinations of caves suspected of containing federally-listed bat species (some

[X] ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 01/31

ISSUED BY	TITLE	DATE
Thomas Strickland	CHIEF - ENDANGERED SPECIES	02/29/2016

presence/absence surveys may require the presence of a U.S. Fish and Wildlife Biologist), and as outlined in Condition G.

F.2. Locations within Region 3 of the USFWS: Illinois, Indiana, Iowa, Michigan, Missouri, and Ohio upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.3. Locations within Region 4 of the USFWS: Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, North Carolina, and Tennessee, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.4. Locations within Region 5 of the USFWS: Connecticut, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Vermont, Virginia and West Virginia, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.5. Locations within Region 6 of the USFWS: Kansas, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

G. Permittee shall notify the USFWS Field Supervisor for the state in which activities are proposed to occur at least 15 days prior to conducting any activities. Contact information is in Condition M. Your request for this site-specific approval must be in writing and must indicate:

G.1. Species for which proposed activities are being conducted.

G.2. Location of proposed activities, including project site, county, and state.

G.3. A description of the activities (i.e., surveys, radio-telemetry studies, etc.).

G.4. Dates when the project is proposed to take place.

G.5. Evidence that Permittee has received any required contracts to complete the activities.

G.6. Whether all annual reporting requirements have been fulfilled.

G.7. You may proceed with activities only upon receipt of written concurrence from the applicable USFWS Field Supervisor. *Your concurrence letter must be carried with this permit to authorize site-specific activities.*

H. Permittee shall adhere to the following conditions involving capture and handling of bats:

H.1. Bats may be captured with mist nets following the protocol included in the Range-wide Indiana Bat Summer Survey Guidelines. Guidelines are available at: <http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html>. Note that you must use the most up-to-date version of the Summer Survey Guidelines, available at the USFWS web site, for your summer surveys. The monitoring interval for mist nets is +/- 10 minutes and may not exceed 15 minutes. Captured bats may be held for a maximum of 30 minutes, unless injured. In extenuating circumstances, bats shall be held for no longer than 45 minutes.

H.2. Bats may be captured with harp traps with written concurrence from the Field Supervisor in the state in which trapping is proposed. Harp traps must be continually monitored. Captured bats may be held for a maximum of 30 minutes, unless injured. In extenuating circumstances, bats shall be held for no longer than 45 minutes.

H.3. Permittees shall carry out non-intrusive measurements on all captured bats. Data shall be recorded for all bats captured and include, but not be limited to, the data requested in any automated or species specific data form provided by the USFWS (e.g., INDIANA BAT SURVEY AND BANDING DATA form). Handling should be limited to the maximum extent practicable and should cease immediately at signs of undue stress (e.g., bat becoming unresponsive, etc.). Bats that appear stressed from handling should be placed in a dark, quiet location away from activity where it can safely fly away after recovery, and should be checked to ensure successful recovery before leaving the study site. Photographs of the identifying characteristics for each individual federally-listed species captured are encouraged. The Permittee may be requested to provide individual photographs after submittal of annual reporting data.

H.4. Lipped metal bands having a unique identifier may be applied to the forearm of captured bats prior to release. No more than one band per bat may be used. Bands should be applied to the forearm of captured bats prior to release. Position the band on the wing so that when the bat is hanging upside down, the band numbers are right-

side up. A single band should be placed on the right forearm of each male and the left forearm of each female bat.

H.5. Radio transmitters may be applied during spring, summer, and fall roosting and migration periods via nontoxic skin bond adhesive. The total weight of the transmitter may not exceed 6% of the bat's body weight and the total weight of the package (transmitter and adhesive) may not exceed 8% of the bat's body weight. The lightest package (both transmitter and adhesive) capable of accomplishing the required task should be used, especially with pregnant females and newly volant juveniles. Bats carrying transmitters must be monitored daily for at least three days, or until the transmitter falls off, whichever occurs first.

H.6. No trapping activities shall occur within 20 meters of a known bat maternity roost site, either natural or artificial roosts, unless Permittee receives prior written approval from the U.S. Fish and Wildlife Service Field Supervisor for the state in which the activities are proposed to occur.

H.7. Equipment used to capture and handle bats shall be cleaned and decontaminated, including personal gear such as boots and gloves, using products cited in decontamination guidelines and in compliance with label directions. The most recent decontamination guidance is found on the web at: <https://www.whitenosesyndrome.org/topics/decontamination>.

I. Upon determination that endangered or threatened bats are present at previously undocumented sites, Permittee shall notify the following offices within 48 hours: the U.S. Fish and Wildlife Service Region 3 Office (Condition L.), and the U.S. Fish and Wildlife Service Field Office within the geographic location of study areas (Condition M.).

J. Accidental mortality may not exceed two specimens. In the event that this number is met, all activities must cease. Any bat mortality or serious injury must be reported within 5 calendar days to the applicable U.S. Fish and Wildlife Service office listed in Condition M. and to the nearest U.S. Fish and Wildlife Service Law Enforcement, Special Agent Office (http://www.fws.gov/offices). Dead or moribund bats may be retained for further study only with the written permission of the U.S. Fish and Wildlife Service. Any bats that are not authorized for retention are to be chilled and promptly transferred to the U.S. Fish and Wildlife Service for potential necropsy and/or contaminants analysis (Condition L.6.).

K. An annual report of all activities conducted under the authority of this permit is due by January 31 following each year this permit is in effect. In addition, copies of all publications and reports resulting from work conducted under this permit must be submitted as they become available. Failure to furnish any reports required by this permit is cause for permit revocation and/or denial of future permit applications. At a minimum, your report shall include:

K.1. The date, time, geographic locations (including datum and projection information), species, age, sex, and weight of all bats encountered.

K.2. A description of locations surveyed where no bats were encountered.

K.3. Band numbers of all bats banded.

K.4. Information on any injuries and/or mortalities and disposition of specimens.

K.5. Location and characteristics of roost trees and bat colonies.

K.6. Copies of any separate reports and/or publications resulting from work conducted under the authority of this permit.

K.7. A completed data collection form as found in the Summer Survey Guidelines, Appendix B, cited in Condition H.1.

K.8. Data shall be submitted for all bats captured and include, but not be limited to, the data requested in any automated or species-specific data form provided by the USFWS (e.g., INDIANA BAT SURVEY AND BANDING DATA forms, the data collection forms found in the current Rangewide Indiana Bat Summer Survey Guidelines cited in Condition H.1., or other species specific forms). Photographs of the identifying characteristics for each individual federally-listed species captured are encouraged. The Permittee may be requested to provide individual photographs after submittal of annual reporting data.

K.9. Copies of all site specific authorization letters required under Condition G.

If no activities occurred over the course of the year, indication of such shall be submitted as an annual report.

L. Copies of your reports shall be sent to the offices listed below. When possible, electronic copies shall be submitted in lieu of hard copies in MS Word, Portable Document Format, Rich Text Format, or other file format that is compatible with the receiving office.

L.1. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Midwest Region (Region 3)
Ecological Services - Endangered Species
6600 American Blvd. W., Suite 990
Bloomington, Minnesota 55437-1458
(612/713-5343; fax 612/713-5292)
permitsR3ES@fws.gov

L.2. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Southeast Region (Region 4)
Endangered Species Permits Office
1875 Century Blvd., Suite 200
Atlanta, Georgia 30345-3301
(404/679-7140; fax 404/679-7081)
permitsR4ES@fws.gov

L.3. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Northeast Region (Region 5)
Endangered Species Division
300 Westgate Center Drive
Hadley, Massachusetts 01035-9589
(703/358-2402; fax 413/253-8482)
permitsR5ES@fws.gov

L.4. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Southwest Region (Region 2)
Endangered Species Permits Office
P.O. Box 1306
Albuquerque, New Mexico 87103-1306
(505/248-6649; fax 505/248-6788)
permitsR2ES@fws.gov

L.5. ESA Assistant Recovery Coordinator & Permit Coordinator
U.S. Fish and Wildlife Service - Mountain-Prairie Region (Region 6)
Endangered Species Permits Office
Denver Federal Center, P.O. Box 25486
Denver, Colorado 80225-0489
(719/628-2670; fax 303/236-0027)
permitsR6ES@fws.gov

L.6. Lori Pruitt
Endangered Species Coordinator
U.S. Fish and Wildlife Service
Ecological Services Field Office
620 S. Walker Street
Bloomington, Indiana 47403-2121
(812/334-4261 x1213; fax 812/334-4273)

M. Additionally, based on geographic area, reports and publications shall be submitted to the following:

M.1. For studies conducted in Illinois:

M.1.a. Kristen Lundh
Endangered Species Coordinator
U.S. Fish and Wildlife Service
Ecological Services Field Office
1511 47th Avenue
Moline, Illinois 61265
(309/757-5800, x215; fax 309/757-5807)

M.1.b. Joseph A. Kath
Endangered Species Manager/Bat Specialist
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702-1271
(217/785-8764; fax 217/785-2438)

M.2. For studies conducted in Indiana:

M.2.a. Lori Pruitt
Endangered Species Coordinator
U.S. Fish and Wildlife Service
Ecological Services Field Office
620 S. Walker Street
Bloomington, Indiana 47403-2121
(812/334-4261 x1213; fax 812/334-4273)

M.2.b. Scott Johnson
Endangered Species Coordinator
Indiana Department of Natural Resources
Division of Fish and Wildlife
402 W. Washington Street, Room W273
Indianapolis, Indiana 46204-2781
(317/234-9585; fax 317/232-8150)

M.3. For studies conducted in Iowa:

M.3.a. Kristen Lundh
Endangered Species Coordinator
U.S. Fish and Wildlife Service
Ecological Services Field Office
1511 47th Avenue
Moline, Illinois 61265
(309/757-5800, x215; fax 309/757-5807)

M.3.b. Kelly Poole
Endangered Species Coordinator
Iowa Department of Natural Resources
Parks, Recreation, and Preserves
Wallace State Office Building
East 9th and Grand Avenue
Des Moines, Iowa 50319-0034
(515/725-8463)

M.4. For studies conducted in Michigan:

M.4.a. Barbara Hosler
Endangered Species Coordinator
U.S. Fish and Wildlife Service
Ecological Services Field Office
2651 Coolidge Road
East Lansing, Michigan 48823
(517/351-6326; fax 517/351-1443)

M.4.b. Dan Kennedy
Endangered Species Coordinator
Michigan Department of Natural Resources
Wildlife Division
P.O. Box 30444
Lansing, Michigan 48909-7444
(517/284-6164; fax 517/373-6705)

M.5. For studies conducted in Missouri:

M.5.a. Amy Selveter
Field Supervisor
U.S. Fish and Wildlife Service
Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-2132
(573/234-2132; fax 573/234-2181)

M.5.b. Tara Jennings
Scientific Collecting Permit Coordinator
Missouri Department of Conservation
Endangered Species and Natural History Division
2901 W. Truman Blvd., P.O. Box 180
Jefferson City, Missouri 65102-0180
(573/751-4115 ext. 3322; fax 573/751-4864)

M.6. For studies conducted in Ohio:

M.6.a. Angela Boyer
Endangered Species Coordinator for Ohio
U.S. Fish and Wildlife Service
Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614/416-8993, x22; fax 614/416-8994)

M.6.b. Kate Haley Parsons
Terrestrial Endangered Species & Wildlife Diversity Program Administrator
Ohio Department of Natural Resources
Division of Wildlife
2045 Morse Road, Building G3
Columbus, Ohio 43229-6693
(614/265-6329; fax 614/262-1143)

M.7. For studies conducted in Alabama:

Daphne Field Office
Field Supervisor
1208-B Main Street
Daphne, Alabama 36526-4419
(251/441-5181)

M.8. For studies conducted in Arkansas:

Arkansas Field Office
Field Supervisor
110 South Amity Road
Suite 300
Conway, Arkansas 72032-8975
(501/513-4470)

M.9. For studies conducted in Massachusetts and Vermont:

New England Field Office
Field Supervisor
70 Commercial Street, Suite 300
Concord, New Hampshire 03301
(603/223-2541)

M.10. For studies conducted in Maryland:

Chesapeake Bay Field Office
Field Supervisor
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
(410/573-4573)

M.11. For studies conducted in Georgia:

Georgia Field Office
Field Supervisor
105 Westpark Drive, Suite D
Athens, Georgia 30606-3175
(706/613-9493; fax 706/613-6059)

M.12. For studies conducted in Florida:

North Florida Ecological Services Office
Field Supervisor
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517
(904/731-3336)

M.13. For studies conducted in Kansas:

Kansas Field Office
Field Supervisor
2609 Anderson Avenue
Manhattan, Kansas 66502
(785/539-3474; fax 785/539-8567)

M.14. For studies conducted in Kentucky:

Frankfort Field Office
Field Supervisor
J C Watts Federal Bldg., Room 265
330 West Broadway
Frankfort, Kentucky 40601-8670
(502/695-0468)

M.15. For studies conducted in Mississippi:

Mississippi Field Office
Field Supervisor
6578 Dogwood View Pkwy, Suite A
Jackson, Mississippi 39213-7856
(601/321-1122)

M.16. For studies conducted in New Jersey:

New Jersey Field Office
Field Supervisor
927 N. Main Street, Building D
Pleasantville, New Jersey 08232-1454
(609/646-9310)

M.17. For studies conducted in New York:

New York Field Office
Field Supervisor
3817 Luker Road
Cortland, New York 13045
(607/753-9334)

M.18. For studies conducted in North Carolina:

Asheville Field Office
Field Supervisor
160 Zillicoa Street
Asheville, North Carolina 28801-1082
(828/258-3939)

M.19. For studies conducted in Oklahoma:

M.19.a. Oklahoma Field Office
Field Supervisor
U.S. Fish and Wildlife Service
9014 E. 21st Street
Tulsa, Oklahoma 74129-1428
(918) 382-4501

M.19.b. Ozark Plateau National Wildlife Refuge
Deputy Refuge Manager
U.S. Fish and Wildlife Services
16602 County Road 465
Colcord, Oklahoma 74338
(918) 326-0156

M.20. For studies conducted in Pennsylvania:

Pennsylvania Field Office
Field Supervisor
315 So. Allen Street, Suite 322
State College, Pennsylvania 16801-4850
(814/234-4090)

M.21. For studies conducted in South Carolina:

Charleston Field Office
Field Supervisor
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407-7558
(843/727-4707 x212)

M.22. For studies conducted in Tennessee:

Cookeville Field Office
Field Supervisor
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, Tennessee 38501-4027
(931/528-6481)

M.23. For studies conducted in Virginia:

Virginia Field Office
Field Supervisor
6669 Short Lane
Gloucester, Virginia 23061
(804/693-6694)

M.24. For studies conducted in West Virginia:

West Virginia Field Office
Field Supervisor
Route 250 South, Elkins Shopping Plaza
694 Beverly Pike
Elkins, West Virginia 26241
(304/636-6586)

cc: FWS/Region 2, 4, 5, and 6 (Attn: Regional Recovery Permits Coordinator)
FWS, TE Coordinators for Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin
DNR/DOC, TE Coordinators for Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin

END

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Authorization is hereby granted, under Section 5/3.22, Chapter 520 and Section 5/20-100, Chapter 515 of the Illinois compiled Statues to:

Last Name: **Hoffman** First Name: **Braden A.** Permit Number: **A17.5985**

Issued: **1/12/2017** Expires: **12/31/2017**

Business Name: **Alliance Consulting, Inc.**

Street Address: **124 Philpott Lane**

City: **Beaver** State: **WV** Zip Code: **25913**

for strictly scientific, educational or zoological purposes, to take the Illinois fauna identified below subject to the following provisions:

May legally capture, by scientifically accepted methods, only the specific aquatic life species listed on the accompanying Illinois Department of Natural Resources (IDNR) scientific permit application/project proposal (on file in Springfield, IL) strictly for scientific, educational, and/or zoological purposes (except endangered and threatened species). After data has been humanely collected from these species, all animals shall be released unharmed at or near the original site of capture. Deceased animals and/or animal parts must be buried or given to a public or state scientific educational or zoological institution. A federal permit is required for all projects involving federally regulated species. If endangered and threatened species are to be taken, the IDNR Division of Natural Heritage, Endangered Species Coordinator must be notified and must approve in writing all project related activities of the permit application.
Possession/Transportation of injurious aquatic life species requires appropriate permits in addition to the previously stated. The IDNR Aquaculture Specialist can be contacted to request and seek approval of all project activities of the permit applicant prior to activities being initiated. If such species are encountered as part of previously authorized projects, they may be kept for disposition into state, scientific, educational, or zoological institutions, if appropriate precautions are taken to further restrict potential release into the environment AND immediate reporting of escape to dnr.aquaculture@illinois.gov . (All aquatic life may be immediately returned unharmed from where they were taken. 515 ILCS 5/10-100.)
Authorization: Statewide, exclusive of nature preserves, and IDNR owned and managed properties.
Individuals authorized to work under direction of applicant include: Bethany Webb, Blake Davis, Brandon Alderman, Alec Pennanco, Jennifer Barrie

I agree to the following provisions and terms of this Scientific Permit.

Permittee's Signature: _____ (Permit not valid unless signed)

Approved By: _____ Office of Resource Conservation

Date: 1/18/17

TERMS FOR SCIENTIFIC PERMIT

1. Under no circumstances shall a scientific permit be used in lieu of sport or commercial licenses.
2. All taking shall be performed by or under the direct supervision of the permittee. Permits must be present with persons involved in actual taking.
3. All gear left unattended must be tagged bearing name and scientific permit number of permittee.
4. Permittee must be at least eighteen (18) years of age.
5. Permits are not transferable and PERMITTE SHALL CARRY PERMIT AT ALL TIMES WHEN TAKING FAUNA.
6. Agency, company or institution listed on the application is responsible for the taking activities and reports of the individual issued this permit
7. Scientific permits will not be valid for taking any species appearing on official State List of Endangered and Threatened Vertebrate Species of Illinois (see attached Administrative Rule, Part 1010) without specific written approval from the Department of Natural Resources.
8. A federal Permit is required for the taking of species protected by the Federal Government in addition to the State Scientific Permit.
9. The Division of Wildlife Resources may require special conditions or provisions on any Scientific Permit.
10. Use of rotenone or any other toxic materials for taking must have special written approval from the Department of Natural Resources and may need a variance from the Illinois Environmental Protection Agency.
11. By January 31 of next year, an annual report of the permittee's activies must be submitted to the Division of Wildlife Resources. In addition, the permittee shall submit a copy of all written reports, etc. that result from the permitted activity. Permits will be renewed after these annual reports and appropriate publications have been received.
12. Any permit may be revoked or suspended at any time by the Department of Natural Resources.
13. Permits expire December 31 each calendar year unless otherwise specified.

Please contact Jana Hirst, district fisheries biologist, prior to first stream sampling: 618/889-4973

The Department of Natural Resources is an equal opportunity employer.

DEPARTMENT OF THE INTERIOR
U.S. FISH & WILDLIFE SERVICE
Endangered Species Permit Office
5600 American Boulevard, West, Suite 990
Bloomington, MN 55437-1458
permitsR3ES@fws.gov

FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

PITTSBURGH WILDLIFE & ENVIRONMENTAL, INC.
dba PWE
853 BEAGLE CLUB ROAD
MCDONALD, PA 15057
U.S.A.

2. AUTHORITY STATUTES
16 USC 1539(a)
16 USC 1533(d)

REGULATIONS
50 CFR 17.22
50 CFR 17.32

50 CFR 13

3. NUMBER
TE06801A-4
AMENDMENT

4. RENEWABLE
☒ YES
☐ NO

5. MAY COPY
☒ YES
☐ NO

6. EFFECTIVE
07/18/2016

7. EXPIRES
12/31/2017

8. NAME AND TITLE OF PRINCIPAL OFFICER (if it is a business)
NEIL R BOSSART
PRESIDENT

9. TYPE OF PERMIT
NATIVE ENDANGERED & THREATENED SP. RECOVERY - E & T
WILDLIFE

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
ON LANDS SPECIFIED WITHIN THE ATTACHED SPECIAL TERMS AND CONDITIONS

11. CONDITIONS AND AUTHORIZATIONS:

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK 10 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

C.1. VALID FOR USE BY NEIL R. BOSSART, CHRISTOPHER W. SANDERS, KEITH CHRISTENSON, BRIAN COOPER, BRADEN HOFFMAN, DALLAS SCOTT SETTLE, AND JENNIFER L. DREIBELBIS, FOR ACTIVITES OUTLINED BELOW TO TAKE INDIANA BAT, NORTHERN LONG-EARED BAT, AND GRAY BAT. UNNAMED ASSISTANTS MAY WORK ON PERMITTED ACTIVITIES UNDER THE DIRECT AND ON-SITE SUPERVISION OF NAMED PERMITTEES. AT LEAST ONE NAMED PERMITTEE MUST REMAIN PRESENT AT EACH MIST-NET SITE WHILE IT IS BEING OPERATED.

C2. VALID FOR USE BY GENAVIE VERON, FOR ACTIVITES OUTLINED BELOW TO TAKE INDIANA BAT AND NORTHERN LONG-EARED BAT EXCLUDING ENTERING HIBERNACULA AND MATERNITY ROOST CAVES . UNNAMED ASSISTANTS MAY WORK ON PERMITTED ACTIVITIES UNDER THE DIRECT AND ON-SITE SUPERVISION OF NAMED PERMITTEE. AT LEAST ONE NAMED PERMITTEE MUST REMAIN PRESENT AT EACH MIST-NET SITE WHILE IT IS BEING OPERATED.

D. ACCEPTANCE OF THIS PERMIT SERVES AS EVIDENCE THAT THE PERMITTEE AND ITS AUTHORIZED AGENTS UNDERSTAND AND AGREE TO ABIDE BY THE TERMS OF THIS PERMIT AND ALL SECTIONS OF TITLE 50 CODE OF FEDERAL REGULATIONS, PARTS 13 AND 17, PERTINENT TO ISSUED PERMITS. SECTION 11 OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED, PROVIDES FOR CIVIL AND CRIMINAL PENALTIES FOR FAILURE TO COMPLY WITH PERMIT CONDITIONS.

E. Permittee is authorized to take (enter hibernacula or maternity roost caves, capture with mist nets or harp traps, handle, identify, radio-tag, band, and release) the Indiana bat (*Myotis sodalis*), northern long-eared bat (*M. septentrionalis*) and gray bat (*M. grisescens*) for scientific research aimed at recovery of the species: presence/absence surveys, studies to document habitat use, population monitoring, and to evaluate potential impacts. This permit does not authorize the collection of voucher specimens.

F. Activities are authorized at the following locations:

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS
ANNUAL REPORT DUE: 01/31

ISSUED BY	TITLE	DATE
[signature]	CHIEF - ENDANGERED SPECIES	07/18/2016

F.1. Location within Region 2 of the USFWS: Oklahoma, upon receipt of written concurrence from the Field Supervisor, and upon coordination with Ozark Plateau National Wildlife Refuge prior to (1) surveys of caves known to be used by federally-listed bats, and (2) examinations of caves suspected of containing federally-listed bat species (some presence/absence surveys may require the presence of a U.S. Fish and Wildlife Biologist), and as outlined in Condition G.

F.2. Locations within Region 3 of the USFWS: Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.3. Locations within Region 4 of the USFWS: Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.4. Locations within Region 5 of the USFWS: New Jersey, New York, Pennsylvania, Virginia and West Virginia, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

F.5. Locations within Region 6 of the USFWS: Kansas, upon receipt of written concurrence from the Field Supervisor, as outlined in Condition G.

G. Permittee shall notify the USFWS Field Supervisor for the state in which activities are proposed to occur at least 15 days prior to conducting any activities. Contact information is in Condition M. Your request for this site-specific approval must be in writing and must indicate:

G.1. Species for which proposed activities are being conducted.

G.2. Location of proposed activities, including project site, county, and state.

G.3. A description of the activities (i.e., surveys, radio-telemetry studies, etc.).

G.4. Dates when the project is proposed to take place.

G.5. Evidence that Permittee has received any required contracts to complete the activities.

G.6. Whether all annual reporting requirements have been fulfilled.

G.7. You may proceed with activities only upon receipt of written concurrence from the applicable USFWS Field Supervisor. *Your concurrence letter must be carried with this permit to authorize site-specific activities.*

H. Permittee shall adhere to following conditions involving capture and handling of bats:

H.1. Bats may be captured with mist nets following the protocol included in the Range-wide Indiana Bat Summer Survey Guidelines. Guidelines are available at: <http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html>. Note that you must use the most up-to-date version of the Summer Survey Guidelines, available on the USFWS website page, for your summer surveys. The monitoring interval for mist nets is +/- 10 minutes and may not exceed 15 minutes. Captured bats may be held for a maximum of 30 minutes, unless injured. In extenuating circumstances, bats shall be held for no longer than 45 minutes.

H.2. Bats may be captured with harp traps with written concurrence from the Field Supervisor in the state in which trapping is proposed. Harp traps must be continually monitored. Captured bats may be held for a maximum of 30 minutes, unless injured. In extenuating circumstances, bats shall be held for no longer than 45 minutes.

H.3. Permittee shall carry out non-intrusive measurements on all captured bats. Data shall be recorded for all bats captured and include, but not be limited to, the data requested in any automated or species specific data sheet provided by the USFWS (e.g., Bat Reporting Spreadsheet). Handling should be limited to the maximum extent practicable and should cease immediately at signs of undue stress (e.g., bat becoming unresponsive, etc.). Bats that appear stressed from handling should be placed in a dark, quiet location away from activity where it can safely fly away after recovery, and should be checked to ensure successful recovery before leaving the study site. Photographs of the identifying characteristics for each individual federally-listed species captured are encouraged. The Permittee may be requested to provide individual photographs after submittal of annual reporting data.

H.4. Lipped metal bands having a unique identifier may be applied to the forearm of captured bats prior to release. No more than one band per bat may be used. Bands should be applied to the forearm of captured bats prior to release. Position the band on the wing so that when the bat is hanging upside down, the band numbers are right-side up. A single band should be placed on the right forearm of each male and the left forearm of each female bat.

H.5. Radio transmitters may be applied during spring, summer, and fall roosting and migration periods via nontoxic skin bond adhesive. The total weight of the transmitter may not exceed 5% of the bat's body weight and the total weight of the package (transmitter and adhesive) may not exceed 6% of the bat's body weight. The lightest package (both transmitter and adhesive) capable of accomplishing the required task should be used, especially with pregnant females and newly volant juveniles. Bats carrying transmitters must be monitored daily for at least three days, or until the transmitter falls off, whichever occurs first.

H.6. No trapping activities shall occur within 20 meters of a known Indiana bat maternity roost site, either natural or artificial roosts, unless Permittee receives prior written approval from the U.S. Fish and Wildlife Service Field Supervisor for the state in which the activities are proposed to occur.

H.7. Equipment used to capture and handle bats shall be cleaned and decontaminated, including personal gear such as boots and gloves, using products cited in decontamination guidelines and in compliance with label directions. The most recent decontamination guidance is found on the web at: <http://www.whitenosesyndrome.org/topics/decontamination>

H.8. Caves, mines, or other suitable hibernation sites may be quietly searched in a manner that minimizes disturbance by utilizing the minimum number of people and time required to complete the survey. Surveys should not be repeated more often than once every other year in any given hibernaculum that is occupied by endangered or threatened bats. Where hibernacula area and safety conditions allow, individuals entering caves are recommended to utilize night vision goggles or red-filtered light and to remain in the cave no more than 90 minutes to

complete the work.

I. Upon determination that endangered bats are present at previously undocumented sites, Permittee shall notify the following offices within 48 hours: the U.S. Fish and Wildlife Service Region 3 Office (Condition L.), and the U.S. Fish and Wildlife Service Field Office within the geographic location of study areas (Condition M.).

J. Accidental mortality may not exceed two specimens. In the event that this number is met, all activities must cease. Any bat mortality or serious injury must be reported within 5 calendar days to the applicable office listed in condition M. and to the nearest U.S. Fish and Wildlife Service Law Enforcement Office (http://www.fws.gov/offices). Dead or moribund bats may be retained for further study only with the written permission of the U.S. Fish and Wildlife Service. Any bats that are not authorized for retention are to be chilled and promptly transferred to the U.S. Fish and Wildlife Service for potential necropsy and/or contaminants analysis (Condition L.6.).

K. An annual report of all activities conducted under the authority of this permit is due by January 31 following each year this permit is in effect. In addition, copies of all publications and reports resulting from work conducted under this permit must be submitted as they become available. Failure to furnish any reports required by this permit is cause for permit revocation and/or denial of future permit applications. At a minimum, your report shall include:

K.1. The date, time, geographic locations (including datum and projection information), species, age, sex, and weight of all bats encountered.

K.2. A description of locations surveyed where no bats were encountered.

K.3. Band numbers of all bats banded.

K.4. Information on any injuries and/or mortalities and disposition of specimens.

K.5. Location and characteristics of roost trees and bat colonies.

K.6. Copies of any separate reports and/or publications resulting from work conducted under the authority of this permit.

K.7. A completed data collection sheet as found on the Range-wide Indiana Bat Summer Survey Guidelines website page, cited in Condition H.1.

K.8. Data shall be submitted for all bats captured and include, but not be limited to, the data requested in any automated or species-specific data sheet provided by the USFWS (e.g., the data collection sheets found on the current Rangewide Indiana Bat Summer Survey Guidelines website page cited in Condition H.1., or other species specific data sheets). Photographs of the identifying characteristics for each individual federally-listed species captured are encouraged. The Permittee may be requested to provide individual photographs after submittal of annual reporting data.

K.9. Copies of all site specific authorization letters required under Condition G.

If no activities occurred over the course of the year, indication of such shall be submitted as an annual report.

L. Copies of your reports shall be sent to the offices listed below. When possible, electronic copies shall be submitted in lieu of hard copies in MS Word, Portable Document Format, Rich Text Format, or other file format that is compatible with the receiving office.

L.1. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Midwest Region (Region 3)
Ecological Services - Endangered Species
5600 American Blvd. W., Suite 990
Bloomington, Minnesota 55437-1458
(612/713-5343; fax 612/713-5292)
permitsR3ES@fws.gov

L.2. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Southeast Region (Region 4)
1875 Century Boulevard, Suite 200
Atlanta, Georgia 30345-3301
(404/679-7101; fax 404/679-7081)
permitsR4ES@fws.gov

L.3. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Northeast Region (Region 5)
Endangered Species Division
300 Westgate Center Drive
Hadley, Massachusetts 01035-9589
(703/358-2402; fax 413/253-8482)
permitsR5ES@fws.gov

L.4. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Southwest Region (Region 2)
500 Gold Ave., SW
P.O. Box 1306
Albuquerque, New Mexico 87103-1306
(505/248-6665; fax 505/248-6788)
permitsR2ES@fws.gov

L.5. Regional Recovery Permits Coordinator
U.S. Fish and Wildlife Service - Mountain-Prairie Region (Region 6)

Endangered Species Permits Office
Denver Federal Center, P.O. Box 25486
Denver, Colorado 80225-0489
(303/236-4212; fax 303/236-0027)
permitsR6ES@fws.gov

L.6. Lori Pruitt
Endangered Species Coordinator for Indiana
U.S. Fish and Wildlife Service
Ecological Services Field Office
620 S. Walker Street
Bloomington, Indiana 47403-2121
(812/334-4261 x1213; fax 812/334-4273)

M. Additionally, based on geographic area, reports and publications shall be submitted to the following:

M.1. For studies conducted in Illinois:

M.1.a. Kristen Lundh
Endangered Species Coordinator for Illinois/Iowa
U.S. Fish and Wildlife Service
Ecological Services Field Office
1511 47th Ave.
Moline, Illinois 61265
(309/757-5800, x215; fax 309/757-5807)

M.1.b. Joseph Keth
Endangered Species Coordinator
Illinois Department of Natural Resources
Division of Natural Heritage
One Natural Resource Way
Springfield, Illinois 62702-1271
(217/785-8764; fax 217/785-2438)

M.2. For studies conducted in Indiana:

Scott Johnson
Endangered Species Coordinator
Indiana Department of Natural Resources
Division of Fish and Wildlife
402 W. Washington Street, Room W273
Indianapolis, Indiana 46204-2781
(317/234-0586; fax 317/232-8150)

M.3. For studies conducted in Iowa:

M.3.a. Kristen Lundh
Endangered Species Coordinator for Illinois/Iowa
U.S. Fish and Wildlife Service
Ecological Services Field Office
1511 47th Ave.
Moline, Illinois 61265
(309/757-5800, x215; fax 309/757-5807)

M.3.b. Kelley Poole
Endangered Species Coordinator
Iowa Department of Natural Resources
Parks, Recreation, and Preserves
Wallace State Office Building
East 9th and Grand Avenue
Des Moines, Iowa 50319-0034
(515/725-8463)

M.4. For studies conducted in Michigan:

M.4.a. Jack Dingledine
Deupty Field Supervisor
U.S. Fish and Wildlife Service
2651 Coolidge Road
East Lansing, Michigan 48823
(517/351-2555; fax 517/351-1443)

M.4.b. Dan Kennedy
Endangered Species Coordinator
Michigan Department of Natural Resources
Wildlife Division
P.O. Box 30444
Lansing, Michigan 48909-7444

(517/284-6184; fax 517/373-6705)

M.6. For studies conducted in Missouri:

M.6.a. Shauna Marquardt
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-2132
(573/234-2132; fax 573/234-2181)

M.6.b. Paul McKenzie
Endangered Species Coordinator for Missouri
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-2132
(573/234-2132; fax 573/234-2181)

M.6.c. Tera Jennings
Scientific Collecting Permit Coordinator
Missouri Department of Conservation
Endangered Species and Natural History Division
2901 W. Truman Blvd., P.O. Box 180
Jefferson City, Missouri 65102-0180
(573/522-4115 ext. 3322; fax 573/751-4984)

M.6. For studies conducted in Ohio:

M.6.a. Angela Boyer
Endangered Species Coordinator for Ohio
U.S. Fish and Wildlife Service
Ohio Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614/416-8993, x22; fax 614/416-8994)

M.6.b. Kate Haley Parsons
Terrestrial Endangered Species & Wildlife Diversity Program Administrator
Ohio Department of Natural Resources - Division of Wildlife
2045 Morse Road, Building G
Columbus, Ohio 43229-6693
(614-/265-6329; fax 614/262-1143)

M.7. For studies conducted in Wisconsin:

M.7.a. Phil Delphey
Endangered Species Coordinator for Wisconsin
U.S. Fish and Wildlife Service
Ecological Services Field Office
4101 American Blvd E.
Bloomington, Minnesota 55425
(952/252-0092 x206; fax 952/646-2873)

M.7.b. Owen Boyle
Director, Bureau of Endangered Resources
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707-7921
(608/266-5244; fax 608/266-2925)

M.8. For studies conducted in Alabama:

Daphne Field Office
Bill Pearson, Field Supervisor
1208-B Main Street
Daphne, AL 36526
(251) 441-5181

M.9. For studies conducted in Arkansas:

Arkansas Field Office
Jim Boggs, Field Supervisor
110 South Amity

Suite 300
Conway, AR 72032-6976
(501) 513-4470

M.10. For studies conducted in Connecticut and Vermont:

New England Field Office
Tom Chapman, Field Supervisor
70 Commercial Street, Suite 300
Concord, NH 03301
(603) 223-2541

M.11. For studies conducted in Georgia:

Georgia Field Office
Field Supervisor
West Park Center, Suite D
105 West Park Drive
Athens, GA 30606-3175
(706) 613-9493

M.12. For studies conducted in Kansas:

Kansas Field Office
Heather Whitlaw, Field Supervisor
2609 Anderson Avenue
Manhattan, Kansas 66502
(785/539-3474; fax 785/539-8567)

M.13. For studies conducted in Kentucky:

Frankfort Field Office
Lee Andrews, Field Supervisor
J C Watts Federal Bldg., Rm 265
330 West Broadway
Frankfort, KY 40601-8670
(502) 695-0468

M.14. For studies conducted in Maryland:

Chesapeake Bay Field Office
Geneviève LaRouche, Field Supervisor
177 Admiral Cochrane Drive
Annapolis, MD 21401
(410) 573-4573

M.15. For studies conducted in Mississippi:

Mississippi Field Office
Steve Ricks, Field Supervisor
6578 Dogwood View Pkwy, Ste A
Jackson, MS 39213-7858
(601) 321-1122

M.16. For studies conducted in New Jersey:

New Jersey Field Office
Field Supervisor
927 N. Main Street, Building D
Pleasantville, NJ 08232-1454
(609) 646-9310

M.17. For studies conducted in New York:

New York Field Office
David Stilwell, Field Supervisor
3817 Luker Road
Cortland, NY 13045
(607) 753-9334

M.18. For studies conducted in North Carolina:

Asheville Field Office
Field Supervisor
160 Zillicoa Street
Asheville, NC 28801-1082

(828) 258-3939

M.19. For studies conducted in Pennsylvania:

Pennsylvania Field Office
Lora Zimmerman, Field Supervisor
315 So. Allen Street, Suite 322
State College, PA 16801-4850
(814) 234-4090

M.20. For studies conducted in Tennessee:

Cookeville Field Office
Mary Jennings, Field Supervisor
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501-4027
(931) 528-6481

M.21. For studies conducted in Oklahoma:

M.21.a. Field Supervisor
U.S. Fish and Wildlife Service
Oklahoma Field Office
9014 E. 21st Street
Tulsa, Oklahoma 74129-1428
(918/382-4501)

M.21.b. Deputy Refuge Manager
U.S. Fish and Wildlife Service
Ozark Plateau National Wildlife Refuge
16602 County Road 465
Colcord, Oklahoma 74338
(918/326-0155)

M.22. For studies conducted in Virginia:

Virginia Field Office
Cindy Schulz, Field Supervisor
6669 Short Lane
Gloucester, VA 23061
(804) 693-6694

M.23. For studies conducted in West Virginia:

West Virginia Field Office
Field Supervisor
Route 250 South, Elkins Shopping Plaza
694 Beverly Pike
Elkins, WV 26241
(304) 636-6586

cc: FWS/Region 2, 4, 5, and 6 (AES/TE)
FWS, TE Coordinators for Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin
DNR/DOC, TE Coordinators for Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin

END

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Authorization is hereby granted, under Section 5/3.22, Chapter 520 and Section 5/20-100, Chapter 515 of the Illinois compliled Statues to:

Last Name: **Bossart** First Name: **Neil** Permit Number: **NH17.5501**

Issued: **12/8/2016** **Expires: 12/31/2017**

Business Name: **Pittsburg Wildlife & Environmental, Inc.**

Street Address: **853 Beagle Club Road**

City: **McDonald** State: **PA** Zip Code: **15057**

for strictly scientific, educational or zoological purposes, to take the Illinois fauna identified below subject to the following provisions:

Applicant and all individuals listed may legally capture, handle, collect data and/or obtain biological samples, by scientifically accepted and approved methods, for projects and species listed below [as listed on the accompanying Illinois Department of Natural Resources (IDNR) scientific permit application/project proposal (on file in Springfield, IL) strictly for scientific, educational and/or zoological purposes]. Permitted activities include: mist-net and acoustic surveys for all bat species, handling for identification purposes, photographing, banding, affixing of radio transmitters and tracked and/or collection of biological samples through wing-punch and hair clipping. All individuals will be released unharmed at or near the original capture location once data is collected Applicant will notify Mike Mooney at: 217.782.0447 or via email at: mike.mooney@illinois.gov) no less than 14 days prior to any activity with location and project specific details. Reporting requirements may be required in a more timely basis than annually depending upon activities included. Possession of a valid scientific collection permit does not grant access for permitted activities as other permits may be required. A federal permit is required for all projects involving federally regulated species, including migratory birds. If endangered and threatened species are incidentally captured and handled during the permitted activity, the occurrence needs to be documented (preferably with photographs of diagnostic characteristics and geographic location) and reported via email to Tara Kieninger at: tara.kieninger@illinois.gov within 72 hours. The specimen cannot be removed and should be released on site immediately. Intentional capture, handling and/or collection of endangered or threatened species require prior approval and possession of an Endangered or Threatened Species Permit. Any permitted activities conducted on State-owned properties require prior approval and possession of an IDNR Research / Site Permit. Any permitted activities conducted on sites Dedicated or Registered through the Illinois Nature Preserves Commission require prior approval and possession of an INPC Research Permit. Applicants must utilize appropriate decontamination procedures to prevent the spread of disease between individuals and sites and every effort should be made to prevent the spread of exotic or invasive plants/plant propagules.

Authorization: Statewide

Special Bat Provisions

1. All individuals working under the direction of this scientific permit (and/or working under the direction of the permit applicant) shall be able to accurately field identify all 12 species of bats endemic to Illinois, including but not limited to: the Federally endangered Indiana bat (Myotis sodalis), the gray bat (Myotis grisescens), the southern myotis (Myotis austroriparius), and the Rafinesque's big-eared bat (Corynorhinus rafinesquii).
2. All chiropteran species are to be released immediately, unharmed after data is collected, including any genetic samples (wing punch, hair clip, etc.) – animals may be banded and/or affixed with radio-transmitters is appropriate to the specific project.
3. Under the direction of this scientific permit, bats are to be collected only by hand (gloved/protected only) and/or butterfly nets and/or mist-nets and/or harp traps designed for such purposes.
4. An annual report documenting all captures, including GPS coordinates, must be submitted to the IDNR (Attn: Joseph Kath) each year after the field season is complete. Failure to submit such a report may result in revocation of this Illinois Scientific permit and your Endangered Species Permit as well. Please note that this permit as well as your Illinois Endangered Species Permit is not valid unless accompanied by any and all applicable Federal (USFS) permits and/or provisions
5. All Federal guidelines regarding White Nose Syndrome (WNS) in bats and the proper decontamination procedures developed by the USFS must be followed at all times within the State of Illinois when conducting ANY and ALL bat research. Failure to strictly comply with these Federal decontamination guidelines may result in the immediate revocation of any and State of Illinois issue permits. For proper WNS decontamination procedures please go to: http://www.fws.gov/northeast/wnscavers.html

I agree to the following provisions and terms of this Scientific Permit.

Permittee's Signature: _____ Approved By: _____ Date: 12/8/16

(Permit not valid unless signed) Office of Resource Conservation

TERMS FOR SCIENTIFIC PERMIT

1. Under no circumstances shall a scientific permit be used in lieu of sport or commercial licenses.
2. All taking shall be performed by or under the direct supervision of the permittee. Permitte must be present with persons involved in actual taking.
3. All gear left unattended must be tagged bearing name and scientific permit number of permittee.
4. Permittee must be at least eighteen (18) years of age.
   Permits are not transferable and PERMITTE SHALL CARRY PERMIT AT ALL TIMES WHEN TAKING FAUNA.
6. Agency, company or institution listed on the application is responsible for the taking activities and reports of the individual issued this permit
7. Scientific permits will not be valid for taking any species appearing on official State List of Endangered and Threatened Vertebrate Species of Illinois (see attached Administrative Rule, Part 1010) without specific written approval from the Department of Natural Resources.

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Authorization is hereby granted, under Section 5/3.22, Chapter 520 and Section 5/20-100, Chapter 515 of the Illinois compliled Statues to:

Last Name: **Cooper** First Name: **Brian** Permit Number: **NH17.6115**

Issued: **4/17/2017** **Expires: 12/31/2017**

Business Name: Pittsburg Wildlife & Environmental, Inc.

Street Address: 853 Beagle Club Road

City: McDonald State: PA Zip Code: 15057

for strictly scientific, educational or zoological purposes, to take the Illinois fauna identified below subject to the following provisions:

Applicant and all individuals listed may legally capture, handle, collect data and/or obtain biological samples, by scientifically accepted and approved methods, for projects and species listed below [as listed on the accompanying Illinois Department of Natural Resources (IDNR) scientific permit application/project proposal (on file in Springfield, IL) strictly for scientific, educational and/or zoological purposes]. Permitted activities include: May capture non-listed bats as encountered with the use of a mist net. May attach radio transmitters and track bats to establish roosts. All bats will be released after data collection at the point of capture. Possession of a valid scientific collection permit does not grant access for permitted activities as other permits may be required. A federal permit is required for all projects involving federally regulated species, including migratory birds. If endangered and threatened species are incidentally captured and handled during the permitted activity, the occurrence needs to be documented (preferably with photographs of diagnostic characteristics and geographic location) and reported via email to Tara Kleninger at: tara.kieninger@illinois.gov within (1) week. The specimen cannot be removed and should be released on site immediately. Intentional capture, handling and/or collection of endangered or threatened species require prior approval and possession of an Endangered or Threatened Species Permit. Any permitted activities conducted on State-owned properties require prior approval and possession of an IDNR Research / Site Permit. Any permitted activities conducted on sites Dedicated or Registered through the Illinois Nature Preserves Commission require prior approval and possession of an INPC Research Permit. Applicants must utilize appropriate decontamination procedures to prevent the spread of disease between individuals and sites and every effort should be made to prevent the spread of exotic or invasive plants/plant propagules.

1. All individuals working under the direction of this scientific permit (and/or working under the direction of the permit applicant) shall be able to accurately field identify all 12 species of bats endemic to Illinois, including but not limited to: the Federally endangered Indiana bat (Myotis sodalis), Northern long-eared bat (Myotis septentrionalis), the gray bat (Myotis grisescens), the southern myotis (Myotis austroriparius), and the Rafinesque's big-eared bat (Corynorhinus rafinesquii).
2. All chiropteran species are to be released immediately, unharmed after data is collected, including any genetic samples (wing punch, hair clip, etc.) – animals may be banded and/or affixed with radio-transmitters is appropriate to the specific project.
3. Under the direction of this scientific permit, bats are to be collected only by hand (gloved/protected only) and/or butterfly nets and/or mist-nets and/or harp traps designed for such purposes.
4. An annual report documenting all captures, including GPS coordinates, must be submitted to the IDNR each year after the field season is complete. Failure to submit such a report may result in revocation of this Illinois Scientific permit and your Endangered Species Permit as well. Please note that this permit as well as your Illinois Endangered Species Permit is not valid unless accompanied by any and all applicable Federal (USFS) permits and/or provisions
5. All Federal guidelines regarding White Nose Syndrome (WNS) in bats and the proper decontamination procedures developed by the USFS must be followed at all times within the State of Illinois when conducting ANY and ALL bat research. Failure to strictly comply with these Federal decontamination guidelines may result in the immediate revocation of any and State of Illinois issue permits. For proper WNS decontamination procedures please go to: http://www.fws.gov/northeast/wnscavers.html

Authorization: Franklin and Williamson Counties

Individuals working under direction of applicant include: Neils Bossart, Genavie Vernon, Jennifer Dreibelis, Ethan Olan, Braden Hoffman, and Alex Patterson

I agree to the following provisions and terms of this Scientific Permit.

Permittee's Signature: Brian Cooper (Permit not valid unless signed)

Approved By: _____ Office of Resource Conservation

Date: 4/21/17

TERMS FOR SCIENTIFIC PERMIT

1. Under no circumstances shall a scientific permit be used in lieu of sport or commercial licenses.
2. All taking shall be performed by or under the direct supervision of the permittee. Permitte must be present with persons involved in actual taking.
3. All gear left unattended must be tagged bearing name and scientific permit number of permittee.
4. Permittee must be at least eighteen (18) years of age.
5. Permits are not transferable and PERMITTE SHALL CARRY PERMIT AT ALL TIMES WHEN TAKING FAUNA.
6. Agency, company or institution listed on the application is responsible for the taking activities and reports of the individual issued this permit
7. Scientific permits will not be valid for taking any species appearing on official State List of Endangered and Threatened Vertebrate Species of Illinois (see attached Administrative Rule, Part 1010) without specific written approval from the Department of Natural Resources.
8. A federal Permit is required for the taking of species protected by the Federal Government in addition to the State Scientific Permit.
9. The Division of Wildlife Resources may require special conditions or provsions on any Scientific Permit.
10. Use of rotenone or any other toxic materials for taking must have special written approval from the Department of Natural Resources and may need a variance from the Illinois Environmental Protection Agency.

APPENDIX C

COMPLETED BAT SURVEY DATA FORMS

Bat Survey Data Form

Project: Mach Water Line Site #: 01 Night: 01 Date: 5/18/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 50'3.40" Long/UTM: -88 51'53.20 Datum: NAD 27

Identifier: B. Cooper Tech(s): Alex Patterson Bat activity time:

Site Description: Wheat field with a small stream running down the middle.

Dominant Tree Species: Oak, maple

Other Wildlife Observed: bobwhite quail, white-tailed deer Whip-Poor-Wills: 0

Comments:

Sunrise: 05:43 Sunset: 20:01 Moonrise: Moonset: Illumination: 50%

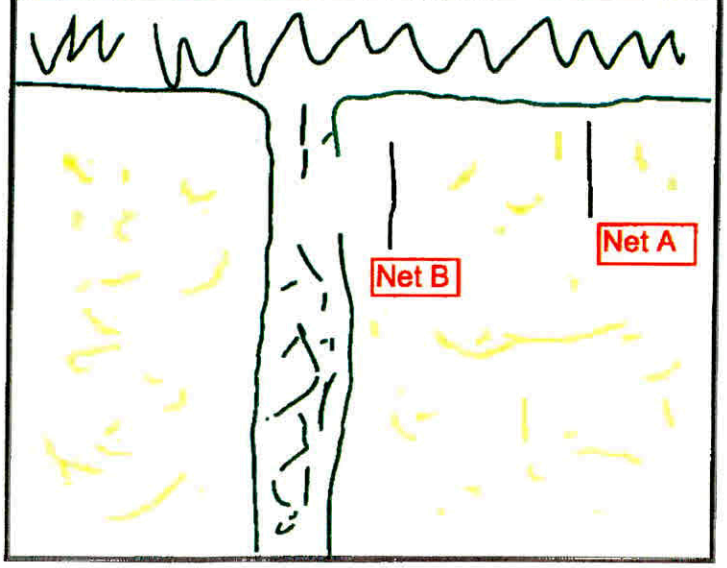
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	12	x	7.8	37 50'02.7"	-88 51'51.4"	Corridor
B	Mist Net	12	x	7.8	37 50'03.0"	-88 51'54.8"	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	27.7 °	0	0
22:10	19.4 °	0	0
01:10	18.3 °	0	0
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line						Site #: 01			Night: 01		Date: 5/18/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 01 Night: 02 Date: 5/19/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 50'3.40" Long/UTM: -88 51'53.20 Datum: NAD 27

Identifier: B. Cooper Tech(s): Alex Patterson Bat activity time:

Site Description: Wheat field with a small stream running down the middle.

Dominant Tree Species: Oak, maple

Other Wildlife Observed: bobwhite quail, white-tailed deer Whip-Poor-Wills: 0

Comments:

Sunrise: 05:42 Sunset: 20:01 Moonrise: Moonset: Illumination: 50%

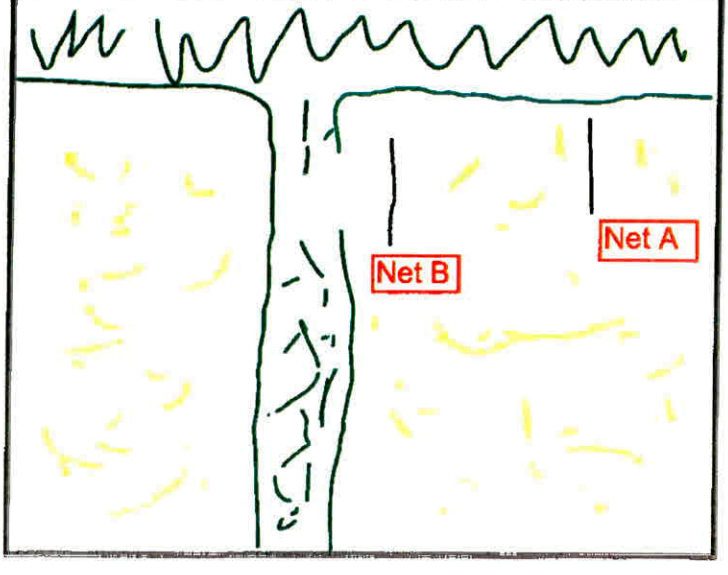
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	12	x	7.8	37 50'02.7"	-88 51'51.4"	Corridor
B	Mist Net	12	x	7.8	37 50'03.0"	-88 51'54.8"	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	23.8 °	0	0
22:10	22.2 °	0	0
01:10	19.4 °	0	0
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line						Site #: 01			Night: 02		Date: 5/19/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	22:40	Eastern Red bat	A	F	NR	14.2	37.0	10	A	0	n/a	
2	00:05	Eastern Red bat	A	F	PG	14.8	41.0	5	A	0	n/a	
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 02 Night: 01 Date: 5/18/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37° 50' 04.3" N Long/UTM: 88° 52' 29.0" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian Bat activity time: 20:30

Site Description: ATV trail and small gas ROW through deciduous hardwoods

Dominant Tree Species: Oak, hickory, sassafras

Other Wildlife Observed: Eastern Wood-pewee, Bobwhite Quail, Fowler's toad Whip-Poor-Wills: 0

Comments:

Sunrise: 05:43 Sunset: 20:00 Moonrise: 01:20 Moonset: 12:14 Illumination: 50%

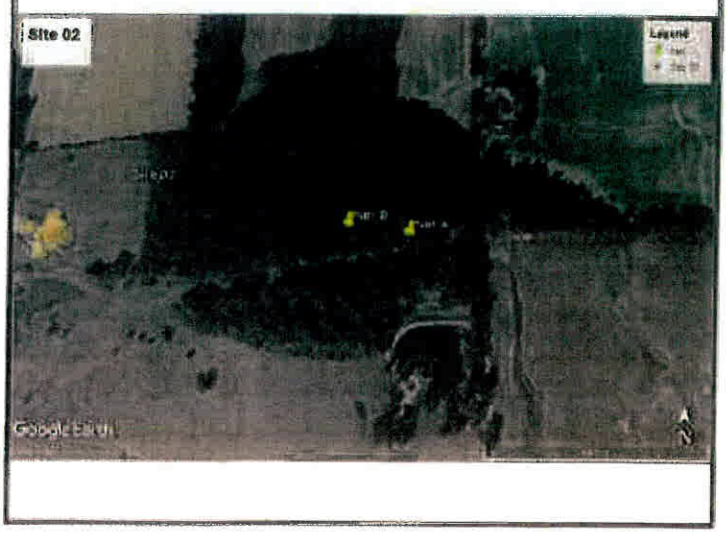
Nets/Traps/Detectors | **Time Open:** 20:15 | **Time Closed:** 01:15

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37° 50' 04.3" N	88° 52' 29.0" W	Corridor
B	Mist Net	6	x	7.8	37° 50' 04.7" N	88° 52' 32.3" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:15	28.0 °	5	0
21:15	21.5 °	0	0
22:15	21.1 °	0	0
23:15	20.8 °	0	0
00:15	20.6 °	0	0
01:15	20.3 °	0	0
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 02 | **Night:** 01 | **Date:** 5/18/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:30	Eastern Red bat	A	F	PG	12.2	40.0	10	A	1		
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 02 Night: 02 Date: 5/19/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37° 50' 04.3" N Long/UTM: 88° 52' 29.0" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian Bat activity time: 20:30

Site Description: ATV trail and small gas ROW through deciduous hardwoods

Dominant Tree Species: Oak, hickory, sassafras

Other Wildlife Observed: Scarlet Tanager, Bobwhite Quail, Cricket frog, coyote Whip-Poor-Wills: 0

Comments:

Sunrise: 05:42 Sunset: 20:01 Moonrise: 01:57 Moonset: 13:14 Illumination: 40%

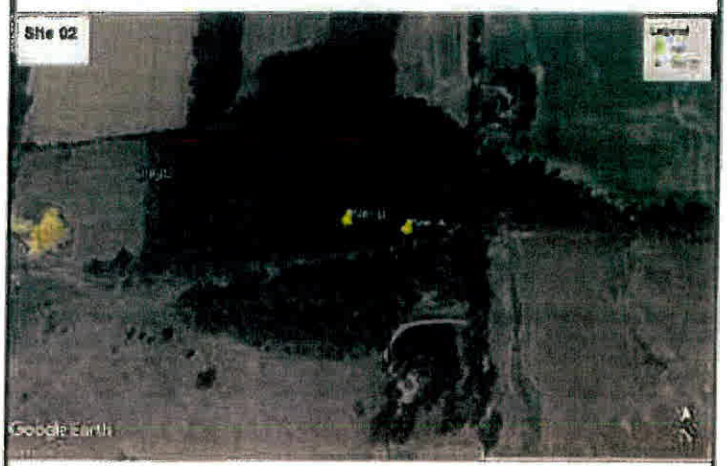
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37° 50' 04.3" N	88° 52' 29.0" W	Corridor
B	Mist Net	6	x	7.8	37° 50' 04.7" N	88° 52' 32.3" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:15	24.5 °	10	0
21:15	22.7 °	15	0
22:15	21.9 °	40	1-4
23:15	22.0 °	100	1-4
00:15	20.6 °	100	0
01:15	20.5 °	100	0
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 02 | **Night:** 02 | **Date:** 5/19/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	21:05	Eastern Red bat	A	F	PG	14.9	40.5	5	A	1		
2	00:15	Eastern Red bat	A	M	NR	10.7	36.5	6	A	1		
3	01:10	Eastern Red bat	A	F	UNK			5	A	UNK		Escape
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 03 Night: 01 Date: 5/18/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 50'0.50" Long/UTM: -88 53'54.40" Datum: NAD 27

Identifier: B. Hoffman Tech(s): Patrick O'Brien Bat activity time: 20:20

Site Description: Along an existing ROW

Dominant Tree Species: Silver maple, red oak, black cherry

Other Wildlife Observed: white-tailed deer Whip-Poor-Wills:

Comments:

Sunrise: 05:43 Sunset: 20:14 Moonrise: 01:20 Moonset: 12:14 Illumination: 40%

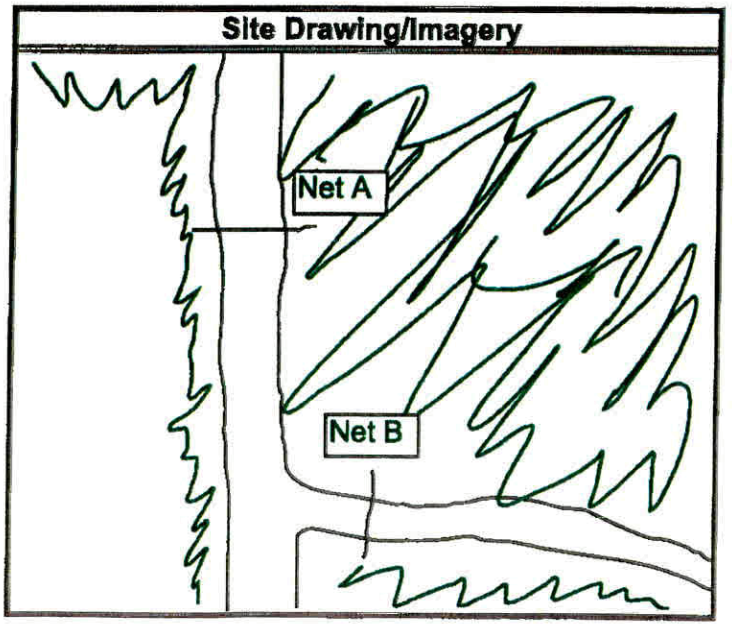
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37 50'0.75"	-88 53'53.92"	Corridor
B	Mist Net	4	x	2.6	37 50'0.86"	-88 53'47.54"	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:00	24.4 °	0	1-4
22:40	19.4 °	0	0
01:10	19.4 °	0	0
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line						Site #: 03			Night: 01		Date: 5/18/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 03 Night: 02 Date: 5/19/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 50'0.50" Long/UTM: -88 53'54.40" Datum: NAD 27

Identifier: B. Hoffman Tech(s): Patrick O'Brien Bat activity time: 20:20

Site Description: Along an existing ROW

Dominant Tree Species: Silver maple, red oak, black cherry

Other Wildlife Observed: white-tailed deer Whip-Poor-Wills:

Comments:

Sunrise: 05:43 Sunset: 20:14 Moonrise: 01:20 Moonset: 12:14 Illumination: 40%

Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37 50'0.75"	-88 53'53.92"	Corridor
B	Mist Net	4	x	2.6	37 50'0.86"	-88 53'47.54"	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:00	22.2 °	0	1-4
22:20	20.5 °	70	0
01:10	19.4 °	30	1-4
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 03 | **Night:** 02 | **Date:** 5/19/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht In Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	01:20	Eastern Red bat	A	F	PG	17.6	42.6	15	A	0	n/a	
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 4 Night: 01 Date: 5/20/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37°50'27.7" Long/UTM: 88°55'29.0" Datum: NAD 27

Identifier: B. Cooper Tech(s): Alex Patterson, Tim Wilson Bat activity time: 20:15

Site Description: Mowed gas line ROW and ATV trails

Dominant Tree Species: Ash, Oak, Elm

Other Wildlife Observed: 0 Whip-Poor-Wills: 0

Comments:

Sunrise: 05:41 Sunset: 20:02 Moonrise: 02:32 Moonset: 14:17 Illumination: 40%

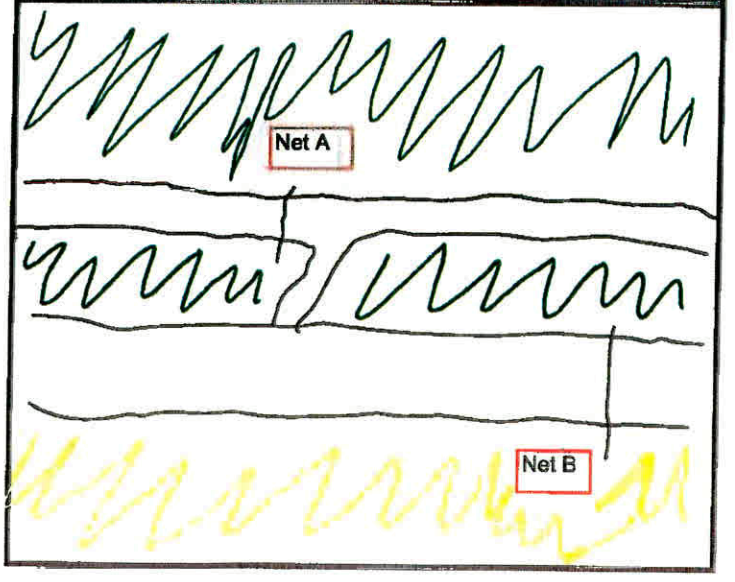
Nets/Traps/Detectors | **Time Open:** | **Time Closed:**

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	6	x	7.8	37°50'27.6"	88°55'30.5"	Corridor
B	Mist Net	9	x	7.8	37°50'29.2"	88°55'31.1"	Forest
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	24.0 °	20	1-4
22:10	21.1 °	40	1-4
02:15	19.4 °	5	1-4
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 4 | **Night:** 01 | **Date:** 5/20/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	21:12	Eastern Red bat	UNK	UNK	UNK			20	B			escaped
2	22:40	Eastern Red bat	A	F	PG	14.5	40.0	20	B	0	n/a	
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 4 Night: 02 Date: 5/21/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37°50'27.7" Long/UTM: 88°55'29.0" Datum: NAD 27

Identifier: B. Cooper Tech(s): Alex Patterson, Tim Wilson Bat activity time: 20:30

Site Description: Mowed gas line ROW and ATV trails

Dominant Tree Species: Ash, Oak, Elm

Other Wildlife Observed: house cats Whip-Poor-Wills: 0

Comments:

Sunrise: 05:41 Sunset: 20:02 Moonrise: 02:32 Moonset: 14:17 Illumination: 40%

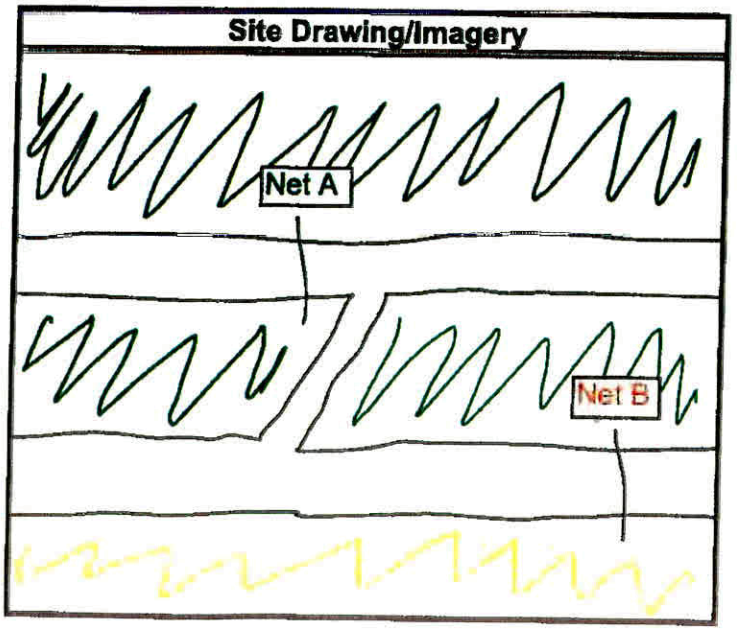
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	6	x	7.8	37°50'27.6"	88°55'30.5"	Corridor
B	Mist Net	9	x	7.8	37°50'29.2"	88°55'31.1"	Forest
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	17.7 °	0	1-4
22:10	15.5 °	20	1-4
01:10	12.7 °	5	0
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 4 | **Night:** 02 | **Date:** 5/21/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	21:00	Eastern Red bat	A	F	PG	15.5	43.0	22	B	0	n/a	
2	21:40	Eastern Red bat	A	M	NR	10.4	40.0	6	B	0	n/a	
3	23:10	Eastern Red bat	A	F	PG	13.8	41.0	10	A	0	n/a	
4	23:55	Eastern Red bat	A	F	PG	13.9	43.0	12	B	0	n/a	
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
7												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line | Site #: 05 | Night: 01 | Date: 5/20/17

State: IL | County: Williamson | Township:

Quad: Johnston City | Lat/UTM: 37° 50' 54.0" N | Long/UTM: 88°56' 14.2" W | Datum: NAD 27

Identifier: B. Cooper | Tech(s): M. Gillian | Bat activity time: 20:26

Site Description: Access road with forested field edges

Dominant Tree Species: Oak, hickory

Other Wildlife Observed: Gray treefrog, Cricket frog, turkey | Whip-Poor-Wills: 0

Comments: Netting suspended 01:00-02:00 to confirm Indiana bat at site 06 and start telemetry

Sunrise: 05:42 | Sunset: 20:02 | Moonrise: 02:33 | Moonset: 14:17 | Illumination: 30%

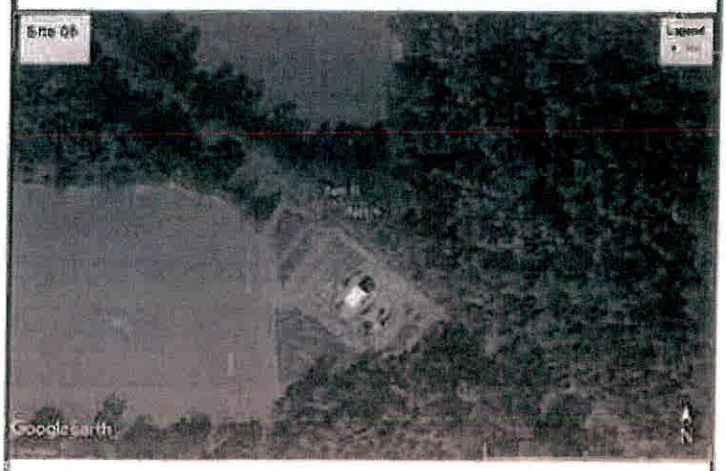
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	18	x	7.8	37° 50' 54.0" N	88°56' 14.2" W	Corridor
B	Mist Net	9	x	7.8	37° 50' 54.2" N	88° 56' 15.6" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	19.8 °	15	1-4
21:10	19.2 °	15	1-4
22:10	18.8 °	20	1-4
23:10	18.6 °	20	0
00:10	17.5 °	10	0
01:10	16.8 °	0	0
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 05 | **Night:** 01 | **Date:** 5/20/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:30	Eastern Red bat	A	F	PG	13.6	41.0	12	B	0		
2	00:10	Eastern Red bat	A	F	PG	13.2	39.0	15	A	0		
3	02:15	Eastern Red bat	A	M	NR			5	A	UNK		Escape
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 05 Night: 02 Date: 5/21/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37° 50' 54.0" N Long/UTM: 88°56' 14.2" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian **Bat activity** time: 20:31

Site Description: Access road with forested field edges

Dominant Tree Species: Oak, hickory

Other Wildlife Observed: Gray treefrog, Cricket frog, turkey Whip-Poor-Wills: 0

Comments:

Sunrise: 05:41 Sunset: 20:03 Moonrise: 03:07 Moonset: 15:22 Illumination: 20%

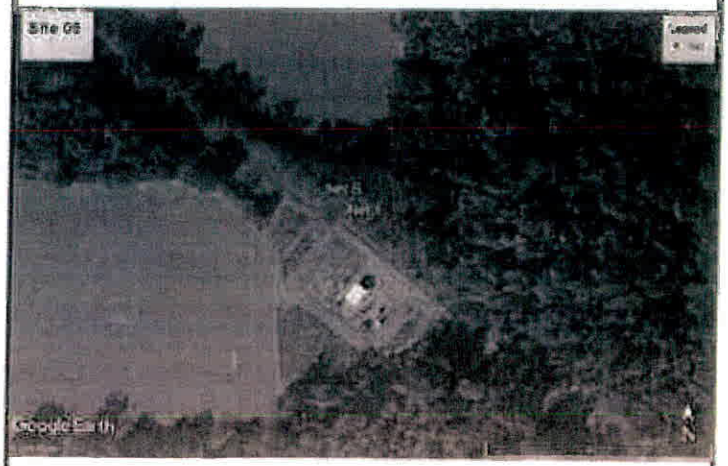
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	18	x	7.8	37° 50' 54.0" N	88°56' 14.2" W	Corridor
B	Mist Net	9	x	7.8	37° 50' 54.2" N	88° 56' 15.6" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	16.1 °	15	1-4
21:10	13.7 °	0	0
22:10	13.2 °	0	0
23:10	11.4 °	0	0
00:10	10.8 °	0	1-4
01:10	10.5 °	0	0
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line						Site #: 05			Night: 02		Date: 5/21/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:50	Eastern Red bat	A	M	NR	10.1	38.5	4	A	0		
2	21:05	Eastern Red bat	A	F	PG	16.7	40.0	10	A	0		
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 06 Night: 01 Date: 5/20/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 51'12.8" Long/UTM: 88 56'43.4" Datum: NAD 27

Identifier: Braden Hoffman Tech(s): PFO Bat activity time: 20:08

Site Description: existing gas line

Dominant Tree Species: red maple, black walnut

Other Wildlife Observed: Whip-Poor-Wills: 0

Comments:

Sunrise: 05:42 Sunset: 20:02 Moonrise: 02:33 Moonset: 14:01 Illumination: 45%

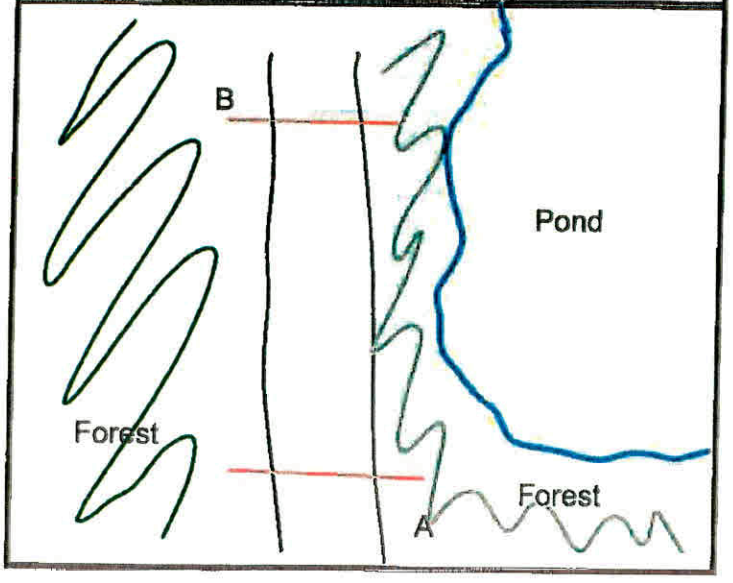
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:50

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37 51 12.8	88 56 43.4	Corridor
B	Mist Net	12	x	7.8	37 51 10.5	88 56 40.5	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	24.0 °	30	1-4
22:10	21.0 °	20	1-4
23:30	19.0 °	40	0
01:50	18.6 °	10	0
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 06 | **Night:** 01 | **Date:** 5/20/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht In Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	21:15	Eastern Red bat	A	F	PG	14.2	40.1	15	A	0	n/a	
2	00:15	Indiana bat	A	F	PG	8.1	36.5	10	B	1	a0015	151.046
3	01:06	Little Brown bat	A	F	PG	12.1	39.2	12	A	0		
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm **Height in Net=Feet**

Bat Survey Data Form

Project: Mach Water Line Site #: 06 Night: 02 Date: 5/21/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 51' 12.8" Long/UTM: 88 56' 43.4" Datum: NAD 27

Identifier: Braden Hoffman Tech(s): PFO Bat activity time: 20:10

Site Description: existing gas line

Dominant Tree Species: red maple,walnut

Other Wildlife Observed: Whip-Poor-Wills: 0

Comments: Gas line. Net B is approx 50yrds from I-57

Sunrise: 05:41 Sunset: 20:03 Moonrise: 03:07 Moonset: 15:22 Illumination: 30%

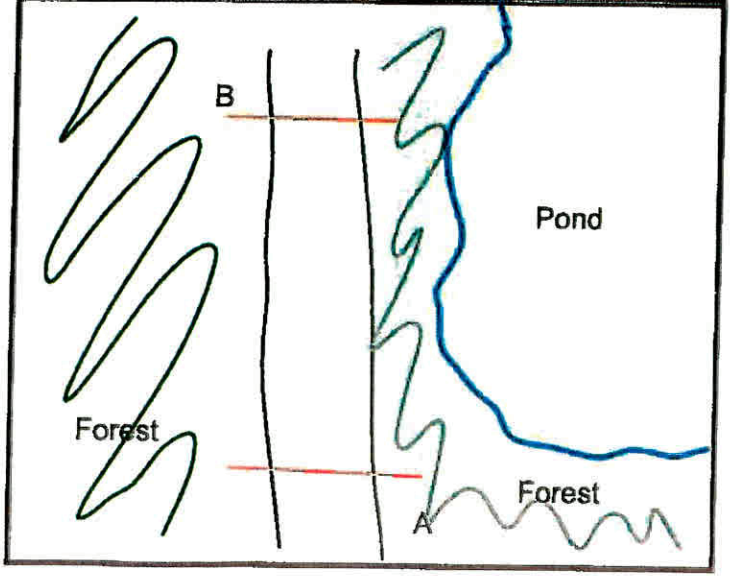
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:15

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37 51 12.8	88 56 43.4	Corridor
B	Mist Net	12	x	7.8	37 51 10.5	88 56 40.5	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	17.0 °	30	0
22:10	14.5 °	0	0
23:30	12.2 °	0	0
00:06	12.2 °	0	0
01:00	11.6 °	0	0
01:15	11.5 °	15	0
	°		

Site Drawing/Imagery



Bat Survey Data Form

	Project: Mach Water Line						Site #: 06		Night: 02		Date: 5/21/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:35	Eastern Red bat	UNK	UNK	UNK			16	A	0		escaped during net lowering
2	00:35	Eastern Red bat	A	F	PG	14.2	40.0	15	A	0		
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
7												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 06 Night: 03 Date: 5/22/17

State: IL County: Williamson Township:

Quad: Johnston City Lat/UTM: 37 51' 12.8" Long/UTM: 88 56' 43.4" Datum: NAD 27

Identifier: Braden Hoffman Tech(s): PFO Bat activity time: 20:20

Site Description: existing gas line

Dominant Tree Species: Red maple, black walnut

Other Wildlife Observed: Whip-Poor-Wills: 0

Comments:

Sunrise: 05:40 Sunset: 20:04 Moonrise: 03:43 Moonset: 16:30 Illumination: 15%

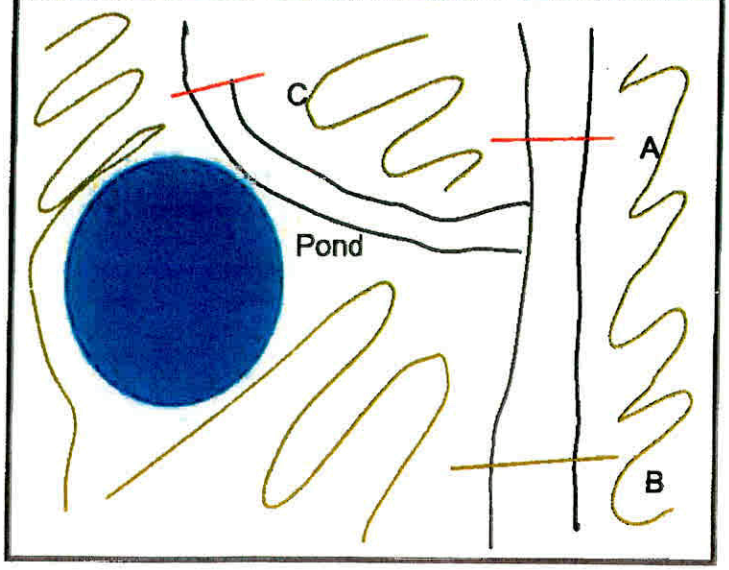
Nets/Traps/Detectors | **Time Open:** 20:20 | **Time Closed:** 01:20

Name	Type	L(m) x H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9 x 7.8	37 51 12.8	88 56 43.4	Corridor
B	Mist Net	12 x 7.8	37 51 10.2	88 56 40.5	Corridor
C	Mist Net	6 x 2.6	37 51 07.8	88 56 45.4	Corridor
		x			
		x			

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:20	16.1 °	0	0
22:30	14.0 °	0	0
00:10	12.7 °	30	1-4
01:20	13.3 °	70	1-4
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 06 | **Night:** 03 | **Date:** 5/22/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	23:05	Eastern Red bat	A	M	NR	11.0	40.0	12	A	0	n/a	
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments: Net C added along pond before night 3 netting began.

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 10 Night: 01 Date: 5/22/17

State: IL County: Franklin Township:

Quad: West Frankfort Lat/UTM: 37° 52' 30.7" N Long/UTM: 88° 58' 32.5" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian Bat activity time: 20:45

Site Description: Old rail bed through forest near ag field, PFO within woodlot

Dominant Tree Species: Oak, cherry, elm

Other Wildlife Observed: Cricket frog Whip-Poor-Wills:

Comments:

Sunrise: 05:40 Sunset: 20:05 Moonrise: 03:43 Moonset: 04:29 Illumination: 10%

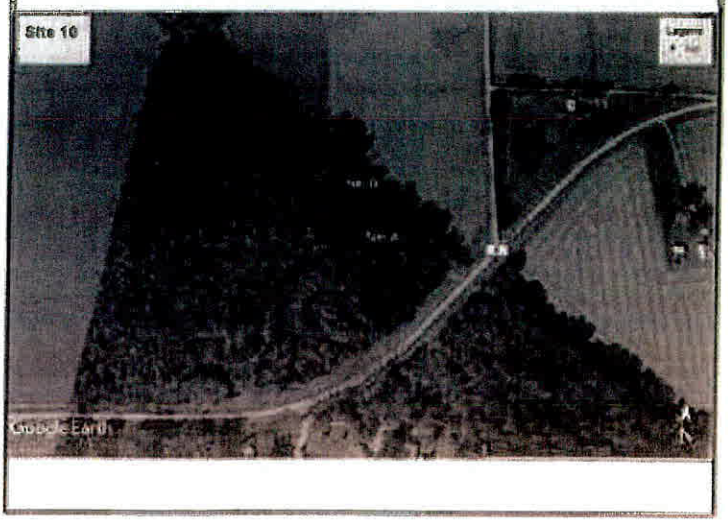
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	12	x	7.8	37° 52' 30.7" N	88° 58' 32.5" W	Corridor
B	Mist Net	12	x	7.8	37° 52' 32.3" N	88° 58' 34.9" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	20.8 °	10	0
21:10	16.1 °	10	0
22:10	14.3 °	0	0
23:10	13.2 °	0	0
00:10	13.3 °	50	0
01:10	13.7 °	70	0
	°		

Site Drawing/Imagery



Bat Survey Data Form

	Project: Mach Water Line						Site #: 10			Night: 01		Date: 5/22/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:45	Eastern Red bat	A	F	PG	14.9	39.0	12	A	0		
2	20:45	Eastern Red bat	A	M	NR	10.8	38.0	12	A	0		
3	21:00	Eastern Red bat	UNK	UNK	UNK			20	A	UNK		Escape
4	21:30	Eastern Red bat	A	F	PG	17.3	42.0	20	B	0		Big bat
5	22:00	Eastern Red bat	A	F	PG	15.9	41.0	20	A	0		
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 10 Night: 02 Date: 5/23/17

State: IL County: Franklin Township:

Quad: West Frankfort Lat/UTM: 37° 52' 30.7" N Long/UTM: 88° 58' 32.5" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian Bat activity time: 20:45

Site Description: Old rail bed through forest near ag field, PFO within woodlot

Dominant Tree Species: Oak, cherry, elm

Other Wildlife Observed: Cricket frog, indigo bunting Whip-Poor-Wills:

Comments:

Sunrise: 05:39 Sunset: 20:05 Moonrise: 04:21 Moonset: 17:39 Illumination: 5%

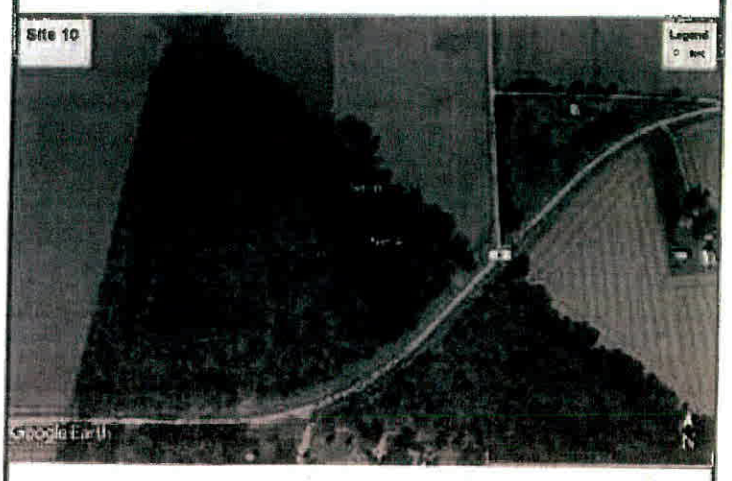
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	12	x	7.8	37° 52' 30.7" N	88° 58' 32.5" W	Corridor
B	Mist Net	12	x	7.8	37° 52' 32.3" N	88° 58' 34.9" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:10	17.9 °	50	1-4
21:10	16.1 °	70	1-4
22:10	15.9 °	90	1-4
23:10	15.1 °	90	1-4
00:10	14.3 °	100	1-4
01:10	14.1 °	100	1-4

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 10 | **Night:** 02 | **Date:** 5/23/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	21:00	Eastern Red bat	A	M	NR	10.7	38.0	22	B	0		
2	23:00	Eastern Red bat	A	F	PG	14.4	42.0	12	A	0		
3	21:00	Eastern Red bat	A	F	PG	15.7	43.0	16	A	0		
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 11 Night: 01 Date: 5/22/17

State: IL County: Franklin Township:

Quad: Christopher Lat/UTM: 37°52'36.1" Long/UTM: 89°00'20.4" Datum: NAD 27

Identifier: B. Cooper Tech(s): Alex Patterson, Tim Wilson Bat activity time: 20:30

Site Description: Powerline ROW with ATV trails branching off and a field at the end.

Dominant Tree Species: Oak,shagbark hickory

Other Wildlife Observed: Vulture, squirrel, deer Whip-Poor-Wills: 0

Comments:

Sunrise: 05:40 Sunset: 20:04 Moonrise: 03:43 Moonset: 16:30 Illumination: 20%

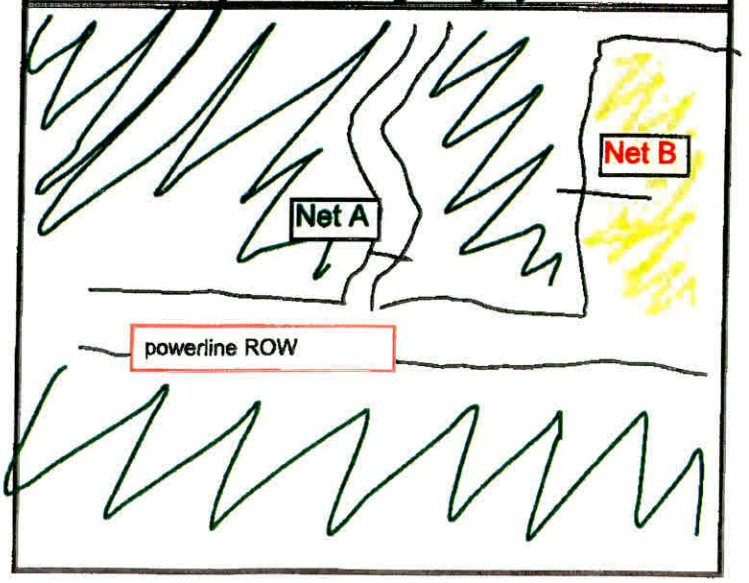
Nets/Traps/Detectors | **Time Open:** 20:15 | **Time Closed:** 01:15

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	12	x	7.8	37°52'35.3"	89°00'21.6"	Corridor
B	Mist Net	9	x	7.8	37°52'35.6"	89°00'17.7"	Forest
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:15	17.2 °	0	0
22:15	15.4 °	0	0
01:15	15.4 °	0	0
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 11 | **Night:** 01 | **Date:** 5/22/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 11 Night: 02 Date: 5/23/17

State: IL County: Franklin Township:

Quad: Christopher Lat/UTM: 37°52'36.1" Long/UTM: 89°00'20.4" Datum: NAD 27

Identifier: B. Cooper Tech(s): Alex Patterson, Tim Wilson Bat activity time:

Site Description: Powerline ROW with ATV trails branching off and a field at the end.

Dominant Tree Species: Oak,shagbark hickory

Other Wildlife Observed: Vulture, squirrel, deer Whip-Poor-Wills: 0

Comments:

Sunrise: 05:40 Sunset: 20:05 Moonrise: 04:21 Moonset: 17:40 Illumination: 15%

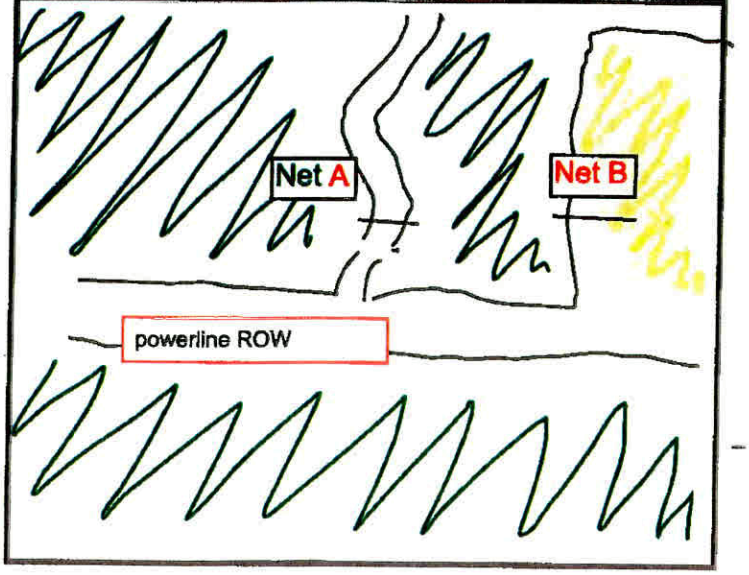
Nets/Traps/Detectors | **Time Open:** 20:10 | **Time Closed:** 01:10

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	12	x	7.8	37°52'35.3"	89°00'21.6"	Corridor
B	Mist Net	9	x	7.8	37°52'35.6"	89°00'17.7"	Forest
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:15	17.7 °	95	1-4
22:15	15.5 °	95	1-4
01:10	14.4 °	70	1-4
	°		
	°		
	°		
	°		

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line						Site #: 11			Night: 02		Date: 5/23/17
	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 12 Night: 01 Date: 5/24/17

State: IL County: Franklin Township:

Quad: Christopher Lat/UTM: 37° 52' 33.7" N Long/UTM: 89° 01' 48.9" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian Bat activity time: 20:30

Site Description: ATV trails through riparian forest between Big Muddy Creek and ag field

Dominant Tree Species: Oak, hickory

Other Wildlife Observed: Deer, coyotes Whip-Poor-Wills: 0

Comments:

Sunrise: 05:39 Sunset: 20:06 Moonrise: 05:01 Moonset: 18:52 Illumination: 0%

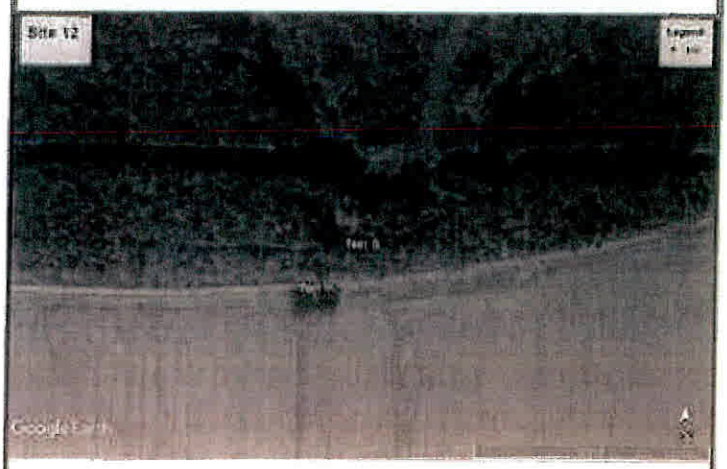
Nets/Traps/Detectors | **Time Open:** 20:15 | **Time Closed:** 01:15

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37° 52' 33.7" N	89° 01' 48.9" W	Corridor
B	Mist Net	9	x	7.8	37° 52' 34.4" N	89° 01' 47.0" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:15	15.5 °	60	1-4
21:15	14.4 °	100	0
22:15	13.3 °	100	0
23:15	13.7 °	50	0
00:15	13.2 °	30	0
01:15	13.4 °	70	1-4

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 12 | **Night:** 01 | **Date:** 5/24/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht in Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:30	Eastern Red bat	A	UNK	UNK			13	B	UNK		Escape
2	20:30	Eastern Red bat	A	F	PG	12.3	41.0	12	B	1		
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

Bat Survey Data Form

Project: Mach Water Line Site #: 12 Night: 02 Date: 5/25/17

State: IL County: Franklin Township:

Quad: Christopher Lat/UTM: 37° 52' 33.7" N Long/UTM: 89° 01' 48.9" W Datum: NAD 27

Identifier: B. Cooper Tech(s): M. Gillian Bat activity time: 20:30

Site Description: ATV trails through riparian forest between Big Muddy Creek and ag field

Dominant Tree Species: Oak, hickory

Other Wildlife Observed: Deer, opossum Whip-Poor-Wills: 0

Comments:

Sunrise: 05:38 Sunset: 20:06 Moonrise: 05:46 Moonset: 21:06 Illumination: 0%

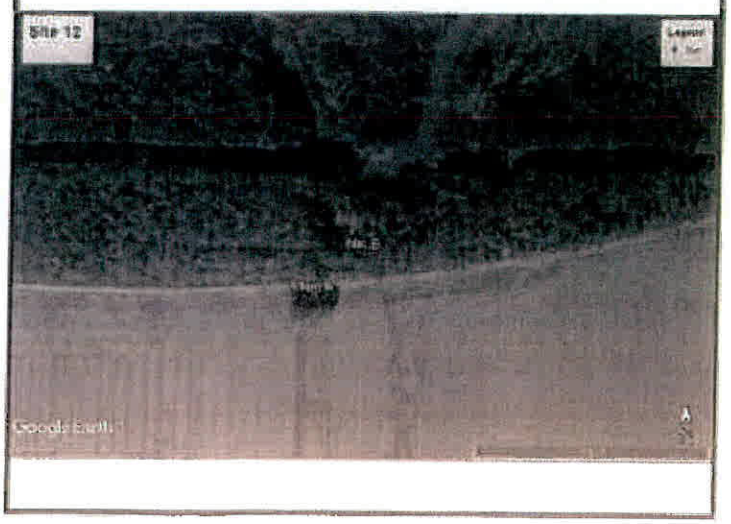
Nets/Traps/Detectors | **Time Open:** 20:15 | **Time Closed:** 01:15

Name	Type	L(m)	x	H(m)	Lat/UTM	Long/UTM	Habitat
A	Mist Net	9	x	7.8	37° 52' 33.7" N	89° 01' 48.9" W	Corridor
B	Mist Net	9	x	7.8	37° 52' 34.4" N	89° 01' 47.0" W	Corridor
			x				
			x				
			x				

Weather

Time	Temp(C)	% Cloud	Wind (mph)
20:15	20.7 °	5	1-4
21:15	16.8 °	0	1-4
22:15	16.7 °	0	1-4
23:15	14.5 °	0	0
00:15	13.9 °	0	0
01:15	13.2 °	0	0

Site Drawing/Imagery



Bat Survey Data Form

Project: Mach Water Line | **Site #:** 12 | **Night:** 02 | **Date:** 5/25/17

	Time	Species of Bat	Age	Sex	Rep	Wt (g)	RFA (mm)	Ht In Net	Net	WNS	Band #	Comments: Transmitter/Parasite/Photo
1	20:45	Eastern Red bat	A	M	NR	8.6	36.0	12	B	1		
2	20:45	Eastern Red bat	A	M	NR	9.3	37.0	12	B	0		
3	21:00	Eastern Red bat	A	M	NR	9.2	36.0	8	A	0		
4	23:00	Eastern Red bat	A	M	NR			15	B	1		Escape from bag
5	00:15	Eastern Red bat	A	M	NR	8.5	37.0	20	B	1		
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Additional Notes/Comments:

Age=A,J Sex=M,F Rep=NR, SCR, PG, LAC, PL RFA=Right Forearm Height in Net=Feet

APPENDIX D
PHASE 4 RADIO-TRACKING

USFWS INDIANA BAT ROOST DATASHEET

Biologists (Full Name): Alex Patterson **Date:** 5/28/17

UTM: Zone____ **Easting**____ **Northing**____ ***OR***

LAT 37° 52' 58.415" **LONG** -88° 56' 20.63"

Property Owner:____ **Phone#**____

State Illinois **County** Franklin **Site #** 06

Roost # 01 **Roost Name:** Bat 151, 646 Roost 01

Roost Tree Data

Species: Ulmus americana **Live**__ **Snag** X **Other**__

(if other, explain)____

DBH (in or cm) 9 in **Total Height (ft or m)** 25 Ft

Height of roost area (if known)____ **Dist. from capture site** ≈ 2 miles

Roost position aspect (deg)____

Exfoliating bark on bole (%) 40% **Describe: sloughing** X **platy**__ **tight**__

Cavities present? ____ **If so, describe:**____

Roost Decay State: 1 2 3 (4) 5 6 7 8 9 Other



APPENDIX D
PHASE 4 RADIO-TRACKING

Roost tree or snag canopy position: Dominant X Co-Dominant __ Suppressed __

Surrounding Habitat Condition

Canopy closure at roost (%) 0%

Approximate woodlot size (ac or ha) 0% **Distance to non-forest (ft or m)** 0Ft

Describe forest/woodlot current condition (mature, partially cut-over, burned, insect damage, etc.)
The roost tree was in a swamp with no canopy cover.

Additional Comments

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

USFWS BAT EMERGENCE SURVEY DATASHEET

Date: 5/28/17 **Surveyor(s) Full Name:** Alex Patterson
State: IL **County:** Franklin **Project Name:** Mach Water Line
Site Name/#: 06 **Roost Name/#** Roost 01 **Bat #:** 01
Lat/Long or UTM of Roost: 37°52'58.415", -88°56'20.613"
Description of Roost/Habitat Feature Surveyed: Roost was a 25Ft tall American elm in a wood with no canopy cover.
Bat Species Known to be using this Roost/Feature (if not known, leave blank): Myotis sodalis
Other Suspected Bat Species (explain):
Weather Conditions during Survey (temperature, precipitation, wind speed): warm, dry
Survey Start Time: 19:05 **Time of Sunset:** 20:05 **Survey End Time:** 21:05

NOTE: Emergence surveys should begin ½ hour before sunset and continue for a minimum of 1 hour or until it is otherwise too dark to see emerging bats. The surveyor(s) should position him or herself so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. Please ensure that surveyor(s) are close enough to the roost to observe all exiting/returning bats, but not close enough to influence emergence (i.e., do not stand directly beneath the roost and do not make unnecessary noise and/or conversation, and minimize use of lights other than a small flashlight to record data, if necessary). Do not shine a light on the roost tree crevice/cave/mine entrance itself as this may prevent or delay bats from emerging. If available, use of an infra-red, night vision, or thermal-imaging video camera or spotting scope and an ultrasonic bat detector are strongly recommended but not required.

Time	Number of Bats Leaving Roost*	Comments / Notes
20:32	1	bat 151.046

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

Site Name/#: 06 **Roost Name/#:** Bat ES1.646 Roost 01

Time	Number of Bats Leaving Roost*	Comments / Notes
Total Number of Bats Observed Emerging from the Roost/Feature During the Survey:	1	

* If any bats return to the roost during the survey, then they should be subtracted from the tally.

Describe Emergence: Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. If a radio-tagged bat was roosting in the tree, at what time did it emerge?

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

USFWS BAT EMERGENCE SURVEY DATASHEET

Date: 5/24/17 **Surveyor(s) Full Name:** Alex Patterson
State: IL **County:** Franklin **Project Name:** Mach Hunter Line
Site Name/#: 06 **Roost Name/#** Bat 157.046 Roost 01 **Bat #:** 151.046
Lat/Long or UTM of Roost: 37°52'58.415" - 88°56'20.613"
Description of Roost/Habitat Feature Surveyed: Roost was a 25 Ft tall American elm in a swamp with an canopy cover.
Bat Species Known to be using this Roost/Feature (if not known, leave blank):
Myotis sodalis
Other Suspected Bat Species (explain):
Weather Conditions during Survey (temperature, precipitation, wind speed):
warm end day
Survey Start Time: 19:05 **Time of Sunset:** 20:05 **Survey End Time:** 21:05

NOTE: Emergence surveys should begin ½ hour before sunset and continue for a minimum of 1 hour or until it is otherwise too dark to see emerging bats. The surveyor(s) should position him or herself so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. Please ensure that surveyor(s) are close enough to the roost to observe all exiting/returning bats, but not close enough to influence emergence (i.e., do not stand directly beneath the roost and do not make unnecessary noise and/or conversation, and minimize use of lights other than a small flashlight to record data, if necessary). Do not shine a light on the roost tree crevice/cave/mine entrance itself as this may prevent or delay bats from emerging. If available, use of an infra-red, night vision, or thermal-imaging video camera or spotting scope and an ultrasonic bat detector are strongly recommended but not required.

Time	Number of Bats Leaving Roost*	Comments / Notes

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

Site Name/#: 06 **Roost Name/#:** Bat 651.046 Roost 01

Time	Number of Bats Leaving Roost*	Comments / Notes
Total Number of Bats Observed Emerging from the Roost/Feature During the Survey:	0	

* If any bats return to the roost during the survey, then they should be subtracted from the tally.

Describe Emergence: Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. If a radio-tagged bat was roosting in the tree, at what time did it emerge?

The bat was not in the tree

APPENDIX D
PHASE 4 RADIO-TRACKING

USFWS INDIANA BAT ROOST DATASHEET

Biologists (Full Name): Alex Patterson **Date:** 5/30/17

UTM: Zone_____ **Easting** _____ **Northing**_____ ***OR***

LAT 37°53'3.385" **LONG** -88°56'7.921"

Property Owner:_____ **Phone#**_____

State Illinois **County** Franklin **Site #** 06

Roost # 02 **Roost Name:** Bat 151,646 Roost 02

Roost Tree Data

Species: Acer rubrum **Live**__ **Snag** X **Other**__

(if other, explain) _____

DBH (in or cm) 10 in **Total Height (ft or m)** 30ft

Height of roost area (if known)_____ **Dist. from capture site** ≈ 2 miles

Roost position aspect (deg)_____

Exfoliating bark on bole (%) 30 **Describe: sloughing** X **platy**__ **tight**__

Cavities present? ____ **If so, describe:**_____

Roost Decay State: 1 2 3 (4) 5 6 7 8 9 Other



APPENDIX D
PHASE 4 RADIO-TRACKING

Roost tree or snag canopy position: Dominant __ Co-Dominant __ Suppressed X

Surrounding Habitat Condition

Canopy closure at roost (%) 20%

Approximate woodlot size (ac or ha) 30 acres **Distance to non-forest (ft or m)** 100 Ft

Describe forest/woodlot current condition (mature, partially cut-over, burned, insect damage, etc.)
The woodlot was in a swamp, causing many trees to be dead or declining.

Additional Comments

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

USFWS BAT EMERGENCE SURVEY DATASHEET

Date: 5/30/17 **Surveyor(s) Full Name:** Alex Patterson
State: IL **County:** Franklin **Project Name:** Marsh Water Line
Site Name/#: 06 **Roost Name/#** Bat 151.046 Roost 02 **Bat #:** 151.046
Lat/Long or UTM of Roost: 37°53'3.389" , -88°56'7.921"
Description of Roost/Habitat Feature Surveyed: Roost 02 was in a swamp and was a 30 Ft ht red maple.
Bat Species Known to be using this Roost/Feature (if not known, leave blank): Myotis sodalis
Other Suspected Bat Species (explain):
Weather Conditions during Survey (temperature, precipitation, wind speed): Warm and dry
Survey Start Time: 19:05 **Time of Sunset:** 20:05 **Survey End Time:** 21:05

NOTE: Emergence surveys should begin ½ hour before sunset and continue for a minimum of 1 hour or until it is otherwise too dark to see emerging bats. The surveyor(s) should position him or herself so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. Please ensure that surveyor(s) are close enough to the roost to observe all exiting/returning bats, but not close enough to influence emergence (i.e., do not stand directly beneath the roost and do not make unnecessary noise and/or conversation, and minimize use of lights other than a small flashlight to record data, if necessary). Do not shine a light on the roost tree crevice/cave/mine entrance itself as this may prevent or delay bats from emerging. If available, use of an infra-red, night vision, or thermal-imaging video camera or spotting scope and an ultrasonic bat detector are strongly recommended but not required.

Time	Number of Bats Leaving Roost*	Comments / Notes
20:25	1	
20:30	1	Bat 151.046

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

Site Name/#: 06 **Roost Name/#:** Lee Bat ISL 046 Roost 07

Time	Number of Bats Leaving Roost*	Comments / Notes
Total Number of Bats Observed Emerging from the Roost/Feature During the Survey:	2	

* If any bats return to the roost during the survey, then they should be subtracted from the tally.

Describe Emergence: Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. If a radio-tagged bat was roosting in the tree, at what time did it emerge?

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

USFWS BAT EMERGENCE SURVEY DATASHEET

Date: 5/31/17 **Surveyor(s) Full Name:** Alex Patterson
State: IL **County:** Franklin **Project Name:** Marsh Water Line
Site Name/#: B6 **Roost Name/#** Bat 151.046 Roost 02 **Bat #:** 151.046
Lat/Long or UTM of Roost: 37° 53' 3.389" -88° 56' 7.921"
Description of Roost/Habitat Feature Surveyed: The roost is a 30 Ft tall red maple.
Bat Species Known to be using this Roost/Feature (if not known, leave blank): Myotis sodalis
Other Suspected Bat Species (explain):
Weather Conditions during Survey (temperature, precipitation, wind speed): warm and dry
Survey Start Time: 19:10 **Time of Sunset:** 20:05 **Survey End Time:** 21:00

NOTE: Emergence surveys should begin ½ hour before sunset and continue for a minimum of 1 hour or until it is otherwise too dark to see emerging bats. The surveyor(s) should position him or herself so that emerging bats will be silhouetted against the sky as they exit the roost. Tallies of emerging bats should be recorded every few minutes or as natural breaks in bat activity allow. Please ensure that surveyor(s) are close enough to the roost to observe all exiting/returning bats, but not close enough to influence emergence (i.e., do not stand directly beneath the roost and do not make unnecessary noise and/or conversation, and minimize use of lights other than a small flashlight to record data, if necessary). Do not shine a light on the roost tree crevice/cave/mine entrance itself as this may prevent or delay bats from emerging. If available, use of an infra-red, night vision, or thermal-imaging video camera or spotting scope and an ultrasonic bat detector are strongly recommended but not required.

Time	Number of Bats Leaving Roost*	Comments / Notes
20:23	2	
20:30	1	Bat 151.046

APPENDIX E
PHASE 4 EMERGENCE SURVEYS

Site Name/#: 06 **Roost Name/#:** Bat ISL 046 Roost 07

Time	Number of Bats Leaving Roost*	Comments / Notes
Total Number of Bats Observed Emerging from the Roost/Feature During the Survey:	3	

* If any bats return to the roost during the survey, then they should be subtracted from the tally.

Describe Emergence: Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. If a radio-tagged bat was roosting in the tree, at what time did it emerge?

APPENDIX D

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE PROJECT AREA

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 01, Net A



Site 01, Net B

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 02, Net A



Site 02, Net B

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 03, Net A



Site 03, Net B

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 04, Net A



Site 04, Net B

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 05, Net A



Site 05, Net B

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 06, Net A



Site 06, Net B

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 06, Net C



Site 10, Net A

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 10, Net B



Site 11, Net A

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 11, Net B



Site 12, Net A

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Site 12, Net B



Eastern Red Bat (*Lasiurus borealis*)

Project No. B16-454-1413

PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Little Brown Bat (*Myotis lucifugus*)



Indiana Bat (*Myotis sodalis*)

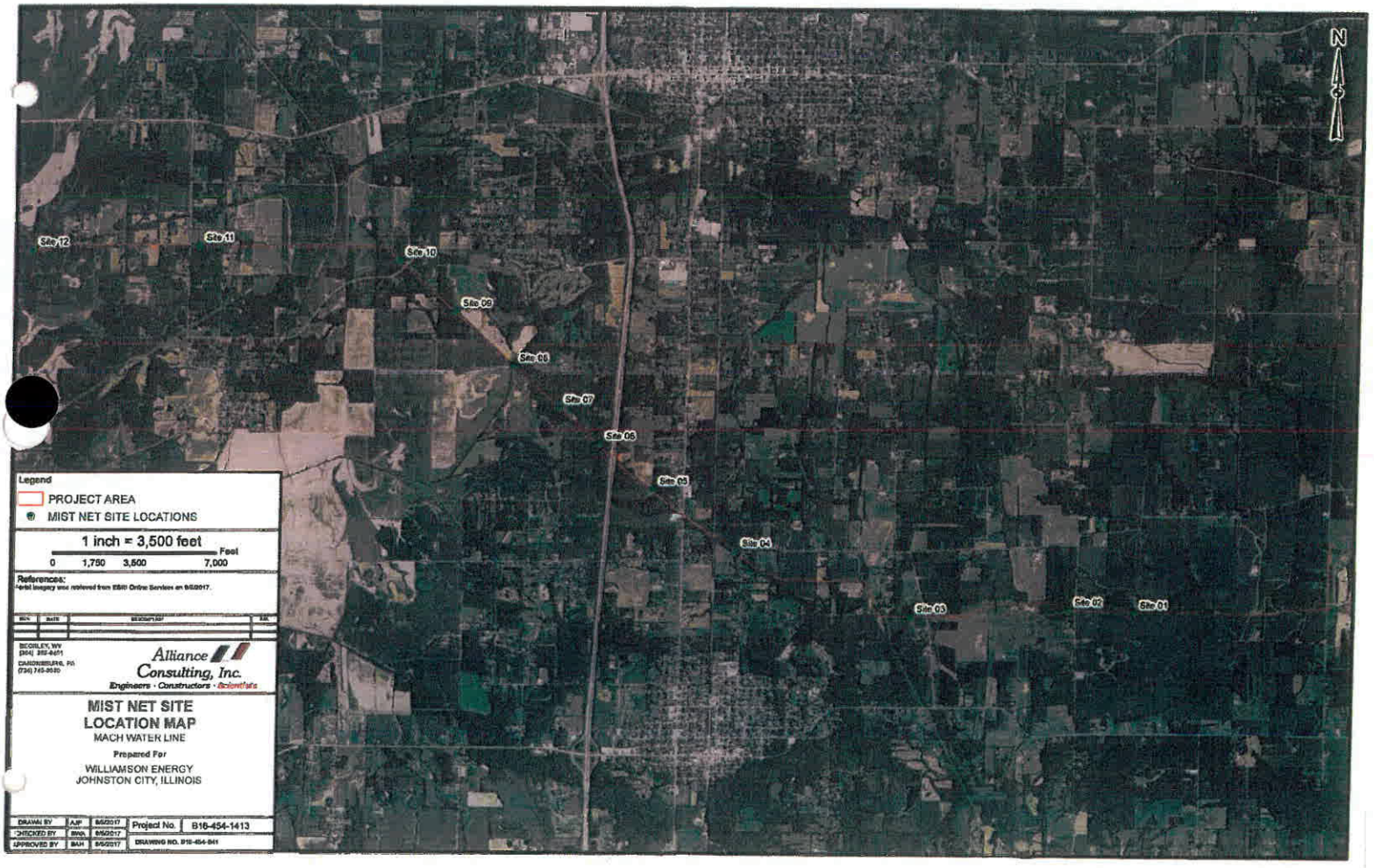
Project No. B16-454-1413

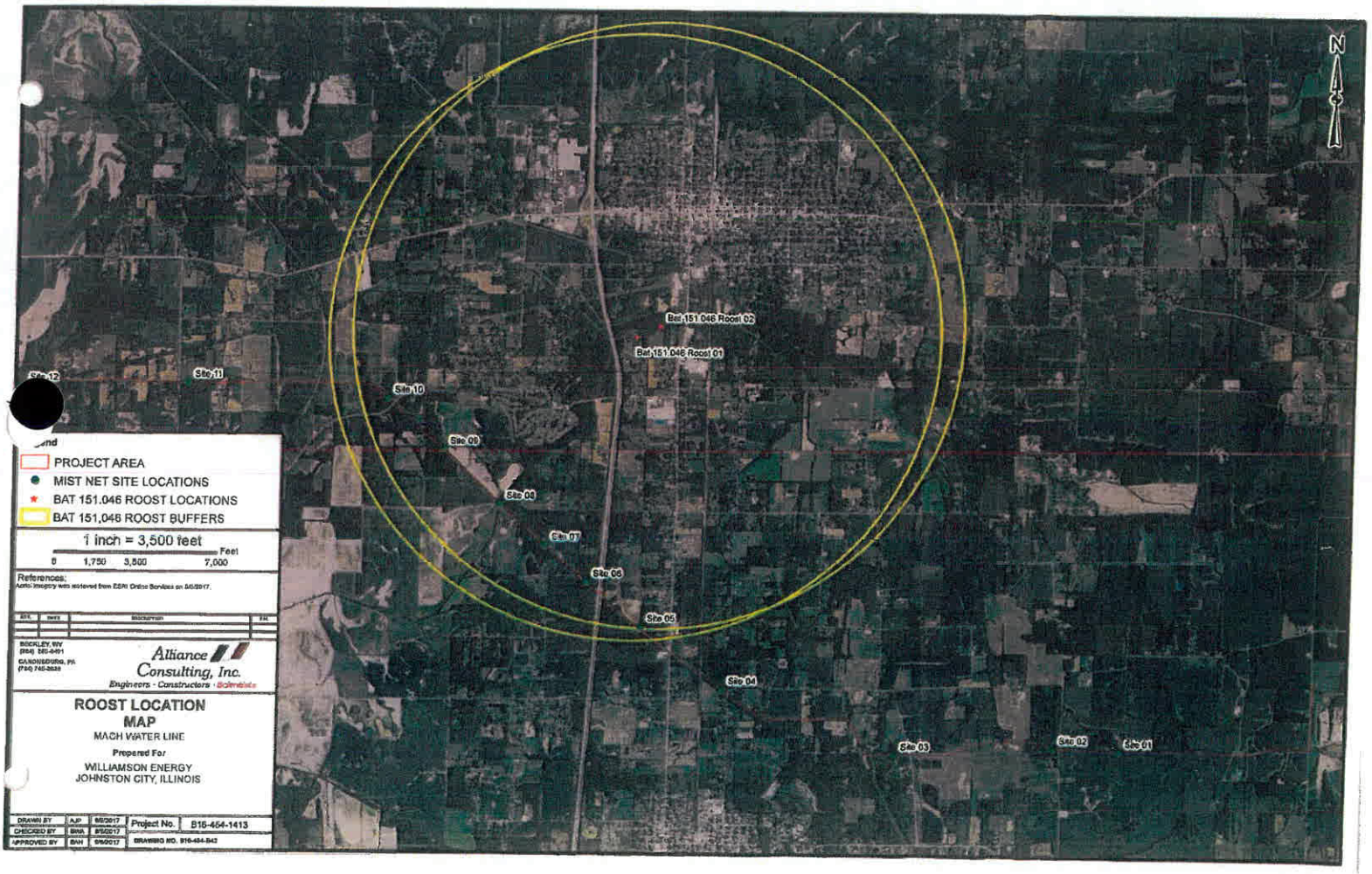
PHOTOGRAPHS OF MIST NET SITES AND REPRESENTATIVE BAT SPECIES CAPTURED WITHIN THE MACH WATER LINE STUDY AREA



Indiana Bat (*Myotis sodalis*)

FIGURES


N
Site 12
Site 11
Site 10
Site 09
Site 08
Site 07
Site 06
Site 05
Site 04
Site 03
Site 02
Site 01
Legend
PROJECT AREA
MIST NET SITE LOCATIONS
1 inch = 3,500 feet
Feet
0
1,750
3,500
7,000
References:
Aerial imagery was retrieved from ESRI Online Services on 9/5/2017.
BECKLEY, WV
(304) 252-8411
CANONSBURG, PA
(724) 745-0530
Alliance Consulting, Inc.
Engineers · Constructors · Scientists
MIST NET SITE
LOCATION MAP
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY
AJP
9/5/2017
CHECKED BY
BNG
9/5/2017
APPROVED BY
BAH
9/5/2017
Project No.
B16-454-1413
DRAWING NO. B16-454-041


N
Bat 151.046 Roost 02
Bat 151.046 Roost 01
Site 12
Site 11
Site 10
Site 09
Site 08
Site 07
Site 06
Site 05
Site 04
Site 03
Site 02
Site 01
PROJECT AREA
MIST NET SITE LOCATIONS
BAT 151.046 ROOST LOCATIONS
BAT 151.046 ROOST BUFFERS
1 inch = 3,500 feet
Feet
0
1,750
3,500
7,000
References:
Aerial imagery was retrieved from ESRI Online Services on 5/5/2017.
Alliance Consulting, Inc.
Engineers - Constructors - Surveyors
ROOST LOCATION MAP
MACH WATER LINE
Prepared For
WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS
DRAWN BY AJP 5/5/2017
CHECKED BY BWA 5/5/2017
APPROVED BY BAH 5/5/2017
Project No. B16-464-1413
DRAWING NO. B16-464-B42

R07884

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

0192-10

State of Illinois
Department of Natural Resources
Office of Mines and Minerals; Land Reclamation Division
One Natural Way
Springfield, IL 62702

PERMIT APPLICATION 456
WATER MANAGEMENT FACILITY

VOLUME II OF II: MAPS

POND CREEK MINE NO. 1
WILLIAMSON COUNTY, IL

Prepared for
WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B17-222-1413
MAY 2017
Re-Submitted July 2018

RECEIVED
JUL 18 2018
IL Environmental Protection Agency
MARION REGIONAL OFFICE

Beckley, WV
Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA
3 Four Coins Drive, Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

State of Illinois
Department of Natural Resources
Office of Mines and Minerals; Land Reclamation Division
One Natural Way
Springfield, IL 62702

PERMIT APPLICATION 456
WATER MANAGEMENT FACILITY

VOLUME II OF II: MAPS

POND CREEK MINE NO. 1
WILLIAMSON COUNTY, IL

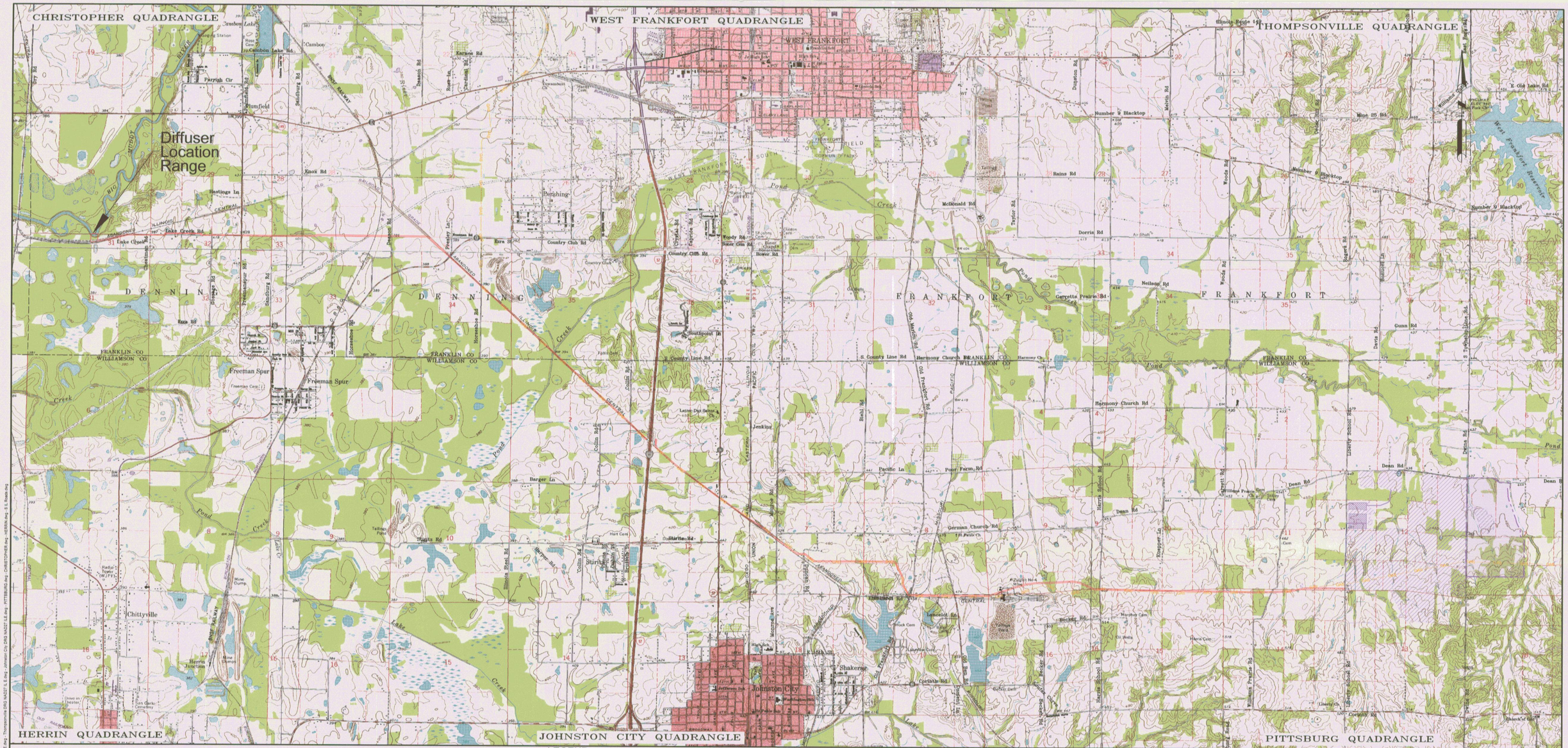
Prepared for
WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B17-222-1413
MAY 2017
Re-Submitted July 2018

WATER MANAGEMENT PIPELINE
WILLIAMSON ENERGY, LLC – POND CREEK MINE NO. 1

DRAWING INDEX

DRAWING NO.	MAP TITLE
17222E1	General Location Map
17222M1-M4	ID of Interest - Sheets 1 - 4
17222M5-M8	Pre-Mining Land Use - Sheets 1 - 4
17222M9-M12	Soils Map - Sheets 1 - 4
17222E2	Cumulative Impact Area Map
17222M13-M16	Hydrology - Mining Operations Map - Sheets 1 - 4
17222E3	Water Management Pipeline Details



R07887

LEGEND

- PERMIT 375 PERMIT BOUNDARY
- PERMIT 375 IBR PERMIT BOUNDARY
- PERMIT 417 PERMIT BOUNDARY
- PROPOSED PERMIT BOUNDARY

ROAD CLASSIFICATION

- HEAVY DUTY
- MEDIUM DUTY
- LIGHT DUTY
- UNIMPROVED DIRT
- HIGHWAY w/ MEDIAN STRIP
- OVERPASS/UNDERPASS
- INTERSTATE ROUTE
- STATE ROUTE

BOUNDARIES

- COUNTY LINE
- TOWNSHIP BOUNDARY
- INCORPORATED CITY BOUNDARY

BUILDINGS AND RELATED FEATURES

- BUILDING
- ABANDONED STRUCTURE
- CHURCH; HOUSE OF WORSHIP
- CEMETERY
- SCHOOL
- GAS LINE

CONTOURS

- INDEX CONTOURS
- INTERMEDIATE CONTOURS

PUBLIC LAND SURVEY SYSTEM

- RANGE / TOWNSHIP LINE / SECTION
- APPROXIMATE RANGE OR TOWNSHIP LINE
- R1E T6N — RANGE OR TOWNSHIP LABELS
- 1 - 36 — SECTION NUMBERS
- FENCES

MINES

- MINE OPENING
- MINE SHAFT
- MINE DUMP

RAILROADS

- RAILROAD
- RAILROAD SIDING

RIVERS AND LAKES

- PERENNIAL STREAM
- INTERMEDIATE STREAM
- PERENNIAL RIVER
- INTERMEDIATE RIVER
- PERENNIAL LAKE/POND
- INTERMEDIATE LAKE/POND
- MARSH OR SWAMP

SCALE

2000 0 2000 4000 FEET

0192 / 18

REV.	DATE	DESCRIPTION	P.M.
1	02/05/18	LABEL ABANDONED RAILROADS	SMS

REFERENCE:

MAPPING CONSIST OF USGS 7.5' QUADRANGLES DIGITAL RASTER GRAPHIC IMAGES. QUADRANGLE SHEET NAMES LISTED ON THE MAP.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

BECKLEY, WV (304) 255-0491 | SUMMERSVILLE, WV (304) 883-2360 | CANONSBURG, PA (724) 745-3630

GENERAL LOCATION MAP & DRAWING SHEETS INDEX

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/25/17	PROJECT NO. B17-222-1413
CHECKED BY	–	–	
APPROVED BY	–	–	DRAWING NO. B17-222-E1

R07888

Pond Creek

Gunn Rd

Davis Rd

S Township Line

T7S R3E

T7S R4E

T8S R3E

T8S R4E

Liberty School Rd

Dwina Rd

Dean Rd

Garrett Rd

Kuepper Ln

Williams Prairie Rd

Private Well (22' Deep Dug Well)

Drilled Well (200' Deep)

Farm Service Office/Apartment

OFFICE

Williams Prairie Church

Cemetery (Un-named)

Harris Cemetery

MATCHLINE - SHEET 2

N

LEGEND

- PROPOSED PERMIT BOUNDARY
- PERMIT 375
- PERMIT 375 PENDING IBR AREA
- PERMIT 417
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- STREAMS
- TOWNSHIP/RANGE/SECTION
- A080408-000 — PROPERTY LINE/TRACT ID
- CEMETERY (FROM 7.5' QUADS)
- CHURCH (FROM 7.5' QUADS)
- 1 — RESIDENCE (OCCUPIED)
- 1VAC — RESIDENCE (UNOCCUPIED)
- 2 — MOBILE HOME (OCCUPIED)
- 2VAC — MOBILE HOME (UNOCCUPIED)
- 3 — SHED
- 4 — GARAGE
- 5 — BARN
- 6 — GRAIN BIN OR SILO
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.
2	05/31/18	REVISE PERMIT BOUNDAY	SMS
1	01/26/18	ADD TRACTS 11-32-200-011 & 012	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0481
CANONSBURG, PA (724) 745-3620

IDENTIFICATION OF INTEREST

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/25/17	PROJECT NO. B17-222-1413	SHEET 1 OF 4
CHECKED BY	SMS	05/19/17		
APPROVED BY	CEY	05/19/17		DRAWING NO. B17-222-M1

R07889

LEGEND

- PROPOSED PERMIT BOUNDARY
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- STREAMS
- TOWNSHIP/RANGE/SECTION (T8S R3E 1)
- A080408-000 — PROPERTY LINE/TRACT ID
- CEMETERY (FROM 7.5' QUADS)
- CHURCH (FROM 7.5' QUADS)
- 1 — RESIDENCE (OCCUPIED)
- 1VAC — RESIDENCE (UNOCCUPIED)
- 2 — MOBILE HOME (OCCUPIED)
- 2VAC — MOBILE HOME (UNOCCUPIED)
- 3 — SHED
- 4 — GARAGE
- 5 — BARN
- 6 — GRAIN BIN OR SILO
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	
2	05/31/18	REVISE PERMIT BOUNDAY	SMS
1	01/26/18	ADD TRACTS 11-32-200-011 & 012	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491 · SUMMERSVILLE, WV (304) 883-3380 · CANONSBURG, PA (724) 745-3630

IDENTIFICATION OF INTEREST

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/25/17	PROJECT NO. B17-222-1413	SHEET 2 OF 4
CHECKED BY	SMS	05/19/17		
APPROVED BY	CEY	05/19/17	DRAWING NO. B17-222-M2	

R07820

LEGEND

- PROPOSED PERMIT BOUNDARY
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- STREAMS
- TOWNSHIP/RANGE/SECTION
- A080408-000 — PROPERTY LINE/TRACT ID
- CEMETERY (FROM 7.5' QUADS)
- CHURCH (FROM 7.5' QUADS)
- 1 — RESIDENCE (OCCUPIED)
- 1VAC — RESIDENCE (UNOCCUPIED)
- 2 — MOBILE HOME (OCCUPIED)
- 2VAC — MOBILE HOME (UNOCCUPIED)
- 3 — SHED
- 4 — GARAGE
- 5 — BARN
- 6 — GRAIN BIN OR SILO
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

DENNING

Freeman Rd
Ezra St
Country Club Rd
Spowart Rd
Calsburg Rd
Latrobe Rd
Newport Rd
Tipps Rd
Woody Rd
Boner Cem Rd
Crystal Rd
Caprice Rd
Deeson Rd
Presley Ln
Miller St
Rice St
Mabry St
Gass St
Davis St
Crawford St
Winery Rd
Ramsey Heights Rd
BNSF RAILWAY
MATCHLINE - SHEET 4
MATCHLINE - SHEET 3
Horseshoe Rd
Creek
Jenna Ln
Southpoint Ln
Cody Ln
S County Line Rd
FRANKLIN CO
WILLIAMSON CO
T. 7 S.
T. 8 S.
T7S R2E
T8S R2E
PACIFIC
UNION
Collin Rd
Pond
Barger Ln
Stiritz Rd
Harper Rd
Illinois Steel Rd
Vienna St
Dublin St
Brussels St
Monaco St
Lisbon St
Stiritz
Hart Cemetery
Latter Day Saints Church
INDUSTRIAL SITE
Water Tank
MATCHLINE - SHEET 3
MATCHLINE - SHEET 2
Illinois Steel Rd Mobile Yard

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	
2	05/31/18	REVISE PERMIT BOUNDAY	SMS
1	01/26/18	ADD TRACTS 11-32-200-011 & 012	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

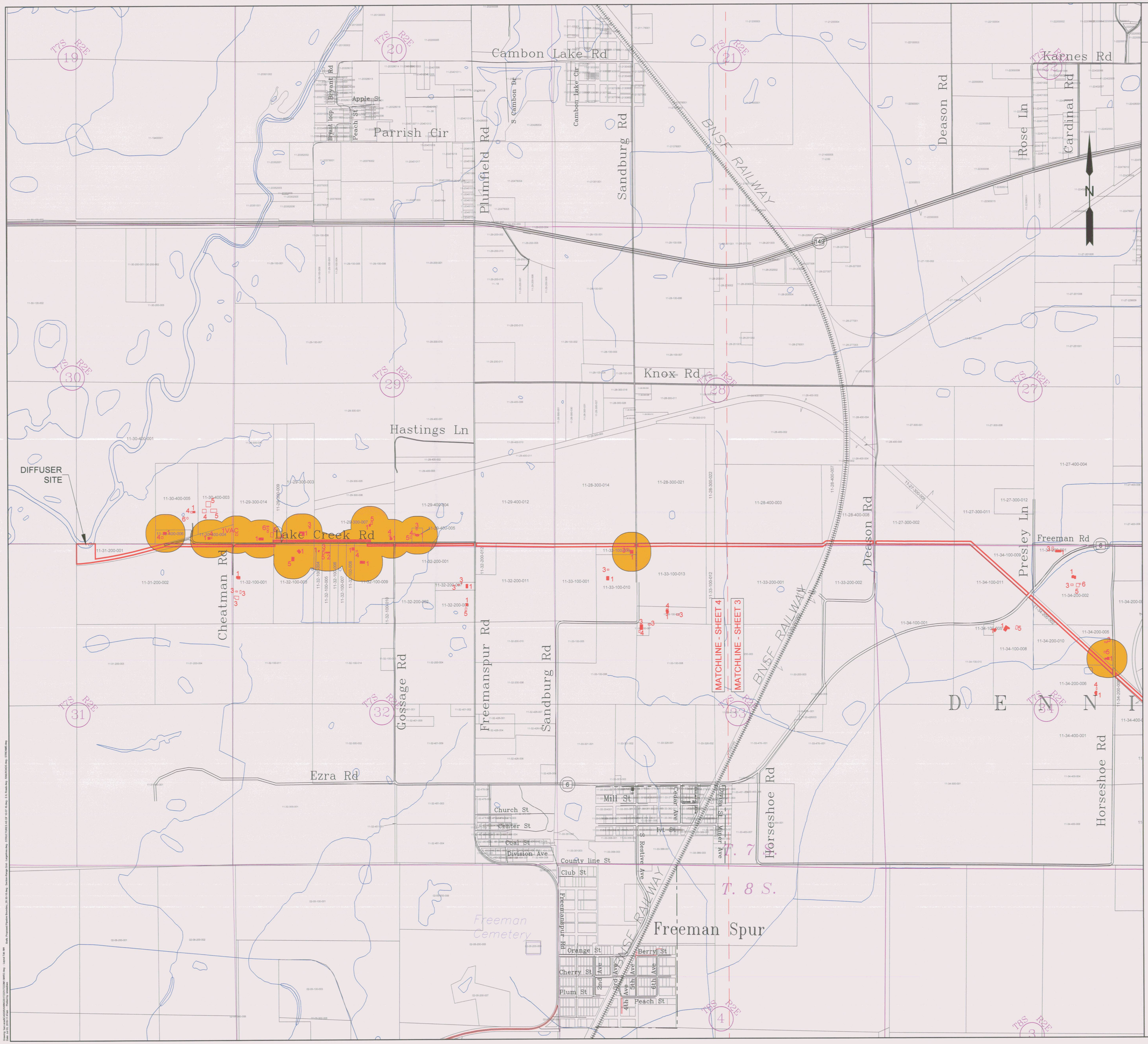
IDENTIFICATION OF INTEREST

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/25/17	PROJECT NO. B17-222-1413
CHECKED BY	SMS	05/19/17	SHEET 3 OF 4
APPROVED BY	CEY	05/19/17	DRAWING NO. B17-222-M3



LEGEND

- PROPOSED PERMIT BOUNDARY
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- STREAMS
- TOWNSHIP/RANGE/SECTION
- A080408-000 PROPERTY LINE/TRACT ID
- CEMETERY (FROM 7.5' QUADS)
- CHURCH (FROM 7.5' QUADS)
- 1 RESIDENCE (OCCUPIED)
- 1VAC RESIDENCE (UNOCCUPIED)
- 2 MOBILE HOME (OCCUPIED)
- 2VAC MOBILE HOME (UNOCCUPIED)
- 3 SHED
- 4 GARAGE
- 5 BARN
- 6 GRAIN BIN OR SILO
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

SCALE
500 0 500 1000 FEET

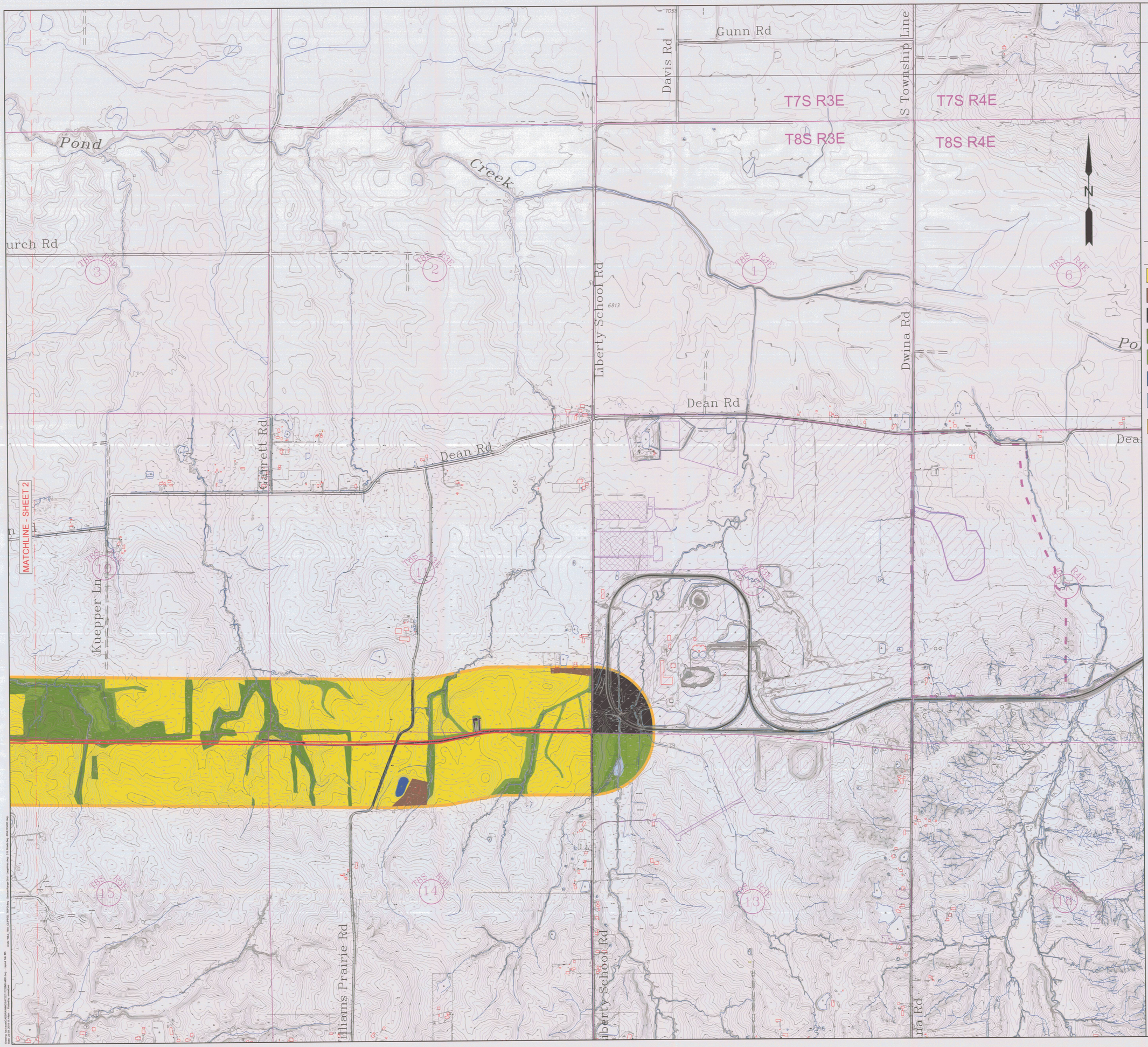
REV.	DATE	DESCRIPTION	P.M.
2	05/31/18	REVISE PERMIT BOUNDAY	SMS
1	01/26/18	ADD TRACTS 11-32-200-011 & 012	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

IDENTIFICATION OF INTEREST

POND CREEK 1 MINE
Prepared For
WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/25/17	PROJECT NO. B17-222-1413	SHEET 4 OF 4
CHECKED BY	SMS	05/19/17		
APPROVED BY	CEY	05/19/17	DRAWING NO. B17-222-M4	



LEGEND

- PROPOSED PERMIT BOUNDARY
- 1000 FOOT PERMIT BOUNDARY OFFSET
- PERMIT 375
- PERMIT 375 PENDING IBR AREA
- PERMIT 417
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION

LAND USE	INSIDE PERMIT BOUNDARY	INSIDE 1000 FT. BOUNDARY
CROPLAND	22.9 AC.	1516.8 AC.
RESIDENTIAL	0.1 AC.	108.3 AC.
INDUSTRIAL/COMMERCIAL	8.2 AC.	103.6 AC.
FISH & WILDLIFE - WOODY	18.6 AC.	816.5 AC.
FISH & WILDLIFE - HERBACEOUS	16.8 AC.	294.1 AC.
FISH & WILDLIFE - WATER	0.4 AC.	62.4 AC.
FISH & WILDLIFE - NWI WETLANDS	0.4 AC.	114.0 AC.
FISH & WILDLIFE - FIELD DELINEATED WETLANDS	3.3 AC.	2.6 AC.
TOTAL	70.7 AC.	3,018.3 AC.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

PRE & POST MINING LAND USE MAP

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04-26-17	PROJECT NO. B17-222-1413	SHEET 1 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–	DRAWING NO. B17-222-M5	



LEGEND

- PROPOSED PERMIT BOUNDARY
- 1000 FOOT PERMIT BOUNDARY OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION

LAND USE	INSIDE PERMIT BOUNDARY	INSIDE 1000 FT. BOUNDARY
CROPLAND	22.9 AC.	1516.8 AC.
RESIDENTIAL	0.1 AC.	108.3 AC.
INDUSTRIAL/COMMERCIAL	8.2 AC.	103.6 AC.
FISH & WILDLIFE - WOODY	18.6 AC.	816.5 AC.
FISH & WILDLIFE - HERBACEOUS	16.8 AC.	294.1 AC.
FISH & WILDLIFE - WATER	0.4 AC.	62.4 AC.
FISH & WILDLIFE - NWI WETLANDS	0.4 AC.	114.0 AC.
FISH & WILDLIFE - FIELD DELINEATED WETLANDS	3.3 AC.	2.6 AC.
TOTAL	70.7 AC.	3,018.3 AC.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

PRE & POST MINING LAND USE MAP

POND CREEK 1 MINE
Prepared For
WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04-26-17	PROJECT NO. B17-222-1413	SHEET 2 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–	DRAWING NO. B17-222-M6	

R07894

LEGEND

- PROPOSED PERMIT BOUNDARY
- 1000 FOOT PERMIT BOUNDARY OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION

LAND USE	INSIDE PERMIT BOUNDARY	INSIDE 1000 FT. BOUNDARY
CROPLAND	22.9 AC.	1516.8 AC.
RESIDENTIAL	0.1 AC.	108.3 AC.
INDUSTRIAL/COMMERCIAL	8.2 AC.	103.6 AC.
FISH & WILDLIFE - WOODY	18.6 AC.	816.5 AC.
FISH & WILDLIFE - HERBACEOUS	16.8 AC.	294.1 AC.
FISH & WILDLIFE - WATER	0.4 AC.	62.4 AC.
FISH & WILDLIFE - NWI WETLANDS	0.4 AC.	114.0 AC.
FISH & WILDLIFE - FIELD DELINEATED WETLANDS	3.3 AC.	2.6 AC.
TOTAL	70.7 AC.	3,018.3 AC.

MATCHLINE - SHEET 4

MATCHLINE - SHEET 3

MATCHLINE - SHEET 3

MATCHLINE - SHEET 2

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

PRE & POST MINING LAND USE MAP

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04-26-17	PROJECT NO. B17-222-1413	SHEET 3 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–		DRAWING NO. B17-222-M7

LEGEND

- PROPOSED PERMIT BOUNDARY
- 1000 FOOT PERMIT BOUNDARY OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION (e.g. T7S R2E 19)

LAND USE	INSIDE PERMIT BOUNDARY	INSIDE 1000 FT. BOUNDARY
CROPLAND	22.9 AC.	1516.8 AC.
RESIDENTIAL	0.1 AC.	108.3 AC.
INDUSTRIAL/COMMERCIAL	8.2 AC.	103.6 AC.
FISH & WILDLIFE - WOODY	18.6 AC.	816.5 AC.
FISH & WILDLIFE - HERBACEOUS	16.8 AC.	294.1 AC.
FISH & WILDLIFE - WATER	0.4 AC.	62.4 AC.
FISH & WILDLIFE - NWI WETLANDS	0.4 AC.	114.0 AC.
FISH & WILDLIFE - FIELD DELINEATED WETLANDS	3.3 AC.	2.6 AC.
TOTAL	70.7 AC.	3,018.3 AC.

DIFFUSER SITE

MATCHLINE - SHEET 4

MATCHLINE - SHEET 3

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	
1	05/31/18	REVISE PERMMIT BOUNDARY	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0481 — CANONSBURG, PA (724) 745-3630

PRE & POST MINING LAND USE MAP

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04-26-17	PROJECT NO. B17-222-1413
CHECKED BY	–	–	SHEET 4 OF 4
APPROVED BY	–	–	DRAWING NO. B17-222-M8

R07896

MATCHLINE - SHEET 2

T7S R3E

T7S R4E

T8S R3E

T8S R4E

N

LEGEND

- PROPOSED PERMIT BOUNDARY
- PERMIT 375
- PERMIT 375 PENDING IBR AREA
- PERMIT 417
- 13A — SOIL–MAP UNIT SYMBOL
- TOWNSHIP/RANGE/SECTION

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
10C	Plumfield silty clay loam, 5 to 10 percent slopes	6.5	9.2%
10D	Plumfield silty clay loam, 10 to 18 percent slopes	2.3	3.3%
12A	Wynoose silt loam, 0 to 2 percent slopes	0.9	1.3%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	0.7%
13B	Bluford silt loam, 2 to 5 percent slopes	3.1	4.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4.0	5.7%
14B	Ava silt loam, 2 to 5 percent slopes	5.4	7.6%
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	0.9	1.3%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	2.5	3.5%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3.6	5.1%
518B	Rend silt loam, 2 to 5 percent slopes	1.1	1.6%
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	0.1	0.1%
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2.0	2.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	1.6	2.3%
802B	Orthents, loamy, undulating	1.7	2.4%
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3.1	4.4%
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	0.6	0.8%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	3.2	4.5%
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
Subtotals for Williamson County		**44.5**	**62.9%**

Franklin County, Illinois (IL055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
13A	Bluford silt loam, 0 to 2 percent slopes	1.0	1.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	1.7	2.4%
14B	Ava silt loam, 2 to 5 percent slopes	3.8	5.4%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
84A	Okaw silt loam, 0 to 2 percent slopes	5.5	7.8%
109A	Racoon silt loam, 0 to 2 percent slopes	2.8	4.0%
338A	Hurst silt loam, 0 to 2 percent slopes	1.8	2.5%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	2.3	3.3%
908F	Hickory-Keil silt loams, 18 to 35 percent slopes	1.5	2.1%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	1.8	2.5%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	2.7	3.8%
W	Water	0.1	0.1%
Subtotals for Franklin County		**26.2**	**37.1%**
Totals for Area of Interest		**70.7**	**100.0%**

NOTE: BACKGROUND IMAGE IS FRANKLIN COUNTY 2015 ORTHO SET TO NAD 27 COORDINATES.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

SOILS MAP

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/27/17	PROJECT NO. B17-222-1413	SHEET 1 OF 4
CHECKED BY	–	–		DRAWING NO. B17-222-M9
APPROVED BY	–	–		

R07897



LEGEND

PROPOSED PERMIT BOUNDARY

13A — SOIL–MAP UNIT SYMBOL

TOWNSHIP/RANGE/SECTION

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
10C	Plumfield silty clay loam, 5 to 10 percent slopes	6.5	9.2%
10D	Plumfield silty clay loam, 10 to 18 percent slopes	2.3	3.3%
12A	Wynoose silt loam, 0 to 2 percent slopes	0.9	1.3%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	0.7%
13B	Bluford silt loam, 2 to 5 percent slopes	3.1	4.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4.0	5.7%
14B	Ava silt loam, 2 to 5 percent slopes	5.4	7.6%
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	0.9	1.3%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	2.5	3.5%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3.6	5.1%
518B	Rend silt loam, 2 to 5 percent slopes	1.1	1.6%
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	0.1	0.1%
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2.0	2.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	1.6	2.3%
802B	Orthents, loamy, undulating	1.7	2.4%
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3.1	4.4%
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	0.6	0.8%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	3.2	4.5%
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
Subtotals for Williamson County		**44.5**	**62.9%**

Franklin County, Illinois (IL055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
13A	Bluford silt loam, 0 to 2 percent slopes	1.0	1.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	1.7	2.4%
14B	Ava silt loam, 2 to 5 percent slopes	3.8	5.4%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
84A	Okaw silt loam, 0 to 2 percent slopes	5.5	7.8%
109A	Racoon silt loam, 0 to 2 percent slopes	2.8	4.0%
338A	Hurst silt loam, 0 to 2 percent slopes	1.8	2.5%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	2.3	3.3%
908F	Hickory-Kell silt loams, 18 to 35 percent slopes	1.5	2.1%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	1.8	2.5%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	2.7	3.8%
W	Water	0.1	0.1%
Subtotals for Franklin County		**26.2**	**37.1%**
Totals for Area of Interest		**70.7**	**100.0%**

NOTE: BACKGROUND IMAGE IS FRANKLIN COUNTY 2015 ORTHO SET TO NAD 27 COORDINATES.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

SOILS MAP

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/27/17	PROJECT NO. B17-222-1413	SHEET 2 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–		DRAWING NO. B17-222-M10

R07898



LEGEND

PROPOSED PERMIT BOUNDARY

13A — SOIL–MAP UNIT SYMBOL

TOWNSHIP/RANGE/SECTION

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
10C	Plumfield silty clay loam, 5 to 10 percent slopes	6.5	9.2%
10D	Plumfield silty clay loam, 10 to 18 percent slopes	2.3	3.3%
12A	Wynoose silt loam, 0 to 2 percent slopes	0.9	1.3%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	0.7%
13B	Bluford silt loam, 2 to 5 percent slopes	3.1	4.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4.0	5.7%
14B	Ava silt loam, 2 to 5 percent slopes	5.4	7.6%
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	0.9	1.3%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	2.5	3.5%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3.6	5.1%
518B	Rend silt loam, 2 to 5 percent slopes	1.1	1.6%
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	0.1	0.1%
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2.0	2.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	1.6	2.3%
802B	Orthents, loamy, undulating	1.7	2.4%
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3.1	4.4%
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	0.6	0.8%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	3.2	4.5%
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
Subtotals for Williamson County		**44.5**	**62.9%**

Franklin County, Illinois (IL055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
13A	Bluford silt loam, 0 to 2 percent slopes	1.0	1.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	1.7	2.4%
14B	Ava silt loam, 2 to 5 percent slopes	3.8	5.4%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
84A	Okaw silt loam, 0 to 2 percent slopes	5.5	7.8%
109A	Racoon silt loam, 0 to 2 percent slopes	2.8	4.0%
338A	Hurst silt loam, 0 to 2 percent slopes	1.8	2.5%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	2.3	3.3%
908F	Hickory-Kell silt loams, 18 to 35 percent slopes	1.5	2.1%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	1.8	2.5%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	2.7	3.8%
W	Water	0.1	0.1%
Subtotals for Franklin County		**26.2**	**37.1%**
Totals for Area of Interest		**70.7**	**100.0%**

NOTE: BACKGROUND IMAGE IS FRANKLIN COUNTY 2015 ORTHO SET TO NAD 27 COORDINATES.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

SOILS MAP

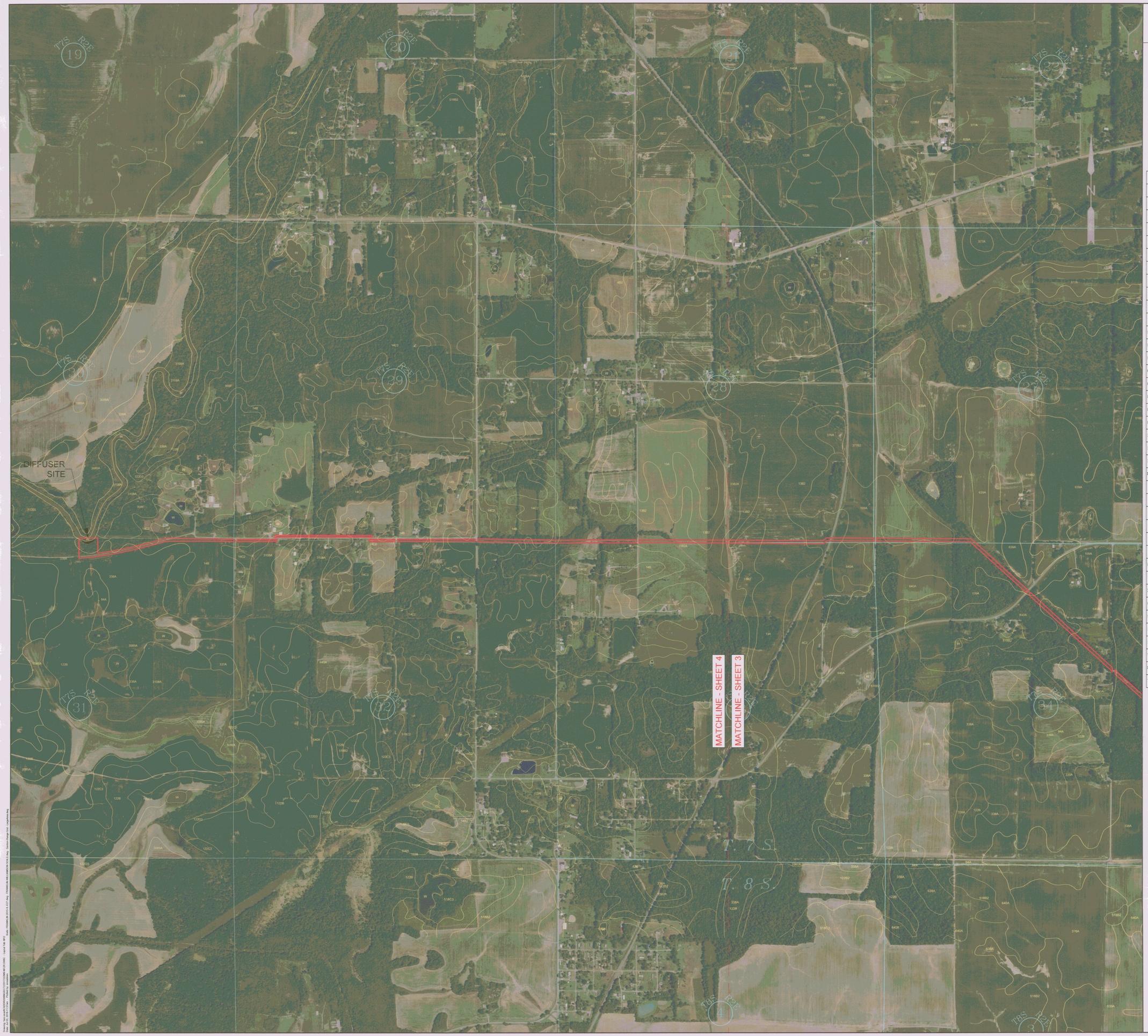
POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/27/17	PROJECT NO. B17-222-1413	SHEET 3 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–	DRAWING NO. B17-222-M11	

R07899



LEGEND

PROPOSED PERMIT BOUNDARY

13A — SOIL–MAP UNIT SYMBOL

TOWNSHIP/RANGE/SECTION

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
10C	Plumfield silty clay loam, 5 to 10 percent slopes	6.5	9.2%
10D	Plumfield silty clay loam, 10 to 18 percent slopes	2.3	3.3%
12A	Wynoose silt loam, 0 to 2 percent slopes	0.9	1.3%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	0.7%
13B	Bluford silt loam, 2 to 5 percent slopes	3.1	4.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	4.0	5.7%
14B	Ava silt loam, 2 to 5 percent slopes	5.4	7.6%
14B2	Ava silt loam, 2 to 5 percent slopes, eroded	0.9	1.3%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	2.5	3.5%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	3.6	5.1%
518B	Rend silt loam, 2 to 5 percent slopes	1.1	1.6%
518C2	Rend silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
518C3	Rend silty clay loam, 5 to 10 percent slopes, severely eroded	0.1	0.1%
640B	Bluford silt loam, bench, 2 to 5 percent slopes	2.0	2.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	1.6	2.3%
802B	Orthents, loamy, undulating	1.7	2.4%
871B	Lenzburg gravelly silty clay loam, 2 to 7 percent slopes, stony	3.1	4.4%
871D	Lenzburg gravelly silty clay loam, 7 to 20 percent slopes, stony	0.6	0.8%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	3.2	4.5%
3420A	Piopolis silty clay loam, 0 to 2 percent slopes, frequently flooded	0.1	0.1%
Subtotals for Williamson County		**44.5**	**62.9%**

Franklin County, Illinois (IL055)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
13A	Bluford silt loam, 0 to 2 percent slopes	1.0	1.4%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	1.7	2.4%
14B	Ava silt loam, 2 to 5 percent slopes	3.8	5.4%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.2	1.7%
84A	Okaw silt loam, 0 to 2 percent slopes	5.5	7.8%
109A	Racoon silt loam, 0 to 2 percent slopes	2.8	4.0%
338A	Hurst silt loam, 0 to 2 percent slopes	1.8	2.5%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	2.3	3.3%
908F	Hickory-Keil silt loams, 18 to 35 percent slopes	1.5	2.1%
3108A	Bonnie silt loam, 0 to 2 percent slopes, frequently flooded	1.8	2.5%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	2.7	3.8%
W	Water	0.1	0.1%
Subtotals for Franklin County		**26.2**	**37.1%**
Totals for Area of Interest		**70.7**	**100.0%**

NOTE: BACKGROUND IMAGE IS FRANKLIN COUNTY 2015 ORTHO SET TO NAD 27 COORDINATES.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.
1	05/31/18	REVISE PERMIT BOUNDARY	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

SOILS MAP

POND CREEK 1 MINE

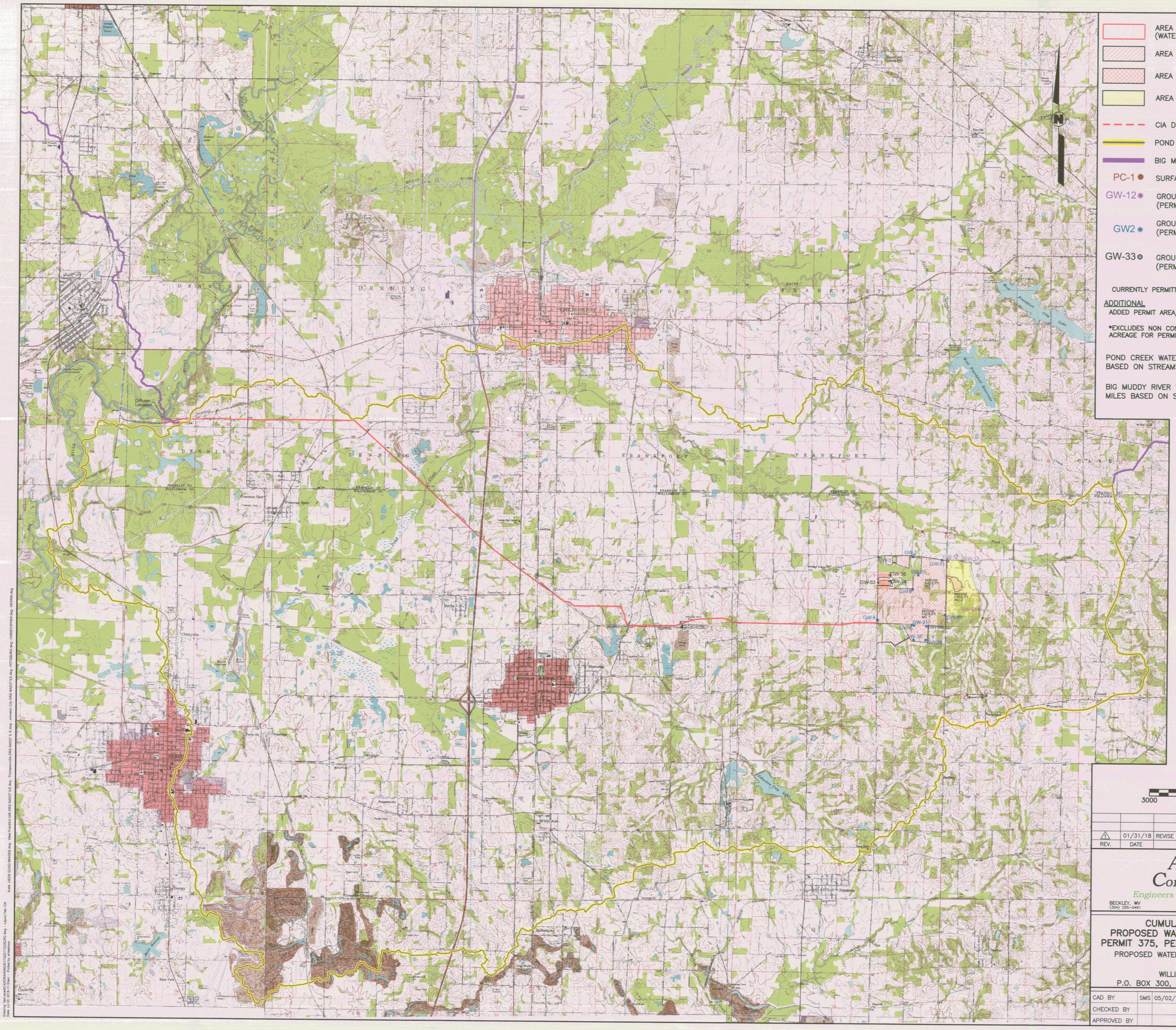
Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/27/17	PROJECT NO. B17-222-1413	SHEET 4 OF 4
CHECKED BY	–	–		DRAWING NO. B17-222-M12
APPROVED BY	–	–		

Drawing Path: M:\B17\B17222\CAD\PERMIT\B17222M12.DWG Layout Tab: MAP
Date: 05/30/2018 7:52am Plotted by: smcmullen

R07900



AREA 1 – PROPOSED PERMIT (WATER MANAGEMENT PIPELINE)	70.7 AC.
AREA 2 – PERMIT NO. 375	*554.94 AC.
AREA 3 – PERMIT NO. 375 IBR	*17.7 AC.
AREA 4 – PERMIT NO. 417	229.78 AC.
CIA DRAINAGE AREA	3,815 AC.
POND CREEK DRAINAGE AREA	64,517 AC.
BIG MUDDY RIVER DRAINAGE AREA	
PC-1	SURFACE WATER MONITORING SITES
GW-12	GROUND WATER MONITORING SITES (PERMIT 417)
GW2	GROUND WATER MONITORING SITES (PERMIT 375)
GW-33	GROUND WATER MONITORING SITES (PERMIT 375 WATER HOLDING CELLS IBR)

CURRENTLY PERMITTED AREA/TOTAL = $\frac{802.42}{64517}$ X 100 = 1.24%

ADDITIONAL
ADDED PERMIT AREA/ TOTAL $\frac{70.7}{64517}$ X 100 = 0.1%

*EXCLUDES NON CONTIGUOIS BONDED AREAS. TOTAL ACREAGE FOR PERMIT NO. 375 IS 703.3 AC.

POND CREEK WATERSHED = 64,517 AC. (101 SQ. MILES BASED ON STREAMSTAT INFORMATION)

BIG MUDDY RIVER WATERSHED = 508,276 AC. (794 SQ. MILES BASED ON STREAMSTAT INFORMATION)

SCALE
3000 0 3000 6000 FEET

REV.	DATE	DESCRIPTION	
1	01/31/18	REVISE MAP LEGEND PER IDNR COMMENT	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

CUMULATIVE IMPACT AREAS PROPOSED WATER MANAGEMENT PIPELINE, PERMIT 375, PERMIT 375 IBR & PERMIT 417

PROPOSED WATER MANAGEMENT PIPELINE PERMIT

Prepared For
WILLIAMSON ENERGY, LLC
P.O. BOX 300, JOHNSTON CITY, ILLINOIS 62951

CAD BY	SMS	05/02/17	PROJECT NO. B7-222-1413
CHECKED BY			
APPROVED BY			DRAWING NO. B17-222-E2

Drawing Name: I:\acad\CADDRAWINGS\17222\17222E2R2.dwg - Layout Tab: CIA
Date: 1/31/2018 11:52am - Plotted by: smadore
Xrefs: USGS QUAD IMAGES.dwg - West Frankfort 24K DRG NAD27 LE.dwg - Thompsonville DRG NAD27 LE.dwg - Johnston City DRG NAD27 LE.dwg - PITTSBURG.dwg - CHRISTOPHER.dwg - HERRIN.dwg

R07901

T7S R3E
T7S R4E
T8S R3E
T8S R4E

Gunn Rd
Davis Rd
S Township Line
Pond Creek
Liberty School Rd
Dwina Rd
Dean Rd
Garrett Rd
Kuepper Ln
Williams Prairie Rd
urch Rd

PC-1
PC-2
PC-3
PC-4

GW-1 EL. 439.82
GW-2 EL. 433.73
GW-4 EL. 462.28
GW-12 EL. 434.15
GW-13 EL. 430.29
GW-28 EL. 464.06
GW-33 EL. ±453.43
GW-34 EL. ±446.54
GW-35 EL. ±444.89

Private Well (22' Deep Dug Well)
Drilled Well (200' Deep)
Farm Service Office/Apartment
WATER HOLDING CELLS
OFFICE
11WM150 FARMSTEAD
11WM150 FRY CEMETERY (4 GRAVES)
BORE BENEATH WILLIAMS PRAIRIE ROAD
BORE BENEATH LIBERTY SCHOOL ROAD
REFERENCE POINT
100 FT.
MATCHLINE - SHEET 2

N

LEGEND

- PROPOSED PERMIT BOUNDARY
- PERMIT 375
- PERMIT 375 PENDING IBR AREA
- PERMIT 417
- GW-1 EL. 439.82 — EXISTING GROUNDWATER MONITORING WELLS WITH ELEVATIONS
- PC-1 — EXISTING SURFACE WATER MONITORING SITES
- WATER MANAGEMENT PIPELINE
- GAS LINE
- 1/2 MILE PERMIT OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION
- STREAM/DRAINAGE DITCHES
- RESIDENCE (OCCUPIED)
- 1VAC — RESIDENCE (UNOCCUPIED)
- 2 — MOBILE HOME (OCCUPIED)
- 2VAC — MOBILE HOME (UNOCCUPIED)
- 3 — SHED
- 4 — GARAGE
- 5 — BARN
- 6 — GRAIN BIN OR SILO
- INTERMEDIATE CONTOURS (2 FT.)
- INDEX CONTOURS (10 FT.)
- 100 FOOT STREAM BUFFER ZONE
- 100 FOOT STREAM BUFFER ZONE ENCROACHMENT
- DELINEATED WETLAND
- 100 FOOT PUBLIC ROAD BUFFER
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

NOTE:

WATER MANAGEMENT PIPELINE WILL BE BORED BENEATH ALL ROADS.

BORING OPERATIONS WILL BE CONDUCTED OUTSIDE THE 100 FT. ROAD RIGHT-OF-WAY.

NO ROADS WILL BE CLOSED TO AVOID IMPACTING THE PUBLIC.

SCALE
500 0 500 1000 FEET

REV.	DATE	DESCRIPTION	P.M.
3	05/31/18	REVISE PERMIT BOUNDARY & REMOVE TRENCHING NOTE	SMS
2	02/13/18	REVISE STREAM BUFFR ZONES	SMS
1	09/05/17	ADD ARCHAEOLOGICAL SITES	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0941 — CANONSBURG, PA (724) 745-3630

HYDROLOGIC / MINING OPERATIONS MAP

POND CREEK 1 MINE
Prepared For
WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	04/27/17	PROJECT NO. B17-222-1413	SHEET 1 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–		DRAWING NO. B17-222-M13

R07902

R2E R3E CIVIL

R2E R3E PACIFIC

S County Line Rd

Harmony Church Rd

Old Frankfort Rd

Biehl Rd

Harmony Church Rd

Jenkins

MATCHLINE - SHEET 3

MATCHLINE - SHEET 2

Pacific Ln

Poor Farm Rd

Harris School Rd

Dean Rd

EXISTING 5 FT. RCP CULVERT

Monroe Rd

BORE BENEATH MONROE ROAD

German Church Rd

MATCHLINE - SHEET 2

MATCHLINE - SHEET 1

11WM402 ISOLATED CISTERN

BORE BENEATH DUNCAN ROAD

Duncan Rd

BORE BENEATH HARRIS SCHOOL ROAD

EXISTING 3 FT. RCP CULVERT

Eberhardt Rd

BORE BENEATH OLD FRANKFORT ROAD

BORE BENEATH EBERHARDT ROAD

Lancelot Ln

BORE BENEATH OLD BEN ROAD

Becker Rd

Monroe Ave

Peterson Ave

E 15th St

Old Frankfort Rd

Old Ben Rd

Shakerag

E 13th St

E 12th St

E 11th St

Market St

Brush Ave

Peterson Ave

Hobbs Ave

Johnston City

Corinth Rd

Ozment Ln

Becker Rd

Harris School Rd

Konrad Curve

Mathewson curve

Lake

LEGEND

- PROPOSED PERMIT BOUNDARY
- PRPOSED NPDES OUTLET LOCATIONS
- WATER MANAGEMENT PIPELINE
- GAS LINE
- RAILROADS
- POWER LINES
- HIGH VOLTAGE POWER LINES
- 1/2 MILE PERMIT OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION
- STREAM/DRAINAGE DITCHES
- 1 RESIDENCE (OCCUPIED)
- 1VAC RESIDENCE (UNOCCUPIED)
- 2 MOBILE HOME (OCCUPIED)
- 2VAC MOBILE HOME (UNOCCUPIED)
- 3 SHED
- 4 GARAGE
- 5 BARN
- 6 GRAIN BIN OR SILO
- INTERMEDIATE CONTOURS (2 FT.)
- INDEX CONTOURS (10 FT.)
- 100 FOOT STREAM BUFFER ZONE
- 100 FOOT STREAM BUFFER ZONE ENCROACHMENT
- DELINEATED WETLAND
- 100 FOOT PUBLIC ROAD BUFFER
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

NOTE:

WATER MANAGEMENT PIPELINE WILL BE BORED BENEATH ALL ROADS.

BORING OPERATIONS WILL BE CONDUCTED OUTSIDE THE 100 FT. ROAD RIGHT-OF-WAY.

NO ROADS WILL BE CLOSED TO AVOID IMPACTING THE PUBLIC.

SCALE
500 0 500 1000 FEET

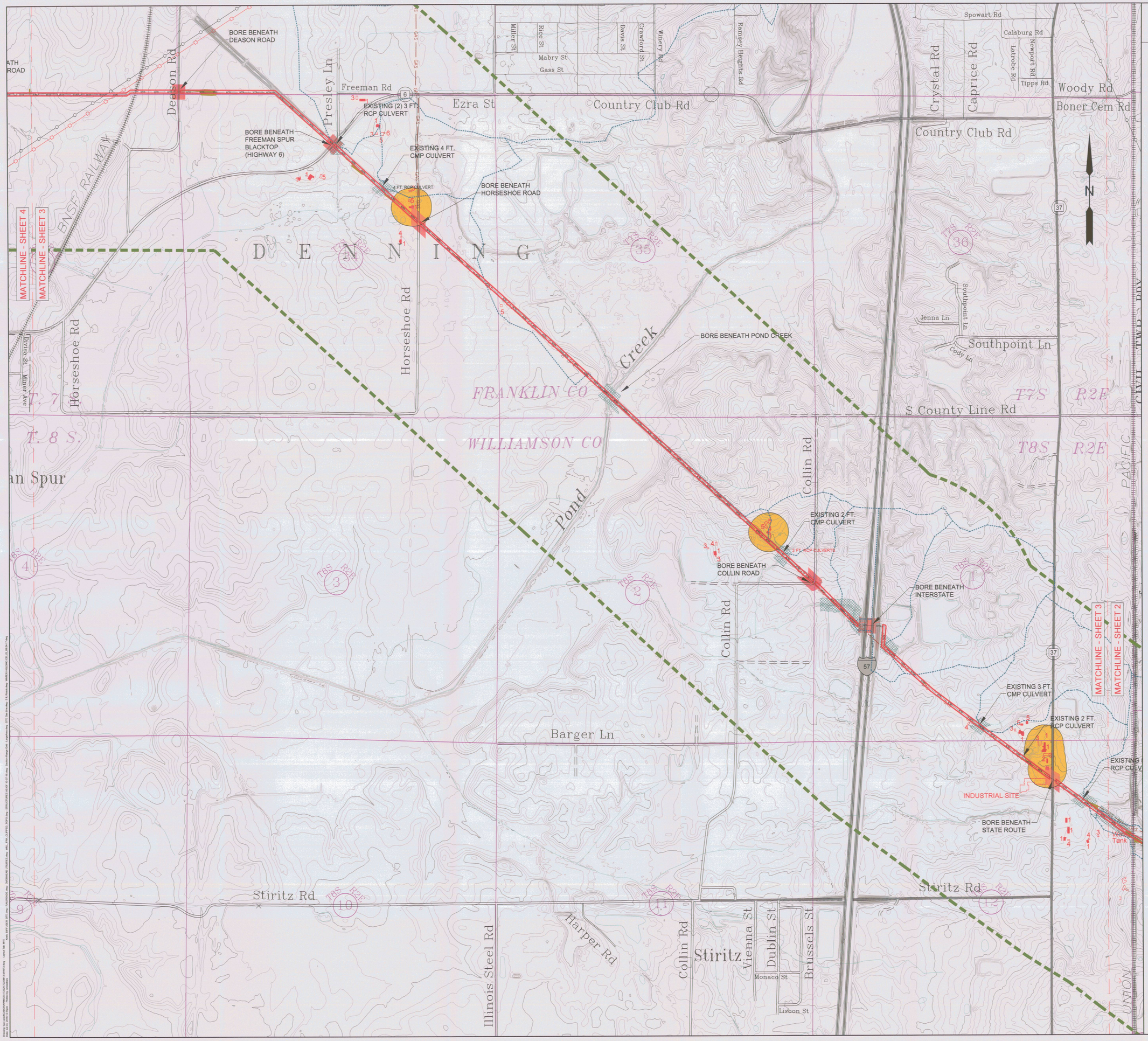
REV.	DATE	DESCRIPTION	P.M.
3	05/31/18	REVISE PERMIT BOUNDARY	SMS
2	02/13/18	REVISE STREAM BUFFR ZONES	SMS
1	09/05/17	ADD ARCHAEOLOGICAL SITES	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

HYDROLOGIC / MINING OPERATIONS MAP

POND CREEK 1 MINE
Prepared For
WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	12/09/16	PROJECT NO. B17-222-1413	SHEET 2 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–		DRAWING NO. B17-222-M14



LEGEND

- PROPOSED PERMIT BOUNDARY
- PRPOSED NPDES OUTLET LOCATIONS
- WATER MANAGEMENT PIPELINE
- GAS LINE
- RAILROADS
- POWER LINES
- HIGH VOLTAGE POWER LINES
- 1/2 MILE PERMIT OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION
- STREAM/DRAINAGE DITCHES
- 1 RESIDENCE (OCCUPIED)
- 1VAC RESIDENCE (UNOCCUPIED)
- 2 MOBILE HOME (OCCUPIED)
- 2VAC MOBILE HOME (UNOCCUPIED)
- 3 SHED
- 4 GARAGE
- 5 BARN
- 6 GRAIN BIN OR SILO
- INTERMEDIATE CONTOURS (2 FT.)
- INDEX CONTOURS (10 FT.)
- 100 FOOT STREAM BUFFER ZONE
- 100 FOOT STREAM BUFFER ZONE ENCROACHMENT
- DELINEATED WETLAND
- 100 FOOT PUBLIC ROAD BUFFER
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

NOTE:

WATER MANAGEMENT PIPELINE WILL BE BORED BENEATH ALL ROADS.

BORING OPERATIONS WILL BE CONDUCTED OUTSIDE THE 100 FT. ROAD RIGHT-OF-WAY.

NO ROADS WILL BE CLOSED TO AVOID IMPACTING THE PUBLIC.

SCALE

500 0 500 1000 FEET

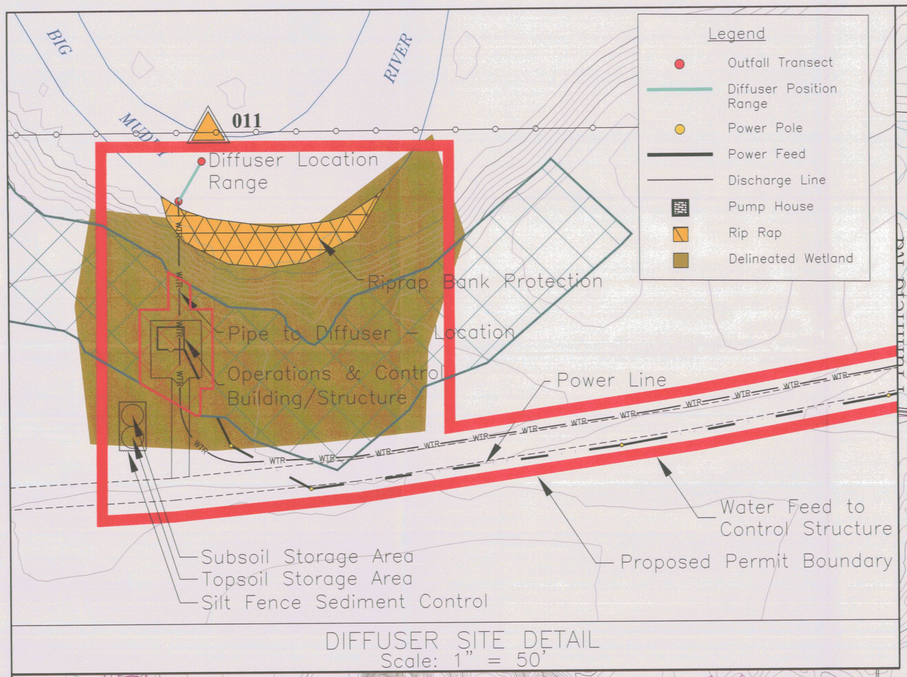
REV.	DATE	DESCRIPTION	P.M.
3	05/31/18	REVISE PERMIT BOUNDARY	SMS
2	02/13/18	REVISE STREAM BUFFR ZONES	SMS
1	09/05/17	ADD ARCHAEOLOGICAL SITES	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

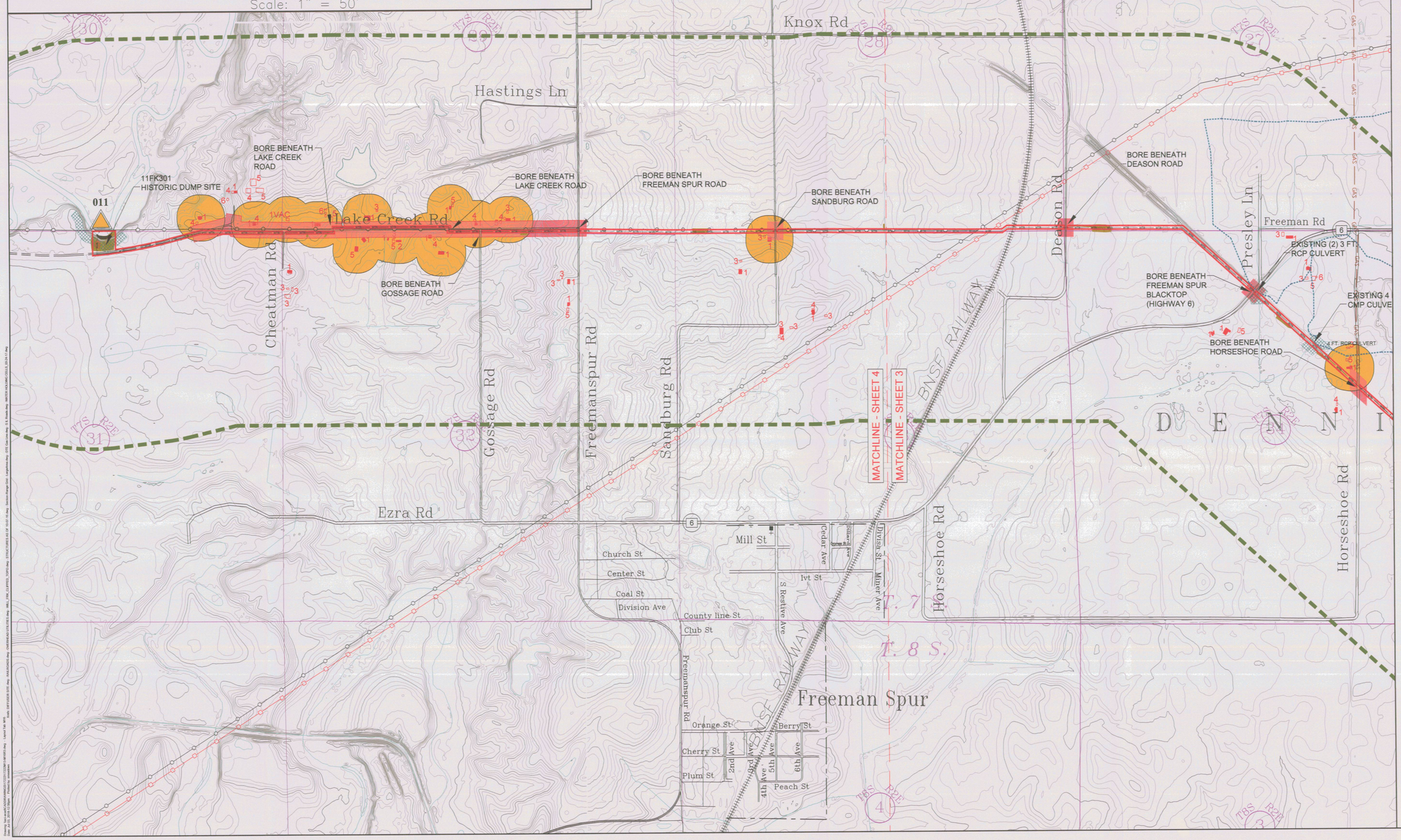
HYDROLOGIC / MINING OPERATIONS MAP

POND CREEK 1 MINE
Prepared For
WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	12/09/16	PROJECT NO. B17-222-1413	SHEET 3 OF 4
CHECKED BY	–	–		
APPROVED BY	–	–	DRAWING NO. B17-222-M15	



DIFFUSER SITE DETAIL
Scale: 1" = 50'



LEGEND

- PROPOSED PERMIT BOUNDARY
- PRPOSED NPDES OUTLET LOCATIONS
- WATER MANAGEMENT PIPELINE
- PROPOSED ELECTRICAL LINE
- GAS LINE
- RAILROADS
- POWER LINES
- HIGH VOLTAGE POWER LINES
- 1/2 MILE PERMIT OFFSET
- PAVED ROADS
- HIGHWAY w/ MEDIAN STRIP
- UNPAVED/GRAVEL ROADS
- TOWNSHIP/RANGE/SECTION
- STREAM/DRAINAGE DITCHES
- 1 RESIDENCE (OCCUPIED)
- 1VAC RESIDENCE (UNOCCUPIED)
- 2 MOBILE HOME (OCCUPIED)
- 2VAC MOBILE HOME (UNOCCUPIED)
- 3 SHED
- 4 GARAGE
- 5 BARN
- 6 GRAIN BIN OR SILO
- INTERMEDIATE CONTOURS (2 FT.)
- INDEX CONTOURS (10 FT.)
- 100 FOOT STREAM BUFFER ZONE
- 100 FOOT STREAM BUFFER ZONE ENCROACHMENT
- DELINEATED WETLAND
- 100 FOOT PUBLIC ROAD BUFFER
- 300 FT. OCCUPIED DWELLING BUFFER ZONE

NOTE:

WATER MANAGEMENT PIPELINE WILL BE BORED BENEATH ALL ROADS.

BORING OPERATIONS WILL BE CONDUCTED OUTSIDE THE 100 FT. ROAD RIGHT-OF-WAY.

NO ROADS WILL BE CLOSED TO AVOID IMPACTING THE PUBLIC.

SCALE
500 0 500 1000 FEET

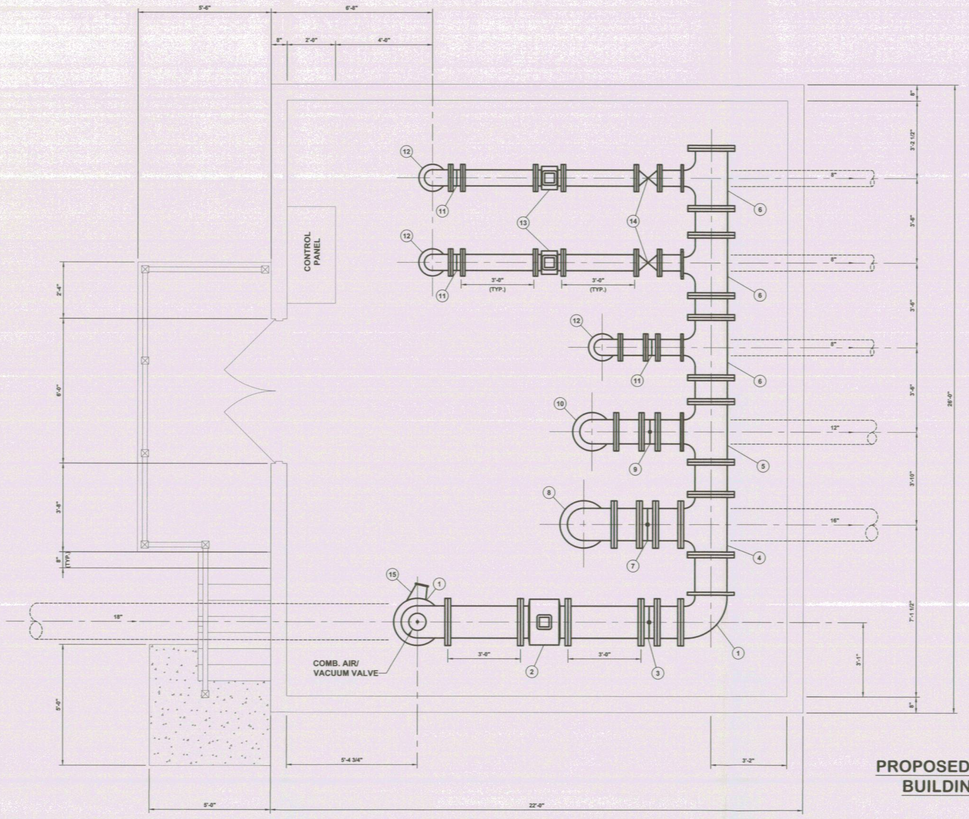
REV.	DATE	DESCRIPTION	P.M.
3	05/31/18	REVISE PERMIT BOUNDARY	SMS
2	02/13/18	REVISE STREAM BUFFR ZONES	SMS
1	09/05/17	ADD ARCHAEOLOGICAL SITES	SMS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3030

HYDROLOGIC / MINING OPERATIONS MAP

POND CREEK 1 MINE
Prepared For
WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

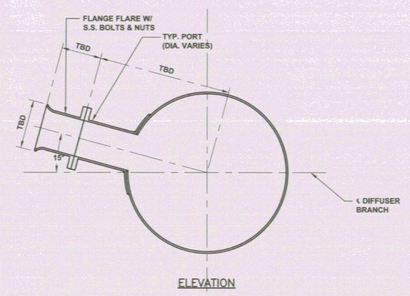
CAD BY	SMS	12/09/16	PROJECT NO. B17-222-1413	SHEET 4 OF 4
CHECKED BY	–	–		DRAWING NO. B17-222-M16
APPROVED BY	–	–		



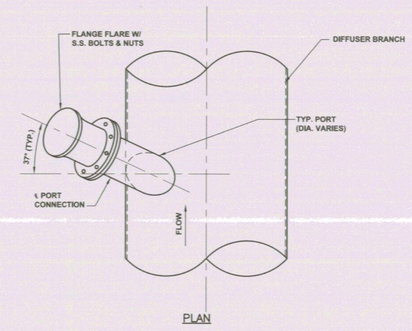
PIPE LEGEND:

1. 16" STEEL 90° BEND, (FL)
2. 16" MAG FLOW METER, (FL)
3. 16" BUTTERFLY VALVE, (FL)
4. 16"x16" STEEL TEE, (FL)
5. 16"x12" STEEL TEE, (FL)
6. 16"x8" STEEL TEE, (FL)
7. 16" BUTTERFLY VALVE, (FL)
8. 16" STEEL 90° BEND, (FL)
9. 12" BUTTERFLY VALVE, (FL)
10. 12" STEEL 90° BEND, (FL)
11. 8" BUTTERFLY VALVE, (FL)
12. 8" STEEL 90° BEND, (FL)
13. 8" MAG FLOW METER, (FL)
14. 8" GATE VALVE, (FL)
15. 16" MANUAL BUTTERFLY VALVE, (FL)

PROPOSED DIFFUSER CONTROL BUILDING PIPING LAYOUT



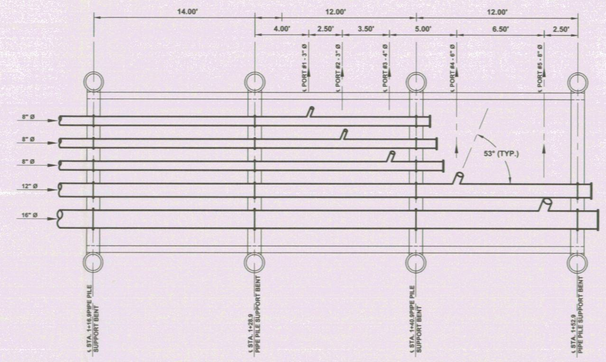
ELEVATION



PLAN

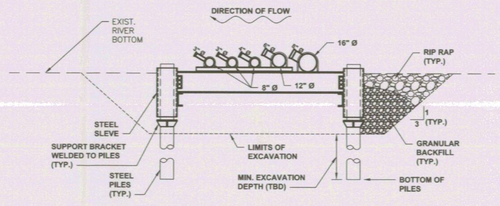
PROPOSED DIFFUSER PORT DETAIL

SCALE: N.T.S.



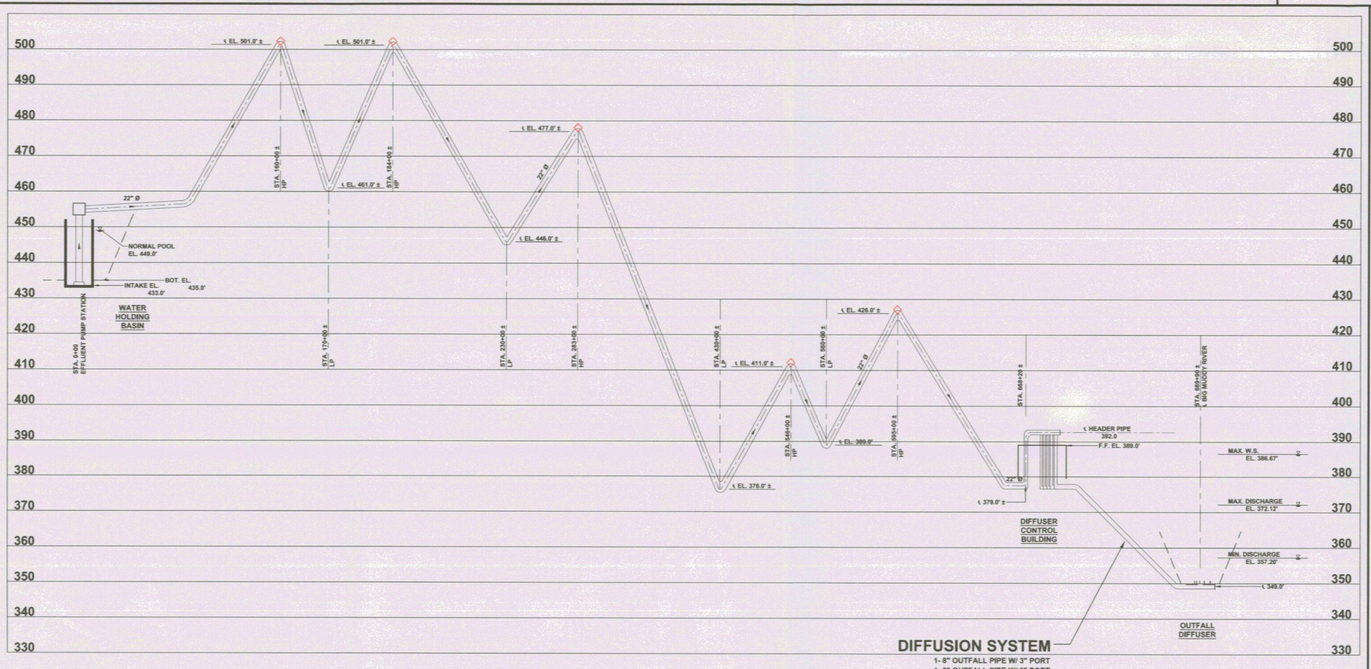
PROPOSED DIFFUSER BRANCH – TYP. PLAN

SCALE: N.T.S.



PROPOSED PIPE PILE SUPPORT BENT – TYP. SECTION

SCALE: N.T.S.



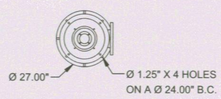
LEGEND

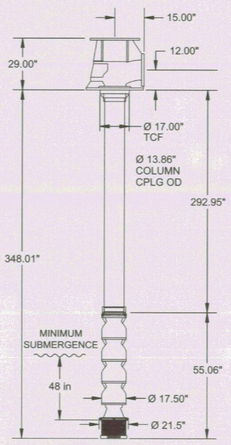
HP - HIGH POINT - ℄ PIPE
LP - LOW POINT - ℄ PIPE
WS - WATER SURFACE
◇ - AIR VALVE (TYP.)

WATER MANAGEMENT PIPELINE PROFILE

VERTICAL TURBINE PUMP

NATIONAL PUMP COMPANY
A GORMAN-RUPP COMPANY





MFG. BY NATIONAL PUMP COMPANY

DRIVER BY OTHERS

CUSTOMER SUPPLIED DRIVER DATA FOR HEADSHAFT

KWY 0.38" BX 1.69" CD 44.78"

250 HP MOTOR

DISCHARGE HEAD

MODEL HI-PRO (CI) W/16.5" & 20.0" BD
12" – ANSI CLASS 150-FF DISCHARGE FLANGE
X PACKING BOX NO SPLIT PACKING GLAND
N/A MECHANICAL SEAL N/A
N/A TENSION ASSEMBLY NO SOLE PLATE

COLUMN

12" X 0.330" WALL X THD N/A FLG'D
LINESHAFT X OPEN (N/A) ENCLOSED
SHAFT DIA 1.69" TPI 10 TPI TUBE DIA N/A

BOWL

2 STAGE E18LC BOWL ASSEMBLY
4000 US GPM FLOW 200 FT. HEAD
STRAINER X YES NO TYPE BASKET

MATERIALS

BOWLS	CI EN	COLUMN	A53, GR B
IMPELLERS	876 BZ (STD)	COLUMN CPLG	DI
BWL SFT	416 SS	SHAFT TUBE	N/A
COLLETS	316 SS	BRG RET	BZ
BOWL BRG	BOWL DWG	LINE SFT BRGS	RUBBER
BOLTING	SS	LINE SHAFT	SS (416)
TENSION BRG	N/A	SHAFT SLEEVES	N/A
MECH SEAL	N/A	SHAFT CPLG	SS (304)
SOLE PLATE	N/A	PACKING	GRAPHITE
BOWL WR	N/A	STRAINER	304SS
IMP WR	N/A	HEAD	CAST IRON
HEAD SHAFT	1045 CS	HEAD SHAFT CPG	CS (1215)
BOWL SURFACE FINSIH	STD PAINT; OD		
COLUMN SURFACE FINISH	STD PAINT; OD		
HEAD SURFACE FINISH	STD PAINT; OD		

PROJECT NAME
Q-60478-1

WEIGHT & THRUST ESTIMATES

BOWL 940 LBS COLUMN 1189 LBS HEAD 685 LBS
SHAFT 194 LBS TUBE 0 LBS DRIVER 0 LBS
HYD THRUST 5820 LBS DRIVER MAX THRUST N/A

SPECIAL NOTE: ASSEMBLE AS A SCVT PUMP

ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SHOWN.
FOUR STAGE ASSEMBLY SHOWN. C-109167
NOT FOR CONSTRUCTION UNLESS CERTIFIED. BUILD - 3

NOTE:

ALL DETAILS WERE PRODUCED FROM THE AUGUST, 2017 *DESIGN BASIC MEMORANDUM FOR BIG MUDDY RIVER MULTIPORT OUTFALL DIFUSSION SYSTEM* BY HORNER & SHIFRIN, ST. LOUIS, MO.

AIR VALVES LOCATIONS WERE ADDED BY ALLIANCE CONSULTING, INC., BECKLEY, WV UNDER THE DIRECTION OF WILLIAMSON ENERGY, LLC.

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630
CHARLESTON, WV (681) 217-2090

WATER MANAGEMENT PIPELINE DETAILS

POND CREEK 1 MINE

Prepared For

WILLIAMSON ENERGY LLC.
JOHNSTON CITY, IL

CAD BY	SMS	02/21/18	PROJECT NO. B17-222-1413	
CHECKED BY	JLP	03/09/18		
APPROVED BY	CEY	04/03/18	DRAWING NO. B17-222-E3	

Drawing: S:\b-files\B17-222\Drawings\B17222E3.dwg - Layout Tab: Layout1
Date: 3/9/2018 - Time: 8:39 AM - Plotted By: Jonathan Pyles
Xrefs:

DOCUMENT

32

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
MINE RELATED WATER POLLUTION CONTROL PERMIT

PERMIT NO.: 2017-MA-1186-1

DATE ISSUED: November 6, 2017

FINAL PLANS, SPECIFICATIONS, APPLICATION AND SUPPORTING DOCUMENTS

EXPIRATION DATE: September 30, 2022

PREPARED BY: Josh Phillips, P.E.
Williamson Energy, LLC

LOG NUMBERS: 1186-17, 1186-17-B and 1385-17

SUBJECT: Williamson Energy, LLC – Pond Creek Mine

Williamson Energy, LLC
P.O. Box 99
Johnston City, IL 62951

Permit is hereby granted to the above designated permittee to construct and operate the Water Management Facility referred to in the above subject heading, and described as follows:

A permit area consisting of 17.7 acres, also identified as Incidental Boundary Revision (IBR) No. 74 and Insignificant Permit Revision (IPR) No. 52 to OMM Permit No. 375, located in Section 12, Township 8 South, Range 3 East, Williamson County, Illinois, to be utilized for the construction of a Water Management Facility consisting of three (3) water holding cells.

Construction and development of the Water Management Facility includes topsoil removal, grading, foundation preparation and installation of a low permeability liner consisting of four (4) foot compacted clay with a hydraulic conductivity of 1×10^{-7} cm/sec within the Water Holding Cells. This Water Management Facility shall be performed in accordance with the procedures discussed and outlined in IEPA Log Nos. 1186-17, 1186-17-B and 1385-17 and shall be subject to all Special Conditions of the Permit.

Operation of the Water Holding Cells will consist of pumping mine infiltration water to the Cells and pumping from the Cells to the Slurry Impoundment/RDA or the Fresh Water Lake to be utilized in the preparation plant closed circuit water handling system. HDPE waterlines will be installed to circulate water to and from the Water Holding Cells. A water level indicator will be installed in the Water Holding Cells to continuously record the water elevation to ensure no discharge. A minimum freeboard of one (1) foot shall be maintained at all times in the Water Holding Cells. Pumpage capacity shall be continuously maintained for sufficient evacuation of water when necessary.

(Continued on Page 2)

This permit is issued in accordance with the Illinois Environmental Protection Act of 1970, the Title 35, Subtitle C: Water Pollution and Subtitle D: Mine Related Pollution Regulations adopted pursuant thereto by the Illinois Environmental Protection Act. THE STANDARD CONDITIONS OF ISSUANCE INDICATED ON THE ATTACHMENT TO THIS PERMIT (PAGE 1a) MUST BE COMPLIED WITH IN FULL. READ ALL CONDITIONS CAREFULLY.

RECEIVED
NOV 09 2017
Environmental Protection Agency
MARION REGIONAL OFFICE

Alan Keller

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

cc: IDNR, Office of Mines and Minerals
IDNR, Division of Water Resources
BOW/MPCP/FOS/Marion

SAK:DM:cs/7515c/10-26-17

Runoff from the area approved herein will be controlled by silt fence, mulching, seeding, vegetation, rock check dams, erosion control blankets, etc. No affected area stormwater runoff from the Water Management Facility shall be directed or discharged to any waters of the United States.

Four (4) monitoring wells identified as Well Nos. GW-33, GW-34, GW-35 and GW-36 have been installed as depicted in IEPA Log Nos. 1186-17, 1186-17-B and 1385-17. These wells shall be completed in the first water bearing zone. Groundwater monitoring shall be performed in accordance with Special Condition No. 5.

The abandonment plan shall be executed and completed in accordance with 35 Ill. Adm. Code 405.109.

This Supplemental Permit supersedes and replaces Permit Number 2017-MA-1186 which was previously issued for the herein permitted facilities.

This permit shall expire at such time as an NPDES permit is issued containing a Construction Authorization for the herein permitted facilities.

This Supplemental Permit is issued subject to the following Special Conditions. If such Special Conditions require additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval for issuance of a Supplemental Permit.

Special Condition No. 1: The Permittee to Construct shall be responsible for obtaining an NPDES Storm Water Permit prior to initiating construction if the construction activities associated with this project will result in the disturbance of one (1) or more acres total land area.

An NPDES Storm Water Permit may be obtained by submitting a properly completed Notice of Intent (NOI) form by certified mail to the Agency's Division of Water Pollution Control – Permit Section.

Special Condition No. 2: The four (4) foot compacted clay liner shall be installed in accordance with the Quality Assurance/Quality Control Plan contained in IEPA Log Nos. 1186-17, 1186-17-B and 1385-17.

Special Condition No. 3: This permit does not authorize a discharge into the waters of the United States from this facility. Any discharge into waters of the United States must be authorized under an NPDES permit.

Special Condition No. 4: Any proposed changes or modifications to the conditions or operating procedures will require notification and approval by the Agency prior to such changes or modifications being implemented.

Special Condition No. 5: Groundwater monitoring requirements for Well Nos. GW-33, GW-34, GW-35 and GW-36 are as follows:

a. Ambient background monitoring shall be performed for all referenced wells. Such ambient monitoring shall consist of six (6) samples collected during the first year (approximately bi-monthly) following well installation but no later than during the first year of operation or disturbance to determine ambient background concentrations. Background monitoring shall include the following list of constituents:

Aluminum	Fluoride	Sulfate
Antimony	Iron (dissolved)	Thallium
Arsenic	Iron (total)	Total Dissolved Solids
Barium	Lead	Vanadium
Beryllium	Manganese (dissolved)	Zinc
Boron	Manganese (total)	pH (field)
Cadmium	Mercury	Acidity
Chloride	Molybdenum	Alkalinity
Chromium	Nickel	Hardness
Cobalt	Phenols	Static Water Elevation
Copper	Selenium	
Cyanide	Silver	

b. Following the ambient monitoring as required under Condition No. 5(a) above, routine monitoring shall continue on quarterly basis as follows:

   i. Monitoring Well Nos. GW-33, GW-34, GW-35 and GW-36 shall continue to be monitored quarterly for the contaminants identified in Condition No. 5(a) above.

c. Following completion of active mining and reclamation, post-mining monitoring of all above referenced wells shall consist of six (6) samples collected during a 12-month period (approximately bi-monthly) to determine post-mining concentrations. Post-mining monitoring shall include the list of constituents identified in Condition No. 5(a) above.

d. Groundwater monitoring reports shall be submitted to the Agency in accordance with the following:

   Mailing address:

   Ilinois Environmental Protection Agency
   Mine Pollution Control Program
   2309 West Main Street, Suite 116
   Marion, IL 62959

   Should electronic filing be available and elected through IDNR/OMM, the Agency shall be notified via correspondence or e-mail at such time that the electronic filing has been completed.

   Completed groundwater monitoring reports shall be filed electronically or mailed and received by the IEPA at the address indicated above in accordance with the following schedule:

Period	Received by IEPA
January, February, March	May 1st
April, May, June	August 1st
July, August, September	November 1st
October, November, December	February 1st

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
MINE RELATED WATER POLLUTION CONTROL PERMIT

e. A statistically valid representation of background and/or post mining water quality required under Condition No. 5(a) above shall be submitted utilizing the following method. This method shall be used to determine the upper 95 percent confidence limit for each parameter listed above.

Should the Permittee determine that an alternate statistical method would be more appropriate based on the data being evaluated, the Permittee may request utilization of such alternate methodology. Upon approval from the Agency, the alternate methodology may be utilized to determine a statistically valid representation of background and/or post mining water quality.

The following method should be used to predict the confidence limit when single groundwater samples are taken from each monitoring (test) well.

i. Determine the arithmetic mean $(\overline{X}_b)$ of each indicator parameter for the sampling period. If more than one well is used, an equal number of samples must be taken from each well.

$$\overline{X}_b = \frac{X_1 + X_2 + \ldots X_n}{n}$$

Where:

$\overline{X}_b$ = Average value for a given chemical parameter
X_n = Values for each sample
n = the number of samples taken

ii. Calculate the background and/or post mining variance (S_b^2) and standard deviation (S_b) for each parameter using the values (X_n) from each sample of the well(s) as follows:

$$S_b^2 = \frac{(X_1 - \overline{X}_b)^2 + (X_2 - \overline{X}_b)^2 + \ldots + (X_n - \overline{X}_b)^2}{n-1}$$

$$S_b = \sqrt{S_b^2}$$

iii. Calculate the upper confidence limit using the following formula:

$$CL = \overline{X}_b \pm t\sqrt{1 + 1/n}\ (S_b)$$

Where:

CL = upper confidence limit prediction
(upper and lower limits should be calculated for pH)
t = one-tailed t value at the required significance
level and at n-1 degrees of freedom from Table 1
(a two-tailed t value should be used for pH)

iv. If the values of any routine parameter for any monitoring well exceed the upper confidence limit for that parameter, the permittee shall conclude that a statistically significant change has occurred at that well.

v. When some of the background and/or post mining values are less than the Method Detection Limit (MDL), a value of one-half (1/2) the MDL shall be substituted for each value that is reported as less than the MDL. All other computations shall be calculated as given above.

If all the background and/or post mining values are less than the MDL for a given parameter, the Practical Quantitation Limit (PQL), as given in 35 Ill. Adm. Code Part 724 Appendix I shall be used to evaluate data from monitoring wells. If the analytical results from any monitoring well exceed two (2) times the PQL for any single parameter, or if they exceed the PQLs for two or more parameters, the permittee shall conclude that a statistically significant change has occurred.

Table 1
Standard t-Tables Level of Significance

Degrees of freedom	t-values (one-tail)		t-values (two-tail)*	
	99%	95%	99%	95%
4	3.747	2.132	4.604	2.776
5	3.365	2.015	4.032	2.571
6	3.143	1.943	3.707	2.447
7	2.998	1.895	3.499	2.365
8	2.896	1.860	3.355	2.306
9	2.821	1.833	3.250	2.262
10	2.764	1.812	3.169	2.228
11	2.718	1.796	3.106	2.201
12	2.681	1.782	3.055	2.179
13	2.650	1.771	3.012	2.160
14	2.624	1.761	2.977	2.145
15	2.602	1.753	2.947	2.131
16	2.583	1.746	2.921	2.120
17	2.567	1.740	2.898	2.110
18	2.552	1.734	2.878	2.101
19	2.539	1.729	2.861	2.093
20	2.528	1.725	2.845	2.086
21	2.518	1.721	2.831	2.080
22	2.508	1.717	2.819	2.074
23	2.500	1.714	2.807	2.069
24	2.492	1.711	2.797	2.064
25	2.485	1.708	2.787	2.060
30	2.457	1.697	2.750	2.042
40	2.423	1.684	2.704	2.021

Adopted from Table III of "Statistical Tables for Biological Agricultural and Medical Research" (1947, R.A. Fisher and F. Yates).

* For pH only when required.

DOCUMENT

33

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

Subject: Williamson Energy, LLC – Pond Creek No. 1 Mine

Data: Log No. 1385-17

Reviewed by: D. Maschhoff **Date:** 10/26/17

Log No. 1385-17 ⇒ Water Holding Cell Construction and Operation IBR/IPR

Log No. 1385-17

- Supplemental information for the Subtitle D permit for Permit No. 2017-MW-1186.
- Incidental Boundary Revision (IBR) No. 74 and Insignificant Permit Revision No. 52 to OMM Permit No. 375.
- 17.7 acres located in Section 12, Township 8 South, Range 3 East, Williamson County, Illinois.
- The construction and activity is described under IEPA Log No. 1186-17.
- HDPE waterlines will be installed to circulate water to and from the proposed water holding cells. The water holding cells will be a series of three cells and depicted on the Surface Facilities Map (Drawing No. B17-116-E1).

* Action: Prepare Subtitle D Permit No. 2017-MA-1186-1.

1385 - 17
Due date 11-8-17
R07914

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

September 25, 2017

Mr. Carson Pollastro
Williamson Energy, LLC
P.O. Box 99
Johnston City, IL 62951

RECEIVED
SEP 28 2017
IL Environmental Protection Agency
Marion REGIONAL OFFICE

Re: Permit No. 375
Insignificant Revision No. 52
Incidental Boundary Revision No. 74

Dear Mr. Pollastro:

The appropriate Department technical staff has reviewed the proposed change dated August 8, 2017 and the supplemental information dated September 6, 2017, submitted by the permittee for the Pond Creek No. 1 Mine. The permittee has requested approval to add 17.7 acres to be used for the construction of three water holding cells and the installation of a HDPE pipe to convey water to the water holding cells. Furthermore, the permittee has requested approval to construct portions of the water holding cells on previously permitted area, construct a temporary access road, install dual 36-inch culverts and construct a temporary bridge. Insignificant permit revisions (IPR's) and incidental boundary revisions (IBR's) are allowed under 62 Ill. Adm. Code Sections 1774.13(b)(2) and (d), respectively.

Section 1774.13: The Department has determined the proposed alteration will not involve significant delay in achieving the final land use or a significant change in land use and is less than 5% of the total permit area, is in compliance with 62 Ill. Adm. Code 1700 – 1850 and is insignificant, and therefore exempts the permittee from submitting a significant permit revision application in accordance with Section 1774.13(b).

Further, the Department finds the permittee has demonstrated in its request, and field inspections by the Department's field representative have confirmed, that these areas meet the requirements for an incidental boundary revision, as outlined in 62 Ill. Adm. Code 1774.13(d). Section 1774.13(d)(6) publication requirements have been met. Section 1774.13(c) findings are below.

The Department grants permission to add the 17.7 acres and commence the activities outlined above as proposed.

DEPARTMENT FINDINGS

Section 1773.15(c)(12): The effect of the proposed permitting action on properties listed on or eligible for listing on the National Register of Historic Places has been taken into account by the Department.

Section 1817.57(a)(1): The applicant has requested a stream buffer zone variance for an area as delineated in the application. In accordance with Section 1817.57(a)(1), the Department finds that:

a. The original stream channel and its associated riparian vegetation will be restored; and

b. Mining activities will not cause or contribute to a violation of Section 1817.42 and will not adversely affect the water quantity and quality or other environmental resources of the stream.

Therefore, the Department authorizes surface mining activities closer than one hundred (100) feet of the top of the bank of the normal channel of the perennial or intermittent stream or through the stream.

Section 1817.97(b): Based on the 17 Ill. Adm. Code Part 1075 consultation, the Department has determined that the operations, as approved, will neither affect the continued existence of endangered or threatened species nor result in the destruction or adverse modification of their critical habitats, as determined under the Endangered Species Act of 1973 (16 USC 1531, et seq.).

Section 1817.150: The applicant has proposed the creation of roads in the permit area. Pursuant to Section 1817.150(a)(2)&(3) the Department has determined that the roads are primary roads. Pursuant to Section 1817.151(a) the construction or reconstruction of the road(s) shall be certified in a report submitted to the Department by a qualified registered professional engineer within thirty (30) days after completion of construction. The report shall indicate that the primary road has been constructed or reconstructed as designed and in accordance with the approved plan.

FEE AND BOND

Section 1777.17(c): The fee for the area will be $442.50. The fee is comprised of $442.50 for non-surface mining permit area ($5/acres x 17.7 acres x the 5 years the bond is in force).

Section 1800.15(d): The bond for the area will be $79,430.00.

The Department is in receipt of the required Fee/Bond.

PERMIT CONDITIONS

1. Pursuant to 62 Ill. Adm. Code 1817.41(c), the applicant shall install proposed groundwater monitoring well GW-36 within sixty (60) days of the issuance of this permit.

   A Boring log and well construction diagram shall be submitted for the installed groundwater monitoring well within thirty (30) days of the date well construction activities are completed. In addition to this information, the applicant shall provide an updated map showing the location of the newly installed well.

2. Pursuant to 62 Ill. Adm. Code 1817.41(c), background groundwater monitoring for each of the newly installed wells shall be conducted within the first year after well installation is complete.

can be found on the Department's Forms webpage at: https://www.dnr.illinois.gov/mines/LRD/Pages/FormsApplicationsMemoranda.aspx under Miscellaneous Permittee/Operator Forms. Proof of plugging of all boreholes shall be in accordance with Operator Memorandum 2015-02.

All other conditions and provisions contained in the approved permit also apply to this revision. Approval from this agency does not relieve the permittee from obtaining approval from other agencies requiring such.

Upon forwarding two copies of your request letter and maps to Illinois Environmental Protection Agency, Mine Pollution Control Program, 2309 West Main Street, Suite 116, Marion, Illinois 62959, mining activities on these 17.7 acres may commence.

Should you have any questions, please contact Will Gillespie at our Benton Office.

Sincerely,

Scott K. Fowler, Supervisor
Land Reclamation Division

SKF:WG:gr

cc: W. Gillespie
Manager, Mine Pollution Control Program, IEPA
M. Parrish

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

State of Illinois
Department of Natural Resources
Office of Mines and Minerals; Land Reclamation Division
One Natural Way
Springfield, IL 62702

PERMIT # 375
IPR AND IBR FOR 17.7 ACRES

POND CREEK MINE NO. 1
WILLIAMSON COUNTY, IL

Prepared for

WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B17-116-1413
AUGUST 2017

Beckley, WV

Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA

3 Four Coins Drive, Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

PART I

RECEIVED
OCT 03 2017
IL Environmental Protection Agency
REGIONAL OFFICE

State of Illinois
Department of Natural Resources
Office of Mines and Minerals
Land Reclamation Division
One Natural Resources Way
Springfield, IL 62702-1271

APPLICATION FOR SURFACE COAL MINING AND RECLAMATION OPERATIONS INCIDENTAL BOUNDARY REVISION IBR-1

PART I

DATE: August 8, 2017

NOTICE: This state agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Ill. Rev. Stat. 1987 Ch. 96 1/2, par. 7901.01 et seq. Disclosure of this information is voluntary, however failure to comply may result in this form not being processed. This form has been approved by the Forms Management Center.

1) A) General Information

(~~I~~)(~~We~~)(The) Williamson Energy LLC
(Name of Company, Corporation, Partnership or Individual)

P. O. Box 99, Johnston City, IL 62951 (618) 983-3020
(Address) (Telephone Number)

hereby submit application for an Incidental Boundary Revision to Permit 375

Name of Mine Pond Creek No. 1.

MSHA No. 11-03141

I, Mark Schuerger under penalty
(vice president or his duly authorized representative under the existing permit)

of perjury declare that all information provided in this application is true and correct to the best of my knowledge.

Authorized Person
Title

Surface Area:

ADDITIONAL ACRES REQUESTED 17.7 EXISTING PERMIT ACREAGE 703.3

(I) (We) **Mark Schuerger**
(Individual or Individuals)

under penalty of perjury declare on behalf of the applicant, Williamson Energy, LLC, that said applicant has valid documents which bestow upon the applicant a legal right to enter and commence surface coal mining and reclamation operations upon lands contained in the proposed IBR area, and such legal right is not in any way the subject of pending court litigation.

Dated this 8th day of August, 2017.

Signature / Authorized Person

ENGINEERING CERTIFICATION

I hereby certify the engineering design used in preparation of this application, attachments, and supplements were done by me or under my direct supervision.

I further certify to the best of my knowledge all such design is in accordance with all applicable local, state and federal laws, rules and regulations. I have placed an "X" on the line below if that item is relevant.

(1) ☒ Whereas the Reclamation Plan calls for an alternative land use, I also certify the plans to conform to applicable accepted standards for adequate land stability, drainage, vegetative cover, and aesthetic design appropriate for the post-mining use of the site.

(2) ☐ Whereas the operation proposes disposal of spoil or waste materials in areas other than mining workings or excavations, I also certify such fills are designed in accordance with recognized professional standards and all applicable laws.

(3) Certification of the Illinois Environmental Protection Agency-35 Ill. Adm. Code 405.104(a) Permit.

☒ In my professional judgment, the plans and specifications submitted as part of this application describe an operation which will meet all applicable effluent and water quality standards. I certify that I am familiar with all of the plans, specifications, reports, and maps submitted as part of this application and that said plans, etc. are accurate insofar as they represent existing conditions.

INDIVIDUAL P.E. CERTIFICATION

Claudio E. Yon — Name

062-050632 — Illinois Registration Number (Seal)

CLAUDIO ELI YON
062-050632
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

Alliance Consulting, Inc. — Firm

124 Philpott Lane, Beaver, WV 25813 — Address

304-255-0491 — Phone Number

Claudio E. Yon — Signature

8/8/17 — Date

PROFESSIONAL DESIGN FIRM CERTIFICATION

Complete if applicable. If not, respond _____

☒ As an employee of a "professional design firm" as defined by the Illinois Department of Financial and Professional Regulation, I certify that the professional design firm is registered and in good standing with the Illinois Department of Financial and Professional Regulation.

Alliance Consulting of West Virginia, Inc. — Professional Design Firm Name

184.006236 — Professional Design Firm Number

B) Indicate the type of disturbance and associated acreage.

Type of Disturbance	Existing Permit	IBR	Total
Area Stripping	20.1	0.0	20.1
Mine Waste Areas	277.4	0.0	277.4
Processing Areas & Support Facilities	4.7	0.0	4.7
Access, Haul Roads & Transport Facilities	180.9	0.3	181.2
Soil Storage Areas	28.9	0.0	28.9
Diversions	87.5	0.0	87.5
Coal Recovery (Gob & Slurry)	32.8	0.0	32.8
Other	32.2	17.4	49.6
Not to be Disturbed	38.8	0.0	38.8
Total	703.3	17.7	721.0

2) A) Provide name and address of every legal or equitable owner of record of the IBR area.

RESPONSE: Parcel Nos. 03-12-100-002, 03-12-100-004 and 03-12-100-005 are owned by: Williamson Energy, LLC, PO Box 99, Johnston City, IL 62951

B) Provide name and address of the owner of record for all surface and subsurface areas contiguous to any part of the proposed IBR area.

RESPONSE: Parcel Nos. 03-12-100-001, 03-12-100-003, 03-12-300-001 and 03-12-300-002 are owned by: Williamson Energy, LLC, PO Box 99, Johnston City, IL 62951

C) Show location of owners of record of those lands, both surface and subsurface, included in or contiguous to the IBR area on premining land use map or another map, if necessary.

RESPONSE: Refer to the Surface Facilities Map (Drawing No. B17-116-E1).

3) Provide name and address of any holder of record of leasehold interest for the IBR area.

RESPONSE: None.

4) Affidavits, Certifications

A) Complete affidavit regarding applicant's legal right to enter and begin surface coal mining and reclamation operations in the IBR area and whether that right is the subject of pending litigation. Identify the documents upon which affidavit is based by type and date of execution and identify specific lands to which each document pertains and explain the legal rights claimed by the applicant (1778.15(a)). If the private mineral estate to be mined has been severed from the private surface estate, provide copies of the documents required under Section 1778.15(B)(1)-(3). On the permit map or other designated map show the boundaries of land within the permit area upon which the applicant has the legal right to enter and begin surface mining activities.

RESPONSE: See Attachment I.4.A.

B) Complete certification for engineering aspects of the application. In addition to the general certification, three specific certifications are included which are applicable only if the box in front of each is marked. The first two cover special permit requirements and should be marked only when they occur for the proposed permit. The third certification covers the Illinois Environmental Protection Agency permit requirements. In most cases, an Illinois registered engineer will be required to certify IEPA permit requirements. Except as otherwise provided all maps, plans and cross-sections included in the permit application shall be prepared by, or under the direction of, and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act, a qualified registered structural engineer licensed under the Illinois Structural Engineering Act or if authorized by state law, a qualified registered professional land surveyor licensed under the Illinois Land Surveyors Act with assistance from experts in related fields.

RESPONSE: See Attachment I.4.B.

5) Areas Designated Unsuitable for Mining

A) Does proposed IBR area include --

(1) Lands within boundaries of the National Park System, National Wildlife Refuge System, National Recreation Areas, etc. [Section 1761.11(a)]?

Yes _____ No ___X___

(2) National forest land?

Yes _____ No ___X___

(3) Any land which will adversely affect any publicly-owned park or places included in or eligible for listing in the National Register of Historic places, etc. [per 62 Ill. Adm. Code 1761.11(a)(3) or Section 10, (B)(C) of the SCM-1?

Yes _____ No ___X___

If yes, complete Part II, Section 10, (B) & (C) of the SCM-1 or the UCM-1 Application.

(4) Any public roads which are to be removed, relocated or temporarily closed?

Yes _____ No ___X___

Indicate on the pre-mining land use map or other designated map the location of the public roads and attach a copy of the written agreement from the appropriate authority authorizing the relocation, removal or temporary closure.

Describe the measures to be used to insure that the interest of the public and land owners affected will be protected.

B) Will proposed IBR area be located --

(1) Within 100 feet of the right-of-way line of any public road?

Yes _____ No ___X___

If yes, explain proposed procedure for complying with regulation section 1761.11(d), including request for variance, if relevant. Provide location of public roads on pre-mining land use map or other designated map. Describe the measures to be used to insure that the interest of the public and land owners affected will be protected.

(2) Within 300 feet measured horizontally from any occupied dwelling?

Yes _____ No ___X___

If so, is waiver provided meeting requirements of Section 1761.15?

(3) Within 300 feet measured horizontally of any public building, school, church, community or institutional building or public park?

Yes _____ No ___X___

(4) Within 100 feet measured horizontally of a cemetery?

Yes _____ No ___X___

C) Are valid existing rights (per 1761.11) claimed for any part of the IBR area?

Yes _____ No ___X___

If yes, provide documentation to substantiate claim.

D) Provide a draft copy of the proposed newspaper notice and name of local newspaper of general circulation in which advertisement of the application will be published, per 62 Ill. Adm. Code 1774.13(d)(6). Certification of publication is to be furnished to the Department and must be received prior to Department approval of the IBR.

RESPONSE: Refer to Attachment Part I.5.D. for the draft copy of the newspaper notice. The notice will be published in the Daily Republican newspaper, located in Marion, IL.

PART I ATTACHMENTS

ATTACHMENT I.5.D

Attachment I.5.D.

PUBLIC NOTICE

Pursuant to the Surface Coal Mining Land Conservation and Reclamation Act (PA-81-1015, as amended) and the Rules and Regulations of the Act, Williamson Energy LLC, P. O. Box 99, Johnston City, IL 62951 hereby gives notice that on _____ 2017, an insignificant permit revision (IPR) / 17.7 acre contiguous incidental boundary revision (IBR) has been submitted to the Illinois Department of Natural Resources, Office of Mines and Minerals, Land Reclamation Division, One Natural Resources Way, Springfield, IL 62702-1271. The IPR?IBR application is to address changes to existing permitted area and to permit 17.7 acres located in Williamson County, NW ¼ of Section 12, Township 8 South, Range 3 East, along the east side of Liberty School Road.

Activities will include developing the site for water holding cells and constructing an access road.

Copies of the application are on file with the Illinois Department of Natural Resources, Office of Mines and Mineral, One Natural Resources Way, Springfield, IL 62702-1271.

Written comments concerning the operations should be addressed to the Office of Mines and Minerals, Land Reclamation Division at the Springfield office, no later than 7 days from the date of this notice.

PART II

PART II

PREMINING INFORMATION

Premining information is to be displayed on premining land use map unless otherwise indicated.

1) Describe how the IBR area perimeter will be marked and discuss the method or system employed to locate permit area perimeter and set markers along it. Designate a reference point outside the IBR area if different than the original permit. Provide a description of the reference point and a sketch relating the reference point to the IBR area perimeter.

RESPONSE: The permit boundary will be delineated by using PVC and/or metal post. The posts delineating the permit boundary surrounding the Water Holding Cells will be located within eye sight of one another.

The permit reference point can be located at the intersection of Permit 375 and Liberty School Road, approximately 5,392 feet due north of the intersection of Liberty School Road and Corinth Road. The reference point location is noted on the Surface Facilities Map (Drawing No. B17-116-E1).

2) Explain and locate areas where the IBR is contiguous to an existing permit.

RESPONSE: The proposed IBR area is contiguous to the current permitted boundaries on the east and north sides. Refer to the Surface Facilities Map (Drawing No. B17-116-E1) for additional details.

3) Give the acreages of each land use within the proposed IBR and existing permit area, employing land use categories of Section 1701.5 listed below, and delineate on premining land use map existing land uses in the proposed permit area and adjacent to it. Include on the premining land use map the location of all buildings and identify the current use of these buildings.

Pre-Mine Land Use	Existing Permit	IBR	Total
Cropland	542.1	0.0	542.1
Pasture land	7.2	0.0	7.2
Grazing land	0.0	0.0	0.0
Forestry	107.9	0.0	107.9
Residential	5.8	0.0	5.8
Industrial/Commercial	4.0	0.0	4.0
Recreation	0.0	0.0	0.0
Fish & Wildlife - Woody	34.9	0.0	34.9
Fish & Wildlife - Herbaceous	0.0	17.7	17.7
Fish & Wildlife – Delineated Wetland	0.0	0.0	0.0
Developed Water Resources	1.4	0.0	1.4
Undeveloped land	0.0	0.0	0.0
Total	703.3	17.7	721.0

RESPONSE: Refer to Map 5 – Soils Resource Map for additional information.

The 0.1 acres of delineated wetland previously identified is isolated. Field determination concluded that site was man-made from mining activities and less than

five years old. Therefore, no wetland exists within the proposed IPR/IBR area. Refer to Attachment II.3 for jurisdictional determination report.

4) Soils Information Map

A) Does the submitted soils map represent a map developed by the National Resources Conservation Service (NRCS)?

Yes ___X___ No_____.

If no, explain.

RESPONSE: Refer to Attachment II.4. (NRCS Custom Soil Resource Report).

B) Delineate on the soils map(s) the area which will incur actual mining (removal of overburden and/or deposition of overburden for the extraction of coal).

RESPONSE: Refer to the Soils Map (Drawing No. B17-116-B2). The IBR area and soil classifications are shown on the map.

C) Are any of the identified map units correlated as prime farmland by NRCS criteria?

Yes ___X___ No_____.

If yes, explain and provide documentation to meet the requirements of Section 1785.17, if a determination for grandfathering and/or negative determination is sought. If prime farmlands exist, which will not meet the exemption criteria described above, the approved prime farmlands restoration plan must be followed.

RESPONSE: Refer to Soils Map (Drawing No. B17-116-B2). Additional information can be found in Attachment II.4. (NRCS Custom Soil Resource Report).

D) Submit, by completing soils information chart, acreage totals of each map unit (soil type and slope classification) and land use capability classes in the IBR area and the percent slope range of each lettered slope classification used on the soil map.

RESPONSE: Soils Map (Drawing No. B17-116-B2). Additional information can be found in Attachment II.4. (NRCS Custom Soil Resource Report).

E) Provide, by completing soil information chart, acreage for each of the map units of high capability land (including grandfathered and negatively determined prime farmland) and non-cropland capability land with respect to areas which will be mined and areas which will incur other forms of disturbance (i.e., roads, ditches, etc.). Identify and provide map unit acreage values, if any, for areas which will not be disturbed.

RESPONSE: Soils Map (Drawing No. B17-116-B2).

F) Are selected overburden materials proposed to be used in lieu of or as a supplement to the A-horizon?

Yes _____ No___X___.

If yes, provide the appropriate information required under 1780.18(b)(4)/1784.13(b)(4).

R07931



LEGEND

- PROPOSED IBR BOUNDARY
- 1000 FOOT BOUNDARY OFFSET
- PERMIT 375
- PERMIT 375; IBR NO. 2 AREA
- PERMIT 375; IBR NO. 7 AREA
- PERMIT 375; IBR NO 63 AREA

LAND USE	INSIDE IBR BOUNDARY	INSIDE 1000 FT. BOUNDARY
CROPLAND	0 AC.	49.0 AC.
RESIDENTIAL	0 AC.	5.6 AC.
INDUSTRIAL/COMMERCIAL	0 AC.	91.7 AC.
FISH & WILDLIFE - WOODY	0.0 AC.	88.4 AC.
FISH & WILDLIFE - HERBACEOUS	17.7 AC.	24.3 AC.
FISH & WILDLIFE - FIELD DELINEATED WETLANDS	0.0 AC.	0.1 AC.
TOTAL	17.7AC.	259.1 AC.

SCALE

400 0 400 800 FEET

REV.	DATE	DESCRIPTION	P.M.
1	08/01/17	REVISE LEGEND AND SHOW IBR NOS. 2, 7, & 63	SMS

Alliance Consulting, Inc.
Engineers • Constructors • Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630

PRE-MINING LAND USE MAP

POND CREEK MINE NO. 1

Prepared For

WILLIAMSON ENERGY LLC.
P.O. BOX 99, JOHNSTON CITY, IL 62951

CAD BY	SMS	03/08/17	PROJECT NO. B17-116-1413	
CHECKED BY	SMS	-	DRAWING NO. B17-116-B1	
APPROVED BY	CEY	-		

Printed By: ssutphin
Date : Oct 03, 2017
Time : 10:23 AM
Z:\17116\17116B1R.dwg

PART II ATTACHMENTS

ATTACHMENT II.3.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

August 10, 2017

Project No. B16-454-1413

Mr. Keith McMullen
U. S. ARMY CORPS OF ENGINEERS
St. Louis District
1222 Spruce Street
St. Louis, MO 63103-2833

Request for U. S. Army Corps of Engineers' Jurisdictional Determination
Wetland and Stream Delineation Report
Williamson Energy, LLC Water Holding Cells
Williamson County, Illinois
Williamson Energy, LLC
Johnston City, Illinois

Dear Mr. McMullen:

On behalf of our client, Williamson Energy, LLC (Williamson), this letter has been prepared to request a Jurisdictional Determination and transmit a wetland and waters of the U.S. delineation report of the project area in association with the construction of the Williamson Energy Water Holding Cells. Alliance Consulting, Inc. (Alliance) and Williamson acknowledge that jurisdictional determinations are solely made by the U. S. Army Corps of Engineers and have submitted this request accordingly. This document has been prepared in general accordance with the December 28, 2004 Draft Guidance for Preparing a Jurisdictional Determination with Post Rapanos Protocols.

1.0 PURPOSE

The purpose of the wetland and waters of the U.S. delineation report was to identify "Waters of the United States" within and adjacent to the proposed Water Holding Cells project area. Both Alliance and Williamson realize that all determinations are preliminary until verified by the Corps of Engineers. However, this document represents our interpretation of current U. S. Army Corps of Engineers jurisdictional determination guidelines.

2.0 INTRODUCTION

The proposed project center is located approximately one mile north of Johnston City in Williamson County, Illinois and has its approximate center at Latitude 37.844254 N and Longitude -88.833956 W (B16-454-B39). Driving directions to the site are located in Appendix A.

The purpose of the project is to construct a water holding cell to be used for treatment of mine water via settling and retention. The permit area limits investigated total approximately 17.7 acres in size within Williamson County, Illinois (Figures, Drawing No. B16-454-B39).

3.0 METHODS

Field investigation of the permit area was conducted on November 8-14, 2016, and January 17, 2017. The weather conditions were sunny, warm, and dry. Suspect water resources including streams, wetlands, ponds or lake, and ditches, were initially sought using the offsite method in which secondary source information was evaluated prior to the site visit. Utilizing secondary data including; topographic maps (U.S. Geological Service [USGS]), National Wetlands Inventory (NWI) maps (U.S. Fish & Wildlife Service [USFWS]), aerial maps (NAPP), the Custom Soil Report and Watershed Boundary Dataset (Natural Resources Conservation Service [NRCS]), the evaluation was completed to attempt to identify the apparent or the most probable stream and wetland locations prior to the field review.

3.1 Stream Resources

Alliance conducted stream measurements to determine the total linear feet of streams within/adjacent to the study area. The study area was defined as a 25 foot buffer from the permit area. All points identified within the proposed study area were located using a TRIMBLE GEO XH, (subfoot accuracy) GPS unit.

3.2 Wetland Resources

Wetland resources within the study area were identified and their boundaries delineated in accordance with the Corps of Engineers Wetlands Delineation Manual (1987 Manual) (Environmental Laboratory, 1987) utilizing the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Environmental Laboratory, 2010). The 1987 Manual was followed in which wetlands are identified based on three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology. Wetland Data Forms and photographs have been included in Appendix B.

In areas determined to be wetlands, the wetland boundaries were flagged in the field and flag locations were surveyed using a GPS unit. The GPS flag points were then converted into a shape file which was then displayed using Geographic Information Systems (GIS) technology to create a graphic showing the site resources. The wetland areas were then calculated using the GIS area utility.

3.3 Open Water Resources

Open water resources within the permit area were identified and surveyed using a GPS unit. The GPS flag points were then converted into a shape file which was then displayed using GIS technology to create a graphic showing the site resources. The open water areas were then calculated using the GIS area utility.

4.0 SITE DESCRIPTION

4.1 Physical Characteristics and Land Use

The project area is located in Williamson County, Illinois near the town of Johnston City. The permit area is approximately 17.7 acres in size located within the Midwest region per the Corps Interim Regional Supplement (2010). It is generally characterized by the combination of a relatively low level of topographic relief, a humid climate with moderate to abundant rainfall, mixed prairie and hardwood natural vegetation, and the predominance of agricultural land uses including the extensive use of agricultural drainage systems (Environmental Laboratory, 2010). The project area has a history of extensive agricultural activities; current land use is agricultural fields with some wooded lots (Figures, Drawing B16-454-B2).

4.2 Drainage and Topography

The permit area is predominately situated on agricultural fields. The permit area is situated within Pond Creek, – Big Muddy River HUC 12 watersheds, all of which are situated in the Upper Mississippi Region HUC 8 watershed (07140106) (Drawing No. B16-454-B8). Drainage of the permit area occurs primarily by way of surface drainage to several ephemeral and intermittent streams that drain to Pond Creek and Big Muddy River, a traditional navigable water (TNW). Pond Creek, a perennial water, flows to the Big Muddy River, a perennial water which flows into the Mississippi River (TNW). The project area is not situated inside of the 100 year floodplain.

4.3 Soils

The principal soil parent materials of the Midwest Region are glacial tills and outwash, glacial like sediments, wind-blown loess, and alluvium deposited along major rivers and streams (Environmental Laboratory, 2010). Six (6) soil types were mapped as occurring within the permit area; one (1) of which is listed as hydric for Williamson County (Table 1). Mapped soils are listed in Table 1 (Figures, Drawing No. B16-454-B40).

Table 1. Descriptions of Soils Occurring within the Permit Area

Map Symbol	Soil Name	Slope	Hydric Soil?
12A	Wynoose silt loam	0-2 percent	Yes
13A	Bluford silt loam	0-2 percent	No
14C2	Ava silt loam,	5-10 percent	No
640A	Bluford silt loam	0-2 percent	No
640B2	Bluford silt loam	2-5 percent	No
3382A	Belknap silt loam	0-2 percent	No

5.0 ECOLOGICAL RESOURCES RESULTS

5.1 Stream Measurements

Alliance conducted stream measurements November 8-10, 2016 to determine the total linear feet of stream within the permit area. The USGS Topographical map identified zero (0) streams in the permit area and NHD data identifies zero (0) streams as occurring within the permit area.

Field investigation identified one (1) potentially jurisdictional wetland within the permit area (Table 2) (Figures, Drawing Nos. B16-454-B39. All drainage from the project area ultimately discharge to Pond Creek and/or tributaries of Pond Creek. Wetland Photographs are included in Appendix B.

Table 2. Stream Identified within the Permit Area

Stream Channel ID	Stream Name	Latitude	Longitude	Length	Stream Type	Flow Characteristics
No stream Channels were Identified within the Permit Area						

5.2 Wetland Resources

Alliance consulted the National Wetlands Inventory (NWI) for the permit area. NWI mapping identified one (1) wetland systems as occurring immediately adjacent to the permit area, which was field truthed (Figures, Drawing B16-454-B39). NWI identified wetlands which were evaluated were not delineated since they occurred outside the proposed project area.

5.3 Wetland Delineation

Wetland measurements were conducted by Alliance personnel on November 8 - 10, 2016 to determine the total acreage of wetlands within the permit area. One (1) wetland was identified by Alliance personnel within the permit area (Table 3). All identified wetlands were found to consist of one of the following wetland habitat types or a complex of one or more of the following per the classification system developed by Cowardin et al. (1979) for wetland classification:

- Palustrine Persistent Emergent (PEM) Wetland Habitat is characterized by erect, rooted herbaceous hydrophytes, excluding mosses and lichens and includes a vast array of grass-like plants, true grasses, and broad leaved plants (Cowardin, et al., 1979).
- Palustrine Forested (PFO) Wetland Habitat is characterized by woody vegetation that is 6m tall or taller (Cowardin, et al., 1979).
- PFO/PEM, Wetland Complexes were found to consist of an assemblage of two or more of the above-mentioned wetland habitat types.

Wetland ID	Hydrologic Connection*	Receiving Waters	8-Digit HUC	Wetland Type (Cowardin)	Est. size in permit area (ac.)	Dominant Wetland Community
Wetland A	Isolated	Isolated	Upper Mississippi Region/07140106	PEM	0.01	PEM
How the wetland(s) connects to TNW*:	Wetland A (isolated and non-jurisdictional)					
How the wetland(s) connects to TNW*:	Wetland A1 (adjacent) UNT of Pond Creek→ Pond Creek→ Big Muddy River					

Subject to verification by the USACE (TNW=Traditional Navigable Water, RPW=Relatively Permanent Water Perennial or Seasonal, NRPW=Non-RPW)

Wetland A as identified above was determined to be a man made depressional wetland that was generated by mining activities within the last 24 months. This wetland was field verified by USACOE personnel with Alliance Consulting on 8-8-17, and determined to be a non-jurisdictional resource.

Ditches
The field investigation identified no provisionally jurisdictional farm ditches.

5.4 Open Water
Alliance surveyed the permit area for areas that are considered "open water" by the U. S. Army Corps of Engineers. For this project, open water was considered to be "*an area that, during a year with normal patterns of precipitation, has standing or flowing water for sufficient duration to establish an ordinary high water mark, where aquatic vegetation is either non-emergent, sparse, or absent*". No open water features were identified within the permit area.

6.0 CLOSING

In closing, we trust that this letter report and supporting data are sufficient for your needs at this time. The services performed for this project were performed with the care and skill ordinarily exercised by reputable members of the profession practicing under similar conditions at the same time and the same or similar locality. No other warranty, expressed or implied, is made or intended by rendition of these consulting services or by furnishing oral or written reports of the findings made. This report has been prepared for the exclusive use of Williamson Energy, LLC.

If you have any questions or require clarification, please do not hesitate to call.

Respectfully submitted,

ALLIANCE CONSULTING, INC.

Alex Patterson
Staff Scientist

Braden Hoffman
Senior Project Manager

Enclosures

AP/BAH:kjs

file: 16454-02

REFERENCES CITED

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979, reprinted 1992. *Classification of wetlands and deepwater habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC.

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Environmental Laboratory. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region, Version 2.0 (USACE, 2010). ERDC/EL TR-10-9, U.S. Army Engineer Research and Development Center, Vicksburg, MS.

Natural Resource Conservation Service (NRCS). 2004. Watershed Boundary Dataset. U.S. Department of Agriculture. Accessed 2017.

Natural Resource Conservation Service (NRCS). Custom Soil Resource Report for Franklin County, Williamson Energy Mach Water Line. U.S. Department of Agriculture. Accessed 2017.

National Aerial Photography Program (NAPP). 2012. Digital Orthophotography Quarter Quadrangle. Ewing, IL.

U.S. Fish and Wildlife Service (USFWS). 1996. National Wetlands Inventory maps, Illinois Statewide map, U.S. Department of the Interior. Madison, WI.

U.S. Geological Survey (USGS). 1968 revised 1976. Topographical quadrangle map (7.5 minute series). Christopher, IL quadrangle. U.S. Geological Survey. Denver, CO.

U.S. Geological Survey (USGS). 1963 revised 1976. Topographical quadrangle map (7.5 minute series). Johnston City, IL quadrangle. U.S. Geological Survey. Denver, CO.

U.S. Geological Survey (USGS). 1963. Topographical quadrangle map (7.5 minute series). Pittsburg, IL quadrangle. U.S. Geological Survey. Denver, CO.

APPENDIX A

DRIVING DIRECTIONS

APPENDIX A
DRIVING DIRECTIONS

1. Get on I-64 E from S Tucker Blvd. and Chouteau Ave.
2. Head east on Spruce St. toward S Tucker Blvd for 98 feet.
3. Turn right at the 1st cross street onto S Tucker Blvd.
4. Turn left at the 1st cross street onto Chouteau Ave/Historic U.S. 66 E.
5. Continue straight onto Chouteau Ave for 335 feet.
6. Turn left onto S 6th St for 0.1 miles.
7. Take the ramp onto I-64 E.
8. Follow I-64 E and I-57 S to Herrin Rd in Johnston City. Take exit 59 from I-57 S for 111 miles.
9. Merge onto I-64 E entering Illinois for 0.8 mile.
10. Keep left to continue on I-55 N/I-64 E for 2.2 miles.
11. Keep right at the fork to continue on I-64 E/IL-3 N, follow signs for Louisville/St Clair Ave. Continue to follow I-64 E for 75.0 miles.
12. Keep right at the fork to continue on I-57 S, follow signs for Interstate 57 S/Memphis for 32.8 miles.
13. Take exit 59 toward Herrin Rd.
14. Take Corinth Rd to Liberty School Rd in Lake Creek Precinct for 7.5 miles.
15. Turn left onto Herrin Rd., go 0.2 mile.
16. Continue onto W Broadway Blvd. for 1.3 mile.
17. Continue onto Corinth Rd. for 4.8 miles.
18. Turn left onto Liberty School Rd. and go 1.1 miles to site.



APPENDIX B

WETLAND DETERMINATION DATA FORMS AND PHOTOGRAPHS

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: March Wetland City/County: Williamson Sampling Date: 11-8-16
Applicant/Owner: Williamson Energy State: IL Sampling Point: Wet A
Investigator(s): AD PO Section, Township, Range:
Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Concave
Slope (%): 0 Lat: 37.8428 Long: -88.8342 Datum: NAD 27
Soil Map Unit Name: NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No X
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No
Hydric Soil Present? Yes X No
Wetland Hydrology Present? Yes X No
Is the Sampled Area within a Wetland? Yes X No
Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. Ø			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Acer saccharinum	5	X	FACW
2. Salix nigra	5	X	OBL
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Scirpus cyperinus	5		OBL
2. Juncus effusus	10	X	OBL
3. Duckweed	10	X	OBL
4. Echinochloa muricata	5		OBL
5.			
6.			
7.			
8.			
9.			
10.			
	30 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1. X			
2.			
	0 = Total Cover		

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ 1 - Rapid Test for Hydrophytic Vegetation
__ 2 - Dominance Test is >50%
__ 3 - Prevalence Index is ≤3.0[1]
__ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

Remarks: (Include photo numbers here or on a separate sheet.)
Wetland recently mowed
P. 1+2 overview P. 3 soil

SOIL

Sampling Point: Wet A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix: Color (moist)	%	Redox Features: Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR Gry	100					clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- X Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- X True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 0.5

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 0.5

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

UL-B same as A

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: DIG-454-1413 City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson County State: IL Sampling Point: Wet A

Investigator(s): AD PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Plain Local relief (concave, convex, none): concave

Slope (%): 0 Lat: 37.8734 Long: -88.8826 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No	
Hydric Soil Present?	Yes X No	Is the Sampled Area within a Wetland? Yes Y No
Wetland Hydrology Present?	Yes X No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3. N/A			
4.			
5.			
	0 = Total Cover		

Sapling/Shrub Stratum (Plot size: 15)			
1. Salix nigra	20	X	OBL
2. Morus rubra	5	Y	FACU
3.			
4.			
5.			
	25 = Total Cover		

Herb Stratum (Plot size: 15)			
1. Typha latifolia	50	X	OBL
2. Phragmites australis	40	X	FACW
3. Polygonum persicaria	10		FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Remarks: (Include photo numbers here or on a separate sheet.)

Recently mowed

1-8 overview 9 soil

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- Y 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No

SOIL

Sampling Point: Wet B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/2	95	10YR 3/6	5	C	PL	clay-loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): _____

Water Table Present? Yes ___ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

R07948

WETLAND DETERMINATION DATA FORM – Midwest Region

Project/Site: B16-454-1413 City/County: Williamson Sampling Date: 11-8-16

Applicant/Owner: Williamson County State: IL Sampling Point: UPL A+B

Investigator(s): AP PO Section, Township, Range:

Landform (hillslope, terrace, etc.): Flood plain Local relief (concave, convex, none): convex

Slope (%): 0 Lat: 37.8421 Long: -88.8343 Datum: NAD27

Soil Map Unit Name: NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes	No X	Is the Sampled Area within a Wetland? Yes No X
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. N/A			
3.			
4.			
5.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. Acer rubrum	5	Y	FACW
2. Ulmus rubra	5	Y	FACW
3.			
4.			
5.			
	10 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Sol. Lago canadensis	30	X	UPL
2. Allium canadense	15	X	FACU
3. Plantago major	15	X	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2. N/A			
	0 = Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes No X

Remarks: (Include photo numbers here or on a separate sheet.)

Overview p. 4-5 soil = 6

Recently Mowed

SOIL

Sampling Point: UPL-A, B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/6	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 5 cm Mucky Peat or Peat (S3)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ Coast Prairie Redox (A16)
- ___ Dark Surface (S7)
- ___ Iron-Manganese Masses (F12)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Gauge or Well Data (D9)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): _____

Water Table Present? Yes ____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): _____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Project No. B16-454-1413

Mach Water Line



Photograph No. 1
Wetland A Overview



Photograph No. 2
Wetland A Soil

Project No. B16-454-1413

Mach Water Line



Photograph No. 1
Wetland A Overview



Photograph No. 2
Wetland A Soil

FIGURES

R07953

N

Wetland A Upland Pit

Wetland A Test Pit

Wetland A

NOTE;
WETLAND A WAS FIELD VERFIED BY ACOE PERSONNEL ON 8-8-17 AND DETERMINED TO BE A MAN MADE NON-JURISDICTIONAL RESOURCE

Wetland ID	Wetland Type	Size (acres)
Wetland A	PEM	0.08

Legend

- WETLANDS
- NWI IDENTIFIED WETLAND LIMITS
- IBR BOUNDARY
- ADJACENT STREAM RESOURCES

1 inch = 200 feet

0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/15/17.

REV.	DATE	DESCRIPTION	P.M.
1	8-10-17	REVISED PROJECT BOUNDARY	BAH

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
SUMMERSVILLE, WV
(304) 883-2360

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

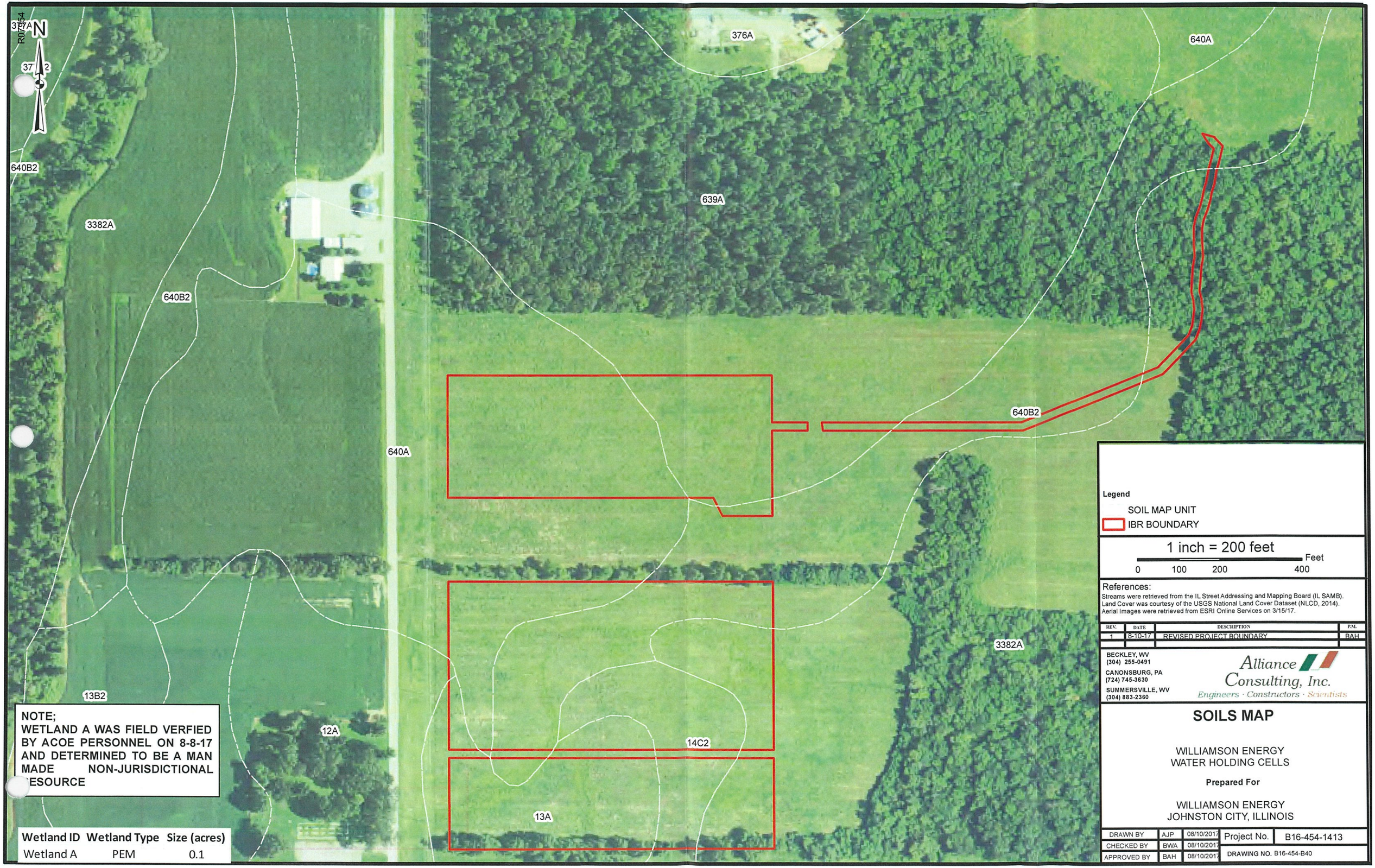
DELINEATION MAP

WILLIAMSON ENERGY
WATER HOLDING CELLS

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	08/10/2017	Project No.	B16-454-1413
CHECKED BY	BWA	08/10/2017		
APPROVED BY	BAH	08/10/2017	DRAWING NO. B16-454-B39	



NOTE;
WETLAND A WAS FIELD VERFIED BY ACOE PERSONNEL ON 8-8-17 AND DETERMINED TO BE A MAN MADE NON-JURISDICTIONAL RESOURCE

Wetland ID	Wetland Type	Size (acres)
Wetland A	PEM	0.1

Legend

SOIL MAP UNIT

IBR BOUNDARY

1 inch = 200 feet

0 100 200 400 Feet

References:
Streams were retrieved from the IL Street Addressing and Mapping Board (IL SAMB).
Land Cover was courtesy of the USGS National Land Cover Dataset (NLCD, 2014).
Aerial Images were retrieved from ESRI Online Services on 3/15/17.

REV.	DATE	DESCRIPTION	P.M.
1	8-10-17	REVISED PROJECT BOUNDARY	BAH

BECKLEY, WV
(304) 255-0491
CANONSBURG, PA
(724) 745-3630
SUMMERSVILLE, WV
(304) 883-2360

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

SOILS MAP

WILLIAMSON ENERGY
WATER HOLDING CELLS

Prepared For

WILLIAMSON ENERGY
JOHNSTON CITY, ILLINOIS

DRAWN BY	AJP	08/10/2017	Project No. B16-454-1413
CHECKED BY	BWA	08/10/2017	
APPROVED BY	BAH	08/10/2017	DRAWING NO. B16-454-B40

ATTACHMENT II.4.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Williamson County, Illinois

Permit 375 - Water Holding Cells IBR Area



April 3, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

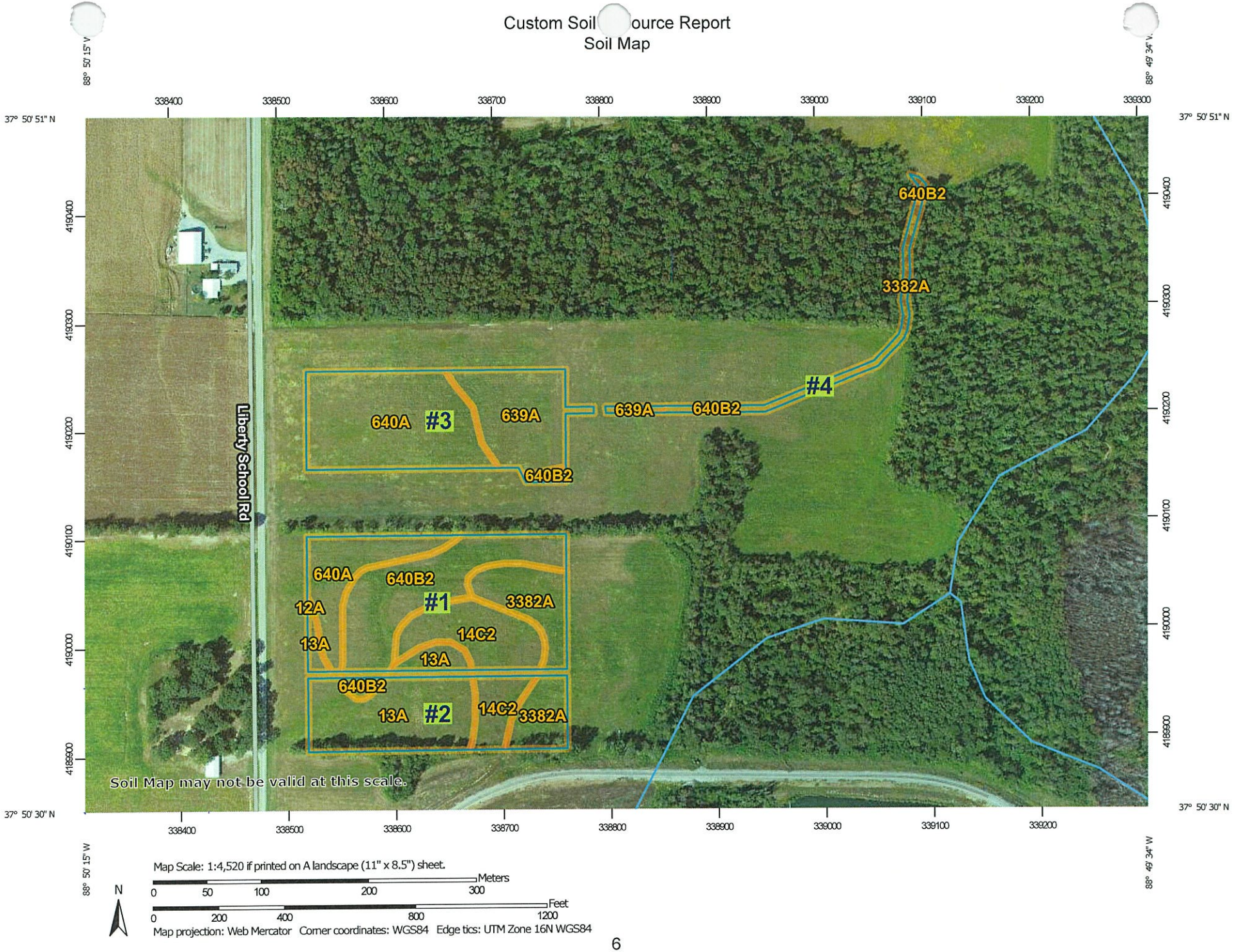
alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface 2
Soil Map 5
Soil Map 6
Legend 7
Map Unit Legend 8
Map Unit Descriptions 9
Williamson County, Illinois 11
12A—Wynoose silt loam, 0 to 2 percent slopes 11
13A—Bluford silt loam, 0 to 2 percent slopes 12
14C2—Ava silt loam, 5 to 10 percent slopes, eroded 13
639A—Wynoose silt loam, bench, 0 to 2 percent slopes 14
640A—Bluford silt loam, bench, 0 to 2 percent slopes 16
640B2—Bluford silt loam, bench, 2 to 5 percent slopes, eroded 17
3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded 18
References 20

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


88° 50' 15" W
88° 49' 34" W
37° 50' 51" N
37° 50' 30" N
338400
338500
338600
338700
338800
338900
339000
339100
339200
339300
4190400
4190300
4190200
4190100
4190000
4189900
Liberty School Rd
640B2
3382A
#4
639A
640B2
640A
#3
639A
640B2
640A
640B2
#1
3382A
12A
14C2
13A
13A
640B2
13A
#2
14C2
3382A
Soil Map may not be valid at this scale.
Map Scale: 1:4,520 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 50 100 200 300
Feet
0 200 400 800 1200
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

R07961

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Williamson County, Illinois
Survey Area Data: Version 11, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 13, 2011—Oct 21, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

R07962

Map Unit Legend

#1, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12A	Wynoose silt loam, 0 to 2 percent slopes	0.0	0.1%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	2.9%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.5	8.7%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	1.5	8.3%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	2.7	15.2%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	1.2	6.8%
Subtotals for #1		**7.4**	**41.9%**
Totals for Area of Interest		**17.7**	**100.0%**

#2, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13A	Bluford silt loam, 0 to 2 percent slopes	2.4	13.7%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	0.7	3.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	0.1	0.8%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	0.8	4.4%
Subtotals for #2		**4.0**	**22.7%**
Totals for Area of Interest		**17.7**	**100.0%**

#3, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
639A	Wynoose silt loam, bench, 0 to 2 percent slopes	2.0	11.3%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	3.5	19.7%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	0.1	0.6%
Subtotals for #3		**5.6**	**31.6%**
Totals for Area of Interest		**17.7**	**100.0%**

#4, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
639A	Wynoose silt loam, bench, 0 to 2 percent slopes	0.1	0.5%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	0.3	1.9%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	0.3	1.6%
Subtotals for #4		**0.7**	**3.9%**
Totals for Area of Interest		**17.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Williamson County, Illinois

12A—Wynoose silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t959
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wynoose and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wynoose

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over sangamon age paleosol till

Typical profile

Ap - 0 to 7 inches: silt loam
Eg - 7 to 19 inches: silt loam
Btg - 19 to 36 inches: silty clay
2Btg - 36 to 66 inches: silty clay loam
3Btgb - 66 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 13 to 24 inches to abrupt textural change
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.02 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Bluford

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

13A—Bluford silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t95c
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 7 inches: silt loam
E - 7 to 19 inches: silt loam
Btg - 19 to 35 inches: silty clay
2Btgx - 35 to 42 inches: silty clay loam
2Btg - 42 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 24 inches to abrupt textural change; 24 to 48 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Wynoose

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

14C2—Ava silt loam, 5 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95l
Elevation: 360 to 840 feet
Mean annual precipitation: 38 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ava, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Eroded

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear

Parent material: Loess over mixed loess and drift over till

Typical profile

Ap - 0 to 9 inches: silt loam
Bt and E - 9 to 28 inches: silty clay loam
Btx - 28 to 36 inches: silty clay loam
2Btx - 36 to 64 inches: silt loam
3Btb - 64 to 78 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Bluford, eroded

Percent of map unit: 10 percent
Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

639A—Wynoose silt loam, bench, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2t95n
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wynoose, bench, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wynoose, Bench

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over mixed loess and drift over ablation till

Typical profile

Ap - 0 to 7 inches: silt loam
Eg - 7 to 19 inches: silt loam
Btg - 19 to 36 inches: silty clay
2Btg - 36 to 66 inches: silty clay loam
3Btgb - 66 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 13 to 24 inches to abrupt textural change
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.02 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Bluford, bench

Percent of map unit: 10 percent
Landform: Structural benches
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

640A—Bluford silt loam, bench, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1lm67
Elevation: 360 to 660 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Bluford, bench, and similar soils: 90 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench

Setting

Landform: Structural benches
Landform position (two-dimensional): Summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 20 inches: silt loam
H3 - 20 to 35 inches: silty clay
H4 - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D

Hydric soil rating: No

Minor Components

Wynoose, bench

Percent of map unit: 5 percent
Landform: Structural benches
Landform position (two-dimensional): Summit, shoulder, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

640B2—Bluford silt loam, bench, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 1n88t
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 45 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford, bench, eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford, Bench, Eroded

Setting

Landform: Structural benches
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Peoria and roxana loess over outwash or basin fill

Typical profile

H1 - 0 to 7 inches: silt loam
H2 - 7 to 27 inches: silty clay
H3 - 27 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 7 to 24 inches to abrupt textural change; 21 to 55 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

3382A—Belknap silt loam, 0 to 2 percent slopes, frequently flooded

Map Unit Setting
National map unit symbol: 2tbrv
Elevation: 330 to 490 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 200 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition
Belknap, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belknap, Frequently Flooded

Setting
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile
Ap - 0 to 7 inches: silt loam
Bw - 7 to 59 inches: silt loam
Bg - 59 to 79 inches: silt loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 12.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Bonnie, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Piopolis, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf



Map Unit Legend

#1, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12A	Wynoose silt loam, 0 to 2 percent slopes	0.0	0.1%
13A	Bluford silt loam, 0 to 2 percent slopes	0.5	2.9%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	1.5	8.7%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	1.5	8.3%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	2.7	15.2%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	1.2	6.8%
Subtotals for #1		**7.4**	**41.9%**
Totals for Area of Interest		**17.7**	**100.0%**

#2, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13A	Bluford silt loam, 0 to 2 percent slopes	2.4	13.7%
14C2	Ava silt loam, 5 to 10 percent slopes, eroded	0.7	3.8%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	0.1	0.8%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	0.8	4.4%
Subtotals for #2		**4.0**	**22.7%**
Totals for Area of Interest		**17.7**	**100.0%**

#3, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
639A	Wynoose silt loam, bench, 0 to 2 percent slopes	2.0	11.3%
640A	Bluford silt loam, bench, 0 to 2 percent slopes	3.5	19.7%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	0.1	0.6%
Subtotals for #3		**5.6**	**31.6%**
Totals for Area of Interest		**17.7**	**100.0%**

#4, Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
639A	Wynoose silt loam, bench, 0 to 2 percent slopes	0.1	0.5%
640B2	Bluford silt loam, bench, 2 to 5 percent slopes, eroded	0.3	1.9%
3382A	Belknap silt loam, 0 to 2 percent slopes, frequently flooded	0.3	1.6%
Subtotals for #4		**0.7**	**3.9%**
Totals for Area of Interest		**17.7**	**100.0%**

N

LEGEND

- PROPOSED PERMIT BOUNDARY
- PERMIT 375
- 13A — SOIL–MAP UNIT SYMBOL
- #1 — AREA OF INTEREST (SOILS AREA)
- T8S R5E 1 — TOWNSHIP/RANGE/SECTION

SCALE

400 0 400 800 FEET

REV.	DATE	DESCRIPTION	P.M.

Alliance Consulting, Inc.
Engineers • Constructors • Scientists
BECKLEY, WV (304) 255–0491
CANONSBURG, PA (724) 745–3630

SOILS MAP

POND CREEK MINE NO. 1

Prepared For

WILLIAMSON ENERGY LLC.

P.O. BOX 99, JOHNSTON CITY, IL 62951

CAD BY	SMS	03/09/17	PROJECT NO. B17–116–1413	R07
CHECKED BY	SMS			
APPROVED BY	CEY		DRAWING NO. B17–116–B2	

Printed By: ssutphin
Date : Oct 03, 2017
Time : 10:24 AM
Z:\17\116\17116B2.dwg

PART III

PART III

OPERATIONS PLAN

1) Explain the proposed operation and why the IBR is needed. Locate on a mining operations map.

RESPONSE: The purpose of this application is to add 17.7 adjacent Incidental Boundary Revision (IBR) acres to the permit for the purpose of constructing water holding cells and to address the Insignificant Permit Revision (IPR) for changes to the existing permit operation plan. No surface and/or underground mining is proposed in this application.

Changes to the existing permit operations plan (IPR)

In addition to the proposed IBR area, this application will address Insignificant Permit Revision (IPR) changes to Permit 375. The changes include: construction of portions of the proposed water holding cells on area permitted for access and equipment storage on previous IBR No. 2 and 63 areas, construction of the remaining portion of the proposed access road along the northern and eastern sides of the existing railroad loop, installation of HDPE waterlines from the water holding cells to existing on-site facilities and from the on-site facilities to the water holding cells. Each of these changes will be explained below.

The proposed water holding cells will be construction in area being added by the proposed IBR and across area previously permitted by Permit 375; IBR 2 and IBR 63. The IBR 2 area affected by the water holding cells was used as a staging area for a concrete borehole. The concrete borehole has been grouted and abandoned and is located outside the footprint of the water holding cells. The IBR 63 area affected by the water holding cells was used for access to an emergency concrete borehole. This emergency concrete borehole has been grouted and abandoned and is located outside the footprint of the water holding cells. Refer to the Pre-Mining Land Use Map (Drawing No. B17-116-B1) for the location of the existing permit boundary, the proposed IBR boundary and the IBR Nos. 2 and 63 boundaries. Post Mining Land Use changes for the IBR Nos. 2 and 63 are discussed in Part IV of this application.

An access road is proposed as part of the IBR application, however, the majority of the access road will be constructed within the existing Permit 375 permit boundary. The proposed access road will be used to transport excavated material (soil) from the water holding cells construction site to the Refuse Disposal Area No. 2. The material will be placed on the out slopes of the refuse area. Refer to the Surface Facilities Map (Drawing No. B17-116-E1) for the location of the proposed access road and the soil placement area.

Equipment to be used will include excavators, dozers, compactors, scrapers, and/or trucks for the construction of the water holding cells and a portion of the proposed access road.

HDPE (slurry) waterlines will be installed to circulate water to and from the proposed water holding cells. Sections of individual pipes will be heat-fused together and at certain intervals, a mechanical clamp will be used. These waterlines will be buried, when possible. Along the existing railroad loop, the propose waterlines will be buried on the inside edge of the proposed access road and the railroad embankment. In areas where the waterlines are not buried, the waterlines will be anchored to the ground to prevent "walking" under expansion/contraction weather conditions. The psi pressure rating is very high on these pipes, however for the proposed use, minimal pressure will be places on these pipes, thus insuring accidental leaks. This application is proposing to run pipeline(s) from the existing refuse fine coal refuse pool area, the existing Fresh Water Lake and the Dean Road Shaft (mine water extraction pump site).

Refer to Part III Attachments; Appendix B for additional information.

Proposed IBR Area

An additional 17.7 acres will be added to Permit 375 for the proposed water holding cells. The cells will be constructed by excavating down to an elevation of 435 and excavated material will be used to construct the embankments and the excess will be used to cover part of the side slopes of the existing coarse coal refuse facility.

The Water Holding Cells will hold water being pumped from the underground mine or the clarified water from the fine coal refuse impoundment area. This water will be pumped back into the existing water management system that supply water to the preparation plant or back to the active mining area. Electric pumps will be located in Cells B and C and diesel pumps will be on site as backups. Refer to Part III Attachments; Appendix B for additional information.

To protect the surrounding groundwater hydrology, the cells will be constructed with a compacted 4 foot clay liner. To verify the availability of suitable material in the area, six soil borings (WHC-1 through 6) were drilled to bedrock in August, 2015 for the proposed Water Holding Cells. Adjacent to these borings, shallow offset borings (WHC-1A through 6A) were drilled to collect soil samples for permeability tests using Shelby tubes. The 4 foot thick clay liner will minimize vertical percolation of precipitation and surface water, which comes into contact with the Water Holding Cells and consequently minimize impacts to groundwater. The thickness of the clay and the proposed grades for construction of Water Holding Cells are shown on Drawing No. B17-116-E2 entitled, "Water Holding Cells Plan View and Sections".

Permeability boring WHC-1A and 2A were analyzed and the results are contained in Attachment III.2.A.1. The Shelby tube samples tested are all from the clay till, at 6-inch increments. The results from these samples are similar to the samples taken in

the adjacent Permit 417 site. The redistributed clay used to construct the Permit 417 clay liner met or exceeded the permeability requirement of $1X10^{-7}$. Based on the information, construction of a clay liner for the Water Holding Cells will be possible. Field testing will be conducted to insure the permeability requirement is met.

Three (3) groundwater monitoring wells (GW-33, GW-34 and GW-35) have been installed in the vicinity of the Water Holding Cells. Refer to Attachment III.1 for the boring logs, sampling information and well completion reports.

During final reclamation of the site, the cell will be de-watered, all sediment removed and disposed of properly, the embankment and open channel spillways removed and the all disturbed area will be vegetated. The incised cells will remain as a fish and wildlife –water area. The lowest elevation for the incise cells will be located and open channels vegetated spillways capable of passing the 100 year – 6 hour storm event will be constructed. Cell B will discharge into Cell A. Cells A and C will discharge into natural drainage channels as depicted on the Reclaimed Water Holding Cells Plan View and Section drawing (Drawing No. B17-116-E4).

Refer to Part IV for post mining land use changes for the existing permit areas being utilized by the water holding cells.

2) Surface Drainage Control

A) 1) Locate on the mining operations map or on a separate drainage map all proposed drainage control systems. Show drainage patterns of all affected mining areas.

RESPONSE: Refer to the Surface Facilities Map (Drawing No. B17-116-E1).

2) Will all surface drainage from the affected mining area be collected and treated prior to leaving the IBR area?

Yes _____ No ___X___

If yes, delineate how and where surface drainage will be collected and treated, and list permit numbers and type of permit that the drainage control systems are operated under. If above answer is no, explain how regulatory compliance will be achieved without treatment, i.e., address the requirements of 1816.46(e)/1817.46(e).

RESPONSE: Compliance with Section 1817.46(e) will be maintained. Alternate sediment control measures will be used in lieu of a siltation structure for affected areas. Areas associated with the Water Holding Cells and the proposed access road will be disturbed for a limited amount of time. During construction of the Water Holding Cells and proposed access road, silt fence will be installed along the downstream sides of the site. Upon completion of the Water Holding Cells and the proposed access road, exposed soils will be permanently vegetated. Silt fence will be maintained and/or replace along the downstream toe of the water holding cells and the access road until reclamation activities are completed.

B) Will all surface drainage from unaffected areas be intercepted and diverted around the affected mining area?

Yes _____ No ___X___

If no, please discuss.

RESPONSE: The Water Holding Cells will be constructed above grade, therefore surface runoff will follow the natural drainage patterns around the cells. The existing railroad loop will divert surface drainage away from the proposed access road.

C) Overland Flow Diversions and Sediment Ponds:

Are either overland flow diversions or sediment ponds to be constructed?

Yes _____ No ___X_____

If yes, complete applicable parts of the SCM-1 or UCM-1 Part IV (surface drainage control).

RESPONSE: No overland flow diversions or sediment ponds are proposed by this permit. The proposed water holding cells will be used as a water storage facility, will be incorporated into the existing water management system currently utilized by the mining operation. The holding cells are not intended to be used as sediment control structures or to be used to comply with water quality laws. Information for the construction of the water holding cells is included in this application.

Mine infiltration water will be pumped to the Water Holding Cells. Clarified decant water will be able to be pumped from the Slurry Impoundment to the Water Holding Cells as well, if needed, to maintain appropriate water levels in the impoundment. From the Water Holding Cells, water can be pumped to the Impoundment or to the Fresh Water Lake to be utilized in the Preparation Plant. As a result, process water and mine infiltration water will not be stored in stormwater ponds on-site not designed for this purpose.

A 4 foot thick clay liner will be installed beneath the footprint of the Water Holding Cells to minimize the potential of impacting the groundwater regime. An 8 foot wide open channel grass-lined spillway has been sized for a 25 year / 6 hour storm event and will be installed between Cell A and Cell B. Another 8 foot wide open channel grass-lined spillway will be installed in the southeast corners of Cell B and Cell C. These spillways will function as an emergency spillway only. No NPDES outlet discharge point is proposed. The water level within the Cells B and C will be maintained by a pump, which will circulate water back to the existing water management system that feeds the preparation plant.

Refer to Attachment III.2.C for Appendix A; SEDCAD calculation, Appendix B; Water Management Facility and Appendix C; Construction Quality Assurance and Quality Control (CQA/QC) information for clay liner.

D) Are surface mining activities, including road crossings, proposed within 100 ft of any stream (ephemeral, intermittent, or perennial)?

Yes _____ No ___X_____

If yes,

a) For any stream(s) located outside the proposed permit boundary where disturbance within 100 ft is proposed go to Part D.2

b) For any stream(s) located **within** the proposed permit boundary where disturbance within 100 ft is proposed go to Part D.1. If No, go to Part D.6.

D.1. Provide a Stream Delineation Report and/or Wetland Delineation Report. Information contained in the report(s) shall meet the requirements found at 1780.14/1784.23, 1780.29/1784.29, 1816.43/ 1817.43 and 1816.97/1817.97.

Indicate the number of each type of stream located within the proposed permit area.

☐ Ephemeral ☐ Intermittent ☐ Perennial

D.2 Is a stream buffer variance requested?

Yes _____ No _____

If **YES**,

a) For stream(s) located **outside** the proposed permit boundary go to Part D.3.

b) For stream(s) located **inside** the proposed permit boundary go to Part D.4.

If **NO**, provide a justification that each disturbed stream is ephemeral based on both parts of the definition of ephemeral stream found at **Section 1701.5 Appendix A.** Briefly describe the disposition of the ephemeral stream(s) during operations and post- mining. Nomenclature of ephemeral streams must be consistent with maps and reports. No further information is required in this part of the application if all streams are ephemeral.

D.3 For each intermittent and/or perennial stream located **outside** the permit boundary where a stream buffer variance is requested, provide the name of the stream and describe how the requirements of Section 1816.57/1817.57 will be met. No further information is required for streams outside the proposed permit boundary.

D.4 For each intermittent and/or perennial stream located **inside** the permit boundary where a buffer variance is requested, describe the proposed activities. Where a bridge, road, culvert or other crossing is proposed for any streams that will not be diverted, provide the information required in Section 1780.37/1784.24. In addition, describe how compliance with Section 1816.57/1817.57 will be achieved.

D.5 For each stream diversion complete the applicable parts of the SCM-1 or UCM-1.

D.6 Discuss how the designated 100 ft stream buffer zone will be marked for any intermittent and/or perennial stream that will not be disturbed by surface mining activities. Cleary indicate the 100 ft. stream buffer zone on all maps. If NO streams are located within the proposed permit boundary or within 100 ft of the proposed permit boundary indicate N/A.

3) Roads and other activities:

A) Are roads to be constructed in the IBR area?

Yes ___X___ No _____

If yes, complete the applicable part of the SCM-1or UCM-1 (transportation facilities).

RESPONSE: An access road will be constructed from the water holding cells and along the northern and eastern sides of the Permit 375 railroad loop. The access road will be used to transport excavated material (soil) from the water holding cells construction site to the Refuse Disposal Area No. 2, where it will be used for reclaiming the outslopes of the impoundment. Refer to Attachment III.3.A for additional information on the access road and the Proposed Road and Bridge Profile and Sections (Drawing No. B17-116-E3).

B) If the operations involve blasting, or any other activities not specifically addressed above, complete applicable parts of the SCM-1 or UCM-1.

RESPONSE: No blasting or other activities are proposed.

4) Are any existing structures proposed for utilization in the IBR?

Yes ___X___ No _____

If yes, complete Part IV.4 of the SCM-1 or UCM-1.

RESPONSE: An existing permitted access from Liberty School Road may be utilized for access to the water holding cells area. Previously permitted area associated with IBR Nos. 2 and 63 will be re-disturbed in the construction of the water holding cells. Refer to the Pre-Mining Land Use Map (Drawing No. B17-116-B1) for the location of the IBR areas and the footprint of the proposed water holding cells.

PART III ATTACHMENTS

ATTACHMENT III.1

UCM-1 PART IV 7) J) and K)

UCM-1 PART IV

OPERATIONS PLAN

7) Surface Drainage Control

J) Permanent and Temporary Impoundments, Ponds, Banks, Dams and Embankments

1) All temporary and permanent impoundments must meet the requirements of 62 Ill. Adm. Code 1817.49. Will the mining operation involve the construction of any impoundments other than those waste retention?

Yes X No _____

If yes, include the following information:

a) Locate on mining operations map all impoundments, dam locations, and watershed limits, indicate which impoundments are proposed to be permanent and complete Part V 3)D) of the application.

RESPONSE: Refer to the Surface Facilities Map (Drawing No. B17-116-E1).

b) Provide construction and maintenance details of dams, spillways, seepage control measures, and erosion control measures for inlets and outlets. Employ maps and cross sections where necessary. Where design plans for proposed structures are not provided, submit a certification statement providing a schedule for submission of detailed design plans for each structure.

RESPONSE: Refer to the Part III Attachments; Appendices A, B, and C and the Water Holding Cells Plan View and Sections (Drawing No. B17-116-E2).

2) Describe proposed reclamation plans for each structure, including a time table and plans for removal and disposal of material. Each plan shall:

a) Be prepared by or under the direction of, and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act,

b) contain a description, map, and cross-section of the structure and its location,

c) contain preliminary hydrologic and geologic information required to assess the hydrologic impact of the structure,

d) if underground mining has occurred, the plan shall contain a survey describing the potential effect on the structure from subsidence of the subsurface strata resulting from the post underground mining operations,

e) for structures where the detailed design plans are not submitted to the Department with the general plan, the plan shall contain a certification

statement which includes a schedule setting forth the dates that detailed design plans are to be submitted. For these structures, the detailed design plans must be submitted to the Department and approved in writing prior to the beginning of construction.

RESPONSE: **Refer to the Post Mining Land Use Map (Drawing No. B17-116-B3) and the Reclaimed Water Holding Cells Plan View and Sections (Drawing No. B17-116-E4).**

As stated in Part III 1) of this application, the final reclamation will be to de-water the cells, removed all sediment and dispose of it in an appropriate area, removed the embankments and vegetate the disturbance. The remaining excavated portion of the cells will remain and be designated as a post mining land use of Fish and Wildlife- Water.

3) For each structure that meets or exceeds the size or other criteria of MSHA, 30 CFR 77.216(a), the detailed design plan shall:

   a) Be prepared by or under the direction of and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act,

   b) include any design and construction requirements for the structure, including any required geo-technical information,

   c) describe the operation and maintenance requirements for each structure, and

   d) describe the timetable and plans for removal of each structure if appropriate.

RESPONSE: **The proposed water holding cells do not meet the criteria state forth by 30 CFR 77.21(a). Refer to the chart and note on the Water Holding Cells Plan View and Sections (Drawing No. B17-116-E2).**

4) For each structure that does not meet or exceed the size or other criteria of MSHA, 30 CFR 77.216(a), the detailed plan shall:

   a) Be prepared by or under the direction of and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act,

   b) include any design and construction requirements for the structure, including any required geo-technical information,

   c) describe the operation and maintenance requirements for each structure, and d) describe the timetable and plans for removal of each structure if appropriate.

RESPONSE: **Refer to the Part III Attachments; Appendices A, B, and C and the Water Holding Cells Plan View and Sections (Drawing No. B17-116-E2).**

K) If any of the following questions are answered yes, a permit may be needed from Illinois Department of Natural Resources, Office of Water Resource Management.

1) Will the mining operation involve the construction of any levees, dikes, haul roads or other similar structures or the placement of any fill along or in the flood plain of any stream serving a drainage area of ten (10) square miles or greater at the point of construction?

Yes _____ No __X__

2) Will the mining operation involve any relocation or diversion of or any construction activity in, over, under or along the banks of any stream serving a drainage area of ten (10) square miles or greater at the point of construction?

Yes _____ No __X__

3) Is there any urban development (residential, commercial or industrial uses) in the areas immediately surrounding the mining operation?

Yes _____ No __X__

(If yes, please re-answer questions 1 and 2 above applying a one (1) square mile drainage area limit.)

4) Will the mining operation involve the construction, major modification, or removal of any dam which in the event of failure would have probability for loss of life or additional economic loss in excess of that which would occur downstream of the dam in the absence of the dam?

Yes _____ No __X__

5) Will the mining operation involve the construction, major modification, or removal of any dam 25 feet or more in height?

Yes _____ No __X__

6) Will the mining operation involve construction, major modification, or removal of any dam which would have an impounding capacity of 50 acre feet or more?

Yes _____ No __X__

RESPONSE: **Refer to the Part III Attachments; Appendix D for the drawings prepared for OWR and the Permit Not Required Notification Letter from Mr. Paul Mauer, State Dam Safety Engineer.**

SOIL BORINGS

Holcomb Foundation Engineering Co., Inc.

R07992

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

393 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

September 15, 2015

Williamson Energy, LLC
211 North Broadway, Suite 2600
St. Louis, MO 63102

Attention: Mr. Josh Phillips

Re: Soil Borings and Laboratory Tests
Pond Creek Mine – Water Holding Cell #1
Johnston City, Illinois
HFE File H-14179
PO 4500102154

Dear Sir:

From August 17 to 18, 2015, we drilled six soil borings in the Water Holding Cell #1 area. The borings were advanced to bedrock, then shallow offset borings were drilled adjacent to the deeper boring to sample soils with Shelby tubes for permeability tests. Permeability tests will be performed on each 6" of the upper five feet of Shelby tubes. The tests for Borings #WHC16-1A and #WHC16-2A are enclosed. We are holding the Shelby tubes for Borings #WHC16-3A to #WHC16-6A, and will not test these unless authorized.

The Boring Logs and Permeability Tests are attached. If you should have any questions or if we can be of further assistance, please feel free to contact us at your convenience.

Sincerely,

HOLCOMB FOUNDATION ENGINEERING CO.

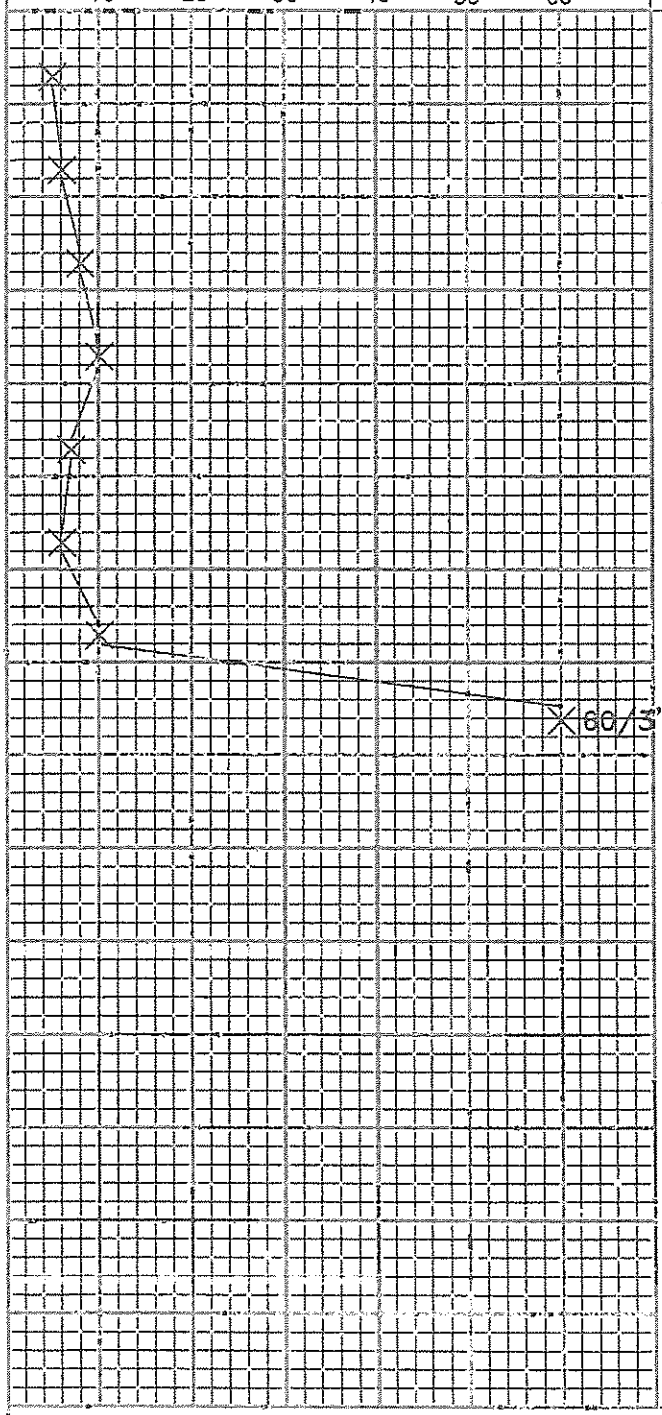
Timothy J. Holcomb, P.E.

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY J. HOLCOMB
062-042149
Exp 11-30-17
ILLINOIS

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-1

R07993



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 450.38
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		**Brown Mottled Gray Silty CLAY** (CL)
	3	ss		
10	4	ss		
	5	ss		
15	6	ss		Brown Mottled Gray Silty to Sandy CLAY (CL)
	7	ss		
	8	ss		Gray SHALE
20				**End of Boring @ -19.5'**
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

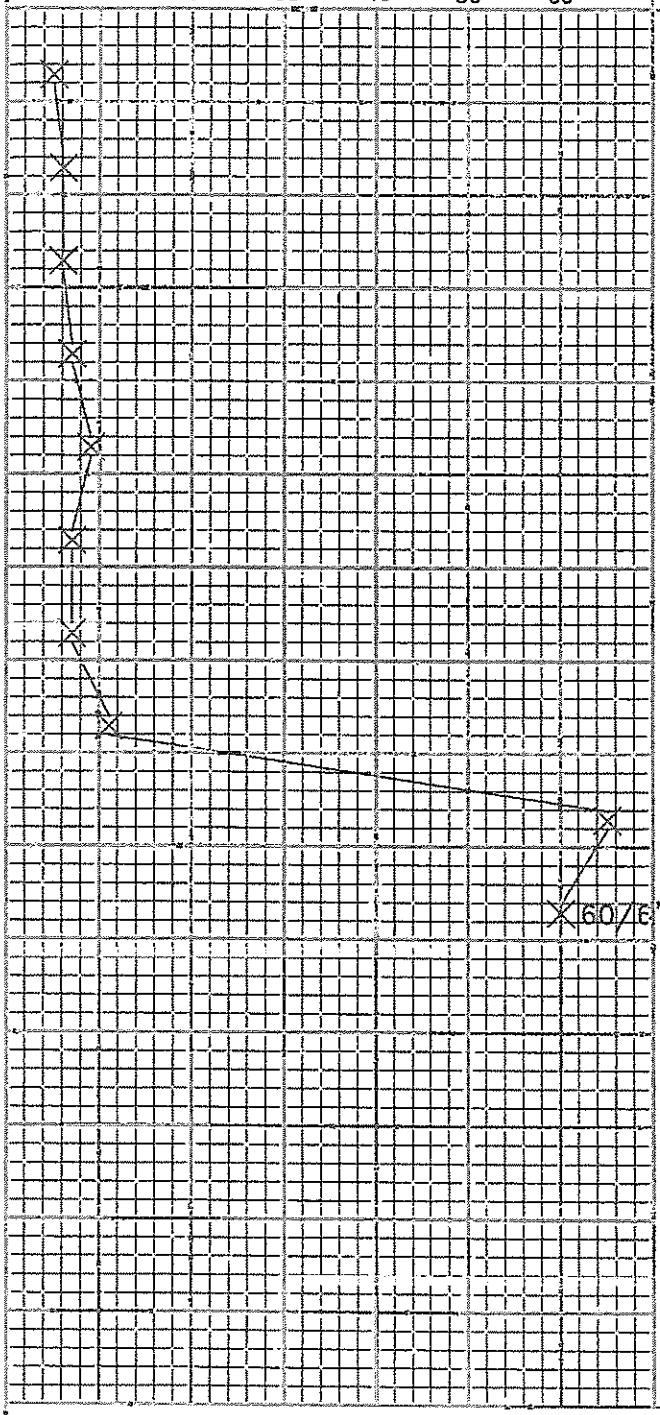
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-2

R07994



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 444.92
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		**Gray Mottled Brown Silty CLAY** (CL)
	3	ss		
10	4	ss		
	5	ss		Brown Sandy CLAY (CL) **with sand seams**
15	6	ss		
	7	ss		
20	8	ss		
	9	ss		Gray SHALE
25	10	ss		
				End of Boring @ -25.0'
30				
35				

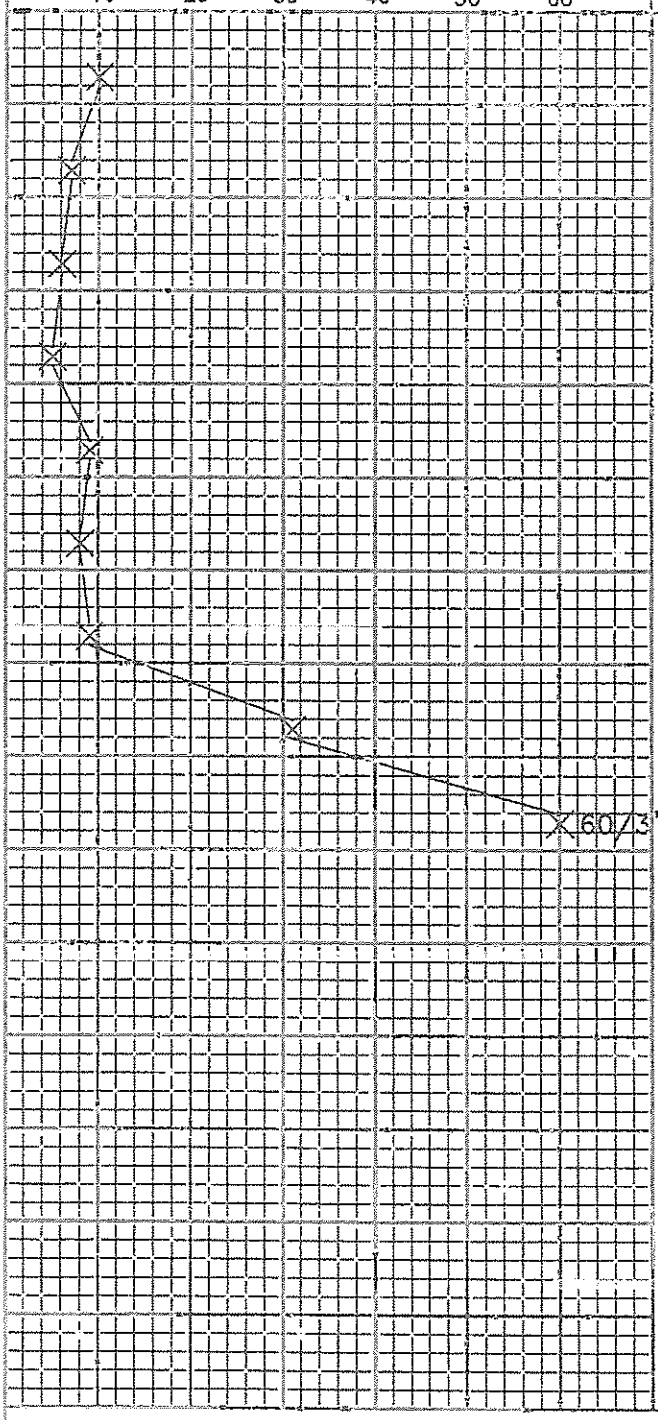
Ground Water Data
Water Encountered @ -18.5' During Drilling and Plugged Upon Completion

Project: Mach Mine – Water Holding Cell No. 1 Williamson County, Illinois	Date of Boring August 17, 2015
Client: Williamson Energy Johnston City, Illinois	Project No. H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-3

R07995



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 452.31
				2" Topsoil
	1	ss		**Gray Mottled Brown Silty CLAY** (CL)
	2	ss		
5	3	ss		
	4	ss		
10	5	ss		**Brown** Sandy CLAY (CL)
	6	ss		
15	7	ss		
	8	ss		
20				Gray Weathered SHALE
	9	ss		Gray SHALE
				End of Boring @ -22.5'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

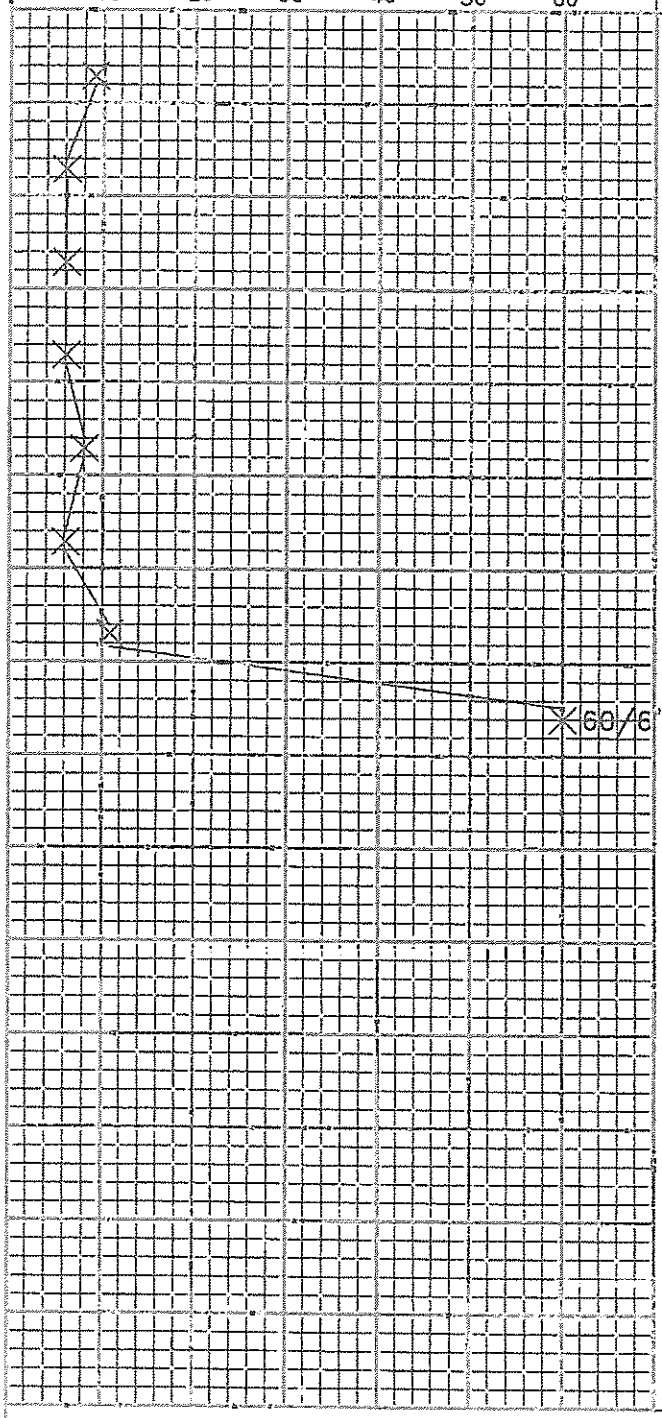
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-4

R07996



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 446.38
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		**Gray Mottled Brown** Silty **CLAY** (CL)
	3	ss		
10	4	ss		
	5	ss		**Brown Silty CLAY** (CL)
15	6	ss		
	7	ss		
	8	ss		Gray SHALE
20				End of Boring @ -19.5'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

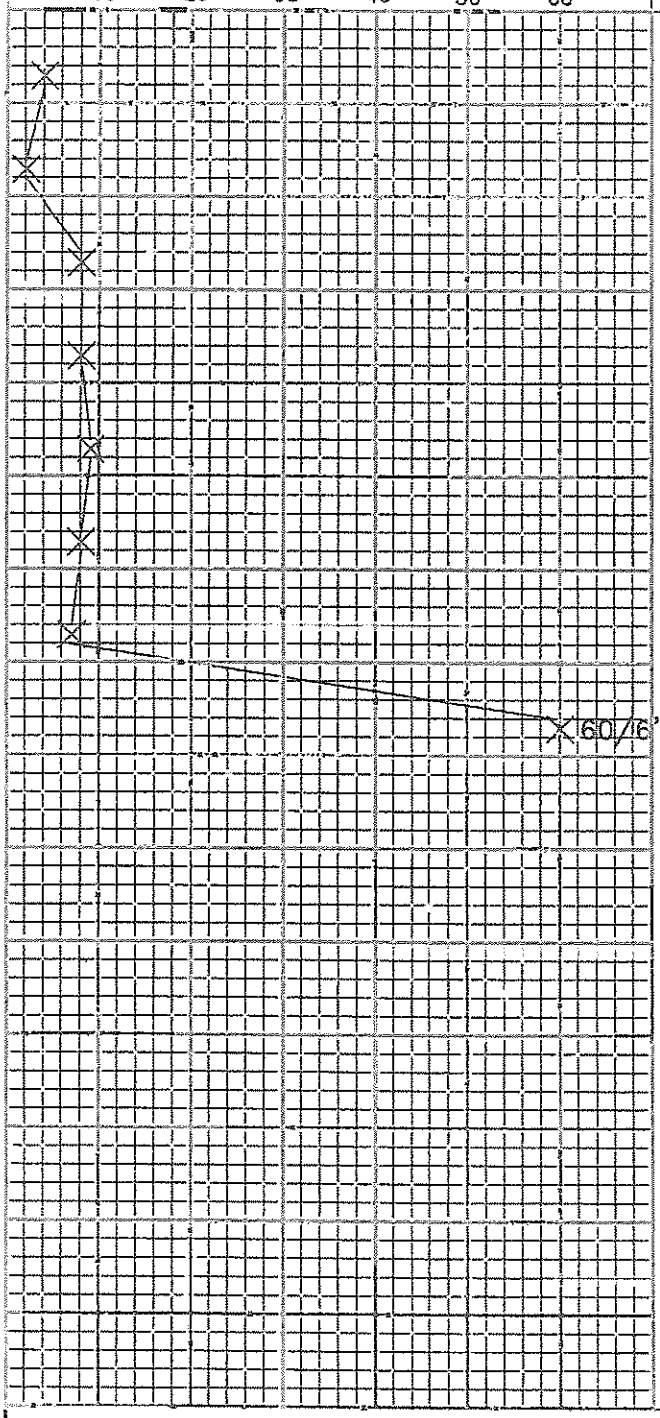
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-5

R07997



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 453.15
				2" Topsoil
	1	ss		**Gray Silty** CLAY (CL)
	2	ss		
5				
	3	ss		Gray Mottled Brown Silty CLAY (CL)
	4	ss		
10				
	5	ss		Brown Silty CLAY (CL)
	7	ss		
15				
	8	ss		
	9	ss		Gray SHALE
20				End of Boring @ -20.0'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

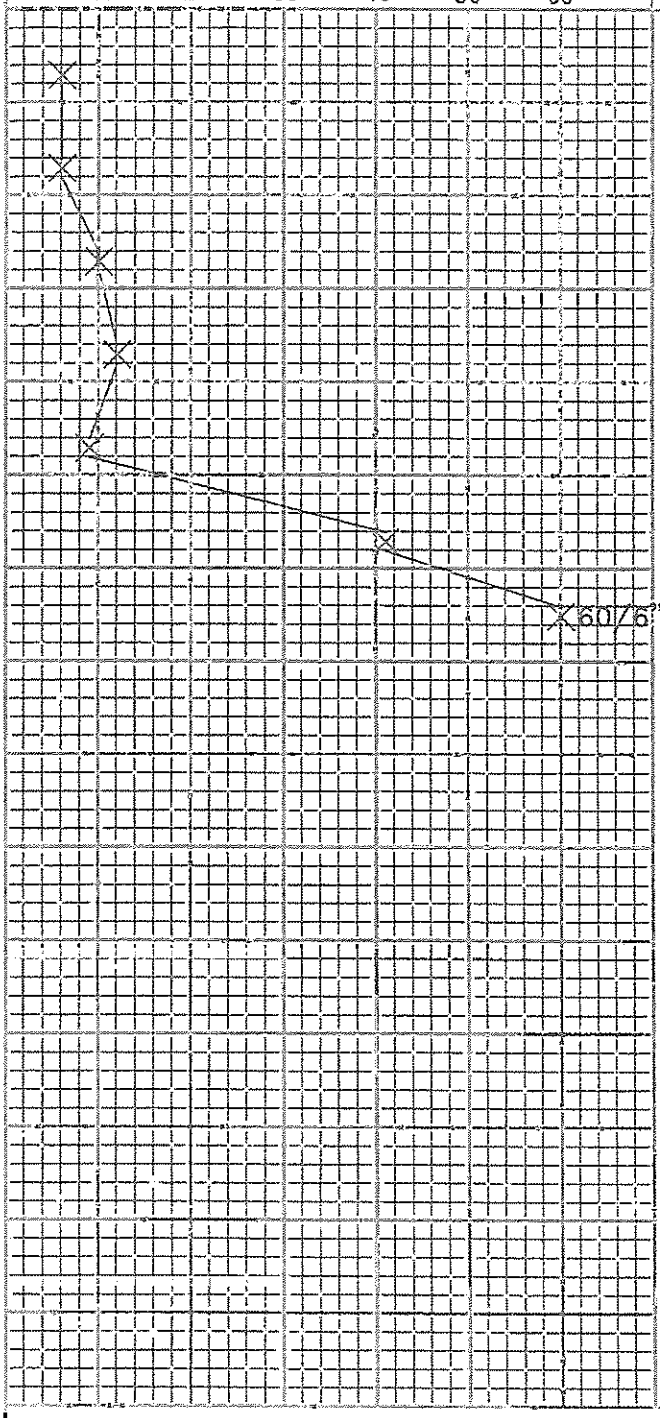
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-6

R07998



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 444.78
				2" Topsoil
	1	ss		**Gray Silty CLAY** (CL)
	2	ss		
5				
	3	ss		Brown Silty CLAY (CL)
	4	ss		
10				
	5	ss		
	6	ss		Brown Weathered SHALE
15				
	7	ss		Gray SHALE
				End of Boring @ -16.5'
20				
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

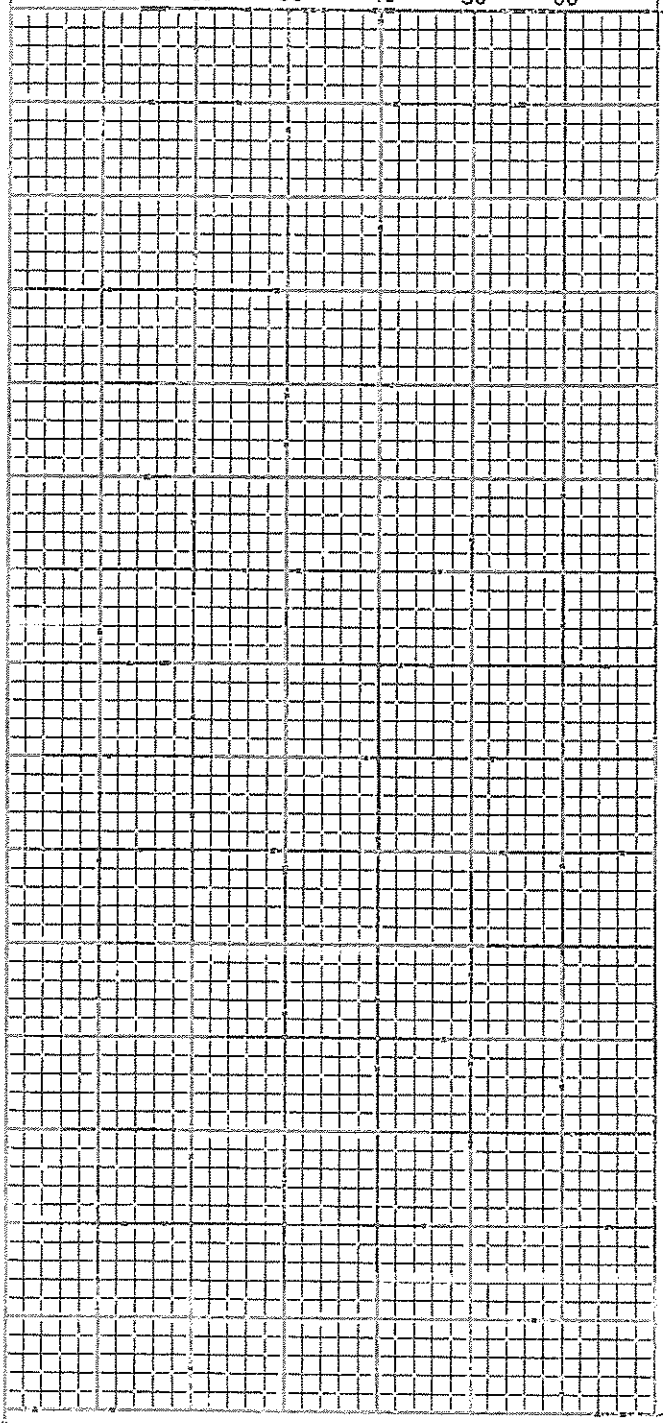
LOG of BORING WHC16-1A offset

R07999

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard (") Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
10				
	1	st		
15	2	st		
	3	st		
20				End of Boring @ −18.0'
25				
30				
35				

Ground Water Data

Ground Water Encountered @ −16.0' During Drilling.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

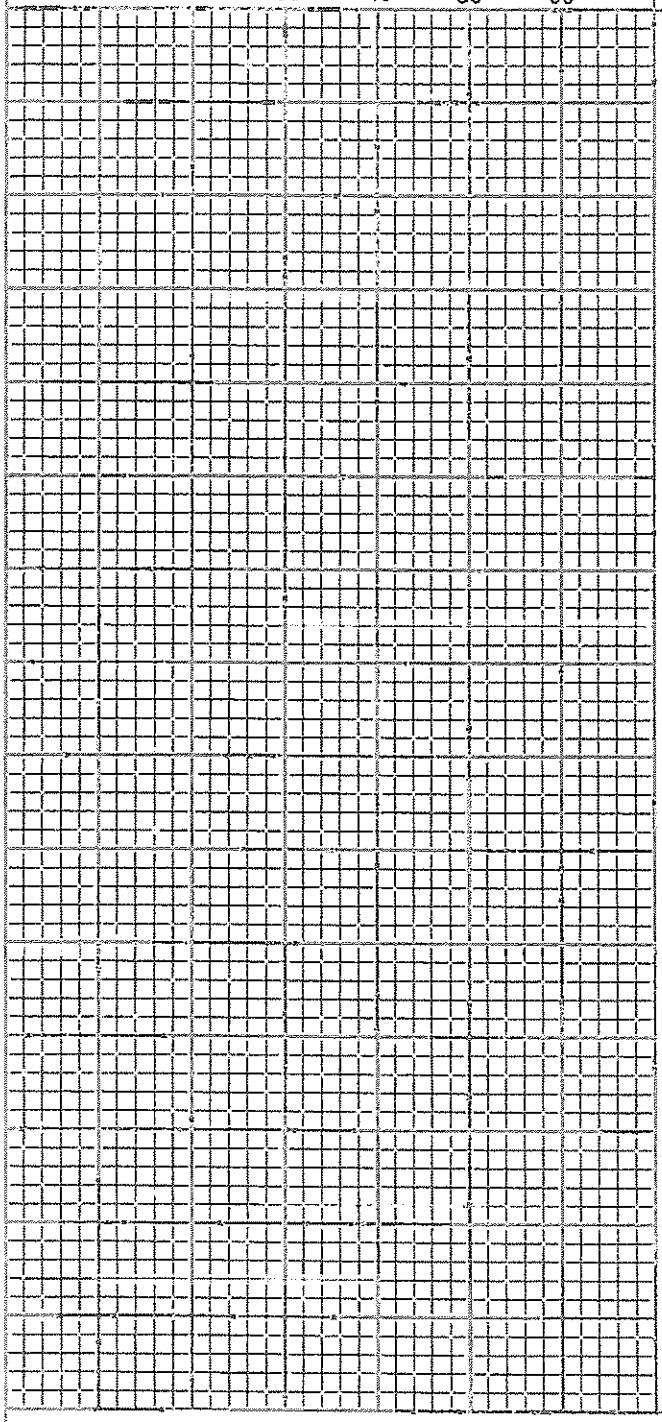
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-2A offset R08000

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6
Water Content (%)
Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
10				
	1	st		Gray Mottled Brown Silty CLAY (CL) with sand
15	2	st		Brown Clayey SAND (SC)
	3	st		Brown Silty CLAY (CL)
20				End of Boring @ -18.0'
25				
30				
35				

Ground Water Data
Ground Water Encountered @ -16.0' During Drilling.

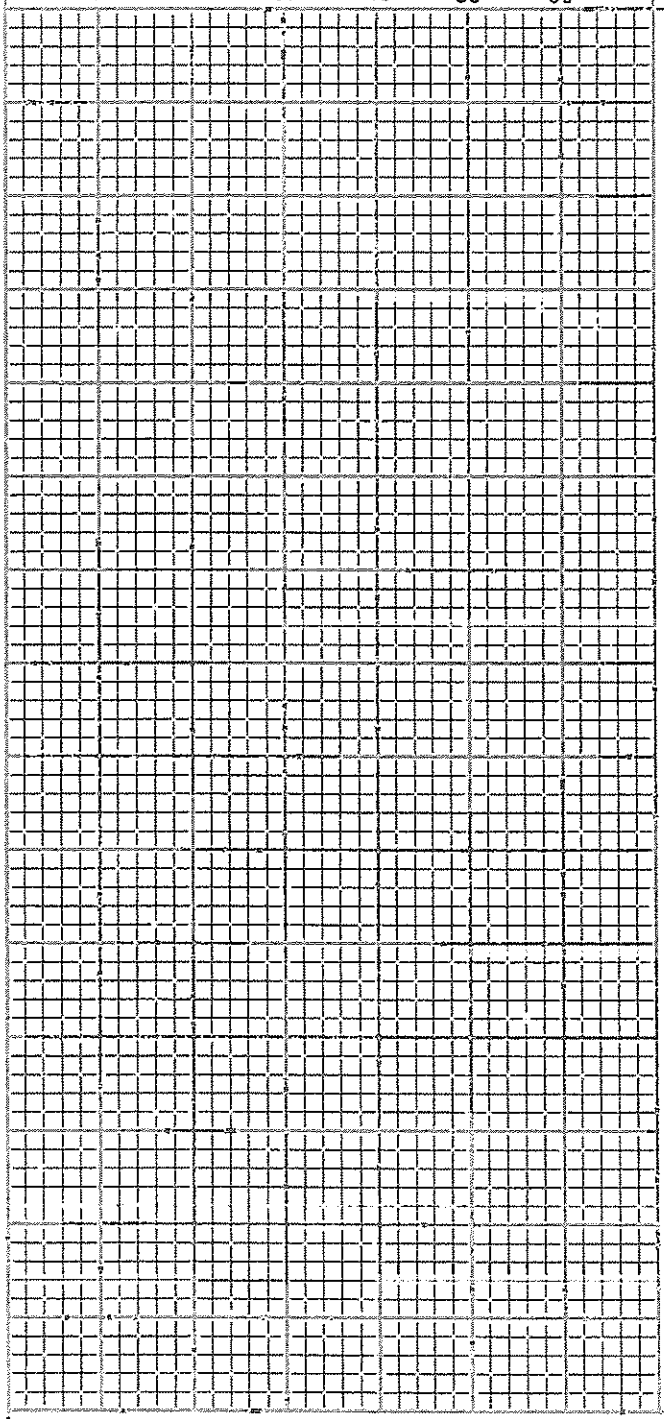
Project: **Pond Creek #1 Mine** **Williamson County, Illinois**	Date of Boring **August 18, 2015**
Client: **Williamson Energy** **Johnston City, Illinois**	Project No. **H-14179**

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-3A offset

R08001

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6
Water Content (%)
Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Mottled Gray Silty CLAY (CL)
5				
10				
	1	st		
15	2	st		
	3	st		
20				End of Boring @ -19.0'
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

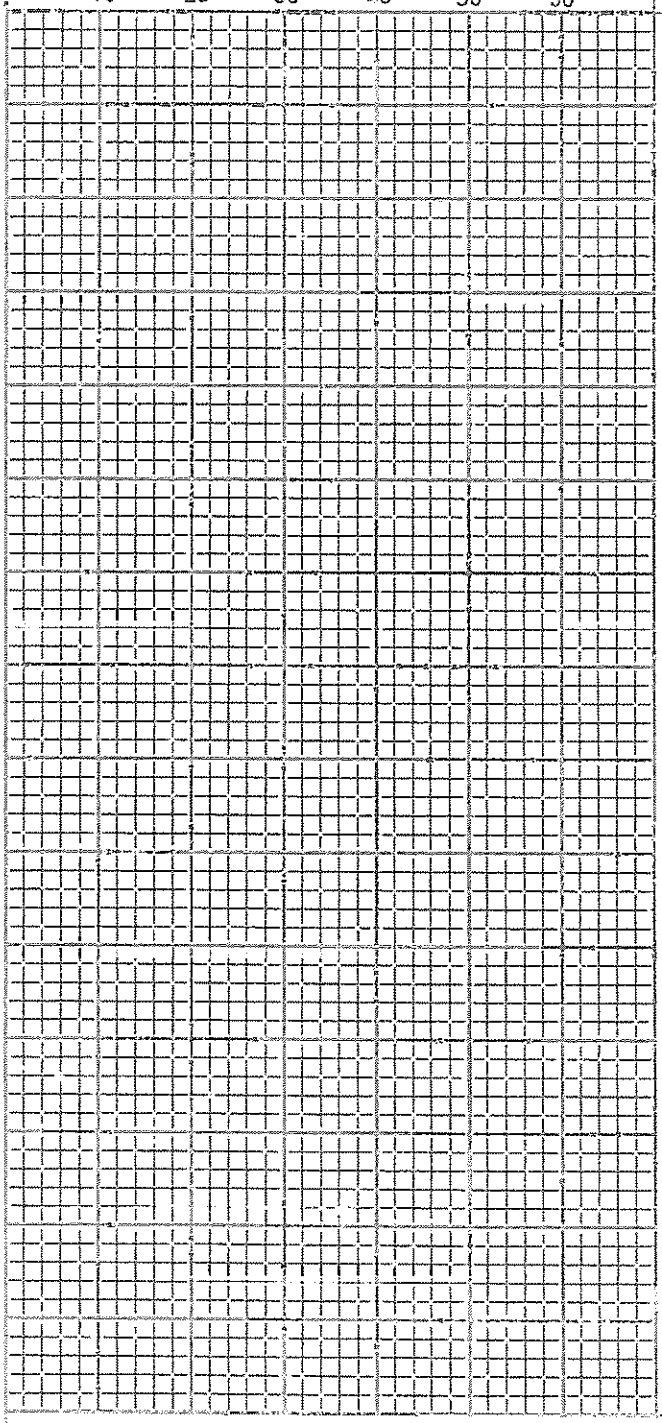
Holcomb Foundation
Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-4A offset R08002

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Mottled Gray Silty CLAY (CL)
5				
10				
	1	st		
15	2	st		
	3	st		
20				End of Boring @ -19.0'
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine Williamson County, Illinois	Date of Boring August 18, 2015
Client: Williamson Energy Johnston City, Illinois	Project No. H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-5A offset

R08003

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6
Water Content (%)
Standard N Penetration, Blows/Ft.
10 20 30 40 50 60

Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
10				
	1	st		
15	2	st		
	3	st		
20				End of Boring @ -18.0'
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

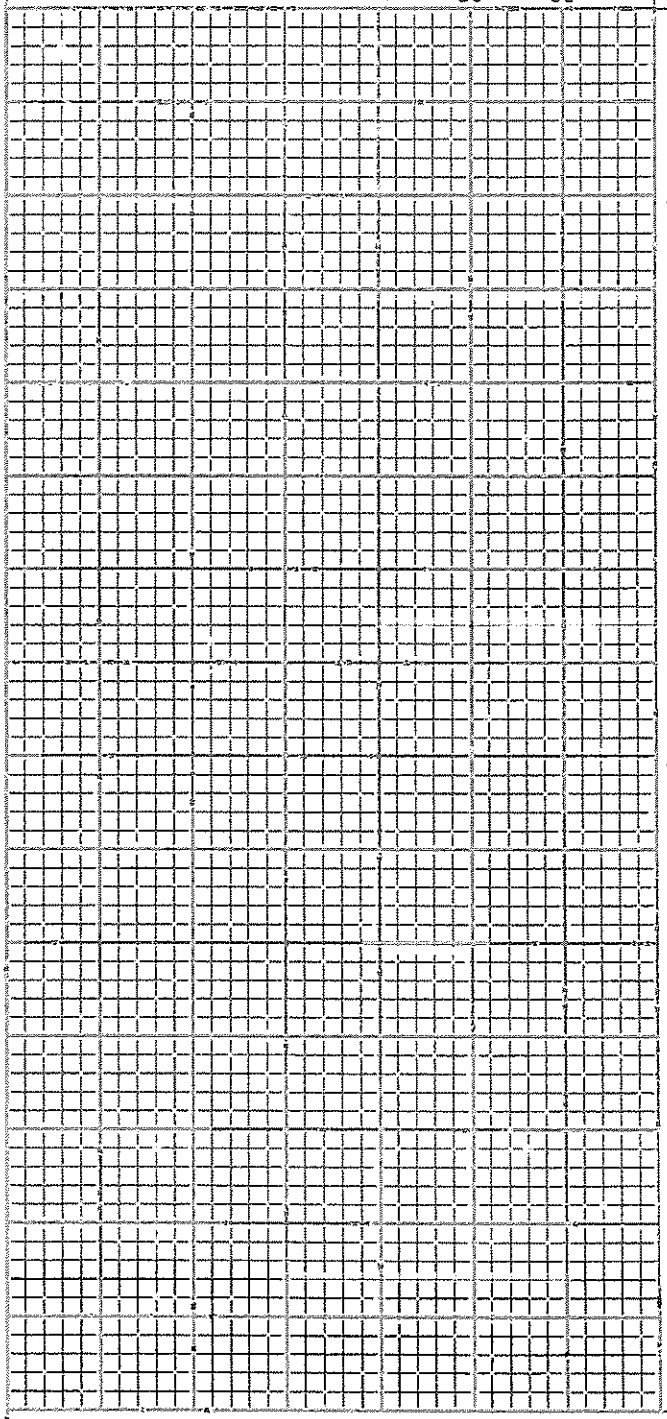
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation
Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-6A offset R08004

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6
Water Content (%)
Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
	1	st		
10	2	st		**Gray Silty CLAY (CL)**
	3	st		
15				End of Boring @ -14.0'
20				
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

LABTEST ASSIGNMENTS AND CHAIN OF CUSTODY

Holcomb Engineering (618) 529-5262
P. O. Box 88
Carbondale, IL 62903

HFE Project No:
Project Title:
Project Site:
Samples Contain Has Mat'ls? (note 1) No: Yes: Type:

Date Samples Obtained
Date of Lab Assignments
Target Date/Required
Assignments By:

Date Rec'd
Rec'd By

SAMPLE INFORMATION						TESTS REQUESTED (Mark "X" in box.)													
Item I. D.	Boring No.	Sample No.	Type: SS, ST, or Bulk	Depth: -Nominal -Interval	Classification (if known) Or Comment	Mc	UW	Pen	QU	QU ST	Att Limit	Dry Sieve	Washed Sieve	Hyd.	pH	SpGr	Proctor (Std)	Proctor (Mod)	Perm	Comments Or Other Tests
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Note 1: If suspected, describe possible Haz Materials: samples requiring special handling or precautions, subject to additional processing fees.

R08005

Holcomb Foundation Engineering Co., Inc.

R08006

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

[illegible]3 Wood Road
[illegible]rbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

Permeability Tests Results

Mach Mine
Water Holding Cell #1

HFE File: H-14179
Date: 8/31/2015

Location	Moisture Content (%) Before Test	Moisture Content (%) After Test	Dry Unit Weight (PCF)	Permeability (Cm./Sec.)
WHC16-1A (12-12.5')	20.0	19.1	108.7	4 x 10-8
WHC16-1A (12.5-13')	19.1	20.4	110.0	5 x 10-7*
WHC16-1A (13-13.5')	19.5	20.3	108.2	4 x 10-7*
WHC16-1A (13.5-14')	19.6	19.7	107.6	1 x 10-7
WHC16-1A (14-14.5')	18.7	20.0	109.8	1 x 10-6*
WHC16-1A (14.5-15')	18.2	19.7	110.9	1 x 10-6*
WHC16-1A (15-15.5')	19.7	19.6	110.0	9 x 10-7*
WHC16-1A (15.5-16')	19.2	18.5	112.3	3 x 10-7*
WHC16-1A (16-16.5')	17.4	16.8	118.6	1 x 10-7
WHC16-1A (16.5-17')	16.0	17.3	115.8	1 x 10-7

* - Permeability not in compliance with 1 x 10-7 cm/sec. specification

Permeability Test performed in accordance with ASTM D-5084

Holcomb Foundation Engineering Co., Inc.

R08007

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

793 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

Permeability Tests Results

Mach Mine
Water Holding Cell #1

HFE File: H-14179
Date: 9/14/2015

Location	Moisture Content (%) Before Test	Moisture Content (%) After Test	Dry Unit Weight (PCF)	Permeability (Cm./Sec.)
WHC16-2A (12-12.5')	19.5	17.8	116.0	3 x 10-7*
WHC16-2A (12.5-13')	18.8	19.1	115.5	5 x 10-7*
WHC16-2A (13-13.5')	18.6	20.5	114.2	1 x 10-7
WHC16-2A (13.5-14')	No Test - Poor Sample			
WHC16-2A (14-14.5')	17.1	20.4	117.1	4 x 10-5*
WHC16-2A (14.5-15')	15.5	14.8	119.7	8 x 10-6*
WHC16-2A (15-15.5')	Sand - No Test			
WHC16-2A (15.5-16')	Sand - No Test			
WHC16-2A (16-16.5')	18.0	18.9	114.8	1 x 10-7
WHC16-2A (16.5-17')	18.2	19.4	113.5	4 x 10-7*

* - Permeability not in compliance with 1 x 10-7 cm/sec. specification

Permeability Test performed in accordance with ASTM D-5084

LABTEST ASSIGNMENTS AND CHAIN OF CUSTODY

Holcomb Engineering (618) 529-5262
P. O. Box 88
Carbondale, IL 62903

HFE Project No:
Project Title:
Project Site:
Samples Contain Has Mat'ls? (note 1) No: Yes: Type:

Date Samples Obtained
Date of Lab Assignments
Target Date/Required
Assignments By:

Date Rec'd
Rec'd By

SAMPLE INFORMATION						TESTS REQUESTED (Mark "X" in box)														
Item I. D.	Boring No.	Sample No.	Type: SS, ST, or Bulk	Depth -Nominal -Interval	Classification (if known) Or Comment	Mc	UW	Pen	QU	QU ST	Att Limit	Dry Sieve	Washed Sieve	Hyd.	pH	SpGr	Proctor (Std)	Proctor (Mod)	Perm	Comments Or Other Tests
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Note 1 - If suspected, describe Possible Haz Materials; samples requiring special handling or precautions, subject to additional processing fees.

R08008

GROUNDWATER MONITORING WELL INSTALLATIONS AND SLUG TESTS

GROUNDWATER MONITORING WELLS 33, 34 AND 35

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18304-1
SAMPLE ID: GW 33
DATE SAMPLED: 12/13/16

REPORT DATE: 12/29/16
COMMENT: 3.30'
SAMPLED BY: Client-JP
DATE RECEIVED: 12/13/16

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	150.1	12/13/16 OG
Acidity	28	mg/L	10	305.1	12/14/16 OG
Alkalinity	596	mg/L	10	310.1	12/14/16 OG
Sulfate	93	mg/L	5	375.4	12/14/16 OG
Chloride	132	mg/L	5	325.3	12/14/16 OG
Hardness	440	mg/L	10	130.2	12/14/16 OG
Total Dissolved Solids	832	mg/L	50	160.1	12/14/16 OG
Total Suspended Solids	< 5	mg/L	5	160.2	12/14/16 OG
Fluoride	1.73	mg/L	0.01	340.2	12/14/16 OG
Cyanide	< 0.002	mg/L	0.002	335.4	12/14/16 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	12/21/16 OG
Aluminum	0.037	mg/L	0.020	3125	12/22/16 AK
Antimony	0.002	mg/L	0.001	3125	12/22/16 AK
Arsenic	< 0.001	mg/L	0.001	3125	12/22/16 AK
Barium	< 0.020	mg/L	0.020	3125	12/22/16 AK
Beryllium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Boron	< 0.020	mg/L	0.020	3125	12/22/16 AK
Cadmium	< 0.0002	mg/L	0.0002	3125	12/22/16 AK
Chromium	0.001	mg/L	0.001	3125	12/22/16 AK
Cobalt	< 0.001	mg/L	0.001	3125	12/22/16 AK
Copper	0.005	mg/L	0.001	3125	12/22/16 AK
Iron, Total	0.078	mg/L	0.020	3125	12/22/16 AK
Iron, Dissolved	0.024	mg/L	0.020	3125	12/22/16 AK
Lead	0.002	mg/L	0.001	3125	12/22/16 AK
Manganese, Total	0.028	mg/L	0.020	3125	12/22/16 AK
Manganese, Dissolved	0.028	mg/L	0.020	3125	12/22/16 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/27/16 AK
Molybdenum	0.002	mg/L	0.001	3125	12/22/16 AK
Nickel	0.001	mg/L	0.001	3125	12/22/16 AK
Selenium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Silver	< 0.001	mg/L	0.001	3125	12/22/16 AK
Thallium	< 0.0004	mg/L	0.0004	3125	12/22/16 AK
Vanadium	0.002	mg/L	0.001	3125	12/22/16 AK
Zinc	< 0.020	mg/L	0.020	3125	12/22/16 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

R08012

CLIENT:	Pond Creek	**REPORT DATE:**	12/29/16
PDL:	18304-2	**COMMENT:**	5.18'
SAMPLE ID:	GW 34	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	12/13/16	**DATE RECEIVED:**	12/13/16

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	150.1	12/13/16 OG
Acidity	30	mg/L	10	305.1	12/14/16 OG
Alkalinity	492	mg/L	10	310.1	12/14/16 OG
Sulfate	250	mg/L	5	375.4	12/14/16 OG
Chloride	120	mg/L	5	325.3	12/14/16 OG
Hardness	390	mg/L	10	130.2	12/14/16 OG
Total Dissolved Solids	1,004	mg/L	50	160.1	12/14/16 OG
Total Suspended Solids	9	mg/L	5	160.2	12/14/16 OG
Fluoride	1.53	mg/L	0.01	340.2	12/14/16 OG
Cyanide	< 0.002	mg/L	0.002	335.4	12/14/16 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	12/21/16 OG
Aluminum	0.326	mg/L	0.020	3125	12/22/16 AK
Antimony	< 0.001	mg/L	0.001	3125	12/22/16 AK
Arsenic	< 0.001	mg/L	0.001	3125	12/22/16 AK
Barium	< 0.020	mg/L	0.020	3125	12/22/16 AK
Beryllium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Boron	0.052	mg/L	0.020	3125	12/22/16 AK
Cadmium	< 0.0002	mg/L	0.0002	3125	12/22/16 AK
Chromium	0.002	mg/L	0.001	3125	12/22/16 AK
Cobalt	< 0.001	mg/L	0.001	3125	12/22/16 AK
Copper	0.006	mg/L	0.001	3125	12/22/16 AK
Iron, Total	0.430	mg/L	0.020	3125	12/22/16 AK
Iron, Dissolved	0.061	mg/L	0.020	3125	12/22/16 AK
Lead	0.002	mg/L	0.001	3125	12/22/16 AK
Manganese, Total	0.026	mg/L	0.020	3125	12/22/16 AK
Manganese, Dissolved	< 0.020	mg/L	0.020	3125	12/22/16 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/27/16 AK
Molybdenum	0.001	mg/L	0.001	3125	12/22/16 AK
Nickel	0.001	mg/L	0.001	3125	12/22/16 AK
Selenium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Silver	< 0.001	mg/L	0.001	3125	12/22/16 AK
Thallium	< 0.0004	mg/L	0.0004	3125	12/22/16 AK
Vanadium	0.002	mg/L	0.001	3125	12/22/16 AK
Zinc	< 0.020	mg/L	0.020	3125	12/22/16 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

R08013

CLIENT:	Pond Creek	**REPORT DATE:**	12/29/16
PDL:	18304-3	**COMMENT:**	3.56'
SAMPLE ID:	GW 35	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	12/13/16	**DATE RECEIVED:**	12/13/16

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.0	Unit	1 - 14	150.1	12/13/16 OG
Acidity	64	mg/L	10	305.1	12/14/16 OG
Alkalinity	644	mg/L	10	310.1	12/14/16 OG
Sulfate	610	mg/L	5	375.4	12/14/16 OG
Chloride	444	mg/L	5	325.3	12/14/16 OG
Hardness	850	mg/L	10	130.2	12/14/16 OG
Total Dissolved Solids	1,972	mg/L	50	160.1	12/14/16 OG
Total Suspended Solids	8	mg/L	5	160.2	12/14/16 OG
Fluoride	0.47	mg/L	0.01	340.2	12/14/16 OG
Cyanide	< 0.002	mg/L	0.002	335.4	12/14/16 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	12/21/16 OG
Aluminum	< 0.020	mg/L	0.020	3125	12/22/16 AK
Antimony	< 0.001	mg/L	0.001	3125	12/22/16 AK
Arsenic	0.001	mg/L	0.001	3125	12/22/16 AK
Barium	< 0.020	mg/L	0.020	3125	12/22/16 AK
Beryllium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Boron	< 0.020	mg/L	0.020	3125	12/22/16 AK
Cadmium	< 0.0002	mg/L	0.0002	3125	12/22/16 AK
Chromium	0.003	mg/L	0.001	3125	12/22/16 AK
Cobalt	0.001	mg/L	0.001	3125	12/22/16 AK
Copper	0.012	mg/L	0.001	3125	12/22/16 AK
Iron, Total	0.185	mg/L	0.020	3125	12/22/16 AK
Iron, Dissolved	0.119	mg/L	0.020	3125	12/22/16 AK
Lead	0.001	mg/L	0.001	3125	12/22/16 AK
Manganese, Total	0.645	mg/L	0.020	3125	12/22/16 AK
Manganese, Dissolved	0.645	mg/L	0.020	3125	12/22/16 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/27/16 AK
Molybdenum	< 0.001	mg/L	0.001	3125	12/22/16 AK
Nickel	0.005	mg/L	0.001	3125	12/22/16 AK
Selenium	0.005	mg/L	0.001	3125	12/22/16 AK
Silver	< 0.001	mg/L	0.001	3125	12/22/16 AK
Thallium	< 0.0004	mg/L	0.0004	3125	12/22/16 AK
Vanadium	0.001	mg/L	0.001	3125	12/22/16 AK
Zinc	< 0.020	mg/L	0.020	3125	12/22/16 AK

Reviewed By: Jeff Gough

SEVERN TRENT ENVIRONMENTAL SERVICES INC

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18304

Client : Pond Creek
Address :
Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : JP
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james plumley
PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	12/13/2016	1127	GW 33	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.30'
2	12/13/2016	1157	GW 34	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					5.175'
3	12/13/2016	1236	GW 35	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.555'

Relinquished by:	Date : Time :	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date : Time :	Received by:	Remarks:
Relinquished by:	Date : 12/13/16 Time : 1415	Received for Laboratory by:	

R08014

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: ww w.summitenviro.com

CLIENT: Pond Creek
PDL: 18440-1
SAMPLE ID: GW 33
DATE SAMPLED: 1/31/17

REPORT DATE: 2/13/17
COMMENT: 4.44'
SAMPLED BY: Client-JP
DATE RECEIVED: 1/31/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.1	Unit	1 - 14	4500 B	1/31/17 OG
Acidity	16	mg/L	10	305.1	2/3/17 OG
Alkalinity	500	mg/L	10	310.1	2/3/17 OG
Sulfate	65	mg/L	5	4500 E	2/3/17 KR
Chloride	140	mg/L	5	4500 B	2/2/17 KR
Hardness	396	mg/L	10	2340 C	2/3/17 OG
Total Dissolved Solids	936	mg/L	50	2540 C	2/2/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	2/2/17 KR
Fluoride	0.31	mg/L	0.01	340.2	2/1/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	2/1/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/7/17 OG
Aluminum	0.050	mg/L	0.020	3125 B	2/10/17 AK
Antimony	0.001	mg/L	0.001	3125 B	2/10/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/10/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Copper	0.008	mg/L	0.001	3125 B	2/10/17 AK
Iron, Total	0.062	mg/L	0.020	3125 B	2/10/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Manganese, Total	0.082	mg/L	0.020	3125 B	2/10/17 AK
Manganese, Dissolved	0.082	mg/L	0.020	3125 B	2/10/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/10/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/10/17 AK
Nickel	0.002	mg/L	0.001	3125 B	2/10/17 AK
Selenium	0.003	mg/L	0.001	3125 B	2/10/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/10/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	2/10/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/10/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	2/13/17
PDL:	18440-2	**COMMENT:**	4.60'
SAMPLE ID:	GW 34	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	1/31/17	**DATE RECEIVED:**	1/31/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	4500 B	1/31/17 OG
Acidity	24	mg/L	10	305.1	2/3/17 OG
Alkalinity	444	mg/L	10	310.1	2/3/17 OG
Sulfate	200	mg/L	5	4500 E	2/3/17 KR
Chloride	108	mg/L	5	4500 B	2/2/17 KR
Hardness	280	mg/L	10	2340 C	2/3/17 OG
Total Dissolved Solids	740	mg/L	50	2540 C	2/2/17 KR
Total Suspended Solids	6	mg/L	5	2540 D	2/2/17 KR
Fluoride	0.45	mg/L	0.01	340.2	2/1/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	2/1/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/7/17 OG
Aluminum	0.047	mg/L	0.020	3125 B	2/10/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/10/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Copper	0.004	mg/L	0.001	3125 B	2/10/17 AK
Iron, Total	0.027	mg/L	0.020	3125 B	2/10/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Manganese, Total	0.022	mg/L	0.020	3125 B	2/10/17 AK
Manganese, Dissolved	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/10/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Nickel	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Selenium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/10/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	2/10/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/10/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

R08017

CLIENT: Pond Creek
PDL: 18440-3
SAMPLE ID: GW 35
DATE SAMPLED: 1/31/17

REPORT DATE: 2/13/17
COMMENT: 3.70'
SAMPLED BY: Client-JP
DATE RECEIVED: 1/31/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.9	Unit	1 - 14	4500 B	1/31/17 OG
Acidity	70	mg/L	10	305.1	2/3/17 OG
Alkalinity	644	mg/L	10	310.1	2/3/17 OG
Sulfate	660	mg/L	5	4500 E	2/3/17 KR
Chloride	440	mg/L	5	4500 B	2/2/17 KR
Hardness	1,000	mg/L	10	2340 C	2/3/17 OG
Total Dissolved Solids	2,264	mg/L	50	2540 C	2/2/17 KR
Total Suspended Solids	13	mg/L	5	2540 D	2/2/17 KR
Fluoride	0.35	mg/L	0.01	340.2	2/1/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	2/1/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/7/17 OG
Aluminum	0.329	mg/L	0.020	3125 B	2/10/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	2/10/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/10/17 AK
Chromium	0.003	mg/L	0.001	3125 B	2/10/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	2/10/17 AK
Copper	0.010	mg/L	0.001	3125 B	2/10/17 AK
Iron, Total	0.825	mg/L	0.020	3125 B	2/10/17 AK
Iron, Dissolved	0.079	mg/L	0.020	3125 B	2/10/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Manganese, Total	1.052	mg/L	0.020	3125 B	2/10/17 AK
Manganese, Dissolved	1.052	mg/L	0.020	3125 B	2/10/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/10/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/10/17 AK
Nickel	0.006	mg/L	0.001	3125 B	2/10/17 AK
Selenium	0.007	mg/L	0.001	3125 B	2/10/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/10/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	2/10/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/10/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.

PHYSICAL ANALYTICAL CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 13440

Client : Pond Creek
Address :

Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : JP
Report to: Chris Skelton
Bill to: chris.skelton@murrayenergy.com
PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	1/31/2017	1435	GW 33	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.44'
2	1/31/2017	1448	GW 34	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.60'
3	1/31/2017	1534	GW 35	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.70'

Relinquished by:	Date : 1/31/17 Time : 4:00PM	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date : Time :	Received by:	Remarks:
Relinquished by:	Date : 1/31/17 Time : 1600	Received for Laboratory by:	

R08018

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

R08019

CLIENT:	Pond Creek	**REPORT DATE:**	3/1/17
PDL:	18499-1	**COMMENT:**	3.71'
SAMPLE ID:	GW 33	**SAMPLED BY:**	Client-HR
DATE SAMPLED:	2/20/17	**DATE RECEIVED:**	2/20/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.5	Unit	1 - 14	4500 B	2/20/17 MM
Acidity	56	mg/L	10	305.1	2/24/17 KR
Alkalinity	628	mg/L	10	310.1	2/24/17 KR
Sulfate	100	mg/L	5	4500 E	2/23/17 KR
Chloride	138	mg/L	5	4500 B	2/24/17 KR
Hardness	324	mg/L	10	2340 C	2/24/17 KR
Total Dissolved Solids	920	mg/L	50	2540 C	2/24/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	2/24/17 KR
Fluoride	0.49	mg/L	0.01	340.2	2/23/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	2/27/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/23/17 KR
Aluminum	0.154	mg/L	0.020	3125 B	2/24/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/24/17 AK
Chromium	0.001	mg/L	0.001	3125 B	2/24/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Copper	0.005	mg/L	0.001	3125 B	2/24/17 AK
Iron, Total	0.132	mg/L	0.020	3125 B	2/24/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Manganese, Total	0.077	mg/L	0.020	3125 B	2/24/17 AK
Manganese, Dissolved	0.071	mg/L	0.020	3125 B	2/24/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/24/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/24/17 AK
Nickel	0.002	mg/L	0.001	3125 B	2/24/17 AK
Selenium	0.003	mg/L	0.001	3125 B	2/24/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/24/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	2/24/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/24/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

R08020

CLIENT: Pond Creek
PDL: 18499-2
SAMPLE ID: GW 34
DATE SAMPLED: 2/20/17

REPORT DATE: 3/1/17
COMMENT: 4.75'
SAMPLED BY: Client-HR
DATE RECEIVED: 2/20/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.3	Unit	1 - 14	4500 B	2/20/17 MM
Acidity	26	mg/L	10	305.1	2/24/17 KR
Alkalinity	520	mg/L	10	310.1	2/24/17 KR
Sulfate	310	mg/L	5	4500 E	2/23/17 KR
Chloride	106	mg/L	5	4500 B	2/24/17 KR
Hardness	332	mg/L	10	2340 C	2/24/17 KR
Total Dissolved Solids	1,000	mg/L	50	2540 C	2/24/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	2/24/17 KR
Fluoride	0.43	mg/L	0.01	340.2	2/23/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	2/27/17 KR
Phenols, Total Recoverable	0.01	mg/L	0.01	420.4	2/23/17 KR
Aluminum	0.043	mg/L	0.020	3125 B	2/24/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Boron	0.069	mg/L	0.020	3125 B	2/24/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/24/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Copper	0.004	mg/L	0.001	3125 B	2/24/17 AK
Iron, Total	0.060	mg/L	0.020	3125 B	2/24/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Manganese, Total	0.101	mg/L	0.020	3125 B	2/24/17 AK
Manganese, Dissolved	0.091	mg/L	0.020	3125 B	2/24/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/24/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/24/17 AK
Nickel	0.002	mg/L	0.001	3125 B	2/24/17 AK
Selenium	0.001	mg/L	0.001	3125 B	2/24/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/24/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	2/24/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/24/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

R08021

CLIENT: Pond Creek
PDL: 18499-3
SAMPLE ID: GW 35
DATE SAMPLED: 2/20/17

REPORT DATE: 3/1/17
COMMENT: 3.91'
SAMPLED BY: Client-HR
DATE RECEIVED: 2/20/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.9	Unit	1 - 14	4500 B	2/20/17 MM
Acidity	82	mg/L	10	305.1	2/24/17 KR
Alkalinity	712	mg/L	10	310.1	2/24/17 KR
Sulfate	620	mg/L	5	4500 E	2/23/17 KR
Chloride	470	mg/L	5	4500 B	2/24/17 KR
Hardness	880	mg/L	10	2340 C	2/24/17 KR
Total Dissolved Solids	2,244	mg/L	50	2540 C	2/24/17 KR
Total Suspended Solids	19	mg/L	5	2540 D	2/24/17 KR
Fluoride	0.48	mg/L	0.01	340.2	2/23/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	2/27/17 KR
Phenols, Total Recoverable	0.02	mg/L	0.01	420.4	2/23/17 KR
Aluminum	0.786	mg/L	0.020	3125 B	2/24/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	2/24/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/24/17 AK
Chromium	0.005	mg/L	0.001	3125 B	2/24/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	2/24/17 AK
Copper	0.009	mg/L	0.001	3125 B	2/24/17 AK
Iron, Total	0.697	mg/L	0.020	3125 B	2/24/17 AK
Iron, Dissolved	0.068	mg/L	0.020	3125 B	2/24/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Manganese, Total	0.977	mg/L	0.020	3125 B	2/24/17 AK
Manganese, Dissolved	0.977	mg/L	0.020	3125 B	2/24/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/24/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Nickel	0.006	mg/L	0.001	3125 B	2/24/17 AK
Selenium	0.009	mg/L	0.001	3125 B	2/24/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/24/17 AK
Vanadium	0.003	mg/L	0.001	3125 B	2/24/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/24/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18499

Client : Pond Creek
Address :

Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : MJM
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james.plumley
PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Ca Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	2/20/2017	1500	GW 33	W	G	4	6.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.71'
2	2/20/2017	1515	GW 34	W	G	4	7.3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.75'
3	2/20/2017	1530	GW 35	W	G	4	6.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.91'

Relinquished by: Michael Mathis	Date : 2/20/17 Time : 16:00	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date : Time :	Received by:	Remarks:
Relinquished by:	Date : 2/20/17 Time : 1600	Received for Laboratory by: Amber Wright	

R08022

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18603-1
SAMPLE ID: GW 33
DATE SAMPLED: 3/21/17

REPORT DATE: 4/5/17
COMMENT: 4.24'
SAMPLED BY: HR - CE
DATE RECEIVED: 3/21/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.6	Unit	1 - 14	4500 B	3/21/17 CE
Acidity	56	mg/L	10	305.1	3/27/17 OG
Alkalinity	612	mg/L	10	310.1	3/27/17 OG
Sulfate	86	mg/L	5	4500 E	3/27/17 KR
Chloride	138	mg/L	5	4500 B	3/28/17 KR
Hardness	440	mg/L	10	2340 C	3/27/17 KR
Total Dissolved Solids	932	mg/L	50	2540 C	3/24/17 OG
Total Suspended Solids	13	mg/L	5	2540 D	3/24/17 OG
Fluoride	0.73	mg/L	0.01	340.2	3/28/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	3/29/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	4/3/17 OG
Aluminum	0.082	mg/L	0.020	3125 B	3/31/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	3/31/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Copper	0.006	mg/L	0.001	3125 B	3/31/17 AK
Iron, Total	0.048	mg/L	0.020	3125 B	3/31/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Manganese, Total	0.057	mg/L	0.020	3125 B	3/31/17 AK
Manganese, Dissolved	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	3/28/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Nickel	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Selenium	0.005	mg/L	0.001	3125 B	3/31/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	3/31/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	3/31/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	3/31/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS
17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	4/5/17
PDL:	18603-2	**COMMENT:**	4.32'
SAMPLE ID:	GW 34	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	3/21/17	**DATE RECEIVED:**	3/21/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	8.1	Unit	1 - 14	4500 B	3/21/17 CE
Acidity	34	mg/L	10	305.1	3/27/17 OG
Alkalinity	424	mg/L	10	310.1	3/27/17 OG
Sulfate	210	mg/L	5	4500 E	3/27/17 KR
Chloride	110	mg/L	5	4500 B	3/28/17 KR
Hardness	330	mg/L	10	2340 C	3/27/17 KR
Total Dissolved Solids	844	mg/L	50	2540 C	3/24/17 OG
Total Suspended Solids	7	mg/L	5	2540 D	3/24/17 OG
Fluoride	0.47	mg/L	0.01	340.2	3/28/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	3/29/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	4/3/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Boron	0.032	mg/L	0.020	3125 B	3/31/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	3/31/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Copper	0.005	mg/L	0.001	3125 B	3/31/17 AK
Iron, Total	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Manganese, Total	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Manganese, Dissolved	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	3/28/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Nickel	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Selenium	0.002	mg/L	0.001	3125 B	3/31/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	3/31/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	3/31/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	4/5/17
PDL:	18603-3	**COMMENT:**	3.70'
SAMPLE ID:	GW 35	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	3/21/17	**DATE RECEIVED:**	3/21/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.3	Unit	1 - 14	4500 B	3/21/17 CE
Acidity	64	mg/L	10	305.1	3/27/17 OG
Alkalinity	700	mg/L	10	310.1	3/27/17 OG
Sulfate	717	mg/L	5	4500 E	3/27/17 KR
Chloride	450	mg/L	5	4500 B	3/28/17 KR
Hardness	1,000	mg/L	10	2340 C	3/27/17 KR
Total Dissolved Solids	1,352	mg/L	50	2540 C	3/24/17 OG
Total Suspended Solids	10	mg/L	5	2540 D	3/24/17 OG
Fluoride	0.51	mg/L	0.01	340.2	3/28/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	3/29/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	4/3/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Arsenic	0.001	mg/L	0.001	3125 B	3/31/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	3/31/17 AK
Chromium	0.003	mg/L	0.001	3125 B	3/31/17 AK
Cobalt	0.001	mg/L	0.001	3125 B	3/31/17 AK
Copper	0.010	mg/L	0.001	3125 B	3/31/17 AK
Iron, Total	0.028	mg/L	0.020	3125 B	3/31/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	3/31/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Manganese, Total	0.511	mg/L	0.020	3125 B	3/31/17 AK
Manganese, Dissolved	0.032	mg/L	0.020	3125 B	3/31/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	3/28/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Nickel	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Selenium	0.017	mg/L	0.001	3125 B	3/31/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	3/31/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	3/31/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	3/31/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	3/31/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18603

Client: Pond Creek
Address:
Phone: 618-983-3020
Contact: Chris Skelton

Sampled by: CE
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james plumley
PO/Billing Reference:
Requested Due Date: Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Field Data: Temp (C)	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Ti Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	3/21/2017	814	GW 33	W	G	4	7.6	10.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.24'
2	3/21/2017	825	GW 34	W	G	4	8.1	11.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.32'
3	3/21/2017	831	GW 35	W	G	4	7.3	11.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.70'

Relinquished by:	Date: 3/21/17 Time: 16:10	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date: Time:	Received by:	Remarks:
Relinquished by:	Date: 3/21/17 Time: 1610	Received for Laboratory by: Amber Wright	

R08026

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	4/27/17
PDL:	18674-1	**COMMENT:**	3.38'
SAMPLE ID:	GW 33	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	4/18/17	**DATE RECEIVED:**	4/18/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.3	Unit	1 - 14	4500 B	4/18/17 CE
Acidity	16	mg/L	10	305.1	4/18/17 OG
Alkalinity	300	mg/L	10	310.1	4/18/17 OG
Sulfate	37	mg/L	5	4500 E	4/18/17 OG
Chloride	152	mg/L	5	4500 B	4/18/17 OG
Hardness	376	mg/L	10	2340 C	4/18/17 OG
Total Dissolved Solids	948	mg/L	50	2540 C	4/18/17 OG
Total Suspended Solids	< 5	mg/L	5	2540 D	4/18/17 OG
Fluoride	0.15	mg/L	0.01	340.2	4/18/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	4/24/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	4/21/17 OG
Aluminum	0.126	mg/L	0.020	3125 B	4/19/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	4/19/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Copper	0.003	mg/L	0.001	3125 B	4/19/17 AK
Iron, Total	0.240	mg/L	0.020	3125 B	4/19/17 AK
Iron, Dissolved	0.058	mg/L	0.020	3125 B	4/19/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Manganese, Total	0.242	mg/L	0.020	3125 B	4/19/17 AK
Manganese, Dissolved	0.218	mg/L	0.020	3125 B	4/19/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	4/19/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	4/19/17 AK
Nickel	0.004	mg/L	0.001	3125 B	4/19/17 AK
Selenium	0.004	mg/L	0.001	3125 B	4/19/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	4/19/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	4/19/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	4/27/17
PDL:	18674-2	**COMMENT:**	4.37'
SAMPLE ID:	GW 34	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	4/18/17	**DATE RECEIVED:**	4/18/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.5	Unit	1 - 14	4500 B	4/18/17 CE
Acidity	30	mg/L	10	305.1	4/18/17 OG
Alkalinity	324	mg/L	10	310.1	4/18/17 OG
Sulfate	450	mg/L	5	4500 E	4/18/17 OG
Chloride	104	mg/L	5	4500 B	4/18/17 OG
Hardness	316	mg/L	10	2340 C	4/18/17 OG
Total Dissolved Solids	852	mg/L	50	2540 C	4/18/17 OG
Total Suspended Solids	6	mg/L	5	2540 D	4/18/17 OG
Fluoride	0.50	mg/L	0.01	340.2	4/18/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	4/24/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	4/21/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	4/19/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Copper	0.003	mg/L	0.001	3125 B	4/19/17 AK
Iron, Total	0.071	mg/L	0.020	3125 B	4/19/17 AK
Iron, Dissolved	0.031	mg/L	0.020	3125 B	4/19/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Manganese, Total	0.406	mg/L	0.020	3125 B	4/19/17 AK
Manganese, Dissolved	0.376	mg/L	0.020	3125 B	4/19/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	4/19/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	4/19/17 AK
Nickel	0.002	mg/L	0.001	3125 B	4/19/17 AK
Selenium	0.002	mg/L	0.001	3125 B	4/19/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	4/19/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	4/19/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	4/19/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	4/27/17
PDL:	18674-3	**COMMENT:**	4.02'
SAMPLE ID:	GW 35	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	4/18/17	**DATE RECEIVED:**	4/18/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.0	Unit	1 - 14	4500 B	4/18/17 CE
Acidity	24	mg/L	10	305.1	4/18/17 OG
Alkalinity	276	mg/L	10	310.1	4/18/17 OG
Sulfate	560	mg/L	5	4500 E	4/18/17 OG
Chloride	462	mg/L	5	4500 B	4/18/17 OG
Hardness	1,072	mg/L	10	2340 C	4/18/17 OG
Total Dissolved Solids	2,172	mg/L	50	2540 C	4/18/17 OG
Total Suspended Solids	21	mg/L	5	2540 D	4/18/17 OG
Fluoride	0.75	mg/L	0.01	340.2	4/18/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	4/24/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	4/21/17 OG
Aluminum	0.388	mg/L	0.020	3125 B	4/19/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Arsenic	0.003	mg/L	0.001	3125 B	4/19/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	4/19/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	4/19/17 AK
Chromium	0.003	mg/L	0.001	3125 B	4/19/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	4/19/17 AK
Copper	0.007	mg/L	0.001	3125 B	4/19/17 AK
Iron, Total	1.072	mg/L	0.020	3125 B	4/19/17 AK
Iron, Dissolved	0.442	mg/L	0.020	3125 B	4/19/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Manganese, Total	0.940	mg/L	0.020	3125 B	4/19/17 AK
Manganese, Dissolved	0.891	mg/L	0.020	3125 B	4/19/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	4/19/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Nickel	0.007	mg/L	0.001	3125 B	4/19/17 AK
Selenium	0.013	mg/L	0.001	3125 B	4/19/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	4/19/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	4/19/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	4/19/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	4/19/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18674

Client : Pond Creek
Address :

Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : CE
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james plumley
PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Field Data: TEMP	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	4/18/2017	838	GW 33	W	G	4	7.3	14.7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.38'
2	4/18/2017	820	GW 34	W	G	4	7.5	14.3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.37'
3	4/18/2017	758	GW 35	W	G	4	7.0	14.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.02'

Relinquished by: C.W. Skelton	Date : 4/18/17 Time : 9:13	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date : Time :	Received by:	Remarks:
Relinquished by:	Date : 4/18/17 Time : 913	Received for Laboratory by: Alice Sheehan	

R08030

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	5/31/17
PDL:	18743-1	**COMMENT:**	4.98'
SAMPLE ID:	GW 33	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	5/11/17	**DATE RECEIVED:**	5/11/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.4	Unit	1 - 14	4500 B	5/11/17 CE
Acidity	32	mg/L	10	305.1	5/12/17 OG
Alkalinity	708	mg/L	10	310.1	5/12/17 OG
Sulfate	96	mg/L	5	4500 E	5/12/17 KR
Chloride	144	mg/L	5	4500 B	5/12/17 OG
Hardness	540	mg/L	10	2340 C	5/12/17 OG
Total Dissolved Solids	980	mg/L	50	2540 C	5/16/17 KR
Total Suspended Solids	7	mg/L	5	2540 D	5/16/17 KR
Fluoride	0.45	mg/L	0.01	340.2	5/12/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	5/15/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	5/26/17 KR
Aluminum	0.021	mg/L	0.020	3125 B	5/19/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Barium	0.085	mg/L	0.020	3125 B	5/19/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	5/19/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	5/19/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Copper	0.004	mg/L	0.001	3125 B	5/19/17 AK
Iron, Total	0.115	mg/L	0.020	3125 B	5/19/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	5/19/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Manganese, Total	0.195	mg/L	0.020	3125 B	5/19/17 AK
Manganese, Dissolved	0.189	mg/L	0.020	3125 B	5/19/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	5/16/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	5/19/17 AK
Nickel	0.003	mg/L	0.001	3125 B	5/19/17 AK
Selenium	0.001	mg/L	0.001	3125 B	5/19/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	5/19/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	5/19/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	5/31/17
PDL:	18743-2	**COMMENT:**	4.65'
SAMPLE ID:	GW 34	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	5/11/17	**DATE RECEIVED:**	5/11/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.6	Unit	1 - 14	4500 B	5/11/17 CE
Acidity	32	mg/L	10	305.1	5/12/17 OG
Alkalinity	440	mg/L	10	310.1	5/12/17 OG
Sulfate	220	mg/L	5	4500 E	5/12/17 KR
Chloride	110	mg/L	5	4500 B	5/12/17 OG
Hardness	500	mg/L	10	2340 C	5/12/17 OG
Total Dissolved Solids	872	mg/L	50	2540 C	5/16/17 KR
Total Suspended Solids	5	mg/L	5	2540 D	5/16/17 KR
Fluoride	0.58	mg/L	0.01	340.2	5/12/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	5/15/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	5/26/17 KR
Aluminum	< 0.020	mg/L	0.020	3125 B	5/19/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Barium	0.038	mg/L	0.020	3125 B	5/19/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Boron	0.027	mg/L	0.020	3125 B	5/19/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	5/19/17 AK
Chromium	0.001	mg/L	0.001	3125 B	5/19/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Copper	0.008	mg/L	0.001	3125 B	5/19/17 AK
Iron, Total	0.075	mg/L	0.020	3125 B	5/19/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	5/19/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Manganese, Total	0.135	mg/L	0.020	3125 B	5/19/17 AK
Manganese, Dissolved	0.089	mg/L	0.020	3125 B	5/19/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	5/16/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	5/19/17 AK
Nickel	0.002	mg/L	0.001	3125 B	5/19/17 AK
Selenium	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	5/19/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	5/19/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	5/19/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	5/31/17
PDL:	18743-3	**COMMENT:**	3.79'
SAMPLE ID:	GW 35	**SAMPLED BY:**	HR - CE
DATE SAMPLED:	5/11/17	**DATE RECEIVED:**	5/11/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.1	Unit	1 - 14	4500 B	5/11/17 CE
Acidity	62	mg/L	10	305.1	5/12/17 OG
Alkalinity	728	mg/L	10	310.1	5/12/17 OG
Sulfate	640	mg/L	5	4500 E	5/12/17 KR
Chloride	440	mg/L	5	4500 B	5/12/17 OG
Hardness	1,380	mg/L	10	2340 C	5/12/17 OG
Total Dissolved Solids	2,220	mg/L	50	2540 C	5/16/17 KR
Total Suspended Solids	15	mg/L	5	2540 D	5/16/17 KR
Fluoride	0.51	mg/L	0.01	340.2	5/12/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	5/15/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	5/26/17 KR
Aluminum	0.138	mg/L	0.020	3125 B	5/19/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	5/19/17 AK
Barium	0.038	mg/L	0.020	3125 B	5/19/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	5/19/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	5/19/17 AK
Chromium	0.004	mg/L	0.001	3125 B	5/19/17 AK
Cobalt	0.002	mg/L	0.001	3125 B	5/19/17 AK
Copper	0.009	mg/L	0.001	3125 B	5/19/17 AK
Iron, Total	0.645	mg/L	0.020	3125 B	5/19/17 AK
Iron, Dissolved	0.149	mg/L	0.020	3125 B	5/19/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Manganese, Total	0.744	mg/L	0.020	3125 B	5/19/17 AK
Manganese, Dissolved	0.678	mg/L	0.020	3125 B	5/19/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	5/16/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	5/19/17 AK
Nickel	0.007	mg/L	0.001	3125 B	5/19/17 AK
Selenium	0.006	mg/L	0.001	3125 B	5/19/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	5/19/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	5/19/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	5/19/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	5/19/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18743

Client: Pond Creek
Address:
Phone: 618-983-3020
Contact: Chris Skelton

Sampled by: CE
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james plumley
PO/Billing Reference:
Requested Due Date: Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Field Data: TEMP	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	5/11/2017	745	GW 33	W	G	4	7.4	15.0	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.98'
2	5/11/2017	803	GW 34	W	G	4	7.6	17.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.65'
3	5/11/2017	824	GW 35	W	G	4	7.1	16.4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.79'

Relinquished by: [signature]	Date: 5/11/17 Time: 16:10	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date: Time:	Received by:	Remarks:
Relinquished by:	Date: 5/11/17 Time: 1610	Received for Laboratory by: Amber Wright	

R08034

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18863-1
SAMPLE ID: GW 33
DATE SAMPLED: 6/19/17

REPORT DATE: 7/5/17
COMMENT: 6.78'
SAMPLED BY: Client-CE
DATE RECEIVED: 6/19/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	4500 B	6/19/17 CE
Acidity	60	mg/L	10	305.1	6/19/17 OG
Alkalinity	188	mg/L	10	310.1	6/19/17 OG
Sulfate	92	mg/L	5	4500 E	6/19/17 KR
Chloride	150	mg/L	5	4500 B	6/19/17 OG
Hardness	520	mg/L	10	2340 C	6/19/17 OG
Total Dissolved Solids	1,010	mg/L	50	2540 C	6/20/17 KR
Total Suspended Solids	6	mg/L	5	2540 D	6/20/17 KR
Fluoride	0.85	mg/L	0.01	340.2	6/21/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	6/19/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	6/30/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	6/22/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Arsenic	0.001	mg/L	0.001	3125 B	6/22/17 AK
Barium	0.130	mg/L	0.020	3125 B	6/22/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	6/22/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	6/22/17 AK
Chromium	0.001	mg/L	0.001	3125 B	6/22/17 AK
Cobalt	0.001	mg/L	0.001	3125 B	6/22/17 AK
Copper	0.003	mg/L	0.001	3125 B	6/22/17 AK
Iron, Total	0.431	mg/L	0.020	3125 B	6/22/17 AK
Iron, Dissolved	0.198	mg/L	0.020	3125 B	6/22/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Manganese, Total	0.261	mg/L	0.020	3125 B	6/22/17 AK
Manganese, Dissolved	0.225	mg/L	0.020	3125 B	6/22/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	6/23/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	6/22/17 AK
Nickel	0.002	mg/L	0.001	3125 B	6/22/17 AK
Selenium	0.002	mg/L	0.001	3125 B	6/22/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	6/22/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	6/22/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18863-2
SAMPLE ID: GW 34
DATE SAMPLED: 6/19/17

REPORT DATE: 7/5/17
COMMENT: 6.12'
SAMPLED BY: Client-CE
DATE RECEIVED: 6/19/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.5	Unit	1 - 14	4500 B	6/19/17 CE
Acidity	32	mg/L	10	305.1	6/19/17 OG
Alkalinity	376	mg/L	10	310.1	6/19/17 OG
Sulfate	220	mg/L	5	4500 E	6/19/17 KR
Chloride	108	mg/L	5	4500 B	6/19/17 OG
Hardness	440	mg/L	10	2340 C	6/19/17 OG
Total Dissolved Solids	860	mg/L	50	2540 C	6/20/17 KR
Total Suspended Solids	10	mg/L	5	2540 D	6/20/17 KR
Fluoride	0.58	mg/L	0.01	340.2	6/21/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	6/19/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	6/30/17 OG
Aluminum	0.165	mg/L	0.020	3125 B	6/22/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Barium	0.046	mg/L	0.020	3125 B	6/22/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Boron	0.032	mg/L	0.020	3125 B	6/22/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	6/22/17 AK
Chromium	0.002	mg/L	0.001	3125 B	6/22/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Copper	0.015	mg/L	0.001	3125 B	6/22/17 AK
Iron, Total	0.235	mg/L	0.020	3125 B	6/22/17 AK
Iron, Dissolved	0.077	mg/L	0.020	3125 B	6/22/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Manganese, Total	0.139	mg/L	0.020	3125 B	6/22/17 AK
Manganese, Dissolved	0.122	mg/L	0.020	3125 B	6/22/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	6/23/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	6/22/17 AK
Nickel	0.001	mg/L	0.001	3125 B	6/22/17 AK
Selenium	0.001	mg/L	0.001	3125 B	6/22/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	6/22/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	6/22/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	6/22/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18863-3
SAMPLE ID: GW 35
DATE SAMPLED: 6/19/17

REPORT DATE: 7/5/17
COMMENT: 6.46'
SAMPLED BY: Client-CE
DATE RECEIVED: 6/19/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.9	Unit	1 - 14	4500 B	6/19/17 CE
Acidity	158	mg/L	10	305.1	6/19/17 OG
Alkalinity	640	mg/L	10	310.1	6/19/17 OG
Sulfate	700	mg/L	5	4500 E	6/19/17 KR
Chloride	442	mg/L	5	4500 B	6/19/17 OG
Hardness	1,070	mg/L	10	2340 C	6/19/17 OG
Total Dissolved Solids	2,300	mg/L	50	2540 C	6/20/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	6/20/17 KR
Fluoride	0.63	mg/L	0.01	340.2	6/21/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	6/19/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	6/30/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	6/22/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	6/22/17 AK
Barium	0.038	mg/L	0.020	3125 B	6/22/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	6/22/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	6/22/17 AK
Chromium	0.002	mg/L	0.001	3125 B	6/22/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	6/22/17 AK
Copper	0.005	mg/L	0.001	3125 B	6/22/17 AK
Iron, Total	0.840	mg/L	0.020	3125 B	6/22/17 AK
Iron, Dissolved	0.531	mg/L	0.020	3125 B	6/22/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Manganese, Total	0.983	mg/L	0.020	3125 B	6/22/17 AK
Manganese, Dissolved	0.983	mg/L	0.020	3125 B	6/22/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	6/23/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Nickel	0.005	mg/L	0.001	3125 B	6/22/17 AK
Selenium	0.006	mg/L	0.001	3125 B	6/22/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	6/22/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	6/22/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	6/22/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18863

Client: Pond Creek
Address:
Phone: 618-983-3020
Contact: Chris Skelton

Sampled by: CE
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james plumley
PO/Billing Reference:
Requested Due Date: Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Field Data: TEMP	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	6/19/2017	842	GW 33	W	G	4	7.2	17.4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					6.78'
2	6/19/2017	928	GW 34	W	G	4	7.5	17.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					6.12'
3	6/19/2017	946	GW 35	W	G	4	6.9	18.3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					6.46'

Relinquished by: [signature] Date: 6/19/17 Time: 10:30 Received by:
Relinquished by: Date: Time: Received by:
Relinquished by: Date: 6/19/17 Time: 1030 Received for Laboratory by: Amber Wright

Shipped / Delivered Date: Time:
Remarks:

R08038

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18950-1
SAMPLE ID: GW 33
DATE SAMPLED: 7/13/17

REPORT DATE: 7/31/17
COMMENT: 6.92'
SAMPLED BY: Client-CE
DATE RECEIVED: 7/13/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.0	Unit	1 - 14	4500 B	7/13/17 CE
Acidity	28	mg/L	10	305.1	7/13/17 OG
Alkalinity	644	mg/L	10	310.1	7/13/17 OG
Sulfate	75	mg/L	5	4500 E	7/13/17 KR
Chloride	140	mg/L	5	4500 B	7/14/17 KR
Hardness	392	mg/L	10	2340 C	7/13/17 OG
Total Dissolved Solids	948	mg/L	50	2540 C	7/13/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	7/13/17 KR
Fluoride	0.47	mg/L	0.01	340.2	7/17/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	7/17/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	7/18/17 OG
Aluminum	0.064	mg/L	0.020	3125 B	7/27/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	7/27/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	7/27/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Copper	0.005	mg/L	0.001	3125 B	7/27/17 AK
Iron, Total	0.478	mg/L	0.020	3125 B	7/27/17 AK
Iron, Dissolved	0.221	mg/L	0.020	3125 B	7/27/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Manganese, Total	0.232	mg/L	0.020	3125 B	7/27/17 AK
Manganese, Dissolved	0.197	mg/L	0.020	3125 B	7/27/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	7/28/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Nickel	0.003	mg/L	0.001	3125 B	7/27/17 AK
Selenium	0.003	mg/L	0.001	3125 B	7/27/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	7/27/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	7/27/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18950-2
SAMPLE ID: GW 34
DATE SAMPLED: 7/13/17

REPORT DATE: 7/31/17
COMMENT: 6.83'
SAMPLED BY: Client-CE
DATE RECEIVED: 7/13/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.3	Unit	1 - 14	4500 B	7/13/17 CE
Acidity	100	mg/L	10	305.1	7/13/17 OG
Alkalinity	412	mg/L	10	310.1	7/13/17 OG
Sulfate	245	mg/L	5	4500 E	7/13/17 KR
Chloride	106	mg/L	5	4500 B	7/14/17 KR
Hardness	384	mg/L	10	2340 C	7/13/17 OG
Total Dissolved Solids	840	mg/L	50	2540 C	7/13/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	7/13/17 KR
Fluoride	0.57	mg/L	0.01	340.2	7/17/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	7/17/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	7/18/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Boron	0.026	mg/L	0.020	3125 B	7/27/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	7/27/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Copper	0.005	mg/L	0.001	3125 B	7/27/17 AK
Iron, Total	0.092	mg/L	0.020	3125 B	7/27/17 AK
Iron, Dissolved	0.043	mg/L	0.020	3125 B	7/27/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Manganese, Total	0.088	mg/L	0.020	3125 B	7/27/17 AK
Manganese, Dissolved	0.086	mg/L	0.020	3125 B	7/27/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	7/28/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Nickel	0.002	mg/L	0.001	3125 B	7/27/17 AK
Selenium	0.001	mg/L	0.001	3125 B	7/27/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	7/27/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	7/27/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	7/31/17
PDL:	18950-3	**COMMENT:**	6.33'
SAMPLE ID:	GW 35	**SAMPLED BY:**	Client-CE
DATE SAMPLED:	7/13/17	**DATE RECEIVED:**	7/13/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.8	Unit	1 - 14	4500 B	7/13/17 CE
Acidity	38	mg/L	10	305.1	7/13/17 OG
Alkalinity	684	mg/L	10	310.1	7/13/17 OG
Sulfate	680	mg/L	5	4500 E	7/13/17 KR
Chloride	430	mg/L	5	4500 B	7/14/17 KR
Hardness	1,088	mg/L	10	2340 C	7/13/17 OG
Total Dissolved Solids	2,236	mg/L	50	2540 C	7/13/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	7/13/17 KR
Fluoride	0.48	mg/L	0.01	340.2	7/17/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	7/17/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	7/18/17 OG
Aluminum	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	7/27/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	7/27/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	7/27/17 AK
Chromium	0.002	mg/L	0.001	3125 B	7/27/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	7/27/17 AK
Copper	0.007	mg/L	0.001	3125 B	7/27/17 AK
Iron, Total	0.714	mg/L	0.020	3125 B	7/27/17 AK
Iron, Dissolved	0.371	mg/L	0.020	3125 B	7/27/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Manganese, Total	0.926	mg/L	0.020	3125 B	7/27/17 AK
Manganese, Dissolved	0.894	mg/L	0.020	3125 B	7/27/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	7/28/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Nickel	0.006	mg/L	0.001	3125 B	7/27/17 AK
Selenium	0.007	mg/L	0.001	3125 B	7/27/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	7/27/17 AK
Vanadium	< 0.001	mg/L	0.001	3125 B	7/27/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	7/27/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18950

Client: Pond Creek
Address:
Phone: 618-983-3020
Contact: Chris Skelton

Sampled by: CE
Report to: Chris Skelton
Bill to: chris.skelton@machmining.com
james plumley
PO/Billing Reference:
Requested Due Date: Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Field Data: TEMP	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	7/13/2017	721	GW 33	W	G	4	7.0	18.7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					6.92'
2	7/13/2017	746	GW 34	W	G	4	7.3	19.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					6.83'
3	7/13/2017	814	GW 35	W	G	4	6.8	20.6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					6.33'

Relinquished by: [signature]	Date: 7/13/17 Time: 8:55	Received by:
Relinquished by:	Date: Time:	Received by:
Relinquished by:	Date: 7/13/17 Time: 8:55	Received for Laboratory by: [signature]

Shipped / Delivered Date: Time:

Remarks:

R08042

ATTACHMENT PART III.2.C.

APPENDIX A

WATER HOLDING CELLS SEDCAD CALCULATIONS (DURING MINING CONDITIONS)

WILLIAMSON ENERGY, LLC

Pond Creek Mine

Holding Cells A & B

25-Yr, 6-Hr Storm Event

BCS

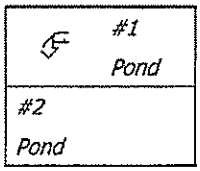
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 6 hr
Rainfall Depth:	4.680 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#2	0.000	0.000	HOLDING CELL A SPILLWAY
Pond	#2	==>	End	0.000	0.000	HOLDING CELL B SPILLWAY



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	2.240	2.240	20.40	0.83
	Out			5.09	0.83
#2	In	5.410	7.650	53.09	2.83
	Out			5.13	2.83

Structure Detail:

Structure #1 (Pond)

HOLDING CELL A SPILLWAY

Pond Inputs:

Initial Pool Elev:	450.26 ft
Initial Pool:	10.06 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
450.26	30.00	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	450.64 ft
Dewater Time:	0.34 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	0.244	0.000	0.000	
435.50	0.269	0.128	0.000	
436.00	0.296	0.270	0.000	
436.50	0.321	0.424	0.000	
437.00	0.346	0.590	0.000	
437.50	0.373	0.770	0.000	
438.00	0.400	0.963	0.000	
438.50	0.426	1.169	0.000	
439.00	0.452	1.389	0.000	
439.50	0.479	1.621	0.000	
440.00	0.507	1.868	0.000	
440.50	0.534	2.128	0.000	
441.00	0.561	2.402	0.000	
441.50	0.589	2.689	0.000	
442.00	0.618	2.991	0.000	
442.50	0.645	3.307	0.000	
443.00	0.673	3.636	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
443.50	0.702	3.980	0.000		
444.00	0.731	4.338	0.000		
444.50	0.760	4.711	0.000		
445.00	0.789	5.098	0.000		
445.50	0.818	5.500	0.000		
446.00	0.847	5.916	0.000		
446.50	0.876	6.347	0.000		
447.00	0.906	6.792	0.000		
447.50	0.936	7.252	0.000		
448.00	0.966	7.728	0.000		
448.50	0.996	8.218	0.000		
449.00	1.026	8.724	0.000		
449.50	1.057	9.244	0.000		
450.00	1.088	9.781	0.000		
450.26	1.104	10.064	0.000	Spillway #1	
450.50	1.119	10.332	3.203	7.30	
450.64	1.128	10.493	5.089	0.80	Peak Stage
451.00	1.150	10.899	9.848		
451.50	1.181	11.482	29.506		
452.00	1.213	12.081	59.416		
452.50	1.244	12.695	98.060		
453.00	1.276	13.325	150.025		
453.50	1.308	13.971	215.871		
454.00	1.341	14.633	295.217		
454.50	1.373	15.312	388.778		
455.00	1.406	16.007	497.241		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000
438.50	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
445.00	0.000	0.000
445.50	0.000	0.000
446.00	0.000	0.000
446.50	0.000	0.000
447.00	0.000	0.000
447.50	0.000	0.000
448.00	0.000	0.000
448.50	0.000	0.000
449.00	0.000	0.000
449.50	0.000	0.000
450.00	0.000	0.000
450.26	0.000	0.000
450.50	3.203	3.203
451.00	9.848	9.848
451.50	29.506	29.506
452.00	59.416	59.416
452.50	98.060	98.060
453.00	150.025	150.025
453.50	215.871	215.871
454.00	295.217	295.217
454.50	388.778	388.778
455.00	497.241	497.241

Structure #2 (Pond)

HOLDING CELL B SPILLWAY

Pond Inputs:

Initial Pool Elev:	450.26 ft

Initial Pool:	50.57 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
450.26	42.50	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	450.69 ft
Dewater Time:	1.23 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	2.755	0.000	0.000	
435.50	2.789	1.386	0.000	
436.00	2.824	2.789	0.000	
436.50	2.859	4.210	0.000	
437.00	2.895	5.649	0.000	
437.50	2.931	7.105	0.000	
438.00	2.967	8.580	0.000	
438.50	3.003	10.072	0.000	
439.00	3.039	11.583	0.000	
439.50	3.075	13.111	0.000	
440.00	3.112	14.658	0.000	
440.50	3.149	16.223	0.000	
441.00	3.186	17.807	0.000	
441.50	3.223	19.409	0.000	
442.00	3.260	21.030	0.000	
442.50	3.297	22.669	0.000	
443.00	3.335	24.327	0.000	
443.50	3.373	26.004	0.000	
444.00	3.411	27.700	0.000	
444.50	3.449	29.415	0.000	
445.00	3.487	31.149	0.000	
445.50	3.525	32.902	0.000	
446.00	3.564	34.674	0.000	
446.50	3.603	36.466	0.000	
447.00	3.642	38.277	0.000	
447.50	3.681	40.108	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
448.00	3.721	41.959	0.000		
448.50	3.761	43.829	0.000		
449.00	3.801	45.720	0.000		
449.50	3.841	47.630	0.000		
450.00	3.881	49.560	0.000		
450.26	3.902	50.568	0.000		Spillway #1
450.50	3.921	51.511	2.850	25.65	
450.69	3.937	52.270	5.127	3.85	Peak Stage
451.00	3.962	53.482	8.762		
451.50	4.003	55.473	27.366		
452.00	4.044	57.485	56.534		
452.50	4.085	59.517	94.086		
453.00	4.126	61.570	143.053		
453.50	4.167	63.643	206.918		
454.00	4.209	65.737	286.060		
454.50	4.251	67.852	378.961		
455.00	4.293	69.988	482.845		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000
438.50	0.000	0.000
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
445.00	0.000	0.000
445.50	0.000	0.000
446.00	0.000	0.000
446.50	0.000	0.000
447.00	0.000	0.000
447.50	0.000	0.000
448.00	0.000	0.000
448.50	0.000	0.000
449.00	0.000	0.000
449.50	0.000	0.000
450.00	0.000	0.000
450.26	0.000	0.000
450.50	2.850	2.850
451.00	8.762	8.762
451.50	27.366	27.366
452.00	56.534	56.534
452.50	94.086	94.086
453.00	143.053	143.053
453.50	206.918	206.918
454.00	286.060	286.060
454.50	378.961	378.961
455.00	482.845	482.845

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	2.240	0.000	0.000	0.000	98.000	M	20.40	0.828
	Σ	**2.240**						**20.40**	**0.828**
#2	1	5.410	0.000	0.000	0.000	98.000	M	49.26	1.999
	Σ	**7.650**						**53.09**	**2.827**

WILLIAMSON ENERGY, LLC

Pond Creek Mine

Holding Cell C

25-Yr, 6-Hr Storm Event

BCS

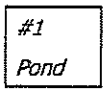
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	25 yr - 6 hr
Rainfall Depth:	4.680 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	HOLDING CELL C SPILLWAY



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	6.640	6.640	60.46	2.45
	Out			6.87	2.45

Structure Detail:

Structure #1 (Pond)

HOLDING CELL C SPILLWAY

Pond Inputs:

Initial Pool Elev:	449.83 ft
Initial Pool:	61.28 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
449.83	30.00	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	450.16 ft
Dewater Time:	0.87 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	3.545	0.000	0.000	
435.50	3.583	1.782	0.000	
436.00	3.621	3.583	0.000	
436.50	3.659	5.403	0.000	
437.00	3.698	7.242	0.000	
437.50	3.736	9.101	0.000	
438.00	3.775	10.978	0.000	
438.50	3.814	12.876	0.000	
439.00	3.853	14.792	0.000	
439.50	3.892	16.729	0.000	
440.00	3.932	18.685	0.000	
440.50	3.972	20.661	0.000	
441.00	4.012	22.657	0.000	
441.50	4.052	24.672	0.000	
442.00	4.092	26.708	0.000	
442.50	4.132	28.764	0.000	
443.00	4.173	30.841	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
443.50	4.214	32.938	0.000		
444.00	4.255	35.055	0.000		
444.50	4.296	37.193	0.000		
445.00	4.337	39.351	0.000		
445.50	4.378	41.530	0.000		
446.00	4.420	43.729	0.000		
446.50	4.462	45.950	0.000		
447.00	4.504	48.191	0.000		
447.50	4.546	50.454	0.000		
448.00	4.589	52.738	0.000		
448.50	4.632	55.043	0.000		
449.00	4.675	57.369	0.000		
449.50	4.718	59.717	0.000		
449.83	4.746	61.279	0.000		Spillway #1
450.00	4.761	62.087	3.565	18.00	
450.16	4.775	62.839	6.871	2.95	Peak Stage
450.26	4.783	63.323	8.997		
450.50	4.804	64.478	14.050		
451.00	4.848	66.891	24.536		
451.50	4.891	69.326	53.031		
452.00	4.935	71.783	89.206		
452.50	4.979	74.261	138.410		
453.00	5.024	76.762	201.646		
453.50	5.068	79.285	278.233		
454.00	5.113	81.830	368.895		
454.50	5.158	84.398	474.324		
455.00	5.203	86.988	595.180		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
438.50	0.000	0.000
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
445.00	0.000	0.000
445.50	0.000	0.000
446.00	0.000	0.000
446.50	0.000	0.000
447.00	0.000	0.000
447.50	0.000	0.000
448.00	0.000	0.000
448.50	0.000	0.000
449.00	0.000	0.000
449.50	0.000	0.000
449.83	0.000	0.000
450.00	3.565	3.565
450.26	8.997	8.997
450.50	14.050	14.050
451.00	24.536	24.536
451.50	53.031	53.031
452.00	89.206	89.206
452.50	138.410	138.410
453.00	201.646	201.646
453.50	278.233	278.233
454.00	368.895	368.895
454.50	474.324	474.324
455.00	595.180	595.180

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.640	0.000	0.000	0.000	98.000	M	60.46	2.453
	Σ	**6.640**						**60.46**	**2.453**

WILLIAMSON ENERGY, LLC

Pond Creek Mine

Holding Cell C

10-Yr, 24-Hr Storm Event

BCS

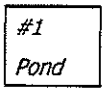
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 24 hr
Rainfall Depth:	5.210 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	HOLDING CELL C SPILLWAY



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	6.640	6.640	47.55	2.75
	Out			5.74	2.75

Structure Detail:

Structure #1 (Pond)

HOLDING CELL C SPILLWAY

Pond Inputs:

Initial Pool Elev:	449.83 ft
Initial Pool:	61.28 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
449.83	30.00	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	450.10 ft
Dewater Time:	1.03 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	3.545	0.000	0.000	
435.50	3.583	1.782	0.000	
436.00	3.621	3.583	0.000	
436.50	3.659	5.403	0.000	
437.00	3.698	7.242	0.000	
437.50	3.736	9.101	0.000	
438.00	3.775	10.978	0.000	
438.50	3.814	12.876	0.000	
439.00	3.853	14.792	0.000	
439.50	3.892	16.729	0.000	
440.00	3.932	18.685	0.000	
440.50	3.972	20.661	0.000	
441.00	4.012	22.657	0.000	
441.50	4.052	24.672	0.000	
442.00	4.092	26.708	0.000	
442.50	4.132	28.764	0.000	
443.00	4.173	30.841	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
443.50	4.214	32.938	0.000		
444.00	4.255	35.055	0.000		
444.50	4.296	37.193	0.000		
445.00	4.337	39.351	0.000		
445.50	4.378	41.530	0.000		
446.00	4.420	43.729	0.000		
446.50	4.462	45.950	0.000		
447.00	4.504	48.191	0.000		
447.50	4.546	50.454	0.000		
448.00	4.589	52.738	0.000		
448.50	4.632	55.043	0.000		
449.00	4.675	57.369	0.000		
449.50	4.718	59.717	0.000		
449.83	4.746	61.279	0.000		Spillway #1
450.00	4.761	62.087	3.565	22.35	
450.10	4.770	62.582	5.742	2.30	Peak Stage
450.26	4.783	63.323	8.997		
450.50	4.804	64.478	14.050		
451.00	4.848	66.891	24.536		
451.50	4.891	69.326	53.031		
452.00	4.935	71.783	89.206		
452.50	4.979	74.261	138.410		
453.00	5.024	76.762	201.646		
453.50	5.068	79.285	278.233		
454.00	5.113	81.830	368.895		
454.50	5.158	84.398	474.324		
455.00	5.203	86.988	595.180		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
438.50	0.000	0.000
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
445.00	0.000	0.000
445.50	0.000	0.000
446.00	0.000	0.000
446.50	0.000	0.000
447.00	0.000	0.000
447.50	0.000	0.000
448.00	0.000	0.000
448.50	0.000	0.000
449.00	0.000	0.000
449.50	0.000	0.000
449.83	0.000	0.000
450.00	3.565	3.565
450.26	8.997	8.997
450.50	14.050	14.050
451.00	24.536	24.536
451.50	53.031	53.031
452.00	89.206	89.206
452.50	138.410	138.410
453.00	201.646	201.646
453.50	278.233	278.233
454.00	368.895	368.895
454.50	474.324	474.324
455.00	595.180	595.180

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	6.640	0.000	0.000	0.000	98.000	M	47.55	2.750
	Σ	**6.640**						**47.55**	**2.750**

APPENDIX A

WATER HOLDING CELLS SEDCAD CALCULATIONS (POST MINING CONDITIONS)

WILLIAMSON ENERGY, LLC

Pond Creek Mine

Holding Cell A

Abandonment Plan

100-Yr, 6-Hr Storm Event

BCS

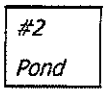
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	6.210 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#2	==>	End	0.000	0.000	HOLDING CELL A SPILLWAY



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#2	In	2.000	2.000	20.10	0.74
	Out			7.21	0.74

Structure Detail:

Structure #2 (Pond)

HOLDING CELL A SPILLWAY

Pond Inputs:

Initial Pool Elev:	445.36 ft
Initial Pool:	5.43 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
445.36	50.00	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	445.74 ft
Dewater Time:	0.22 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	0.244	0.000	0.000	
435.50	0.270	0.129	0.000	
436.00	0.298	0.271	0.000	
436.50	0.324	0.426	0.000	
437.00	0.352	0.595	0.000	
437.50	0.379	0.778	0.000	
438.00	0.406	0.974	0.000	
438.50	0.433	1.183	0.000	
439.00	0.460	1.407	0.000	
439.50	0.487	1.643	0.000	
440.00	0.514	1.893	0.000	
440.50	0.541	2.157	0.000	
441.00	0.568	2.434	0.000	
441.50	0.595	2.725	0.000	
442.00	0.623	3.029	0.000	
442.50	0.650	3.348	0.000	
443.00	0.677	3.679	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
443.50	0.704	4.024	0.000		
444.00	0.732	4.384	0.000		
444.50	0.759	4.756	0.000		
445.00	0.787	5.143	0.000		
445.36	0.807	5.430	0.000		Spillway #1
445.50	0.815	5.543	2.628	4.45	
445.74	0.830	5.746	7.210	0.85	Peak Stage
446.00	0.845	5.958	12.014		
446.50	0.866	6.386	21.400		
447.00	0.888	6.825	48.844		
447.50	0.906	7.273	82.853		
448.00	0.924	7.731	129.043		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000
438.50	0.000	0.000
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
445.00	0.000	0.000
445.36	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
445.50	2.628	2.628
446.00	12.014	12.014
446.50	21.400	21.400
447.00	48.844	48.844
447.50	82.853	82.853
448.00	129.043	129.043

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	0.700	0.000	0.000	0.000	98.000	M	8.48	0.348
	2	1.300	0.000	0.000	0.000	77.000	M	11.62	0.396
	Σ	**2.000**						**20.10**	**0.743**

WILLIAMSON ENERGY, LLC
Pond Creek Mine

Holding Cell B

Abandonment Plan

100-Yr, 6-Hr Storm Event

BCS

Copyright 1998 -2010 Pamela L Schwab

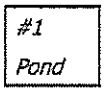
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	6.210 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	HOLDING CELL B SPILLWAY



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	4.500	4.500	51.33	2.04
	Out			5.36	2.04

Structure Detail:

Structure #1 (Pond)

HOLDING CELL B SPILLWAY

Pond Inputs:

Initial Pool Elev:	446.05 ft
Initial Pool:	34.92 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
446.05	50.00	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	446.41 ft
Dewater Time:	0.90 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	2.755	0.000	0.000	
435.50	2.791	1.387	0.000	
436.00	2.828	2.791	0.000	
436.50	2.864	4.215	0.000	
437.00	2.901	5.656	0.000	
437.50	2.938	7.116	0.000	
438.00	2.975	8.594	0.000	
438.50	3.011	10.090	0.000	
439.00	3.048	11.605	0.000	
439.50	3.085	13.138	0.000	
440.00	3.122	14.690	0.000	
440.50	3.158	16.260	0.000	
441.00	3.195	17.849	0.000	
441.50	3.232	19.455	0.000	
442.00	3.269	21.080	0.000	
442.50	3.305	22.724	0.000	
443.00	3.342	24.386	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
443.50	3.379	26.066	0.000		
444.00	3.416	27.765	0.000		
444.50	3.452	29.482	0.000		
445.00	3.489	31.217	0.000		
445.50	3.526	32.971	0.000		
446.00	3.563	34.743	0.000		
446.05	3.566	34.918	0.000		Spillway #1
446.41	3.589	36.223	5.356	21.70	Peak Stage
446.50	3.594	36.532	6.627		
447.00	3.625	38.337	13.973		
447.50	3.647	40.155	37.070		
448.00	3.670	41.985	67.875		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000
438.50	0.000	0.000
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
445.00	0.000	0.000
445.50	0.000	0.000

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
446.00	0.000	0.000
446.05	0.000	0.000
446.50	6.627	6.627
447.00	13.973	13.973
447.50	37.070	37.070
448.00	67.875	67.875

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	3.500	0.000	0.000	0.000	98.000	M	42.39	1.738
	2	1.000	0.000	0.000	0.000	77.000	M	8.94	0.304
	Σ	**4.500**						**51.33**	**2.042**

WILLIAMSON ENERGY, LLC

Pond Creek Mine

Holding Cell C

Abandonment Plan

100-Yr, 6-Hr Storm Event

BCS

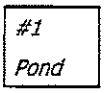
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	6.210 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	HOLDING CELL C SPILLWAY



Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	12.400	12.400	124.48	4.60
	Out			10.83	4.60

Structure Detail:

Structure #1 (Pond)

HOLDING CELL C SPILLWAY

Pond Inputs:

Initial Pool Elev:	444.93 ft
Initial Pool:	39.14 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
444.93	50.00	3.00:1	3.00:1	8.00

Pond Results:

Peak Elevation:	445.61 ft
Dewater Time:	1.11 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
435.00	3.545	0.000	0.000	
435.50	3.584	1.782	0.000	
436.00	3.623	3.584	0.000	
436.50	3.662	5.405	0.000	
437.00	3.701	7.246	0.000	
437.50	3.740	9.106	0.000	
438.00	3.779	10.986	0.000	
438.50	3.818	12.885	0.000	
439.00	3.857	14.804	0.000	
439.50	3.896	16.742	0.000	
440.00	3.935	18.700	0.000	
440.50	3.974	20.677	0.000	
441.00	4.014	22.674	0.000	
441.50	4.073	24.696	0.000	
442.00	4.132	26.747	0.000	
442.50	4.151	28.818	0.000	
443.00	4.171	30.898	0.000	

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)	
443.50	4.230	32.999	0.000		
444.00	4.290	35.129	0.000		
444.50	4.311	37.279	0.000		
444.93	4.329	39.137	0.000		Spillway #1
445.00	4.332	39.440	1.116	17.80	
445.50	4.373	41.616	9.090	7.35	
445.61	4.383	42.096	10.833	1.45	Peak Stage
446.00	4.415	43.813	17.064		
446.50	4.447	46.029	43.194		
447.00	4.479	48.260	74.925		

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
435.00	0.000	0.000
435.50	0.000	0.000
436.00	0.000	0.000
436.50	0.000	0.000
437.00	0.000	0.000
437.50	0.000	0.000
438.00	0.000	0.000
438.50	0.000	0.000
439.00	0.000	0.000
439.50	0.000	0.000
440.00	0.000	0.000
440.50	0.000	0.000
441.00	0.000	0.000
441.50	0.000	0.000
442.00	0.000	0.000
442.50	0.000	0.000
443.00	0.000	0.000
443.50	0.000	0.000
444.00	0.000	0.000
444.50	0.000	0.000
444.93	0.000	0.000
445.00	1.116	1.116
445.50	9.090	9.090
446.00	17.064	17.064

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
446.50	43.194	43.194
447.00	74.925	74.925

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	4.300	0.000	0.000	0.000	98.000	M	52.08	2.135
	2	8.100	0.000	0.000	0.000	77.000	M	72.40	2.465
	Σ	**12.400**						**124.48**	**4.600**

ACCESS BERM 24 INCH CULVERT

WILLIAMSON ENERGY, LLC

Pond Creek Mine

Proposed Pipe

10-Yr, 6-Hr Storm Event

BCS

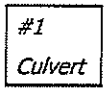
General Information

Storm Information:

Storm Type:	NRCS Type II
Design Storm:	10 yr - 6 hr
Rainfall Depth:	3.910 inches

Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Culvert	#1	==>	End	0.000	0.000	PROPOSED PIPE



Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	2.920	2.920	17.89	0.62

Structure Detail:

[illegible]

PROPOSED PIPE

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
90.00	0.53	0.0240	7.00	0.00	0.90

Culvert Results:

Design Discharge = 17.89 cfs

Minimum pipe diameter: 1 - 21 inch pipe(s) required

NOTE: Install 1 - 24 inch pipe

Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	2.920	0.000	0.000	0.000	87.000	M	17.89	0.620
	Σ	**2.920**						**17.89**	**0.620**

APPENDIX B

WATER MANAGEMENT FACILITY

POND CREEK MINE WATER MANAGEMENT FACILITY

WATER HOLDING CELLS

Purpose

The purpose of this application is to facilitate the construction of new water holding cells at Williamson Energy, LLC's Pond Creek Mine. The current water holding cell, permitted under IDNR Permit No. 417 and IEPA Permit 2015-MA-3432, was constructed within the proposed footprint of Refuse Disposal Area (RDA). Prior to the construction of Phase 11 of the RDA, the current water holding cell shall be eliminated by dewatering the cell and removing all silt and settled material. Once the cell is allowed to dry, it will be backfilled with compacted coarse refuse in compliance with the approved refuse construction specifications and plan detailed in Permit No. 417. The new Water Holding Cells will replace the current cell as well as provide additional long term water storage and staging for future water management systems. The material excavated from the Water Holding Cells will also be utilized to reclaim the slopes of the inactive portion of the RDA that will result in decreased constituent loadings and improve overall water quality at the site.

Sediment Control Measures during Construction

Construction of the new Water Holding Cells will begin upon issuance of the required permits. Alternate sediment control measures will be used in lieu of a siltation structure for affected areas. Areas associated with the Water Holding Cells and the proposed access road will be disturbed for a limited amount of time. The Water Holding Cells will be constructed above grade; therefore, surface runoff will follow the natural drainage patterns around the cells. During construction of the Water Holding Cells and proposed access road, silt fence will be installed along the downstream sides of the site. Upon completion of the Water Holding Cells and the proposed access road, exposed soils will be permanently vegetated. The access road temporarily used to transport soil material for the refuse reclamation will be stabilized with stone. Silt fence will be maintained and/or replaced along the downstream toe of the water holding cells and the access road until reclamation activities are completed.

Current Plant Operations and Water Management

Water is used by the Mine in two areas of the operations. The Mine uses water in the coal extraction process to suppress dust and to wash the coal in the Preparation Plant. Concurrently, mine infiltration water is removed from the mine to protect workers and allow mining to occur.

The water used in the coal extraction process is fresh, untreated water purchased from the City of Johnston City, Illinois. The purchased water is pumped to Pond 005. During mining

operations, the water from Pond 005 is pumped to the mine to extract coal. After use during the coal extraction process, this water is not recoverable.

Raw coal is separated from rock in the Preparation Plant. The larger rocks that are mined are screened off from the incoming feed to the Preparation Plant where they are deposited onto the refuse belt. This material is used to construct the coarse refuse embankment.

Water used to wash the coal in the Preparation Plant comes from the Fresh Water Lake. The fine material ultimately ends up at the thickener units. The makeup water required for the thickener units is pumped to the plant from the Fresh Water Lake. The underflow from the thickeners is pumped to the Slurry Impoundment/Refuse Disposal Area (RDA).

Over time, the fine solid particles present in the thickener underflow that is pumped to the Slurry Impoundment/RDA settle to the bottom of the impoundment leaving clarified water on the surface. The clarified water is able to be recycled by pumping it from the Impoundment back to the Fresh Water Lake where it can be pumped into the Preparation Plant and reused in the process. As a result, the majority of the wash water is recovered.

There is some loss of water during the washing process. Additionally, since the fines do not all settle immediately in the Slurry Impoundment, the quality of the clarified water results in a need for additional water for the Preparation Plant. Therefore, Preparation Plant water is supplemented with mine infiltration water and/or stormwater.

Mine Infiltration Water

An aquifer above the coal seam has caused an influx in water into the Mine (infiltrating groundwater). It is necessary to remove the water from the mine to protect the health and safety of the workforce, as well as, the overall mining operation. The Mine currently has an excess of water onsite due to the infiltrating groundwater. To manage this excess water, the Mine utilizes the infiltrating groundwater during the coal washing processes. The infiltrating groundwater is pumped from the mine to the Water Holding Cells. Water is pumped from the Water Holding Cells to the Fresh Water Lake. Surplus mine water that cannot be utilized in the Preparation Plant is stored in the sealed areas of the mine (if/when possible) or the Slurry Impoundment (RDA).

Water Holding Cells Operation

Mine infiltration water will be pumped to the Water Holding Cells or the Impoundment. Clarified decant water can be pumped from the Impoundment to the Water Holding Cell if necessary to maintain appropriate water levels in the Impoundment. From the Water Holding Cells, water can be pumped to the Impoundment or to the Fresh Water Lake to be utilized in the Pond Creek Mine's coal preparation closed circuit water handling system. Water in the Water Holding Cell is not allowed to directly discharge from the facility to any waterway under this

permit application. This will be accomplished by the installation of a water level indicator in Water Holding Cells B and C. This device will automatically and continuously record the water elevation in Water Holding Cells B and C. If and when the water elevation in Water Holding Cell B and C comes to within two foot of the emergency spillways of the cells, the pump installed in Water Holding Cells B and/or C will automatically activate and pump the excess water to the Impoundment. An elevation of approximately 6 inches below the emergency spillway elevation will retain the 25 year/6 hour storm event. See the attached Calculation Sheet and the Water Holding Cells Plan View and Section drawing (Drawing No. B17-116-E2).

The Fresh Water Lake has an emergency overflow structure that discharges into Pond 006. An automatic control system is installed to ensure an unintentional discharge of this water does not occur. A water level indicator is installed in the Fresh Water Lake that indicates the water elevation in the Fresh Water Lake with respect to the emergency spillway elevation that flows into Pond 006. Once the pool elevation gets within one foot of the spillway elevation, a signal is sent to automatically shut off the pump that pumps water to the Fresh Water Lake. If both the Fresh Water Lake and Water Holding Cells are at capacity, mine infiltration water required to be removed from the mine will be pumped to the Impoundment for temporary storage.

Protections and Monitoring

Pump pressures will be monitored by the existing water management monitoring system. Should leakage or rupture occur in the waterlines, the pumping systems will be shut down and spill containment provisions will be put in place as the situation requires. If a power outage would occur and disable the water holding cell pumps, all inbound water will be diverted to the fine coal refuse impoundment and the mandatory 25 year – 6 hour storm retention capacity for the cells freeboard will be maintained by using diesel pumps.

Groundwater Protection

The Water Holding Cells will be constructed with a compacted 4 foot thick clay liner. To verify the availability of suitable material in the area, six soil borings (WHC-1 through 6) were drilled to bedrock in August 2015 for the proposed Water Holding Cells. Adjacent to these borings, shallow offset borings (WHC-1A through 6A) were drilled to collect soil samples for permeability tests using Shelby tubes.

Permeability boring WHC-1A and 2A were analyzed and the results are attached. The Shelby tube samples tested are all from the clay till, at 6-inch increments. The results from these samples are similar to the samples taken in the adjacent Permit 417 site. The redistributed clay used to construct the Permit 417 clay liner met or exceeded the permeability requirement of $1x10^{-7}$ cm/s. Based on the information, construction of a clay liner for the Water Holding Cells is achievable. Field testing will be conducted to insure the permeability requirement is met.

Refer to the Construction Quality Assurance and Quality Control (CQA/QC) Plan for information on the clay liner installation and testing.

Three (3) groundwater monitoring wells (GW-33, GW-34, and GW-35) have been installed in the vicinity of the Water Holding Cells. Sampling information for these wells and the well completion reports are included.

The applicant has been notified by IEPA that a fourth well (GW-36) will be required. The fourth well will not be drill until the construction of the water holding cells are completed and prior to water being pumped into the cells. The boring log and well completion report will be submitted to the Department upon receipt from the drilling company. The proposed well is shown on the Surface Facilities Map (Drawing No. B17-116-E1).

Permit 375 - Water Holding Cells IBR

ACI Project No.: B17-116-1413

The purpose of the following calculations is to determine the maximum pool levels required for Holding Cells A-B and C to store the runoff associated with a 25 year/6 hour storm event without activating the emergency spillways.

HOLDING CELL A and B

Drainage Area: 7.65 acres

25 yr/6 hr. Rainfall = 4.68 inches

$$\frac{4.68 \text{ inches}}{1} \times \frac{1 \text{ foot}}{12 \text{ inches}} \times \frac{7.65 \text{ acres}}{1} = 2.98 \text{ acre/feet}$$

Combined volume at spillway invert elevation 450.25' = 60.64 acre/feet

60.64 acre/feet - 2.98 acre/feet = 57.66 acre/feet

El.	ac/ft
449.200	8.94
x	57.66
450.259	60.64

x = 449.75 Storm retention elevation

HOLDING CELL C

Drainage Area: 2.24 acres

25 yr/6 hr. Rainfall = 4.68 inches

$$\frac{4.68 \text{ inches}}{1} \times \frac{1 \text{ foot}}{12 \text{ inches}} \times \frac{6.64 \text{ acres}}{1} = 2.59 \text{ acre/feet}$$

Volume at spillway invert elevation 449.830 = 61.28 acre/feet

61.28 acre/feet - 2.59 acre/feet = 58.69 acre/feet

El.	ac/ft
449.100	58.31
x	58.69
449.830	61.28

x = 449.28 Storm retention elevation

18-inch HDPE Pipe Design between Cells B and C

Pump discharge - 5,000 gpm (11.14 cfs)

Culvert Design — Fri Jul 28 10:57:59 2017

Design Parameters

Section		
Shape:	Circular	
Material:	HDPE - Smooth	
Diameter:	18.00	in
Manning's n:	0.0120	
Number of Barrels:	2	
Inlet		
Inlet Type:	Groove End Projecting	
Ke:	0.20	
Inverts		
Inlet Invert Elevation:	448.250	ft
Outlet Invert Elevation:	447.780	ft
Length:	160.000	ft
Slope:	0.29	%

Culvert Calculation		
Discharge:	13.30	cfs
Headwater Elevation:	449.750	ft
Tailwater Elevation:	0.000	ft
Downstream Velocity:	5.33	ft/s
Downstream Flow Depth:	0.998	ft
Flow Control Type:	Inlet Control, Unsubmerged	

APPENDIX C

CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL (CQA/QC)

SECTION I
GENERAL

SECTION I
(CONTINUED)

1.0 INTRODUCTION

This Construction Quality Assurance and Quality Control (CQA/QC) Plan has been prepared to provide the Owner, Engineer, Contractor and Subcontractor the means to govern the construction quality and to satisfy the environmental protection requirements. More specifically, this CQA/QC Plan addresses the installation of the clay liner at the proposed Water Holding Cells facility at Williamson Energy LLC's Pond Creek Mine.

The CQA/QC Plan is divided into the following sections:

- Section I, General;
- Section II, Site Preparation; Quality Assurance/Quality Control;
- Section III, Documentation, Quality Assurance

2.0 DEFINITIONS RELATING TO CONSTRUCTION QUALITY ASSURANCE

2.1 Construction Quality Assurance and Construction Quality Control

This CQA/QC Plan is devoted to construction quality assurance/quality control for the construction quality assurance only of the liner system to be installed at Water Holding Cells facility at the Pond Creek Mine. In the context of this plan, construction quality assurance and construction quality control are defined as follows:

Construction Quality Assurance (CQA) - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service. Construction Quality Control (CQC) - Those actions which provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements

2.2 Use of Terms in This Plan

In the context of this document:

- Construction Quality Assurance refers to means and actions employed by the Owner to assure conformity of the clay liner preparation and construction with this CQA/QC Plan, Contract Drawings, and the Specifications.

- Construction Quality Control refers to those actions taken by Contractors or Subcontractors to ensure that the materials and the workmanship meet the requirements of this CQA/QC Plan and the Specifications.

3.0 PARTIES TO CONSTRUCTION QUALITY ASSURANCE

3.1 Descriptions of the Parties

The parties to Construction Quality Assurance include the Owner, Project Manager, Engineer, Contractor and Subcontractors.

3.1.1 Engineer

The Engineer is responsible for the engineering design, drawings, plans, and specifications for the Water Holding Cells facility. The engineer is also responsible for certifying construction of the segments necessary for state and federal regulatory agencies. There may be multiple engineers employed by the owner or the contactor.

3.1.2 Contractor and Subcontractors

The Contractor and Subcontractors are responsible for the site preparation and construction of the clay liner system. The owner may elect to perform work designated herein to be performed by the contactor. The Contractor and Subcontractor may be employees of the owner.

3.1.3 Owner

The Owner is Williamson Energy, LLC, who is responsible for the facility.

3.1.4 Project Manager

The Project Manager is the official representative of the Owner and may also be an employee of the owner. In this CQA Plan, the term "Project Manager" will apply equally to "Construction Coordinator" or "Owner's Representative", i.e., the individual or company in charge of coordinating construction activities.

3.2 Qualifications of the Parties

The following qualifications are required of all parties involved with the design and construction of the Water Holding Cells facility. These qualifications must be submitted to the Project Manager for review and approval.

3.2.1 Engineer

The Engineer should be a qualified engineer, registered as required by regulation. The Engineer should have a history which demonstrates familiarity with clay liner systems, as appropriate, including detailed design methods and procedures.

3.2.2 Contractor and Subcontractors

Qualifications of the Contractor and Subcontractors are specific to the construction contract and independent of this CQA/QC Plan. It is the Contractor's responsibility to ensure that the equipment, materials and construction techniques meet the Specifications of the project. The Contractor and Subcontractor may be employed by the owner.

4.0 SCOPE OF CONSTRUCTION QUALITY ASSURANCE

The scope of this CQA/QC Plan includes the CQA of construction of the clay liner system at the Water Holding Cells facility proposed for the Pond Creek Mine. The CQA of the selection, evaluation is included in the scope.

5.0 REFERENCES

The CQA/QC Plan includes references to the test procedures of the American Society for Testing and Materials (ASTM). It is the responsibility of the entity performing the work to assure the most recent version of the testing procedures is being used.

6.0 SITE AND PROJECT CONTROL

To guarantee a high degree of quality during construction, clear, open channels of communication are essential. To that end, meetings are critical.

6.1 Pre-Construction Meeting

A Pre-Construction Meeting will be held at the site. At a minimum, the meeting will be attended by the Owner, Engineer, the Contractor, and the Project Manager.

Specific topics considered for this meeting include:

- Communicate to all parties any relevant documents;
- Review critical design details of the project;
- Review the site-specific CQA/QC Plan;
- Make any appropriate modifications to the CQA/QC Plan;
- Review the responsibilities of each party;
- Review lines of authority and communication;
- Review methods for documenting and reporting, and for distributing documents and reports;

- Establish protocols for testing;
- Establish protocols for handling deficiencies, repairs, and retesting;
- Review the time schedule for all operations;
- Outline procedures for packaging and storing archive samples;
- Review repair procedures; and,
- Establish soil stockpiling locations (if any).

6.2 Progress Meetings

Progress meetings will be held between the Superintendent, the Contractor, the Project Manager, and any other concerned parties as necessary. These meetings will discuss current progress, planned activities which lie ahead, and any new business or revisions to the work. The CQA Manager will log any problems, decisions, or questions arising at this meeting. Any matter requiring action which is raised in this meeting will be reported to the appropriate parties.

6.3 Problem or Work Deficiency Meeting

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by all interested parties, the Project Manager, and the Contractor. If the problem requires a design modification, the Engineer should also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and,
- Implement an action plan to resolve the problem or deficiency.

The meeting will be documented by a person designated at the meeting and minutes will be transmitted to affected parties.

SECTION II
SITE PREPARATION QUALITY ASSURANCE

SECTION II
(CONTINUED)

1.0 INTRODUCTION

This section of the CQA/QC Plan addresses the site preparation and outlines the CQA/QC program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

Construction Specifications

1. Soil to be used for soil liner construction shall be classified as CL, ML, CL-ML or CH (ASTM Unified Classification). Soil shall be free of grass, vines, vegetation, and rock or stones greater than 4 inches.

2. Soil liner construction shall be completed in general accordance with the following procedures. Soil shall be delivered to the construction area with construction trucks, wheel tractor scrapers, tractor and pull behind scraper combinations, or dozers. The soil is to be spread to appropriate thickness using a bulldozer or soil compactor. If deemed necessary, a tractor/disk combination is to be used to process the soil (e.g., break down clods, dry soil, or mix in water). Each processed lift is then to be compacted with a soil compactor (e.g., CAT 815 or similar), pull behind sheepsfoot roller and or rubber tired or track equipment.

3. Each soil lift shall be placed to a 12 to 24 inch loose thickness depending on compaction results of the material being placed.

4. If soft areas are encountered, they shall be removed, as well as dry material, within 2 feet in any direction of the soft material. Suitable material will be placed in the excavation and replaced in accordance with these specifications.

5. Each lift shall be compacted to the minimum standard Proctor density (ASTM D698) identified by Item 19 below, at a moisture content 0% to 5% above the optimum moisture content of the soil.

6. Soil liner construction shall proceed to ensure consistent achievement of density, moisture content, and hydraulic conductivity for each successive lift.

7. The placement of frozen material or the placement of material on frozen ground shall be prohibited.

8. If drying or freezing occur the surface will be scarified.

9. Construction shall proceed only during favorable climatic conditions.

10. Soil liner construction shall be completed in a manner which reduces void spaces within the soil and liner.

SECTION II
(CONTINUED)

11. All construction stakes shall be removed during construction, and all test holes (e.g., Shelby tube samples) are to be backfilled with bentonite.

12. The soil liner shall be constructed in a manner to achieve a uniform barrier with a hydraulic conductivity of $1x10^{-7}$ cm/sec.

13. If acceptable compaction results are not achieved, the soil lift shall be reprocessed, or removed and replaced. If the moisture content is less than optimum, or greater than 5% above optimum, the failing material shall be wetted or dried to a moisture content within specification and then recompacted. If the dry density is below specification, the failing material shall be recompacted until a passing test is achieved.

14. In the event of a failing conductivity test, the soil may be removed or recompacted and retested until a passing result is obtained; or the soil immediately above and below the test specimen from the same Shelby tube may be tested. If both tests pass, the original test shall be nullified. If either test fails, that portion of the liner shall be rejected and shall be reconstructed and retested until passing results are obtained. The limits of necessary reconstruction shall be determined by additional sampling and testing within the failed region, thereby isolating the failing area of work.

15. Construction additives are not permitted for soil liner construction unless testing is completed to ensure that hydraulic conductivity requirements can be met after incorporation of the products and unless written approval is provided by the IDNR.

Testing Specifications

16. Prior to initiating soil liner construction, borrow soils shall be identified, qualified, and verified. At a minimum, a representative sample of each soil type identified within the borrow area is to be collected and analyzed for gradation, compaction, and hydraulic conductivity characteristics.

17. Samples collected from the borrow area shall be evaluated in accordance with ASTM D422, D4318, and D2487 to ensure classification criteria are met.

18. Samples collected from the borrow area shall be tested in accordance with ASTM D698 to determine maximum dry density and optimum moisture content of the soil.

19. Samples collected from the borrow area shall be compacted to 90% and 95% standard Proctor density at or near optimum moisture content. The hydraulic conductivity of the recompacted samples shall be determined in accordance with ASTM D5084 procedures. The results of this testing shall be used to establish the

minimum dry density for soil liner compaction necessary to achieve a hydraulic conductivity of $1x10^{-7}$ cm/sec or less.

20. Moisture and density testing by nuclear methods (ASTM D2922 and D3017) shall be conducted at a rate of at least one test per 2,000 cy placed. Testing locations shall be random, and shall not be known to the earthwork contractor prior to lift placement.

21. To insure the accuracy and reproducibility of the nuclear testing, all nuclear density gauges shall be certified to calibration and shall be recertified and calibrated every 1.5 years. Soil compaction tests shall also be double-checked with independent test methods.–A drive cylinder test and laboratory moisture content determination shall be conducted and compared to gauge readings. These independent checks shall be made at the outset of construction and on a bi-weekly basis (e.g., every ten working days) thereafter.

22. Samples for hydraulic conductivity verification shall be retrieved from the compacted soil liner and tested in accordance with ASTM D5084 procedures. Samples shall be retrieved using three-inch Shelby tubes. Samples shall be completed at a frequency of one sample/test per 20,000 cy placed. The vertical location of the recovered samples shall be varied so that representative portions or lifts of the constructed liner are tested. Testing locations shall be random, and shall not be known to the earthwork contractor prior to soil liner construction.

23. Liner thickness will be verified upon installation by the use of onboard equipment GPS and/or ground survey checks. To verify liner thickness the ground elevation will be checked before and after liner construction.

24. The soil liner will be protected in areas where it could be vulnerable to being excavated (into ponds, stockpiles, etc.) by surveying the completed liner. If any excavating is to be done in these areas, surveying will be performed to assure the liner is not penetrated. The liner to be covered beneath the Water Holding Cells facility will be visually inspected and repairs made if necessary before the pumping of water.

2.0 SOILS CONSTRUCTION QUALITY ASSURANCE

Soils CQA will be performed on all components of the construction. Construction evaluation testing will consist of: 1) monitoring the work; and 2) laboratory and field tests. Laboratory tests will be conducted on samples taken at the borrow source and stockpile(s) prior to construction, and also during the course of the work. Field tests will be conducted during the course of the work.

2.1 Monitoring

SECTION II
(CONTINUED)

The Project Manager shall monitor and document the construction of all components. Monitoring the construction work for the subgrade layer includes the following:

- Monitoring the action of the compaction and/or heavy hauling equipment on the construction surface (i.e., penetration, pumping, cracking, etc.).

2.2 Construction Quality Control Testing Frequency

All Construction Quality Control testing will be conducted in conjunction with the CQC testing by the qualified personnel in accordance with the project Specifications or as directed by the Owner or the Project Manager. Documentation and reporting of test results will be in accordance with the regulatory requirements.

Pre-construction testing will be conducted on material samples obtained from the borrow source and/or stockpile(s). Pre-construction testing will consist of material evaluation tests as described in Subsection 3 of this section of the CQA/QC Plan. Construction Quality Control testing will be conducted on samples taken from the material during the course of the work.

Sampling locations will be selected by the Project Manager.

2.3 Deficiencies

If a defect is discovered in the site preparation, the Project Manager will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Project Manager will determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Project Manager deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Project Manager will define the limits and nature of the defect.

2.3.1 Notification

After determining the extent and nature of a defect, the Project Manager will notify the Owner and Contractor and schedule appropriate retests when the work deficiency is corrected.

2.3.2 Repairs and Retesting

The Contractor will correct the deficiency to the satisfaction of the Project Manager. If a project Specification criterion cannot be met, or unusual weather conditions hinder work, then the Project Manager will develop and present to the Owner suggested solutions for his approval.

All retests recommended by the Project Manager must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The Project Manager will also verify that all installation requirements are met and that all submittals are provided.

SECTION II
(CONTINUED)

SECTION III
CONSTRUCTION QUALITY ASSURANCE DOCUMENTATION

SECTION III
(CONTINUED)

1.0 DOCUMENTATION

An effective CQA plan depends largely on recognition of all construction activities that should be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The Project Manager will document that all quality assurance requirements have been addressed and satisfied.

The Contractor or Superintendent will provide the Project Manager and Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The Project Manager will also maintain at the job site a complete file of plans and Specifications, a CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

1.1 Recordkeeping

Standard reporting procedures will include preparation of a report which, at a minimum, will consist of: (a) field notes, including memoranda of meetings and/or discussions with the Contractor or Superintendent; (b) observation logs, and testing data sheets; and (c) construction problem and solution data sheets. This information will be regularly submitted to and reviewed by the Project Manager and/or the Engineer.

1.1.1 Memorandum of Discussion with Earthwork Contractor or Subcontractors

A memorandum will be prepared periodically, summarizing discussions between the Project Manager and Contractor or Superintendent. At a minimum, the memorandum will include the following information:

- date, project name, location, and other identification;
- name of parties to discussion;
- relevant subject matter or issues;
- activities planned and schedule; and,
- signature of the Contractor or Superintendent and/or Project Manager.

1.1.2 Observation Logs and Testing Data Sheets

Observation logs and testing data sheets will be prepared periodically. At a minimum, these logs and data sheets will include the following information:

- an identifying sheet number for cross referencing and document control;

SECTION III
(CONTINUED)

- date, project name, location, and other identification;
- data on weather conditions;
- a reduced-scale Site Plan showing all proposed work areas and test locations;
- descriptions and locations of ongoing construction;
- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- locations where tests and samples were taken;
- a summary of test results;
- calibrations or recalibrations of test equipment, and actions taken as a result of recalibration;
- off site materials received, including quality verification documentation;
- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and,
- the Project Manager's signature.

APPENDIX D

IDNR-OFFICE OF WATER RESOURCES PLAN AND SIGN-OFF

IDNR; OFFICE OF WATER RESOURCES PLAN AND SIGN-OFF

Alliance Consulting, Inc.

Steve Sutphin <ssutphin@acl-wv.com>

Fwd: Meeting

From: "Mauer, Paul" <Paul.Mauer@Illinois.gov>
Date: July 25, 2017 at 6:04:24 PM CDT
To: James Plumley <james.plumley@foresight.com>
Subject: RE: Meeting

See Attached. If you need a hard copy by mail, let me know.

Paul

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

Date: 7/25/2017

Williamson Energy, LLC
Water Holding Structures
Pond Creek Mine

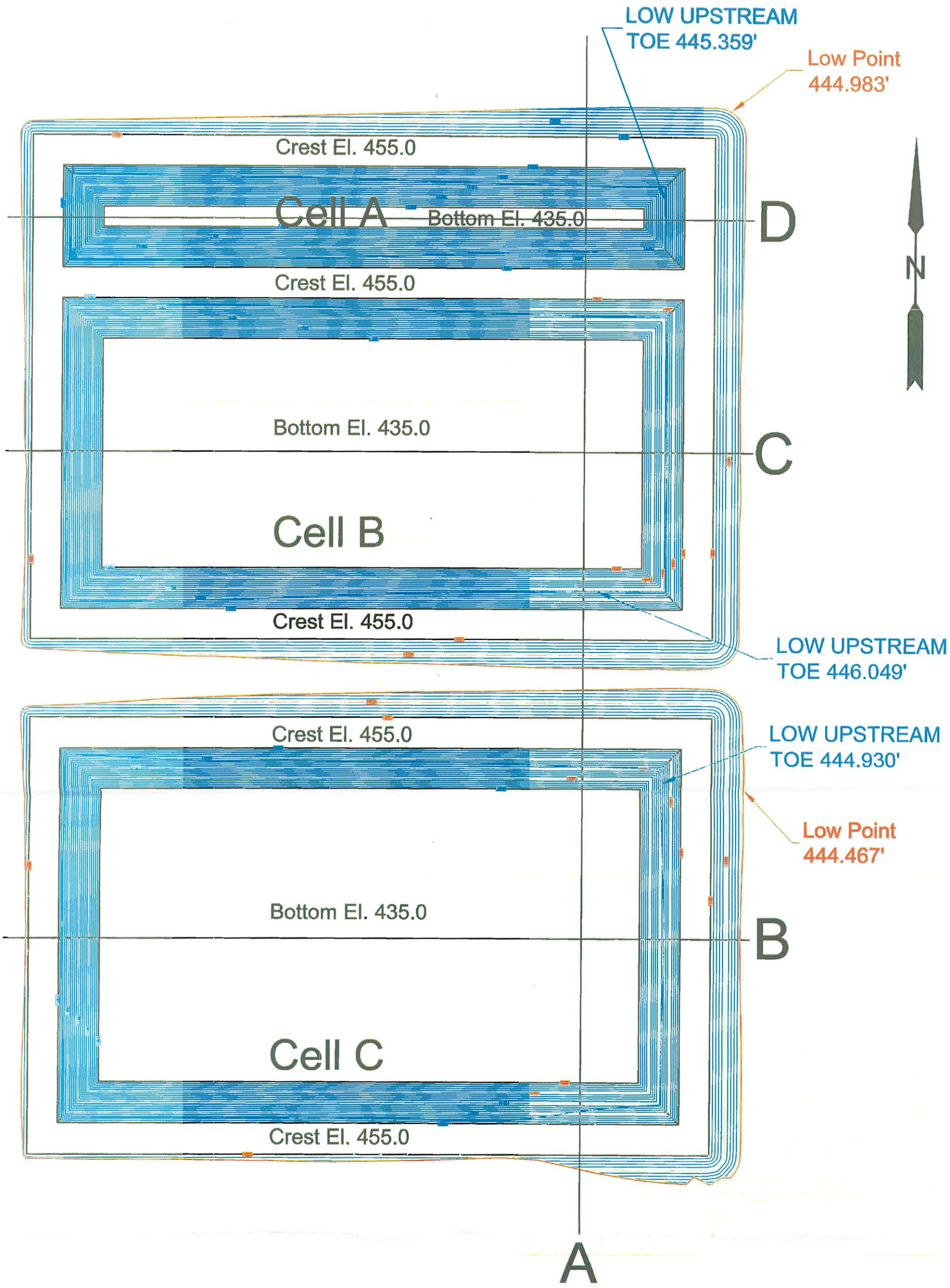
PERMIT NOT REQUIRED NOTIFICATION LETTER

Information on the project noted above was provided in a July 25, 2017 submittal by James Plumley. Based on our review of the information provided and in accordance with the Rivers, Lakes and Streams Act [615 ILCS 5], a Department of Natural Resources, Office of Water Resources permit will not be required for this work because:

Each of the 2 proposed dam structures will not impound 50 acre feet or more. If modifications are proposed, this office should be contacted for a determination of permit applicability prior to initiation of construction. Also, future changes in downstream land use could change the hazard classification making a permit and dam modification necessary.

If you have any questions or comments concerning the above determination, please feel free to contact me at 217/782-4427. This letter is not to be construed as a release from any other federal, state or local laws or regulations.

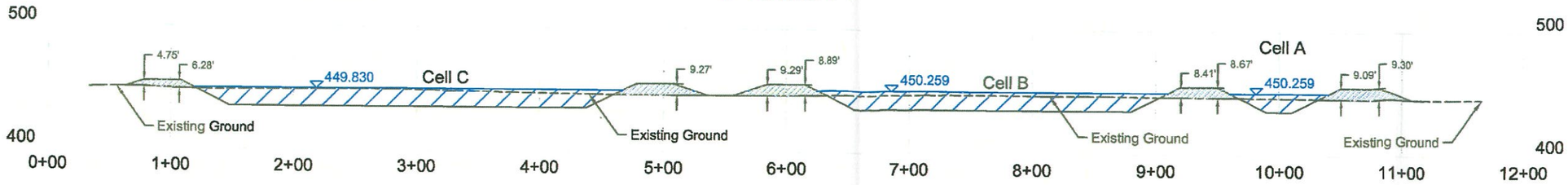
BY: Paul Mauer, Jr., P.E.
State Dam Safety Engineer



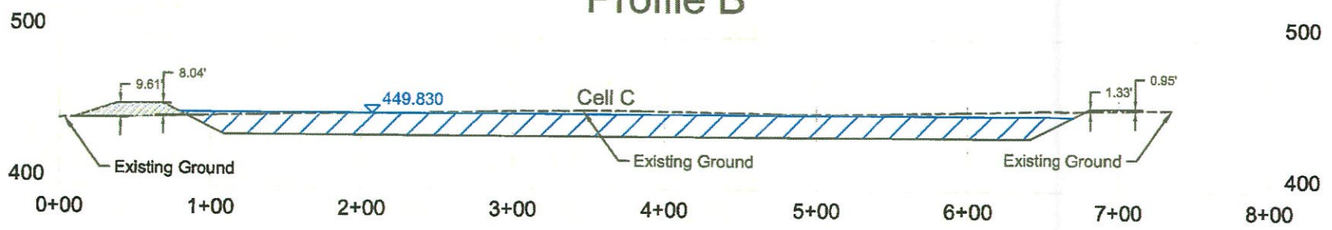
Williamson Energy, LLC
Revised Water Holding
Cell Design Option #7
7/18/17

R08131

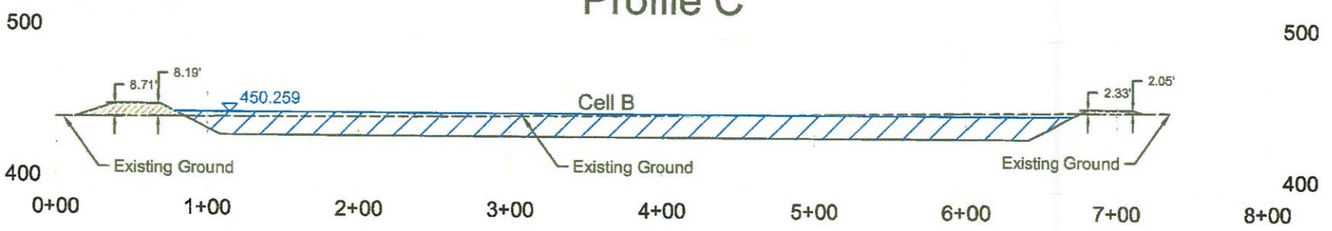
Profile A



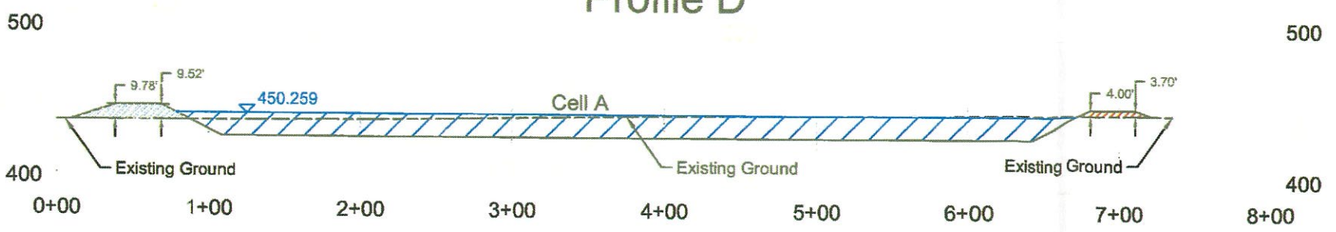
Profile B

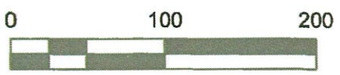


Profile C



Profile D





Williamson Energy, LLC
Revised Water Holding
Cell Design Option #7
7/18/17

Structure A
7/18/2017 Option 7

OWR Calculation

Structure A	Elevation		Cubic ft	Acre Ft
Down Stream Toe	444.983	Fill Volume	221,749	5.09
Crest	455.000	Fill Volume	679,666	15.60
Difference	10.017		457,916	10.51

MSHA Calculation

Structure A	Elevation		Cubic ft	Acre Ft
UP Stream Toe	445.359	Fill Volume	234,828	5.39
Spillway	450.259	Fill Volume	438,741	10.07
Difference	4.900		203,913	4.68

OWR Crest Elevation of 455.000'

Volumes by Triangulation (Prisms) Tue Jul 18 10:53:36 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Structure 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 455.000

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
1.41	697665.7	16.02	1.41

OWR Down Stream Elevation of 444.983'

Volumes by Triangulation (Prisms) Tue Jul 18 10:51:10 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Structure 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 444.983

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
0.79	221749.4	5.09	1.41

MSHA Up Stream Toe Elevation 445.359'

Volumes by Triangulation (Prisms) Wed Jul 19 15:35:26 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Structure 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 450.259

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
1.10	438741.3	10.07	1.41

MSHA Spillway Elevation 450.259'

Volumes by Triangulation (Prisms) Tue Jul 18 11:32:29 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Structure 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 445.359

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
0.81	234827.9	5.39	1.41

Cell A 444.983.txt

Cell A Cell A; Downstream Toe Elevation 444.983

Volumes by Triangulation (Prisms) Tue Jul 18 10:51:10 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 444.983

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
0.79	221749.4	5.09	1.41

Cell A 455.txt

Cell A; Crest Elevation 455

Volumes by Triangulation (Prisms) Tue Jul 18 11:58:53 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 455.000

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
1.41	697665.7	16.02	1.41

Cell A 445.359.txt

Cell A; Upstream Toe Elevation 445.359

Volumes by Triangulation (Prisms) Tue Jul 18 11:32:29 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 445.359

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
0.81	234827.9	5.39	1.41

Cell A 450.259.txt

Cell A; Pool/Spillway Elevation 450.259

Volumes by Triangulation (Prisms) Wed Jul 19 15:35:26 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 450.259

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
1.10	438741.3	10.07	1.41

Cell B

7/18/2017 Option 7

OWR Calculation

Cell B	Elevation		Cubic ft	Acre Ft
Down Stream Toe	444.983	Fill Volume	1,354,192	31.09
Crest	455.000	Fill Volume	3,048,679	69.99
Difference	10.017		1,694,487	38.90

MSHA Calculation

Cell B	Elevation		Cubic ft	Acre Ft
UP Stream Toe	446.049	Fill Volume	1,517,968	34.85
Spillway	450.259	Fill Volume	2,202,739	50.57
Difference	4.210		684,771	15.72

OWR Crest Elevation of 455.000'

Volumes by Triangulation (Prisms) Tue Jul 18 10:48:36 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 455.000

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.29	3048679.2	69.99	4.29

OWR Down Stream Elevation of 444.983'

Volumes by Triangulation (Prisms) Tue Jul 18 10:46:51 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 444.983

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
3.49	1354191.9	31.09	4.29

MSHA Spillway Elevation 450.259'

Volumes by Triangulation (Prisms) Wed Jul 19 15:32:36 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 450.259

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
3.90	2202738.7	50.57	4.29

MSHA Up Stream Toe Elevation 446.05'

Volumes by Triangulation (Prisms) Tue Jul 18 11:09:49 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin

Final Elevation: 446.049

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
3.57	1517967.5	34.85	4.29

Cell B 444.983.txt

Cell B; Downstream Toe Elevation 444.983

Volumes by Triangulation (Prisms) Tue Jul 18 10:46:51 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 444.983

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
3.49	1354191.9	31.09	4.29

Cell B 455.txt

Cell B; Crest Elevation 455

Volumes by Triangulation (Prisms) Tue Jul 18 10:48:36 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 455.000

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.29	3048679.2	69.99	4.29

Cell B 446.049.txt

Cell B; Upstream Toe Elevation 446.049

Volumes by Triangulation (Prisms) Tue Jul 18 11:09:49 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 446.049

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
3.57	1517967.5	34.85	4.29

Cell B 450.259.txt

Cell B; Pool/Spillway Elevation 450.259

Volumes by Triangulation (Prisms) Wed Jul 19 15:32:36 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 AB.tin
Final Elevation: 450.259

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
3.90	2202738.7	50.57	4.29

Cell C

7/18/2017 Option 7

OWR Calculation

Cell C	Elevation		Cubic ft	Acre Ft
Down Stream Toe	444.467	Fill Volume	1,613,896	37.05
Crest	455.000	Fill Volume	3,789,162	86.99
Difference	10.533		2,175,266	49.94

MSHA Calculation

Cell C	Elevation		Cubic ft	Acre Ft
UP Stream Toe	444.930	Fill Volume	1,700,865	39.05
Spillway	449.830	Fill Volume	2,669,297	61.28
Difference	4.900		968,432	22.23

OWR Crest Elevation of 455.000'

Volumes by Triangulation (Prisms) Tue Jul 18 09:46:18 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin

Final Elevation: 455.000

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
5.20	3789161.5	86.99	5.20

OWR Down Stream Elevation of 444.467'

Volumes by Triangulation (Prisms) Tue Jul 18 09:44:49 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin

Final Elevation: 444.467

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.29	1613896.0	37.05	5.20

MSHA Spillway Elevation 449.830'

Volumes by Triangulation (Prisms) Wed Jul 19 15:30:39 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin

Final Elevation: 449.830

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.75	2669297.0	61.28	5.20

MSHA Up Stream Toe Elevation 444.930'

Volumes by Triangulation (Prisms) Tue Jul 18 11:05:58 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin

Final Elevation: 449.330

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.70	2566399.7	58.92	5.20

Cell C 444.467.txt

Cell C; Downstream Toe Elevation 444.467

Volumes by Triangulation (Prisms) Tue Jul 18 09:44:49 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin
Final Elevation: 444.467

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.29	1613896.0	37.05	5.20

Cell C 455.txt

Cell C; Crest Elevation 445

Volumes by Triangulation (Prisms) Tue Jul 18 09:46:18 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin
Final Elevation: 455.000

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
5.20	3789161.5	86.99	5.20

Cell C 444.93.txt

Cell C; Upstream Toe Elevation 444.93

Volumes by Triangulation (Prisms) Tue Jul 18 10:58:14 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin
Final Elevation: 444.930

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.33	1700865.0	39.05	5.20

Cell C 449.830.txt

Cell C; Pool/Spillway Elevation 449.830

Volumes by Triangulation (Prisms) Wed Jul 19 15:30:39 2017

Existing Surface: C:\Users\jplumley.CLINERES\Desktop\Permitting\Mine Permitting\Mach Mining\Surface IBRs\Water Holding Cell 3-17-17\7-18-17\Option 7 - 1 C.tin
Final Elevation: 449.830

FILL Area (Acres)	Fill Volume (CF)	Fill Volume (Acre-Ft)	Total Area (Acres)
4.75	2669297.0	61.28	5.20

ATTACHMENT III.3.A.

Attachment III.3.A.

Transportation Facilities

1) Provide a detailed description on mining operations map or other map and show location of the following:

   a) Proposed road(s), conveyor system(s), or rail system.

   b) Related sediment control facilities.

   c) Earth borrow locations and/or locations for deposition of excess excavation.

RESPONSE: An access road is proposed for the purpose of transporting soil from the incise areas of the Water Holding Cells. The soil will be hauled to the Refuse Disposal Area No. 2 site and used for reclamation. Refer to the Proposed Road and Bridge Profiles and Sections drawing (Drawing No. B16-221-E3) for more details.

The proposed access road will be constructed along the existing railroad loop. Excavated material from the water holding cells will be used to construct the road. A railroad car bridge is proposed as a crossing for the unnamed tributary of Pond Creek. Refer to the Proposed Road and Bridge Profiles and Sections drawing (Drawing No. B16-221-E3). Incorporation of the geotextile fabric will provide a stable base and will allow easier construction in persistently wet areas. A 36 inch culvert will be placed in the discharge channel of Pond 006 to allow the drainage to pass beneath the access road. All areas disturbed by placement of aggregate or pipe culverts will be seeded and mulched following construction activities. Installation of a geotextile fabric will be used underneath any aggregate that may be placed to construct the road subbase.

2) Provide specifications and plan-profiles of existing gradeline, proposed road centerline, ditch flow lines, road cut, fill embankment, culvert, bridge and drainage structures. Provide typical cross sections where appropriate.

RESPONSE: Refer to the Surface Facilities Map (Drawing No. B17-116-E1) and the Proposed Road and Bridge Profiles and Sections drawing (Drawing No. B16-221-E3).

3) For all transportation facilities to be constructed, provide construction details for all sediment control facilities to be constructed to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area.

RESPONSE: Silt fence will be established at the toe of the access road. The outslope of the access road will be vegetated with the Permit 375 approved seed mixture.

4) Discuss the revegetation of ditch and borrow areas involved in construction.

RESPONSE: No ditch or borrow areas are associated with the construction of the access road.

5) Discuss the estimated life of each facility and how materials will be removed when the facility becomes inactive.

RESPONSE: The access road will be utilized for the purpose of transporting soil to the Refuse Disposal Area No.2. Upon the completion of this operation, the access road will be graded and seeded. At the end of active mining, the access road material will be used as soil cover for disturbed mining areas. The bridge and culvert will be removed and sold as scrap metal. The stream channel in the location of the road culvert will be re-established, stabilized, and vegetated.

ROAD CULVERT (POND 006 CULVERT EXTENSION)

```
**************************************
*       BUCKRIDGE ENVIRONMENTAL      *
*          ENGINEERING, INC.         *
*                                    *
*          RESERVOIR ROUTING         *
**************************************
```

RSROUT - Version 2.0I
FILE: C:\HYDROLGY\PC-PLANT.PRE NOVEMBER 25, 2004

PROJ TITLE: Drainage Control Plan for Prep PLANT & COAL YARD

LOCATION: Steelhead Development - Pond Cr. 1 Mine
Williamson County, Illinois
RESERVOIR: Proposed Sediment Pond 006

RESERVOIR ROUTING - SUMMARY TABLE

(ALL TIMES ARE FROM START OF RAINFALL)

INFLOW PARAMETERS

WATERSHED AREA	61.60	ACRES
RAINFALL RETURN PERIOD	10.00	YEARS
RAINFALL DURATION	24.00	HOURS
RAINFALL AMOUNT	4.90	INCHES
TIME AT START OF INFLOW	7.80	HOURS
PEAK INFLOW	67.34	CFS
TIME TO PEAK INFLOW	12.30	HOURS
INFLOW RUNOFF VOLUME	14.28	ACRE-FEET
TIME TO END OF INFLOW	32.50	HOURS

RESERVOIR PARAMETERS

RESERVOIR ELEV. AT START OF STORM	444.00	FEET
NORMAL POOL ELEVATION	444.00	FEET
EMBANKMENT CREST ELEVATION	450.00	FEET

STORAGE VOLUME & DISCHARGE RATE AT:

POOL ELEVATION AT STORM START	33.99	AC-FT,	0.0 CFS
NORMAL POOL ELEVATION	33.99	AC-FT,	0.0 CFS
EMBANKMENT CREST ELEVATION	55.07	AC-FT,	385.8 CFS

ROUTING SUMMARY

PEAK RESERVOIR ELEVATION	445.14	FEET
TIME TO PEAK RESERVOIR ELEVATION	13.20	HOURS
OUTFLOW RATE AT PEAK ELEVATION	35.35	CFS
FREEBOARD AT PEAK ELEVATION	4.86	FEET
* TIME TO DRAWDOWN TO NORMAL POOL	23.60	HOURS
OUTFLOW RUNOFF VOLUME	14.27	ACRE-FEET
ROUTING TIME INCREMENT	0.10	HOURS

* NOTE: FROM TIME OF PEAK RESERVOIR ELEVATION

CULVERT #7
Q_{10}

Calculation from Permit 375 Pond 006

PART IV

RECLAMATION PLAN

1) Provide a reclamation plan map outlining proposed reclamation of the lands within the proposed IBR area and state how the IBR area will be reclaimed in conformity with the original plan.

RESPONSE: Refer to the Post Mining Land Use Map (Drawing No. B17-116-B3). The reclamation of the IBR area will comply with the approved reclamation plan for Permit 375.

2) Post Mining Land Use

A) Provide a detailed description of proposed post-mining land uses and capabilities employing land use and capability categories listed below. Provide acreage figures for each post-mining land use proposed for the existing permit, the IBR area and total permit after inclusion of the IBR acreage and designate the post-mining land uses on the Post Mining Land Use Map. Acreage figures for post-mining land use must differentiate between mined and surface disturbance areas based on the mining line used in the premining section of the application.

RESPONSE: Refer to Post Mining Land Use Map (Drawing No. B17-116-B3).

Land Use	Capability								
	Existing Permit (ac)			IBR (ac)			Total (ac)		
	Prime	HCap	NonCr	Prime	HCap	NonCr	Prime	HCap	NonCr
Cropland	13.0	7.5	2.5	0.0	0.0	0.0	13.0	7.5	2.5
Pasture Land	0.0	0.8	5.5	0.0	0.0	0.0	0.0	0.8	5.5
Grazing Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Forestry	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	14.3
Residential	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	1.5
Industrial /	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Recreation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fish & Wildlife Habitat (Herbaceous)	5.5+	11.3	46.0	0.0	2.0	9.5 *	5.5	13.3	55.5
Fish & Wildlife Habitat (Woody)	0.0	0.8	571.8+	0.0	0.0	0.0	0.0	0.8	571.8
Fish & Wildlife Habitat (Wetland)	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2
Fish & Wildlife Habitat (Water)	0.0	0.0	3.0	0.0	0.0	6.2 *	0.0	0.0	9.2
Developed Water Resources	0.0	0.0	19.3	0.0	0.0	0.0	0.0	0.0	19.3
Undeveloped Land	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Totals	**18.8**	**20.4**	**664.1**	**0.0**	**2.0**	**15.7**	**18.8**	**22.4**	**679.8**
	703.3			**17.7**			**721.0**		

NOTE: * Denotes 8.1 Fish and Wildlife Habitat-Herbaceous and 5.3 acres of the total 6.2 acres Fish and Wildlife-Water Prime Farmland Acres as Negative Determination acres within the Fish and Wildlife Habitat-Water area.

\+ Denotes a land use change of -2.7 NonCr acres from Fish and Wildlife Habitat (Woody) identified in Permit 375; IBR No. 2 and -0.3 Prime acres from Fish and Wildlife Habitat (Herbaceous) identified in Permit 375; IBR No. 63. Fish and Wildlife Habitat (Water) has increased by 3.0 NonCr acres.

Prime: Prime farmland HCap: High Capability - meeting productivity requirements of 62 Ill. Adm. Code 1825.
NonCrop: Non-Cropland - All soils which do not qualify as prime farmland or high capability.

RESPONSE: Per 62 IL Adm. Code; Section 1823.11(a), 14.4 acres of prime farmland will be designated as post mining negative determination area.

A total of 2.7 acres associated with Permit 375; IBR No. 2 will be affected by the propose water holding cells construction. The post mining land use for this area was designated as Fish and Wildlife-Woody. The area was not part of an enhancement area or part of a replacement requirement associated with a previously approved Protection and Enhancement Plan. This land use acreage will be changed to Fish and Wildlife-Water.

A total of 0.3 acres associated with Permit 375; IBR No. 63 will be affected by the propose water holding cells construction. The post mining land use for this area was designated as Fish and Wildlife-Herbaceous. This land use acreage will be changed to Fish and Wildlife-Water.

3) Are trees located within the proposed boundary area?

Yes _____ No __X__

If yes, then pursuant to Sections 1784.21 (a)(2)(A) and (C) and 1817.97 (b) the applicant shall:

A) Provide a Protection and Enhancement Plan (PEP) and an Incidental Take (IT) authorization request to the Department for the Indiana bat meeting the specifications of the "Range-wide Indiana Bat Protection and Enhancement Plan Guidelines" (revised 2013) developed by the U.S. Fish and Wildlife Service and the Office of Surface Mining, or justify why no PEP and IT are required under those guidelines.

B) Discuss whether or not the project is consistent with the Northern long-eared bat Final 4(d) Rule (January 2016), and if not then provide a PEP and IT authorization request to the Department consistent with the 2013 Indiana bat guidelines referenced above.

RESPONSE: The proposed IBR/IPR area, as shown on the 2015 Williamson County digital ortho and the most current Google Earth image dated October 22, 2016, does show tree existing within the area. However, these images do not represent the site at the time of the application submittal. Trees were cut prior to the submittal of this application and within the seasonal tree clearing period (Oct. 15 to Mar. 31).



LEGEND

PROPOSED IBR BOUNDARY

1000 FOOT BOUNDARY OFFSET

PERMIT 375

IBR POST MINING LAND USE

FISH & WILDLIFE - HERBACEOUS	11.5 AC. HIGH CAPABILITY SOILS	
FISH & WILDLIFE - WATER	6.2 AC.	
TOTAL	17.7 AC.	

ADJACENT LAND USE

- CROPLAND
- RESIDENTIAL
- INDUSTRIAL/COMMERCIAL
- FISH & WILDLIFE - WOODY
- FISH & WILDLIFE - HERBACEOUS
- FISH & WILDLIFE - WATER
- FISH & WILDLIFE - FIELD DELINEATED WETLANDS

SCALE

400 0 400 800 FEET

REV.	DATE	DESCRIPTION	P.M.
2	09/05/17	ADDRESS D. SPINDLER'S COMMENT	SMS
1	08/02/17	SHOW REVISED CELLS LAYOUT	SMS

Alliance Consulting, Inc.

Engineers • Constructors • Scientists

BECKLEY, WV (304) 255-0491

CANONSBURG, PA (724) 745-3630

POST MINING LAND USE MAP

POND CREEK MINE NO. 1

Prepared For

WILLIAMSON ENERGY LLC.
P.O. BOX 99, JOHNSTON CITY, IL 62951

CAD BY	SMS	03/16/17	PROJECT NO. B17-116-1413	R08
CHECKED BY	SMS	04/04/17		
APPROVED BY	CEY	04/04/17	DRAWING NO. B17-116-R3	

Printed By: ssutphin
Date : Oct 03, 2017
Time : 10:25 AM
Z:\17116\17116B3R2.dwg

DOCUMENT

34

1186-/11-A
Due date: 7-7-17
R08186

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397
BRUCE RAUNER, GOVERNOR ALEC MESSINA, DIRECTOR

MEMORANDUM

Date: May 26, 2017

To: Dora Maschhoff

From: Bill Buscher BB

Subject: Review and Comment on the Pond Creek Mine Permit #417 new water holding cell groundwater monitoring and protection plan, Johnston City, Illinois

At the request of the Mine Pollution Control Program (MPCP) the Groundwater Section has reviewed the data for the Pond Creek Mine, permit no. 417, new water holding cell. The purpose of the review is to evaluate groundwater protection and monitoring system design for the new cell.

1. A low permeability liner will be required to be installed under the proposed new refuse footprint area. The low permeability liner must consist of four feet of compacted clay with a hydraulic conductivity of $1x10^{-7}$ cm/s or less. A synthetic liner capable of providing an equivalent level of groundwater protection may also be used.

2. Each lift of the liner shall be compacted to 95% standard Proctor density.

3. Four monitoring wells are required, one in addition to the three already in place. This well should be located near the northwest corner of the cell approximately 100 feet south of the corner on the west side.

4. The monitoring wells are required to be sampled a minimum of six times over the course of a year for the inorganic parameters listed in Table A prior to use of the cell and also six times post-reclamation. An adequate number of samples must be collected to calculate a statistical representation of existing groundwater quality ("background") in the area, prior to use of the cell. Sampling frequency must be bi-monthly until an adequate data set exists to calculate statistically based background concentrations. Quarterly sampling during active mining will be required.

5. A statistical representation of existing water quality must be established using the method outlined in Attachment 1, or another Agency-approved method, for each of the monitoring wells. The statistical procedures described may not be appropriate under existing and proposed site conditions. Alternative statistical methods may need to be used. This method should be used to determine the 95 percent confidence limit for each parameter.

6. The post mining statistical method used may depend upon the initial background statistics method.

ATTACHMENT 1

A. A statistically valid representation of background (existing) and/or post-mining groundwater quality shall be submitted to the Agency utilizing the following method. This method should be used to predict the confidence limit when single groundwater samples are taken from each monitoring (test) well.

Should the Permittee determine that an alternate statistical method would be more appropriate based on the data being evaluated, the Permittee may request utilization of such alternate methodology. Upon approval from the Agency, the alternate methodology may be utilized to determine a statistically valid representation of background and/or post-mining groundwater quality.

1. Determine the arithmetic mean $(\overline{X}_b)$ of each indicator parameter for the sampling period. If more than one well is used, an equal number of samples must be taken from each well.

$$\overline{X}_b = \frac{X_1 + X_2 + \ldots X_n}{n}$$

Where:

$\overline{X}_b$ = Average value for a given chemical parameter

X_n = Values for each sample

n = the number of samples taken

2. Calculate the variance (S_b^2) and standard deviation (S_b) for each parameter using the values (X_n) from each sample of the well(s) as follows:

$$S_b^2 = \frac{(X_1 - \overline{X}_b)^2 + (X_2 - \overline{X}_b)^2 + \ldots + (X_n - \overline{X}_b)^2}{n-1}$$

$$S_b = \sqrt{S_b^2}$$

3. Calculate the upper confidence limit using the following formula:

$$CL = \overline{X}_b \pm t\sqrt{1+1/n}\ (S_b)$$

Where:

CL = upper confidence limit prediction
(upper and lower limits should be calculated for pH)

t = one-tailed t value at the required significance level and at n-1 degrees of freedom from Table 1
(a two-tailed t value should be used for pH)

4. If the values of any routine parameter for any monitoring well exceed the upper confidence limit for that parameter, the permittee shall conclude that a statistically significant change has occurred at that well.

5. When some of the values are less than the Method Detection Limit (MDL), a value of one-half (1/2) the MDL shall be substituted for each value that is reported as less than the MDL. All other computations shall be calculated as given above.

B. If all values are less than the MDL for a given parameter, the Practical Quantitation Limit (PQL), for the analytical method utilized, shall be used to evaluate data from monitoring wells. If the analytical results from any monitoring well exceed two (2) times the PQL for any single parameter, or if they exceed the PQLs for two or more parameters, the permittee shall conclude that a statistically significant change has occurred.

Table 1
Standard t-Tables Level of Significance

Degrees of freedom	t-values (one-tail)		t-values (two-tail)*		
		99%	95%	99%	95%
4	3.747	2.132	4.604	2.776	
5	3.365	2.015	4.032	2.571	
6	3.143	1.943	3.707	2.447	
7	2.998	1.895	3.499	2.365	
8	2.896	1.860	3.355	2.306	
9	2.821	1.833	3.250	2.262	
10	2.764	1.812	3.169	2.228	
11	2.718	1.796	3.106	2.201	
12	2.681	1.782	3.055	2.179	
13	2.650	1.771	3.012	2.160	
14	2.624	1.761	2.977	2.145	
15	2.602	1.753	2.947	2.131	
16	2.583	1.746	2.921	2.120	
17	2.567	1.740	2.898	2.110	
18	2.552	1.734	2.878	2.101	
19	2.539	1.729	2.861	2.093	
20	2.528	1.725	2.845	2.086	
21	2.518	1.721	2.831	2.080	
22	2.508	1.717	2.819	2.074	
23	2.500	1.714	2.807	2.069	
24	2.492	1.711	2.797	2.064	
25	2.485	1.708	2.787	2.060	
30	2.457	1.697	2.750	2.042	
40	2.423	1.684	2.704	2.021	

Adopted from Table III of "Statistical Tables for Biological Agricultural and Medical Research" (1947, R.A. Fisher and F. Yates).
* For pH only when required.

Table A

Aluminum	Fluoride	Sulfate
Antimony	Iron (dissolved)	Thallium
Arsenic	Iron (total)	Total Dissolved Solids
Barium	Lead	Vanadium
Beryllium	Manganese (dissolved)	Zinc
Boron	Manganese (total)	pH
Cadmium	Mercury	Acidity
Chloride	Molybdenum	Alkalinity
Chromium	Nickel	Hardness
Cobalt	Phenols	Static Water Elevation
Copper	Selenium	
Cyanide	Silver	

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

Subject: Williamson Energy, LLC – Pond Creek No. 1 Mine

Data: Log No. 1186-17

Reviewed by: D. Maschhoff **Date:** 7/28/17

Log No. 1186-17 ⇒ Water Holding Cell Construction and Operation

---

Log No. 1186-17

- Construction and development of the Water Management Facility includes topsoil removal, grading, foundation preparation and installation of a low permeability liner consisting of four (4) foot compacted clay with a hydraulic conductivity of 1×10^{-7} cm/sec within the Water Holding Cell. This Water Management Facility shall be performed in accordance with the procedures discussed and outlined in IEPA Log No. 1186-17 and shall be subject to all Special Conditions of the Permit.
- Operation of the Water Holding Cell will consist of pumping mine infiltration water to the Cell and pumping from the Cell to the Slurry Impoundment/RDA or the Fresh Water Lake to be utilized in the preparation plant closed circuit water handling system. A water level indicator will be installed in the Water Holding Cell to continuously record the water elevation to insure no discharge. A minimum freeboard of one (1) foot shall be maintained at all times in the Water Holding Cell, therefore; pumpage capacity shall be continuously maintained for sufficient evacuation of water when necessary.
- Runoff from the area approved herein will be controlled by silt fence, mulching, seeding, vegetation, rock check dams, erosion control blankets, etc. No affected area stormwater runoff from the Water Management Facility shall be directed or discharged to any waters of the state.
- This permit will be issued with the expressed understanding that there shall be no surface discharge from these facilities. If such discharge occurs, additional or alternate facilities shall be provided. The construction of such additional or alternate facilities may not be started until a Permit for the construction is issued by the Agency.

* Action: Prepare Subtitle D Permit No. 2017-MA-1186.

1186-/17-B
Due date: 9-22-17
R08163

Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

August 10, 2017

Illinois EPA – Division of Water Pollution Control
Attn: Dora S. Maschhoff
2309 West Main Street – Suite 116
Marion, Illinois 62959

Williamson Energy, LLC
Pond Creek No. 1 Mine
Williamson County, Illinois

Dear Ms. Maschhoff:

I appreciate your time recently to review the upcoming water holding cell construction project at Pond Creek No. 1 Mine. As discussed, we are currently waiting on approval of an IBR/IPR from IDNR allowing the construction of the water holding cells. Construction activities will begin immediately upon receipt of this permit. In addition, the configuration of the cells has been modified to comply with impounded storage requirements. Cell B and Cell C will be hydraulically connected by multiple 18" HDPE pipes set at elevations to control flow from Cell B pool into Cell C pool.

Please find attached the following information you requested:

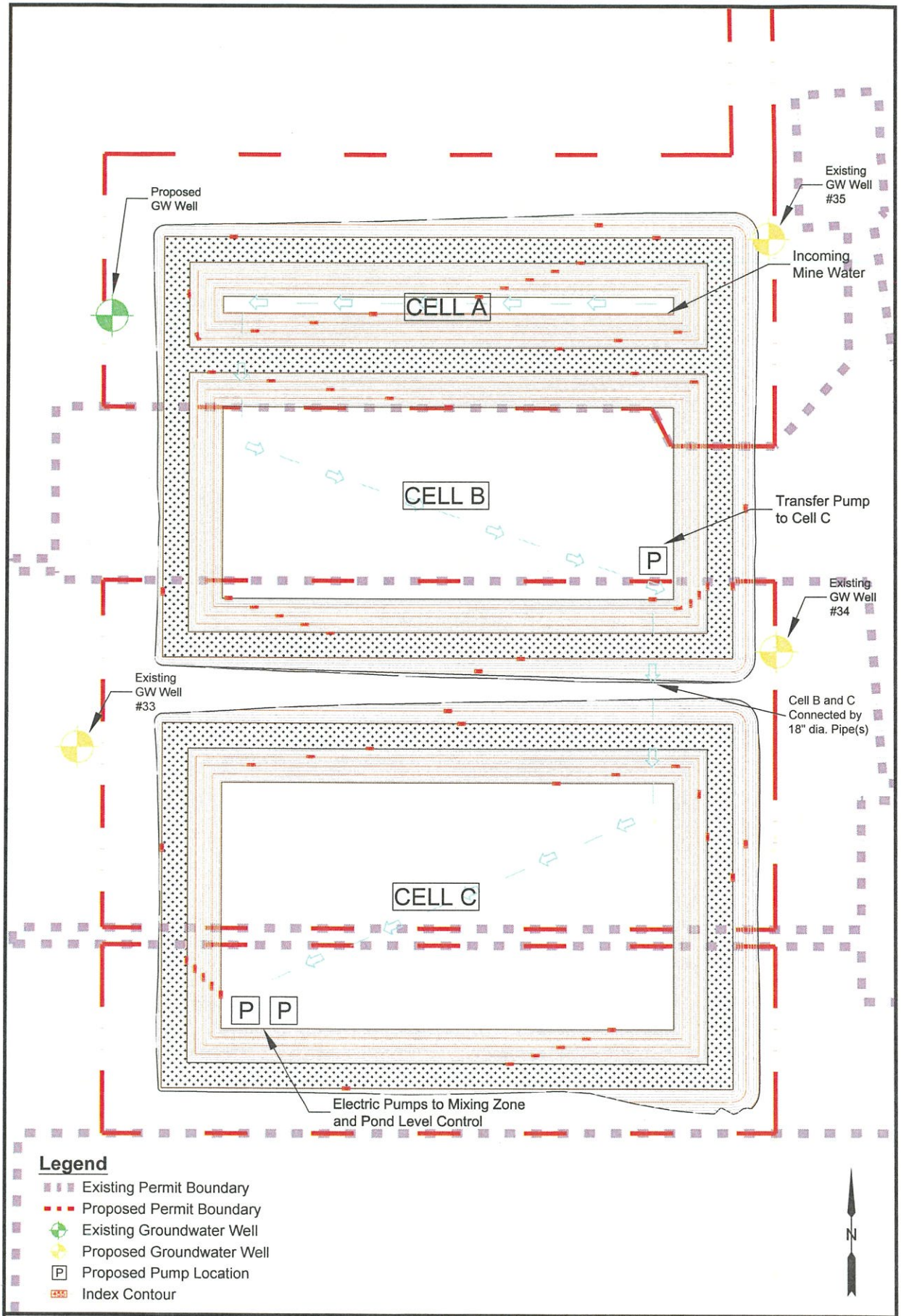
1. Latitude/Longitude of proposed diffuser location
   - Lat: 37d52'36.07"
   - Long: 89d01' 48.05"
2. Proposed location of additional groundwater monitoring well
   - See Attachment I
3. Revised layout of cell configuration
   - See Attachment I

Please feel free to contact me at any time regarding this project. I look forward to the opportunity to work with you and your agency in the future. Let me know if you need anything further.

Sincerely,

Josh Phillips, P.E.

AUG 11 2017


Proposed GW Well
Existing GW Well #35
Incoming Mine Water
CELL A
CELL B
Transfer Pump to Cell C
P
Existing GW Well #34
Existing GW Well #33
Cell B and C Connected by 18" dia. Pipe(s)
CELL C
P P
Electric Pumps to Mixing Zone and Pond Level Control
Legend
Existing Permit Boundary
Proposed Permit Boundary
Existing Groundwater Well
Proposed Groundwater Well
P Proposed Pump Location
Index Contour
N
0 100 200 300
SCALE: 1" = 100'
WILLIAMSON ENERGY LLC
POND CREEK #1 MINE
PO BOX 300, JOHNSTON CITY, ILLINOIS 62951
WATER HOLDING CELLS
REVISED LAYOUT
Drawn By: JLP
Date: 8/10/2017
Attachment I

DOCUMENT

35

1186 - / 17
R08166
Due date: 5-16-17

Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

April 2, 2017

Manager, Permit Section
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
Mine Pollution Control Program
2309 W. Main St., Suite 116
Marion, IL 62959

Re: Williamson Energy, LLC – Permit Application for New Water Holding Cell Construction and Operation

Manager, Permit Section,

Please find attached two (2) copies of a permit application to allow for the construction of a new Water Management Facility at Williamson Energy, LLC's Pond Creek Mine. No discharge from the facility is requested under this application and is addressed in the pending NPDES application for the facility.

If you have any questions, or require additional information, please contact me at (217) 710-7713.

Respectfully submitted,

WILLIAMSON ENERGY, LLC

Simon Stepp, P.E.

RECEIVED
APR 04 2017
IL Environmental Protection Agency
MARION REGIONAL OFFICE

POND CREEK MINE WATER MANAGEMENT FACILITY

WATER HOLDING CELLS

Purpose

The purpose of this application is to facilitate the construction of new water holding cells at Williamson Energy, LLC's Pond Creek Mine. The current water holding cell, permitted under IDNR Permit No. 417 and IEPA Permit 2015-MA-3432, was constructed within the proposed footprint of Refuse Disposal Area (RDA). Prior to the construction of Phase 11 of the RDA, the current water holding cell shall be eliminated by dewatering the cell and removing all silt and settled material. Once the cell is allowed to dry, it will be backfilled with compacted coarse refuse in compliance with the approved refuse construction specifications and plan detailed in Permit No. 417. The new Water Holding Cells will replace the current cell as well as provide additional long term water storage and staging for future water management systems. The material excavated from the Water Holding Cells will also be utilized to reclaim the slopes of the inactive portion of the RDA that will result in decreased constituent loadings and improve overall water quality at the site.

Sediment Control Measures during Construction

Construction of the new Water Holding Cells will begin upon issuance of the required permits. Alternate sediment control measures will be used in lieu of a siltation structure for affected areas. Areas associated with the Water Holding Cells and the proposed access road will be disturbed for a limited amount of time. The Water Holding Cells will be constructed above grade; therefore, surface runoff will follow the natural drainage patterns around the cells. During construction of the Water Holding Cells and proposed access road, silt fence will be installed along the downstream sides of the site. Upon completion of the Water Holding Cells and the proposed access road, exposed soils will be permanently vegetated. The access road temporarily used to transport soil material for the refuse reclamation will be stabilized with stone. Silt fence will be maintained and/or replaced along the downstream toe of the water holding cells and the access road until reclamation activities are completed.

Current Plant Operations and Water Management

Water is used by the Mine in two areas of the operations. The Mine uses water in the coal extraction process to suppress dust and to wash the coal in the Preparation Plant. Concurrently, mine infiltration water is removed from the mine to protect workers and allow mining to occur.

The water used in the coal extraction process is fresh, untreated water purchased from the City of Johnston City, Illinois. The purchased water is pumped to Pond 005. During mining

operations, the water from Pond 005 is pumped to the mine to extract coal. After use during the coal extraction process, this water is not recoverable.

Raw coal is separated from rock in the Preparation Plant. The larger rocks that are mined are screened off from the incoming feed to the Preparation Plant where they are deposited onto the refuse belt. This material is used to construct the coarse refuse embankment.

Water used to wash the coal in the Preparation Plant comes from the Fresh Water Lake. The fine material ultimately ends up at the thickener units. The makeup water required for the thickener units is pumped to the plant from the Fresh Water Lake. The underflow from the thickeners is pumped to the Slurry Impoundment/Refuse Disposal Area (RDA).

Over time, the fine solid particles present in the thickener underflow that is pumped to the Slurry Impoundment/RDA settle to the bottom of the impoundment leaving clarified water on the surface. The clarified water is able to be recycled by pumping it from the Impoundment back to the Fresh Water Lake where it can be pumped into the Preparation Plant and reused in the process. As a result, the majority of the wash water is recovered.

There is some loss of water during the washing process. Additionally, since the fines do not all settle immediately in the Slurry Impoundment, the quality of the clarified water results in a need for additional water for the Preparation Plant. Therefore, Preparation Plant water is supplemented with mine infiltration water and/or stormwater.

Mine Infiltration Water

An aquifer above the coal seam has caused an influx in water into the Mine (infiltrating groundwater). It is necessary to remove the water from the mine to protect the health and safety of the workforce, as well as, the overall mining operation. The Mine currently has an excess of water onsite due to the infiltrating groundwater. To manage this excess water, the Mine utilizes the infiltrating groundwater during the coal washing processes. The infiltrating groundwater is pumped from the mine to the Water Holding Cells. Water is pumped from the Water Holding Cells to the Fresh Water Lake. Surplus mine water that cannot be utilized in the Preparation Plant is stored in the sealed areas of the mine (if/when possible) or the Slurry Impoundment (RDA).

Water Holding Cells Operation

Mine infiltration water will be pumped to the Water Holding Cells or the Impoundment. Clarified decant water can be pumped from the Impoundment to the Water Holding Cell if necessary to maintain appropriate water levels in the Impoundment. From the Water Holding Cells, water can be pumped to the Impoundment or to the Fresh Water Lake to be utilized in the Pond Creek Mine's coal preparation closed circuit water handling system. Water in the Water Holding Cell is not allowed to directly discharge from the facility to any waterway under this

permit application. This will be accomplished by the installation of a water level indicator in the Water Holding Cell. This device will automatically and continuously record the water elevation in the Water Holding Cell. If and when the water elevation in the Water Holding Cell comes to within one foot of the discharge elevation of the cell, the pump installed in the Water Holding Cell will automatically activate and pump the excess water to the Impoundment. If at any time this pump becomes inoperable, mine infiltration water be sent directly to the Impoundment and will not be pumped to the Water Holding Cell until the proper operation of the pump can be restored.

The Fresh Water Lake has an emergency overflow structure that discharges into Pond 006. An automatic control system is installed to ensure an unintentional discharge of this water does not occur. A water level indicator is installed in the Fresh Water Lake that indicates the water elevation in the Fresh Water Lake with respect to the emergency spillway elevation that flows into Pond 006. Once the pool elevation gets within one foot of the spillway elevation, a signal is sent to automatically shut off the pump that pumps water to the Fresh Water Lake. If both the Fresh Water Lake and Water Holding Cells are at capacity, mine infiltration water required to be removed from the mine will be pumped to the Impoundment for temporary storage.

Groundwater Protection

The Water Holding Cells will be constructed with a compacted 4 foot thick clay liner. To verify the availability of suitable material in the area, six soil borings (WHC-1 through 6) were drilled to bedrock in August 2015 for the proposed Water Holding Cells. Adjacent to these borings, shallow offset borings (WHC-1A through 6A) were drilled to collect soil samples for permeability tests using Shelby tubes.

Permeability boring WHC-1A and 2A were analyzed and the results are attached. The Shelby tube samples tested are all from the clay till, at 6-inch increments. The results from these samples are similar to the samples taken in the adjacent Permit 417 site. The redistributed clay used to construct the Permit 417 clay liner met or exceeded the permeability requirement of $1x10^{-7}$ cm/s. Based on the information, construction of a clay liner for the Water Holding Cells is achievable. Field testing will be conducted to insure the permeability requirement is met. Refer to the Construction Quality Assurance and Quality Control (CQA/QC) Plan for information on the clay liner installation and testing.

Three (3) groundwater monitoring wells (GW-22, GW-34, and GW-35) have been installed in the vicinity of the Water Holding Cells. Sampling information for these wells and the well completion reports are included.

GROUNDWATER MONITORING WELLS 33, 34 AND 35

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18304-1
SAMPLE ID: GW 33
DATE SAMPLED: 12/13/16

REPORT DATE: 12/29/16
COMMENT: 3.30'
SAMPLED BY: Client-JP
DATE RECEIVED: 12/13/16

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	150.1	12/13/16 OG
Acidity	28	mg/L	10	305.1	12/14/16 OG
Alkalinity	596	mg/L	10	310.1	12/14/16 OG
Sulfate	93	mg/L	5	375.4	12/14/16 OG
Chloride	132	mg/L	5	325.3	12/14/16 OG
Hardness	440	mg/L	10	130.2	12/14/16 OG
Total Dissolved Solids	832	mg/L	50	160.1	12/14/16 OG
Total Suspended Solids	< 5	mg/L	5	160.2	12/14/16 OG
Fluoride	1.73	mg/L	0.01	340.2	12/14/16 OG
Cyanide	< 0.002	mg/L	0.002	335.4	12/14/16 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	12/21/16 OG
Aluminum	0.037	mg/L	0.020	3125	12/22/16 AK
Antimony	0.002	mg/L	0.001	3125	12/22/16 AK
Arsenic	< 0.001	mg/L	0.001	3125	12/22/16 AK
Barium	< 0.020	mg/L	0.020	3125	12/22/16 AK
Beryllium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Boron	< 0.020	mg/L	0.020	3125	12/22/16 AK
Cadmium	< 0.0002	mg/L	0.0002	3125	12/22/16 AK
Chromium	0.001	mg/L	0.001	3125	12/22/16 AK
Cobalt	< 0.001	mg/L	0.001	3125	12/22/16 AK
Copper	0.005	mg/L	0.001	3125	12/22/16 AK
Iron, Total	0.078	mg/L	0.020	3125	12/22/16 AK
Iron, Dissolved	0.024	mg/L	0.020	3125	12/22/16 AK
Lead	0.002	mg/L	0.001	3125	12/22/16 AK
Manganese, Total	0.028	mg/L	0.020	3125	12/22/16 AK
Manganese, Dissolved	0.028	mg/L	0.020	3125	12/22/16 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/27/16 AK
Molybdenum	0.002	mg/L	0.001	3125	12/22/16 AK
Nickel	0.001	mg/L	0.001	3125	12/22/16 AK
Selenium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Silver	< 0.001	mg/L	0.001	3125	12/22/16 AK
Thallium	< 0.0004	mg/L	0.0004	3125	12/22/16 AK
Vanadium	0.002	mg/L	0.001	3125	12/22/16 AK
Zinc	< 0.020	mg/L	0.020	3125	12/22/16 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	12/29/16
PDL:	18304-2	**COMMENT:**	5.18'
SAMPLE ID:	GW 34	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	12/13/16	**DATE RECEIVED:**	12/13/16

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	150.1	12/13/16 OG
Acidity	30	mg/L	10	305.1	12/14/16 OG
Alkalinity	492	mg/L	10	310.1	12/14/16 OG
Sulfate	250	mg/L	5	375.4	12/14/16 OG
Chloride	120	mg/L	5	325.3	12/14/16 OG
Hardness	390	mg/L	10	130.2	12/14/16 OG
Total Dissolved Solids	1,004	mg/L	50	160.1	12/14/16 OG
Total Suspended Solids	9	mg/L	5	160.2	12/14/16 OG
Fluoride	1.53	mg/L	0.01	340.2	12/14/16 OG
Cyanide	< 0.002	mg/L	0.002	335.4	12/14/16 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	12/21/16 OG
Aluminum	0.326	mg/L	0.020	3125	12/22/16 AK
Antimony	< 0.001	mg/L	0.001	3125	12/22/16 AK
Arsenic	< 0.001	mg/L	0.001	3125	12/22/16 AK
Barium	< 0.020	mg/L	0.020	3125	12/22/16 AK
Beryllium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Boron	0.052	mg/L	0.020	3125	12/22/16 AK
Cadmium	< 0.0002	mg/L	0.0002	3125	12/22/16 AK
Chromium	0.002	mg/L	0.001	3125	12/22/16 AK
Cobalt	< 0.001	mg/L	0.001	3125	12/22/16 AK
Copper	0.006	mg/L	0.001	3125	12/22/16 AK
Iron, Total	0.430	mg/L	0.020	3125	12/22/16 AK
Iron, Dissolved	0.061	mg/L	0.020	3125	12/22/16 AK
Lead	0.002	mg/L	0.001	3125	12/22/16 AK
Manganese, Total	0.026	mg/L	0.020	3125	12/22/16 AK
Manganese, Dissolved	< 0.020	mg/L	0.020	3125	12/22/16 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/27/16 AK
Molybdenum	0.001	mg/L	0.001	3125	12/22/16 AK
Nickel	0.001	mg/L	0.001	3125	12/22/16 AK
Selenium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Silver	< 0.001	mg/L	0.001	3125	12/22/16 AK
Thallium	< 0.0004	mg/L	0.0004	3125	12/22/16 AK
Vanadium	0.002	mg/L	0.001	3125	12/22/16 AK
Zinc	< 0.020	mg/L	0.020	3125	12/22/16 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18304-3
SAMPLE ID: GW 35
DATE SAMPLED: 12/13/16

REPORT DATE: 12/29/16
COMMENT: 3.56'
SAMPLED BY: Client-JP
DATE RECEIVED: 12/13/16

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.0	Unit	1 - 14	150.1	12/13/16 OG
Acidity	64	mg/L	10	305.1	12/14/16 OG
Alkalinity	644	mg/L	10	310.1	12/14/16 OG
Sulfate	610	mg/L	5	375.4	12/14/16 OG
Chloride	444	mg/L	5	325.3	12/14/16 OG
Hardness	850	mg/L	10	130.2	12/14/16 OG
Total Dissolved Solids	1,972	mg/L	50	160.1	12/14/16 OG
Total Suspended Solids	8	mg/L	5	160.2	12/14/16 OG
Fluoride	0.47	mg/L	0.01	340.2	12/14/16 OG
Cyanide	< 0.002	mg/L	0.002	335.4	12/14/16 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	12/21/16 OG
Aluminum	< 0.020	mg/L	0.020	3125	12/22/16 AK
Antimony	< 0.001	mg/L	0.001	3125	12/22/16 AK
Arsenic	0.001	mg/L	0.001	3125	12/22/16 AK
Barium	< 0.020	mg/L	0.020	3125	12/22/16 AK
Beryllium	< 0.001	mg/L	0.001	3125	12/22/16 AK
Boron	< 0.020	mg/L	0.020	3125	12/22/16 AK
Cadmium	< 0.0002	mg/L	0.0002	3125	12/22/16 AK
Chromium	0.003	mg/L	0.001	3125	12/22/16 AK
Cobalt	0.001	mg/L	0.001	3125	12/22/16 AK
Copper	0.012	mg/L	0.001	3125	12/22/16 AK
Iron, Total	0.185	mg/L	0.020	3125	12/22/16 AK
Iron, Dissolved	0.119	mg/L	0.020	3125	12/22/16 AK
Lead	0.001	mg/L	0.001	3125	12/22/16 AK
Manganese, Total	0.645	mg/L	0.020	3125	12/22/16 AK
Manganese, Dissolved	0.645	mg/L	0.020	3125	12/22/16 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/27/16 AK
Molybdenum	< 0.001	mg/L	0.001	3125	12/22/16 AK
Nickel	0.005	mg/L	0.001	3125	12/22/16 AK
Selenium	0.005	mg/L	0.001	3125	12/22/16 AK
Silver	< 0.001	mg/L	0.001	3125	12/22/16 AK
Thallium	< 0.0004	mg/L	0.0004	3125	12/22/16 AK
Vanadium	0.001	mg/L	0.001	3125	12/22/16 AK
Zinc	< 0.020	mg/L	0.020	3125	12/22/16 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18304

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

Client : Pond Creek
Address :

Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : JP
Report to: Chris Skelton
Bill to: chris.skelton@natchmine.com
James Plumley
PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO$_3$	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	12/13/2016	1127	GW 33	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.30'
2	12/13/2016	1157	GW 34	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					5.175'
3	12/13/2016	1236	GW 35	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.555'

Relinquished by:	Date : Time :	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date : Time :	Received by:	Remarks:
Relinquished by:	Date : 12/13/16 Time : 1415	Received for Laboratory by:	

R08174

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	2/13/17
PDL:	18440-1	**COMMENT:**	4.44'
SAMPLE ID:	GW 33	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	1/31/17	**DATE RECEIVED:**	1/31/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.1	Unit	1 - 14	4500 B	1/31/17 OG
Acidity	16	mg/L	10	305.1	2/3/17 OG
Alkalinity	500	mg/L	10	310.1	2/3/17 OG
Sulfate	65	mg/L	5	4500 E	2/3/17 KR
Chloride	140	mg/L	5	4500 B	2/2/17 KR
Hardness	396	mg/L	10	2340 C	2/3/17 OG
Total Dissolved Solids	936	mg/L	50	2540 C	2/2/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	2/2/17 KR
Fluoride	0.31	mg/L	0.01	340.2	2/1/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	2/1/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/7/17 OG
Aluminum	0.050	mg/L	0.020	3125 B	2/10/17 AK
Antimony	0.001	mg/L	0.001	3125 B	2/10/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/10/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Copper	0.008	mg/L	0.001	3125 B	2/10/17 AK
Iron, Total	0.062	mg/L	0.020	3125 B	2/10/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Manganese, Total	0.082	mg/L	0.020	3125 B	2/10/17 AK
Manganese, Dissolved	0.082	mg/L	0.020	3125 B	2/10/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/10/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/10/17 AK
Nickel	0.002	mg/L	0.001	3125 B	2/10/17 AK
Selenium	0.003	mg/L	0.001	3125 B	2/10/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/10/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	2/10/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/10/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	2/13/17
PDL:	18440-2	**COMMENT:**	4.60'
SAMPLE ID:	GW 34	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	1/31/17	**DATE RECEIVED:**	1/31/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	4500 B	1/31/17 OG
Acidity	24	mg/L	10	305.1	2/3/17 OG
Alkalinity	444	mg/L	10	310.1	2/3/17 OG
Sulfate	200	mg/L	5	4500 E	2/3/17 KR
Chloride	108	mg/L	5	4500 B	2/2/17 KR
Hardness	280	mg/L	10	2340 C	2/3/17 OG
Total Dissolved Solids	740	mg/L	50	2540 C	2/2/17 KR
Total Suspended Solids	6	mg/L	5	2540 D	2/2/17 KR
Fluoride	0.45	mg/L	0.01	340.2	2/1/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	2/1/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/7/17 OG
Aluminum	0.047	mg/L	0.020	3125 B	2/10/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/10/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Copper	0.004	mg/L	0.001	3125 B	2/10/17 AK
Iron, Total	0.027	mg/L	0.020	3125 B	2/10/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Manganese, Total	0.022	mg/L	0.020	3125 B	2/10/17 AK
Manganese, Dissolved	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/10/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Nickel	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Selenium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/10/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	2/10/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/10/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	2/13/17
PDL:	18440-3	**COMMENT:**	3.70'
SAMPLE ID:	GW 35	**SAMPLED BY:**	Client-JP
DATE SAMPLED:	1/31/17	**DATE RECEIVED:**	1/31/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.9	Unit	1 - 14	4500 B	1/31/17 OG
Acidity	70	mg/L	10	305.1	2/3/17 OG
Alkalinity	644	mg/L	10	310.1	2/3/17 OG
Sulfate	660	mg/L	5	4500 E	2/3/17 KR
Chloride	440	mg/L	5	4500 B	2/2/17 KR
Hardness	1,000	mg/L	10	2340 C	2/3/17 OG
Total Dissolved Solids	2,264	mg/L	50	2540 C	2/2/17 KR
Total Suspended Solids	13	mg/L	5	2540 D	2/2/17 KR
Fluoride	0.35	mg/L	0.01	340.2	2/1/17 OG
Cyanide	< 0.002	mg/L	0.002	335.4	2/1/17 OG
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/7/17 OG
Aluminum	0.329	mg/L	0.020	3125 B	2/10/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	2/10/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/10/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/10/17 AK
Chromium	0.003	mg/L	0.001	3125 B	2/10/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	2/10/17 AK
Copper	0.010	mg/L	0.001	3125 B	2/10/17 AK
Iron, Total	0.825	mg/L	0.020	3125 B	2/10/17 AK
Iron, Dissolved	0.079	mg/L	0.020	3125 B	2/10/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Manganese, Total	1.052	mg/L	0.020	3125 B	2/10/17 AK
Manganese, Dissolved	1.052	mg/L	0.020	3125 B	2/10/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/10/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/10/17 AK
Nickel	0.006	mg/L	0.001	3125 B	2/10/17 AK
Selenium	0.007	mg/L	0.001	3125 B	2/10/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/10/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/10/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	2/10/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/10/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
www.[illegible].com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18440

Client : Pond Creek
Address :

Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : JP
Report to: Chris Skelton
Bill to: [illegible]

PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	1/31/2017	1435	GW 33	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.44'
2	1/31/2017	1448	GW 34	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.60'
3	1/31/2017	1534	GW 35	W	G	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.70'

Relinquished by:	Date : 1/31/17 Time : 4:00PM	Received by:	Shipped / Delivered Date: Time:
Relinquished by:	Date : Time :	Received by:	Remarks:
Relinquished by:	Date : 1/31/17 Time : 1600	Received for Laboratory by:	

R08178

SUMMIT ENVIRONMENTAL SERVICES, INC.

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208

CHEMICAL ANALYSTS & CONSULTANTS

Website: www.summitenviro.com

CLIENT: Pond Creek
PDL: 18499-1
SAMPLE ID: GW 33
DATE SAMPLED: 2/20/17

REPORT DATE: 3/1/17
COMMENT: 3.71'
SAMPLED BY: Client-HR
DATE RECEIVED: 2/20/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.5	Unit	1 - 14	4500 B	2/20/17 MM
Acidity	56	mg/L	10	305.1	2/24/17 KR
Alkalinity	628	mg/L	10	310.1	2/24/17 KR
Sulfate	100	mg/L	5	4500 E	2/23/17 KR
Chloride	138	mg/L	5	4500 B	2/24/17 KR
Hardness	324	mg/L	10	2340 C	2/24/17 KR
Total Dissolved Solids	920	mg/L	50	2540 C	2/24/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	2/24/17 KR
Fluoride	0.49	mg/L	0.01	340.2	2/23/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	2/27/17 KR
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	2/23/17 KR
Aluminum	0.154	mg/L	0.020	3125 B	2/24/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/24/17 AK
Chromium	0.001	mg/L	0.001	3125 B	2/24/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Copper	0.005	mg/L	0.001	3125 B	2/24/17 AK
Iron, Total	0.132	mg/L	0.020	3125 B	2/24/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Manganese, Total	0.077	mg/L	0.020	3125 B	2/24/17 AK
Manganese, Dissolved	0.071	mg/L	0.020	3125 B	2/24/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/24/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/24/17 AK
Nickel	0.002	mg/L	0.001	3125 B	2/24/17 AK
Selenium	0.003	mg/L	0.001	3125 B	2/24/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/24/17 AK
Vanadium	0.002	mg/L	0.001	3125 B	2/24/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/24/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	3/1/17
PDL:	18499-2	**COMMENT:**	4.75'
SAMPLE ID:	GW 34	**SAMPLED BY:**	Client-HR
DATE SAMPLED:	2/20/17	**DATE RECEIVED:**	2/20/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.3	Unit	1 - 14	4500 B	2/20/17 MM
Acidity	26	mg/L	10	305.1	2/24/17 KR
Alkalinity	520	mg/L	10	310.1	2/24/17 KR
Sulfate	310	mg/L	5	4500 E	2/23/17 KR
Chloride	106	mg/L	5	4500 B	2/24/17 KR
Hardness	332	mg/L	10	2340 C	2/24/17 KR
Total Dissolved Solids	1,000	mg/L	50	2540 C	2/24/17 KR
Total Suspended Solids	< 5	mg/L	5	2540 D	2/24/17 KR
Fluoride	0.43	mg/L	0.01	340.2	2/23/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	2/27/17 KR
Phenols, Total Recoverable	0.01	mg/L	0.01	420.4	2/23/17 KR
Aluminum	0.043	mg/L	0.020	3125 B	2/24/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Arsenic	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Boron	0.069	mg/L	0.020	3125 B	2/24/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/24/17 AK
Chromium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Cobalt	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Copper	0.004	mg/L	0.001	3125 B	2/24/17 AK
Iron, Total	0.060	mg/L	0.020	3125 B	2/24/17 AK
Iron, Dissolved	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Manganese, Total	0.101	mg/L	0.020	3125 B	2/24/17 AK
Manganese, Dissolved	0.091	mg/L	0.020	3125 B	2/24/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/24/17 AK
Molybdenum	0.001	mg/L	0.001	3125 B	2/24/17 AK
Nickel	0.002	mg/L	0.001	3125 B	2/24/17 AK
Selenium	0.001	mg/L	0.001	3125 B	2/24/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/24/17 AK
Vanadium	0.001	mg/L	0.001	3125 B	2/24/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/24/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	3/1/17
PDL:	18499-3	**COMMENT:**	3.91'
SAMPLE ID:	GW 35	**SAMPLED BY:**	Client-HR
DATE SAMPLED:	2/20/17	**DATE RECEIVED:**	2/20/17

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	6.9	Unit	1 - 14	4500 B	2/20/17 MM
Acidity	82	mg/L	10	305.1	2/24/17 KR
Alkalinity	712	mg/L	10	310.1	2/24/17 KR
Sulfate	620	mg/L	5	4500 E	2/23/17 KR
Chloride	470	mg/L	5	4500 B	2/24/17 KR
Hardness	880	mg/L	10	2340 C	2/24/17 KR
Total Dissolved Solids	2,244	mg/L	50	2540 C	2/24/17 KR
Total Suspended Solids	19	mg/L	5	2540 D	2/24/17 KR
Fluoride	0.48	mg/L	0.01	340.2	2/23/17 KR
Cyanide	< 0.002	mg/L	0.002	335.4	2/27/17 KR
Phenols, Total Recoverable	0.02	mg/L	0.01	420.4	2/23/17 KR
Aluminum	0.786	mg/L	0.020	3125 B	2/24/17 AK
Antimony	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Arsenic	0.002	mg/L	0.001	3125 B	2/24/17 AK
Barium	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Beryllium	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Boron	< 0.020	mg/L	0.020	3125 B	2/24/17 AK
Cadmium	< 0.0002	mg/L	0.0002	3125 B	2/24/17 AK
Chromium	0.005	mg/L	0.001	3125 B	2/24/17 AK
Cobalt	0.003	mg/L	0.001	3125 B	2/24/17 AK
Copper	0.009	mg/L	0.001	3125 B	2/24/17 AK
Iron, Total	0.697	mg/L	0.020	3125 B	2/24/17 AK
Iron, Dissolved	0.068	mg/L	0.020	3125 B	2/24/17 AK
Lead	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Manganese, Total	0.977	mg/L	0.020	3125 B	2/24/17 AK
Manganese, Dissolved	0.977	mg/L	0.020	3125 B	2/24/17 AK
Mercury	< 0.002	mg/L	0.002	245.1	2/24/17 AK
Molybdenum	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Nickel	0.006	mg/L	0.001	3125 B	2/24/17 AK
Selenium	0.009	mg/L	0.001	3125 B	2/24/17 AK
Silver	< 0.001	mg/L	0.001	3125 B	2/24/17 AK
Thallium	< 0.0004	mg/L	0.0004	3125 B	2/24/17 AK
Vanadium	0.003	mg/L	0.001	3125 B	2/24/17 AK
Zinc	< 0.020	mg/L	0.020	3125 B	2/24/17 AK

Reviewed By: Amber Wright

SUMMIT ENVIRONMENTAL SERVICES, INC.
CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, IL 62896
Phone (618) 983-8280
ses_1@frontier.com

CHAIN OF CUSTODY RECORD AND ANALYTICAL REQUEST

SES Project Number(s): 18499

Client : Pond Creek
Address :
Phone : 618-983-3020
Contact : Chris Skelton

Sampled by : MJM
Report to: Chris Skelton
Bill to: chris.skelton@mechmining.com
james plumley
PO/Billing Reference :
Requested Due Date : Regular

Sample Number	Date	Time	Sample Location	Matrix	Composite or Grab	Number of Containers	Field Data: pH	Analyses Requested: Acid	Alkalinity	Sulfate	Chloride	Hardness	TDS	TSS	Fluoride	Cyanide	Phenols	Ag As Cd Co Cr Cu	Se Tl Zn	Al B Ba Be Mo V	Hg	Fe*Mn* total & dissolved	Preservatives: Unpreserved	H_2SO_4	HNO_3	NaOH	Other (HCl, $Na_2S_2O_3$)	Check In: Arrival Temp in °C	Acceptable for hold time	Bottles/preservative OK	Remarks
1	2/20/2017	1500	GW 33	W	G	4	6.5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.71'
2	2/20/2017	1515	GW 34	W	G	4	7.3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					4.75'
3	2/20/2017	1530	GW 35	W	G	4	6.9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	1	1					3.91'

Relinquished by:	Date :	Time :	Received by:	Shipped / Delivered Date:	Time:
Michael Mulvira	2/20/17	16:00			
Relinquished by:	Date :	Time :	Received by:	Remarks:	
Relinquished by:	Date :	Time :	Received for Laboratory by:		
	2/20/17	1600	Amber Wright		

R08182

SOIL BORINGS

Holcomb Foundation Engineering Co., Inc.

R08184

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

393 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

September 15, 2015

Williamson Energy, LLC
211 North Broadway, Suite 2600
St. Louis, MO 63102

Attention: Mr. Josh Phillips

Re: Soil Borings and Laboratory Tests
Pond Creek Mine – Water Holding Cell #1
Johnston City, Illinois
HFE File H-14179
PO 4500102154

Dear Sir:

From August 17 to 18, 2015, we drilled six soil borings in the Water Holding Cell #1 area. The borings were advanced to bedrock, then shallow offset borings were drilled adjacent to the deeper boring to sample soils with Shelby tubes for permeability tests. Permeability tests will be performed on each 6" of the upper five feet of Shelby tubes. The tests for Borings #WHC16-1A and #WHC16-2A are enclosed. We are holding the Shelby tubes for Borings #WHC16-3A to #WHC16-6A, and will not test these unless authorized.

The Boring Logs and Permeability Tests are attached. If you should have any questions or if we can be of further assistance, please feel free to contact us at your convenience.

Sincerely,

HOLCOMB FOUNDATION ENGINEERING CO.

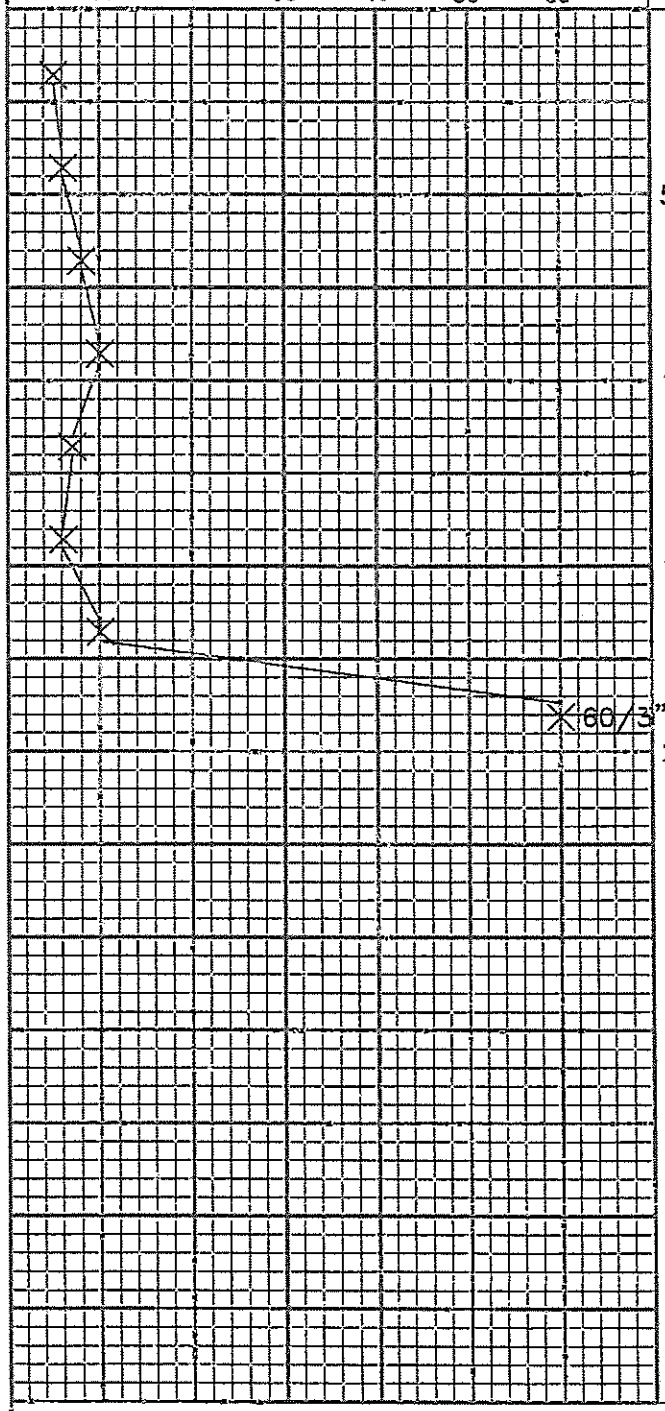
Timothy J. Holcomb, P.E.



Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-1

R08135



Depth In Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 450.38
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		Brown Mottled Gray Silty CLAY (CL)
	3	ss		
10	4	ss		
	5	ss		
15	6	ss		Brown Mottled Gray Silty to Sandy CLAY (CL)
	7	ss		
	8	ss		Gray SHALE
20				End of Boring @ -19.5'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine - Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

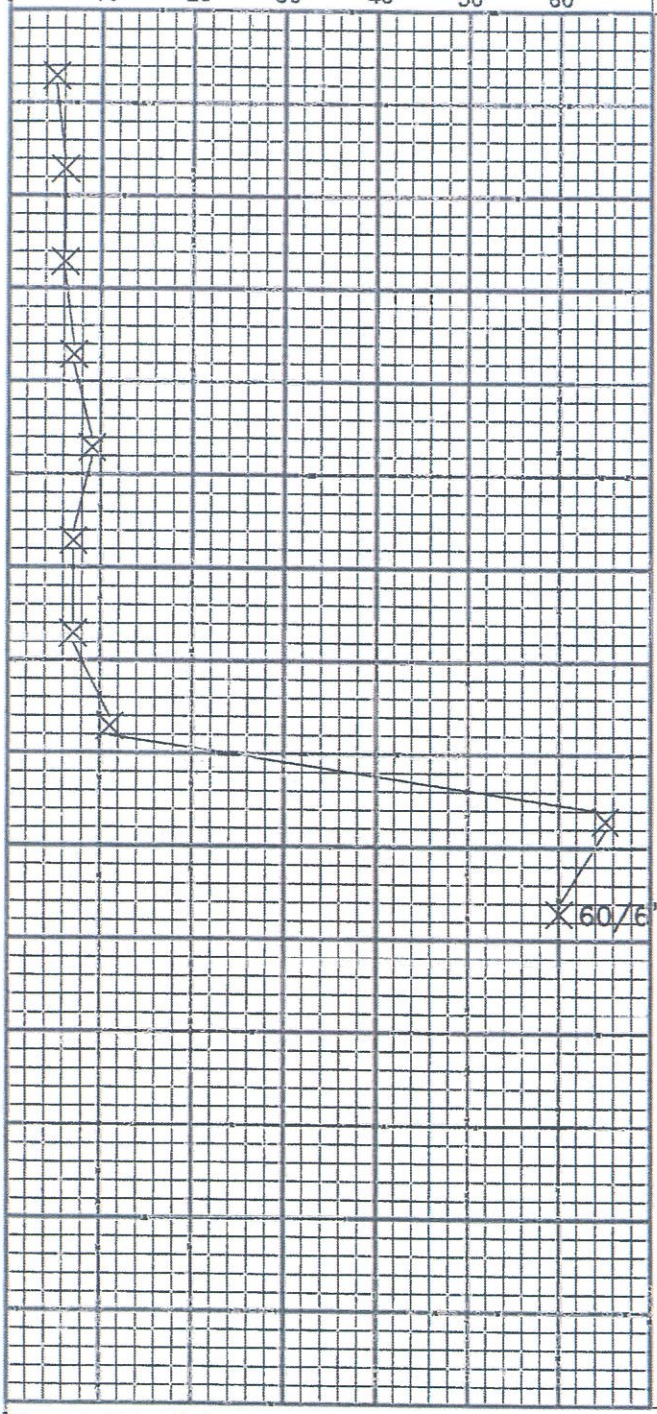
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-2

R08186



Depth In Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 444.92
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		Gray Mottled Brown Silty CLAY (CL)
	3	ss		
10	4	ss		
	5	ss		Brown Sandy CLAY (CL) with sand seams
15	6	ss		
	7	ss		
20	8	ss		
	9	ss		Gray SHALE
25	10	ss		
				End of Boring @ -25.0'
30				
35				

Ground Water Data
Water Encountered @ -18.5' During Drilling and Plugged Upon Completion

Project: Mach Mine - Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

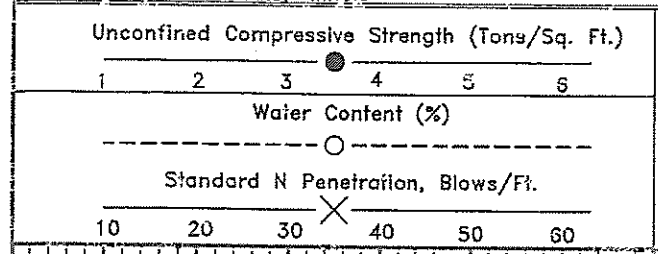
Client: Williamson Energy
Johnston City, Illinois

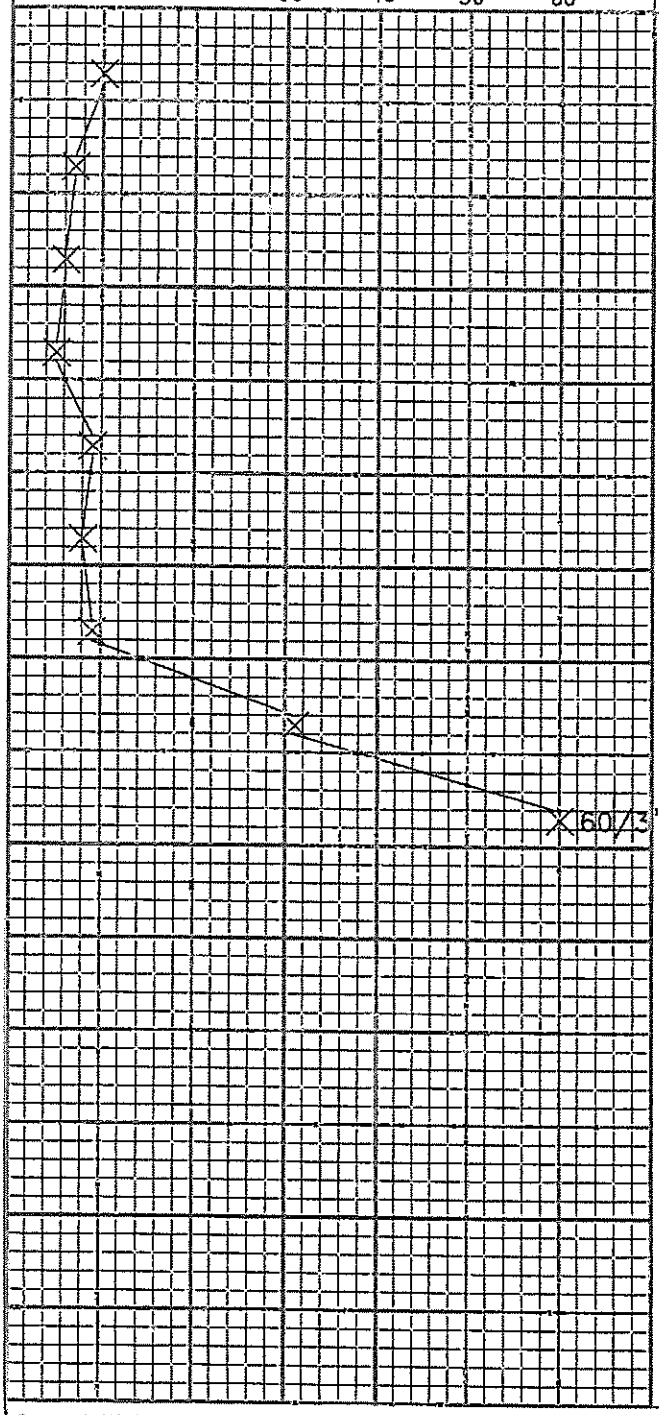
Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-3

R08187





Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 452.31
				2" Topsoil
	1	ss		Gray Mottled Brown Silty CLAY (CL)
5	2	ss		
	3	ss		
	4	ss		
10	5	ss		Brown Sandy CLAY (CL)
	6	ss		
15	7	ss		
	8	ss		
20				Gray Weathered SHALE
	9	ss		Gray SHALE
				End of Boring @ -22.5'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

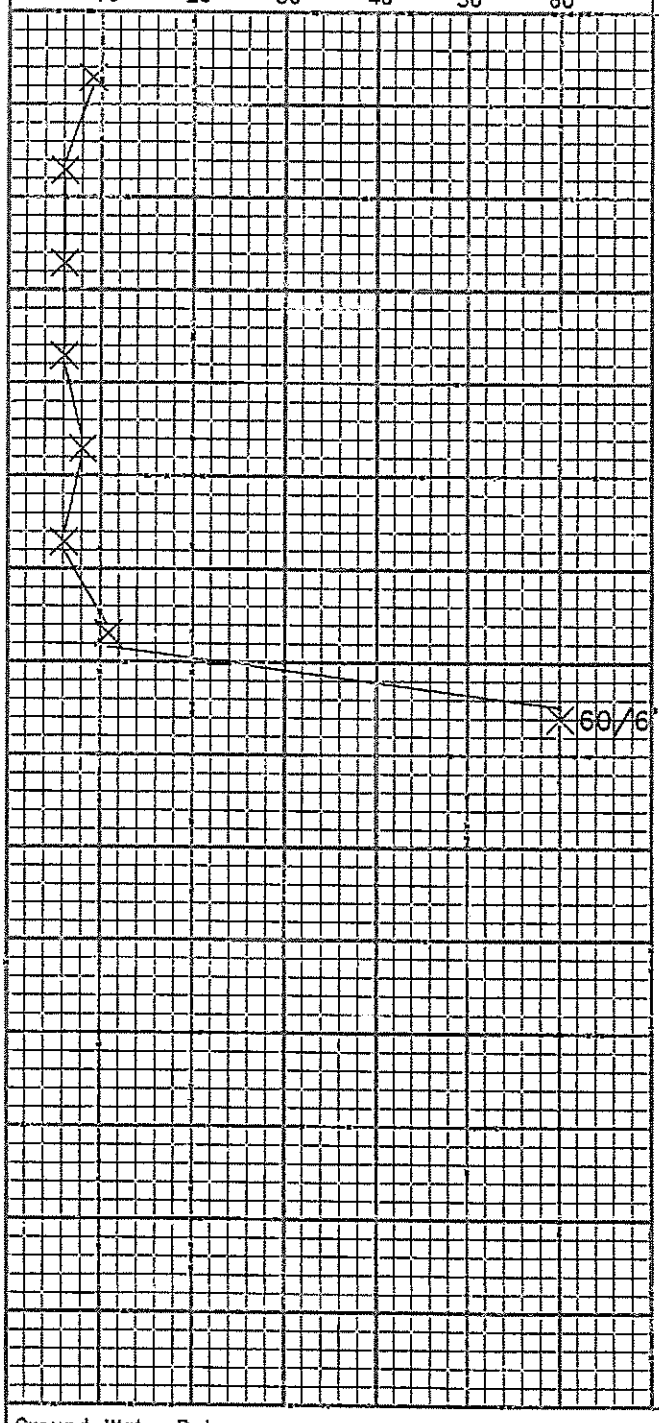
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-4

R08188



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 446.38
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		Gray Mottled Brown Silty CLAY (CL)
	3	ss		
	4	ss		
10	5	ss		Brown Silty CLAY (CL)
	6	ss		
15	7	ss		
	8	ss		Gray SHALE
20				End of Boring @ -19.5'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

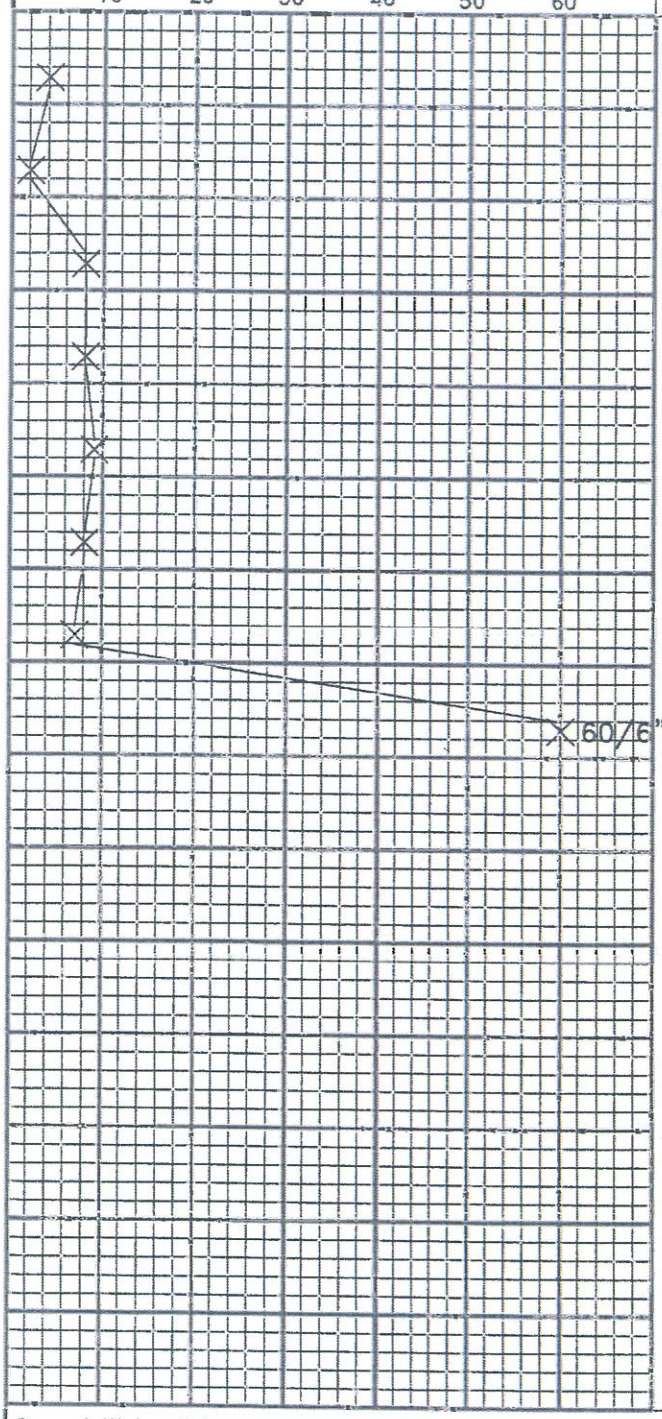
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-5

R08189



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 453.15
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
5	2	ss		
	3	ss		Gray Mottled Brown Silty CLAY (CL)
10	4	ss		
	5	ss		Brown Silty CLAY (CL)
15	7	ss		
	8	ss		
	9	ss		Gray SHALE
20				End of Boring @ -20.0'
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

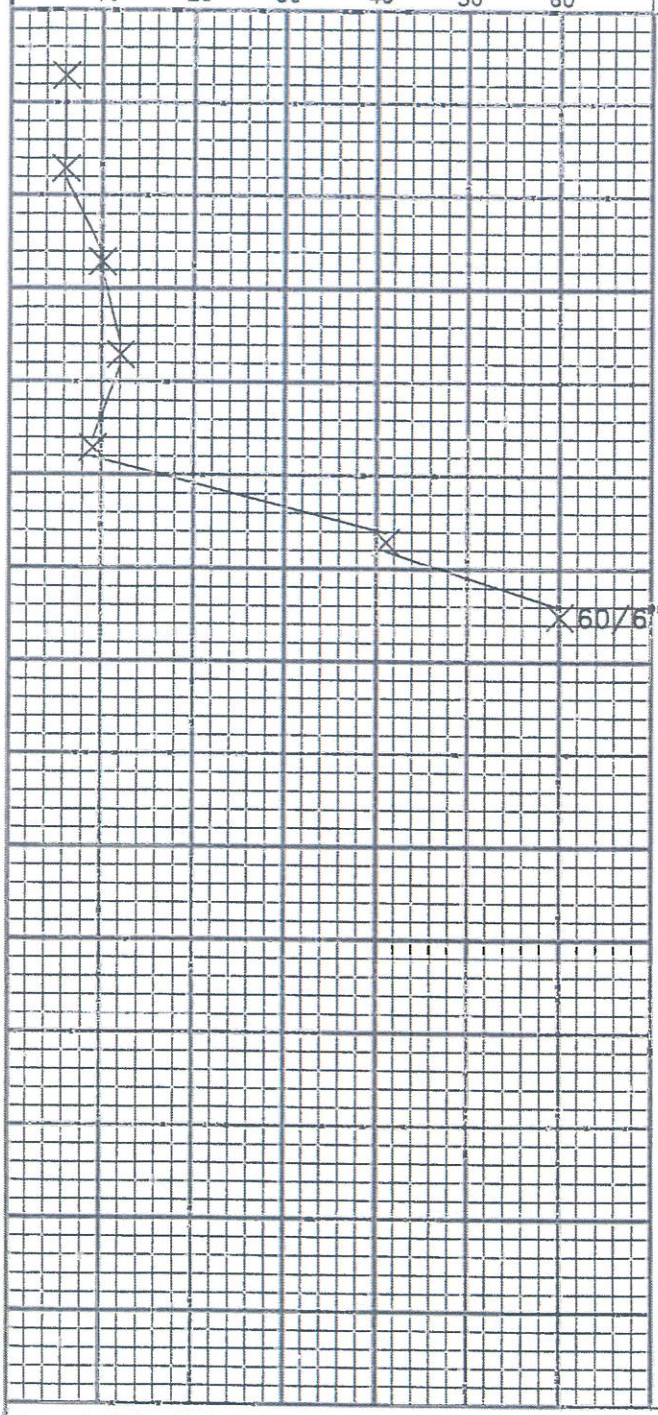
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-6

R08190



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 444.78
				2" Topsoil
	1	ss		Gray Silty CLAY (CL)
	2	ss		
5				
	3	ss		Brown Silty CLAY (CL)
	4	ss		
10				
	5	ss		
	6	ss		Brown Weathered SHALE
15				
	7	ss		Gray SHALE
				End of Boring @ -16.5'
20				
25				
30				
35				

Ground Water Data
No Water Encountered During Drilling

Project: Mach Mine – Water Holding Cell No. 1
Williamson County, Illinois

Date of Boring
August 17, 2015

Client: Williamson Energy
Johnston City, Illinois

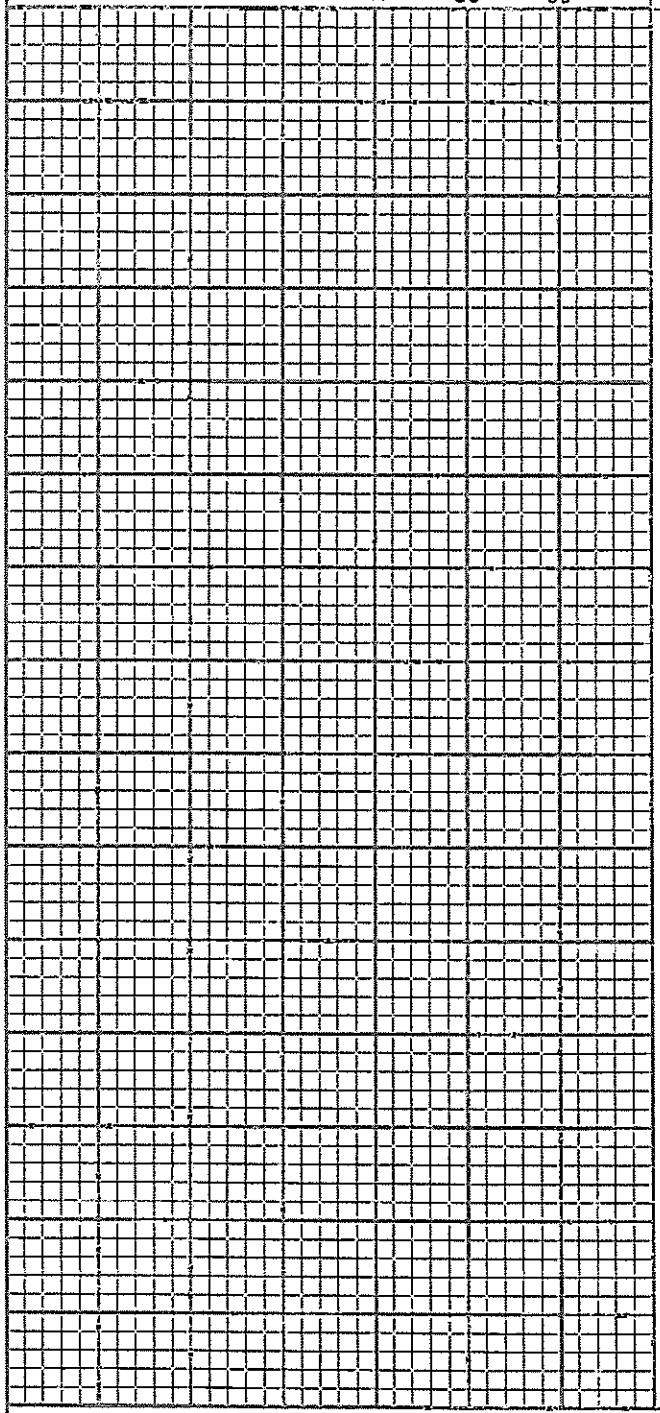
Project No.
H-14179

Holcomb Foundation
Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-1A offset

R08191

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6
Water Content (%)
Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
10				
	1	st		
15	2	st		
	3	st		
20				End of Boring @ -18.0'
25				
30				
35				

Ground Water Data
Ground Water Encountered @ -16.0' During Drilling.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

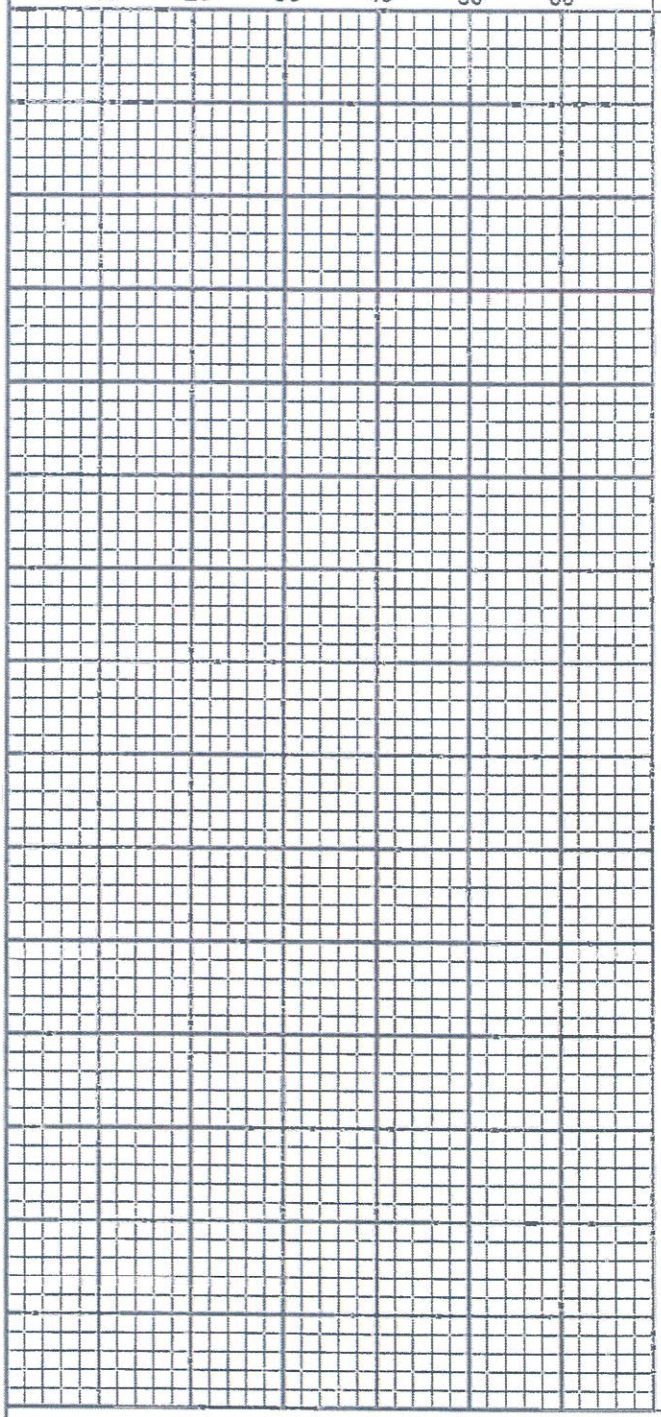
LOG of BORING WHC16-2A offset

R08192

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
10				
	1	st		Gray Mottled Brown Silty CLAY (CL) with sand
15	2	st		Brown Clayey SAND (SC)
	3	st		Brown Silty CLAY (CL)
20				End of Boring @ -18.0'
25				
30				
35				

Ground Water Data
Ground Water Encountered @ -16.0' During Drilling.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

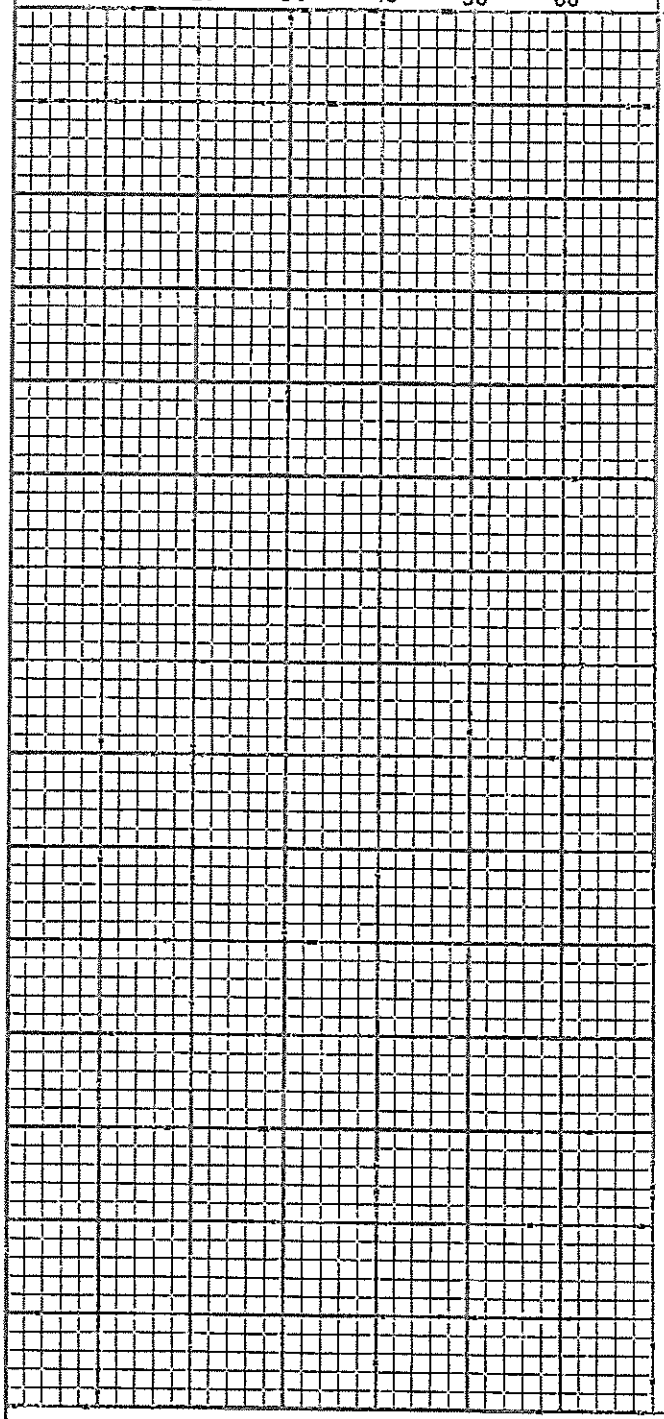
LOG of BORING WHC16-3A offset

R08193

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Mottled Gray Silty CLAY (CL)
5				
10				
15	1	st		
	2	st		
	3	st		
20				End of Boring @ -19.0'
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation
Engineering Co.
PO Box 88 Carbondale, Illinois

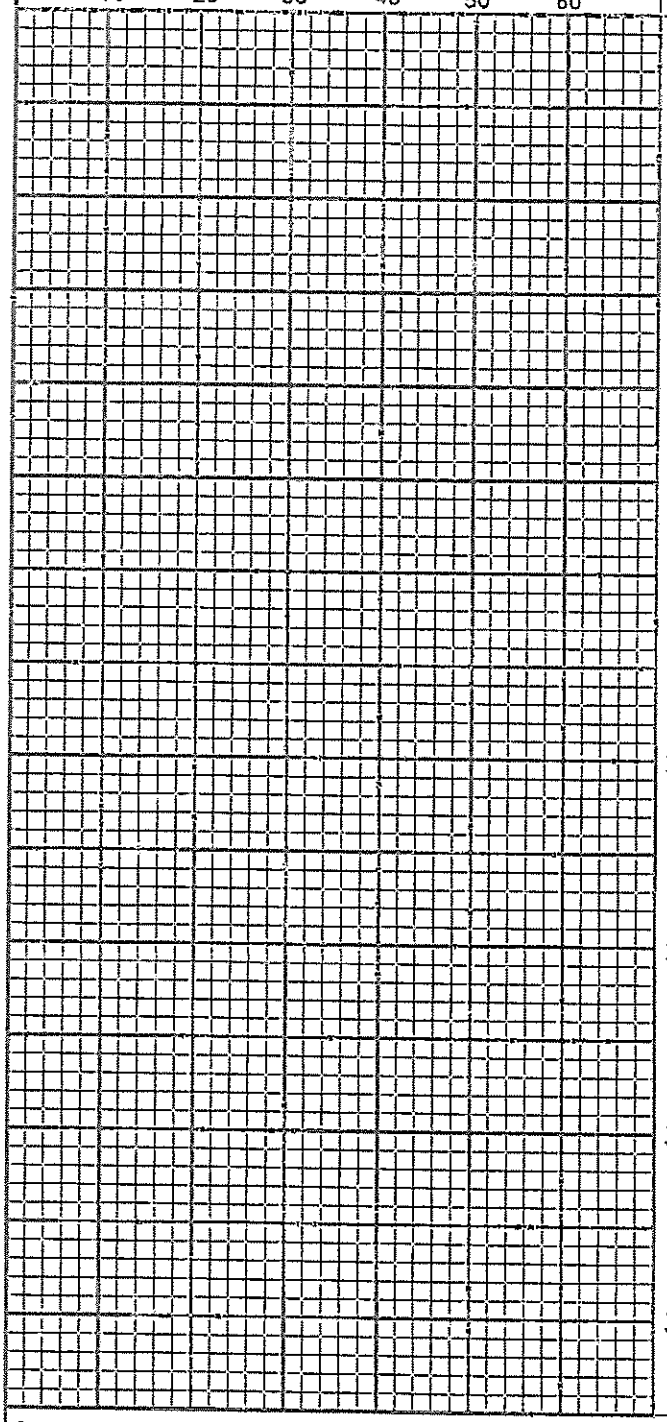
LOG of BORING WHC16-4A offset

R08194

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Mottled Gray Silty CLAY (CL)
5				
10				
15	1	st		
	2	st		
	3	st		
20				End of Boring @ -19.0'
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

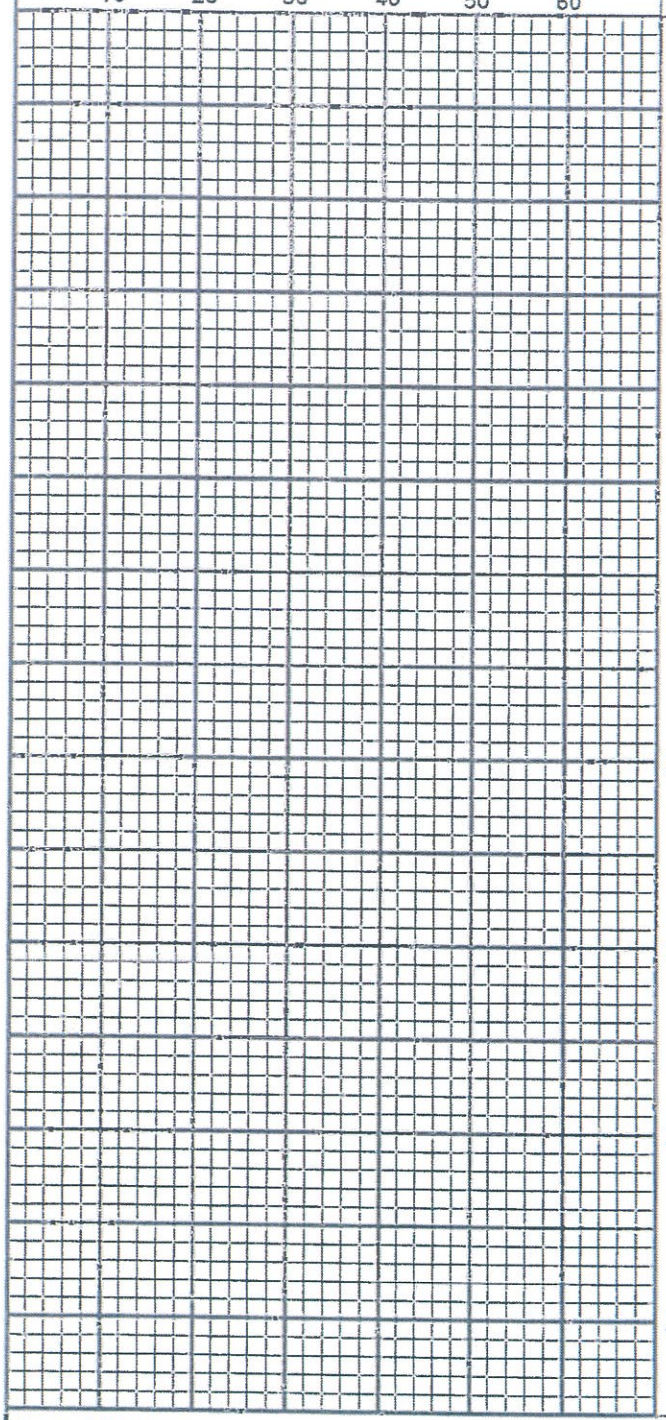
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-5A offset

R08195



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
10				
	1	st		
15	2	st		
	3	st		
20				End of Boring @ -18.0'
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

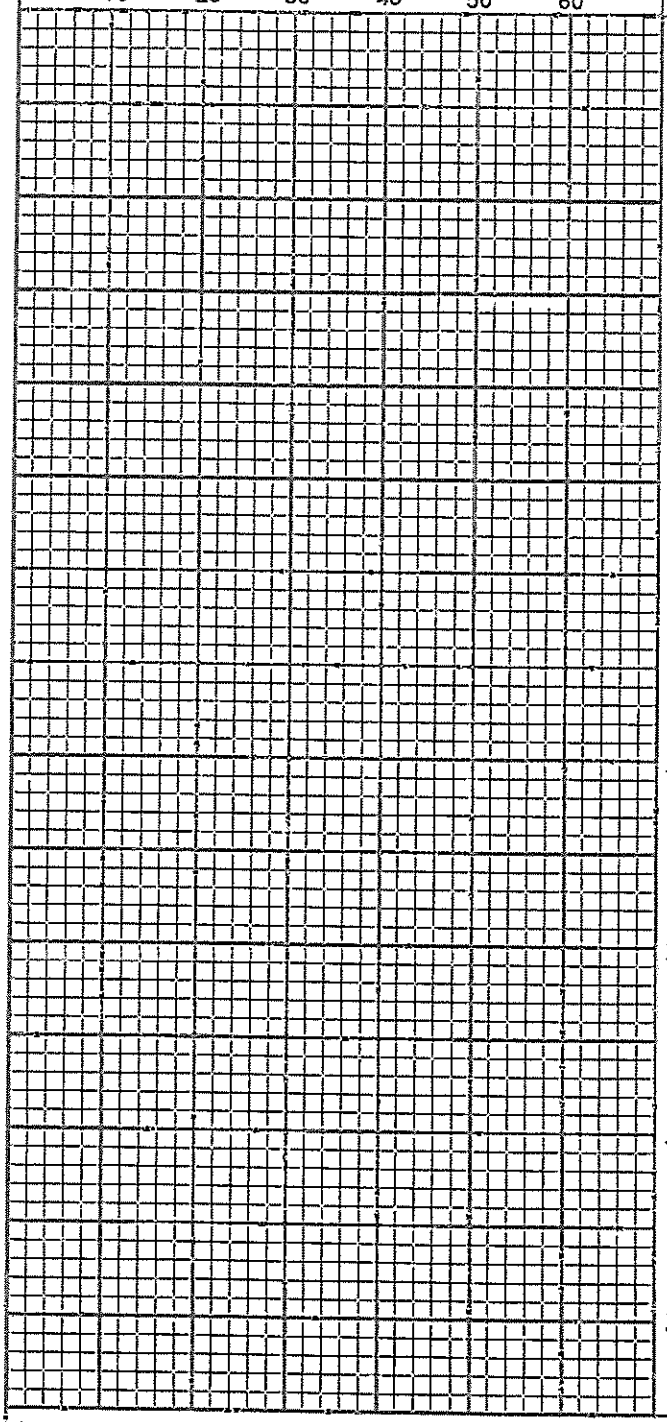
Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WHC16-6A offset

R08196



Depth In Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation
				2" Topsoil
				Brown Silty CLAY (CL)
5				
	1	st		
10	2	st		Gray Silty CLAY (CL)
	3	st		
15				End of Boring @ -14.0'
20				
25				
30				
35				

Ground Water Data
No Ground Water Encountered During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine
Williamson County, Illinois

Date of Boring
August 18, 2015

Client: Williamson Energy
Johnston City, Illinois

Project No.
H-14179

LABTEST ASSIGNMENTS AND CHAIN OF CUSTODY

Holcomb Engineering (618) 529-5262
P. O. Box 88
Carbondale, IL 62903

HFE Project No: [illegible]
Project Title: [illegible]
Project Site:
Samples Contain Has Mat'ls? (note 1) No: / Yes: Type:

Date Samples Obtained [illegible]
Date of Lab Assignments [illegible]
Target Date/Required
Assignments By: [illegible]

Date Rec'd
Rec'd By

SAMPLE INFORMATION						TESTS REQUESTED (Mark "X" in box.)														
Item I. D.	Boring No.	Sample No.	Type: SS, ST, or Bulk	Depth -Nominal -Interval	Classification (if known) Or Comment	Mc	UW	Pen	QU	QU ST	Att Limit	Dry Sieve	Washed Sieve	Hyd.	pH	SpGr	Proctor (Std)	Proctor (Mod)	Perm	Comments Or Other Tests
1	[illegible]	1-2	ST																✓	
2	[illegible]	1-2	ST																✓	
3	[illegible]	1-2	ST																[illegible]	
4	[illegible]	1-2	ST																✓	
5	[illegible]	1-2	ST																✓	
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Note 1 If suspected, describe possible Haz Materials: samples requiring special handling or precautions, subject to additional processing fees.

R08197

Holcomb Foundation Engineering Co., Inc.

R08198

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

393 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

Permeability Tests Results

Mach Mine
Water Holding Cell #1

HFE File: H-14179
Date: 8/31/2015

Location	Moisture Content (%) Before Test	Moisture Content (%) After Test	Dry Unit Weight (PCF)	Permeability (Cm./Sec.)
WHC16-1A (12-12.5')	20.0	19.1	108.7	4 x 10-8
WHC16-1A (12.5-13')	19.1	20.4	110.0	5 x 10-7*
WHC16-1A (13-13.5')	19.5	20.3	108.2	4 x 10-7*
WHC16-1A (13.5-14')	19.6	19.7	107.6	1 x 10-7
WHC16-1A (14-14.5')	18.7	20.0	109.8	1 x 10-6*
WHC16-1A (14.5-15')	18.2	19.7	110.9	1 x 10-6*
WHC16-1A (15-15.5')	19.7	19.6	110.0	9 x 10-7*
WHC16-1A (15.5-16')	19.2	18.5	112.3	3 x 10-7*
WHC16-1A (16-16.5')	17.4	16.8	118.6	1 x 10-7
WHC16-1A (16.5-17')	16.0	17.3	115.8	1 x 10-7

* - Permeability not in compliance with 1 x 10-7 cm/sec. specification

Permeability Test performed in accordance with ASTM D-5084

Holcomb Foundation Engineering Co., Inc.

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

393 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

Permeability Tests Results

Mach Mine
Water Holding Cell #1

HFE File: H-14179
Date: 9/14/2015

Location	Moisture Content (%) Before Test	After Test	Dry Unit Weight (PCF)	Permeability (Cm./Sec.)
WHC16-2A (12-12.5')	19.5	17.8	116.0	3 x 10-7*
WHC16-2A (12.5-13')	18.8	19.1	115.5	5 x 10-7*
WHC16-2A (13-13.5')	18.6	20.5	114.2	1 x 10-7
WHC16-2A (13.5-14')	No Test - Poor Sample			
WHC16-2A (14-14.5')	17.1	20.4	117.1	4 x 10-5*
WHC16-2A (14.5-15')	15.5	14.8	119.7	8 x 10-6*
WHC16-2A (15-15.5')	Sand - No Test			
WHC16-2A (15.5-16')	Sand - No Test			
WHC16-2A (16-16.5')	18.0	18.9	114.8	1 x 10-7
WHC16-2A (16.5-17')	18.2	19.4	113.5	4 x 10-7*

* - Permeability not in compliance with 1 x 10-7 cm/sec. specification

Permeability Test performed in accordance with ASTM D-5084

LABTEST ASSIGNMENTS AND CHAIN OF CUSTODY

Holcomb Engineering (618) 529-5262
P. O. Box 88
Carbondale, IL 62903

HFE Project No: N - [illegible]
Project Title: [illegible] MINE POND CREEK
Project Site:
Samples Contain Has Mat'ls? (note 1) No: Yes: Type:
NO SAMPLES

Date Samples Obtained 9-15-15
Date of Lab Assignments NO
Target Date/Required LAB
Assignments By:

Date Rec'd
Rec'd By

SAMPLE INFORMATION						TESTS REQUESTED (Mark "X" in box.)														
Item I. D.	Boring No.	Sample No.	Type: SS, ST, or Bulk	Depth -Nominal -Interval	Classification (if known) Or Comment	Mc	UW	Pen	QU	QU ST	Att Limit	Dry Sieve	Washed Sieve	Hyd.	pH	SpGr	Proctor (Std)	Proctor (Mod)	Perm	Comments Or Other Tests
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Note 1 If suspected, describe possible Haz Materials: samples requiring special handling or precautions, subject to additional processing fees.

1 REPORT RE: LAB TESTING FOR TUBES PUSHED 8-17 + 8-18.

R08200

GROUNDWATER MONITORING WELL INSTALLATIONS AND SLUG TESTS

Holcomb Foundation Engineering Co., Inc.

R08202

SOILS • BITUMINOUS • CONCRETE • ENGINEERING AND TESTING

393 Wood Road
Carbondale, IL 62901

PHONE 618-529-5262
TOLL FREE 800-333-1740
FAX 618-457-8991

October 21, 2016

Williamson Energy
PO Box 99
Johnston City, Illinois 62951

Attention: Mr. James Plumley

Re: Monitoring Well Installations and Slug Tests
Pond Creek Mine
Johnston City, Illinois
HFE File H-14179
Purchase Order No. 4500139030

Dear Sir:

On October 6 and 10, 2016 we drilled three soil borings and installed ground water monitoring wells WE1016-GW-33, 34, and 35. The wells were installed and cleaned out when set, then slug tests were performed on October 18, 2016. Results of the slug tests are as follows:

Boring No.	Hydraulic Conductivity (cm./sec.)
WE1016-GW-33	1.197 x 10-4
WE1016-GW-34	1.286 x 10-4
WE1016-GW-35	2.530 x 10-4

The Boring Logs, Well Completion Reports, and Slug Test Results are attached. If you should have any questions or if we can be of further assistance, please feel free to contact us at your convenience.

Sincerely,

HOLCOMB FOUNDATION ENGINEERING CO.

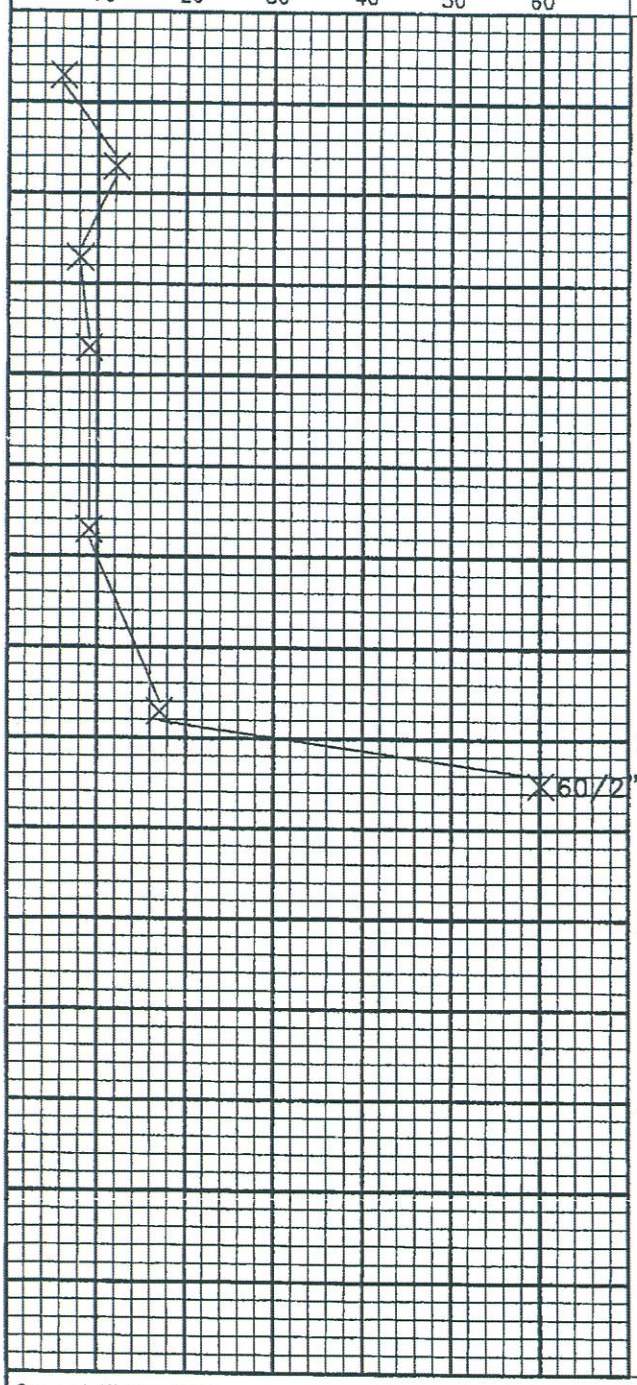
Timothy J. Holcomb, P.E.

REGISTERED PROFESSIONAL ENGINEER
TIMOTHY J.
HOLCOMB
062-042149
Exp 11-30-17
ILLINOIS

R08203

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WE1016-GW-33



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 453.16 N428872.00 E354992.09
				5" Topsoil
	1	ss		Gray Mottled Brown Silty CLAY (CL)
	2	ss		
5	3	ss		
	4	ss		
10				
	5	ss		Brown Silty CLAY (CL) with pebbles
15				
	6	ss		
20				Gray- Brown Weathered SHALE
		ss		Gray SHALE
				End of Boring @ -21.5'
25				
30				
35				

Ground Water Data
Ground Water Encountered @ -14.0' During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine Water Holding Cell
Williamson County, Illinois

Date of Boring
October 10, 2016

Client: Williamson Energy, LLC
St. Louis, Missouri

Project No.
H-14179

R08204

Holcomb Foundation Engineering Company

Monitoring Well Report

Site # H-14179 Location Williamson County Well # WE1016-GW-33

Site Name Pond Creek #1 Grid Coordinate Northing 428872.00 Easting 354992.09

Drilling Contractor Holcomb Foundation Engineering Date Drilled Start: 10/10/2016

Driller B. Schwartz Geologist Date Completed: 10/10/2016

Drilling Method Hollow Stem Augers

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite

Amount of Cement: # of bags lbs. per bag

Amount of Bentonite: # of bags 3 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Granular Chips

Amount of Bentonite: # of bags lbs. per bag

Type of Sand Pack: FilterSil #1 10-20

Source of Sand: FilterSil Junction City, GA

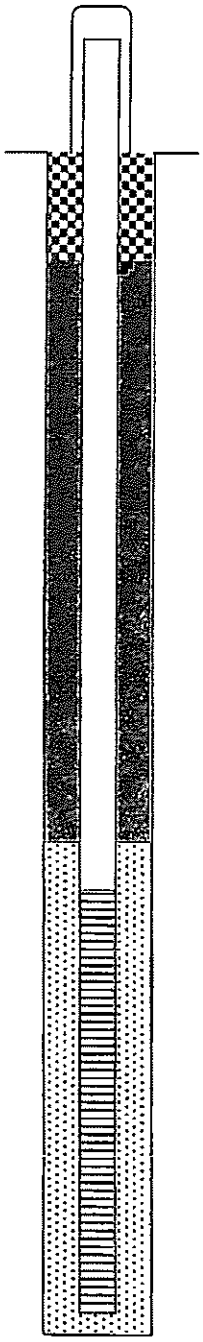
Amount of Sand: # of bags 6 lbs. per bag 50

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			Sch 40	
Riser pipe above wt			Sch 40	
Riser pipe below wt			Sch 40	
Screen			Sch 40	
Coupling joint screen to riser			Sch 40	
Protective Casing				Steel

Measurements to .1 ft. (where applicable)

Riser pipe length			13'	
Protective cover length			5'	
Screen length			10'	
Bottom of screen to end cap			0.1'	
Top of screen to first joint			0.1'	
Total length of casing			---	
Screen slot size			0.010"	
% of openings in screen			---	
Diameter of borehole (in)			8.0"	
ID of riser pipe (in)			2.0"	



+3.0 MSL Top of Riser Pipe

453.16 MSL Ground Surface

2 ft. Concrete Seal

-2.0 ft. Top of Bentonite

7 ft. Bentonite

-9.0 ft. Top of Sand

-11.0 ft. Top of Screen

10.0 ft. Total Screen Interval

-20.0 ft. Bottom of Screen

-21.5 ft. Bottom of Borehole

Completed by: T. Holcomb Surveyed by: Ill. registration #

R08205

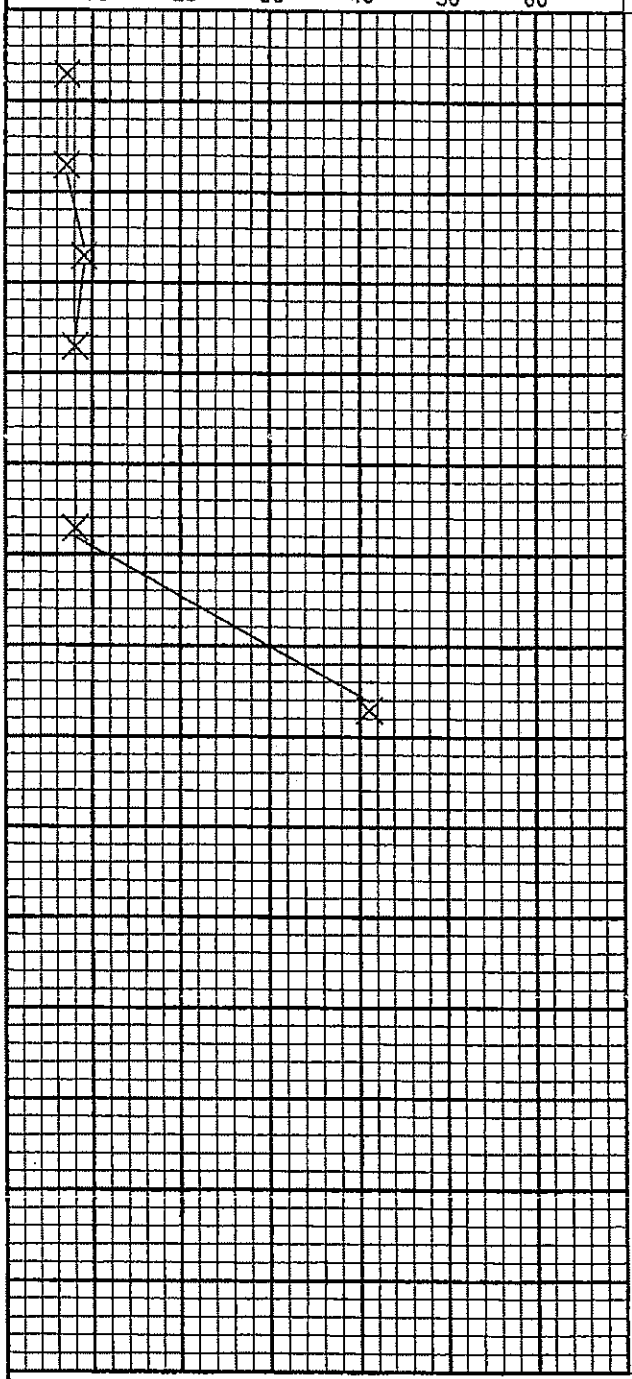
Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WE1016-GW-34

Unconfined Compressive Strength (Tons/Sq. Ft.)
1 2 3 4 5 6

Water Content (%)

Standard N Penetration, Blows/Ft.
10 20 30 40 50 60



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 446.4 N428985.01 E355851.75
				5" Topsoil
	1	ss		Gray Mottled Brown Silty CLAY (CL)
5	2	ss		
	3	ss		Brown Mottled Gray Silty CLAY (CL) with trace sand
10	4	ss		
	5	ss		
15				
	6	ss		Gray Mottled Brown Weathered SHALE
20				End of Boring @ -20.0'
25				
30				
35				

Ground Water Data
Ground Water Encountered @ -15.0' During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine Water Holding Cell
Williamson County, Illinois

Date of Boring
October 6, 2016

Client: Williamson Energy, LLC
St. Louis, Missouri

Project No.
H-14179

R08206

Holcomb Foundation Engineering Company

Monitoring Well Report

Site # H-14179 Location Williamson County Well # WE1016-GW-34

Site Name Pond Creek #1 Grid Coordinate Northing 428985.01 Easting 355851.75

Drilling Contractor Holcomb Foundation Engineering Date Drilled Start: 10/6/2016

Driller B. Schwartz Geologist Date Completed: 10/6/2016

Drilling Method Hollow Stem Augers

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite

Amount of Cement: # of bags ____ lbs. per bag ____

Amount of Bentonite: # of bags 3 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Granular Chips

Amount of Bentonite: # of bags ____ lbs. per bag ____

Type of Sand Pack: FilterSil #1 10-20

Source of Sand: FilterSil Junction City, GA

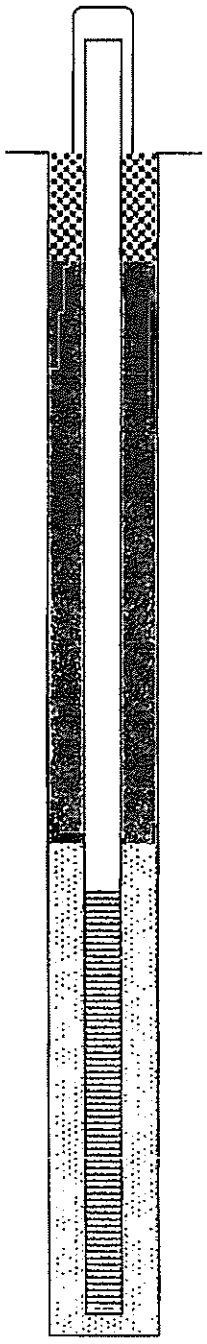
Amount of Sand: # of bags 6 lbs. per bag 50

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			Sch 40	
Riser pipe above wt			Sch 40	
Riser pipe below wt			Sch 40	
Screen			Sch 40	
Coupling joint screen to riser			Sch 40	
Protective Casing				Steel

Measurements to .1 ft. (where applicable)

Riser pipe length			13'	
Protective cover length			5'	
Screen length			10'	
Bottom of screen to end cap			0.1'	
Top of screen to first joint			0.1'	
Total length of casing			—	
Screen slot size			0.010"	
% of openings in screen			—	
Diameter of borehole (in)			8.0"	
ID of riser pipe (in)			2.0"	



+3.0 MSL Top of Riser Pipe

446.4 MSL Ground Surface

2 ft. Concrete Seal

-2.0 ft. Top of Bentonite

6 ft. Bentonite

-8.0 ft. Top of Sand

-10.0 ft. Top of Screen

10.0 ft. Total Screen Interval

-20.0 ft. Bottom of Screen

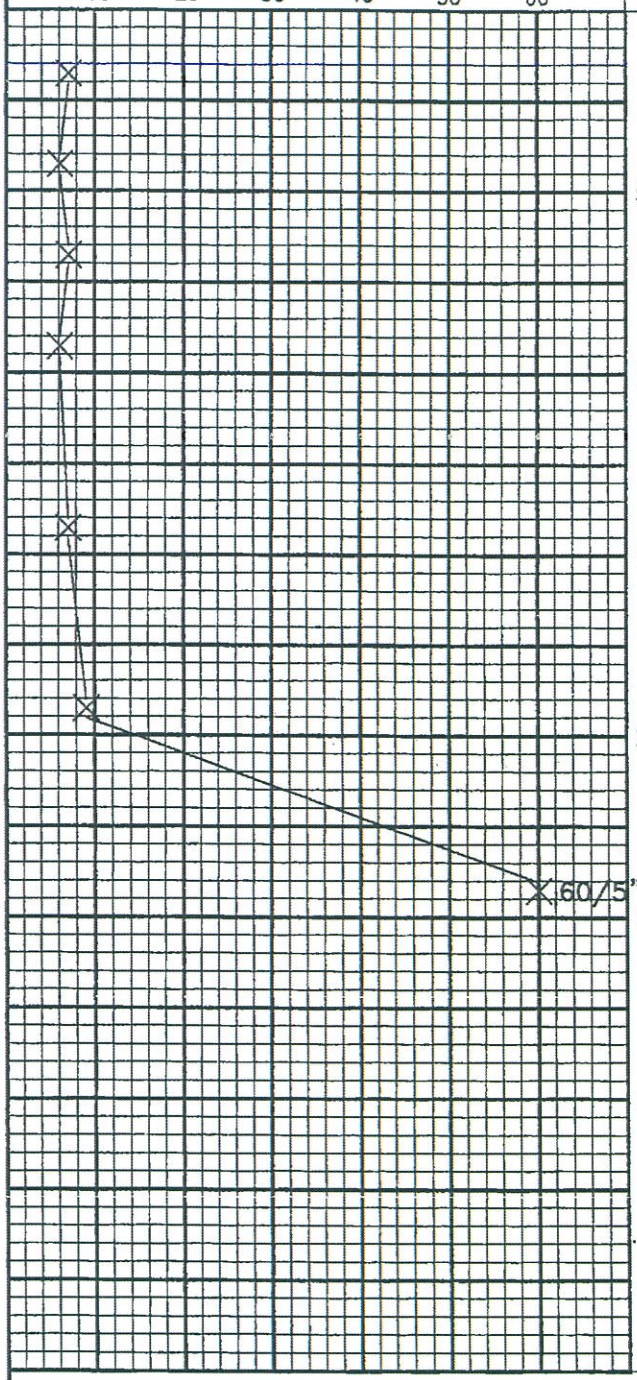
-20.0 ft. Bottom of Borehole

Completed by: T. Holcomb Surveyed by: ____ Ill. registration # ____

R08207

Holcomb Foundation Engineering Co.
PO Box 88 Carbondale, Illinois

LOG of BORING WE1016-GW-35



Depth in Feet	Sample No.	Type Sample	Sample Distance	Description of Material
				Surface Elevation 444.55 N429470.26 E355853.67
				4" Topsoil
	1	ss		Gray Silty CLAY (CL)
	2	ss		Gray Mottled Brown Silty CLAY (CL)
5	3	ss		Brown Mottled Gray Silty CLAY (CL) with trace sand
	4	ss		
10				
	5	ss		
15				
	6	ss		
20				Gray Mottled Brown Weathered SHALE
	7	ss		
25				End of Boring @ -25.0'
30				
35				

Ground Water Data
Ground Water Encountered @ -18.5' During Drilling and Dry Upon Completion.

Project: Pond Creek #1 Mine Water Holding Cell Williamson County, Illinois	Date of Boring October 6, 2016
Client: Williamson Energy, LLC St. Louis, Missouri	Project No. H-14179

R08208

Holcomb Foundation Engineering Company

Monitoring Well Report

Site # H-14179 Location Williamson County Well # WE1016-GW-35

Site Name Pond Creek #1 Grid Coordinate Northing 429470.26 Easting 355853.67

Drilling Contractor Holcomb Foundation Engineering Date Drilled Start: 10/6/2016

Driller B. Schwartz Geologist Date Completed: 10/6/2016

Drilling Method Hollow Stem Augers

Annular Space Details

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite

Amount of Cement: # of bags lbs. per bag

Amount of Bentonite: # of bags 4 lbs. per bag 50

Type of Bentonite Seal (Granular, Pellet): Granular Chips

Amount of Bentonite: # of bags lbs. per bag

Type of Sand Pack: FilterSil #1 10-20

Source of Sand: FilterSil Junction City, GA

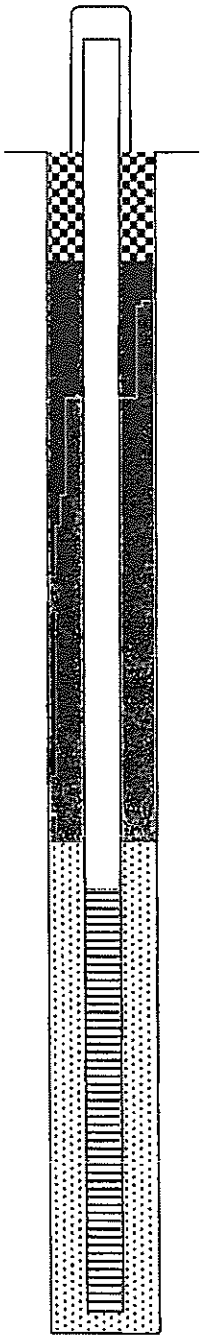
Amount of Sand: # of bags 6 lbs. per bag 50

Well Construction Materials

	Stainless Steel Specify Type	Teflon Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			Sch 40	
Riser pipe above wt			Sch 40	
Riser pipe below wt			Sch 40	
Screen			Sch 40	
Coupling joint screen to riser			Sch 40	
Protective Casing				Steel

Measurements to .1 ft. (where applicable)

Riser pipe length			16.5'	
Protective cover length			5'	
Screen length			10'	
Bottom of screen to end cap			0.1'	
Top of screen to first joint			0.1'	
Total length of casing			---	
Screen slot size			0.010"	
% of openings in screen			---	
Diameter of borehole (in)			8.0"	
ID of riser pipe (in)			2.0"	



+3.0 MSL Top of Riser Pipe

444.55 MSL Ground Surface

2 ft. Concrete Seal

-2.0 ft. Top of Bentonite

9 ft. Bentonite

-11.0 ft. Top of Sand

-13.5 ft. Top of Screen

10.0 ft. Total Screen Interval

-23.5 ft. Bottom of Screen

-23.5 ft. Bottom of Borehole

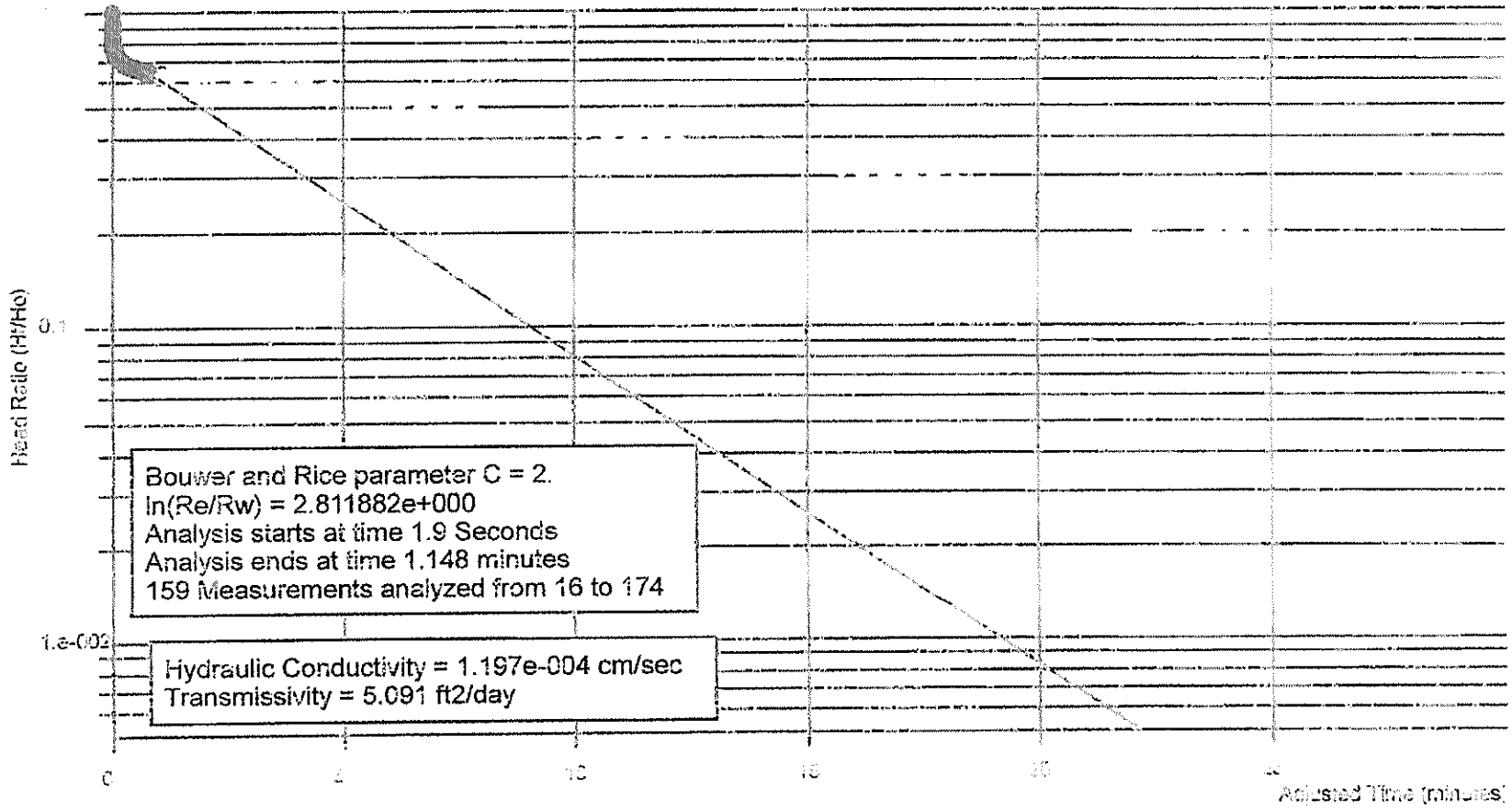
Completed by: T. Holcomb Surveyed by: Ill. registration #

Rising Head Test October 18, 2016

Pond Creek #1 Williamson County

Bouwer and Rice Graph

GW-33



Project Number: 1148-300-16-02 for HFE

Analysis by Starpoint Software

Ho is 1.336 feet at 1.9 Seconds

R08209

Rising Head Test

Site Name:	Pond Creek #1
Location:	Williamson County
Test Date:	October 18, 2016
Client:	HFE
Project Number:	1146-300-16-02
Import File:	C:\Projects\Holcomb\Mach Mine\GW33 slug out.txt

Well Label:	GW-33
Aquifer Thickness:	15. feet
Screen Length:	10. feet
Casing Radius:	1. Inches
Effective Radius:	4. Inches
Static Water Level:	9.3 feet
Water Table to Screen Bottom:	15. feet
Anisotropy Ratio:	1
Time Adjustment:	1.9 Seconds

Test starts with trial 7
There are 240 time and drawdown measurements
Maximum head is 1.412 feet
Minimum head is -1.8e-002 feet

Trial	Time (Seconds)	Adjusted Time (Seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-1.9	9.318	-1.8e-002	-1.275e-002
2	0.1	-1.8	9.063	0.237	0.1678
3	0.2	-1.7	8.91	0.39	0.2762
4	0.3	-1.6	8.751	0.549	0.3888
5	0.5	-1.4	8.598	0.702	0.4972
6	0.6	-1.3	8.317	0.983	0.6962
7	0.7	-1.2	8.064	1.236	0.8754
8	0.9	-1.	7.888	1.412	1.
9	1.	-0.9	7.893	1.407	0.9965
10	1.1	-0.8	8.083	1.217	0.8619
11	1.2	-0.7	8.183	1.117	0.7911
12	1.4	-0.5	8.326	0.974	0.6898
13	1.5	-0.4	8.317	0.983	0.6962
14	1.6	-0.3	8.212	1.088	0.7705
15	1.7	-0.2	8.064	1.236	0.8754
16	1.9	0.	7.965	1.335	0.9455
17	2.	1.e-001	7.965	1.335	0.9455
18	2.1	0.2	8.05	1.25	0.8853
19	2.2	0.3	8.162	1.138	0.8059
20	2.4	0.5	8.212	1.088	0.7705
21	2.5	0.6	8.235	1.065	0.7542
22	2.6	0.7	8.223	1.077	0.7627
23	2.8	0.9	8.169	1.131	0.801
24	2.9	1	8.113	1.187	0.8407
25	3.	1.1	8.094	1.206	0.8541
26	3.1	1.2	8.122	1.178	0.8343
27	3.2	1.3	8.179	1.121	0.7939
28	3.4	1.5	8.209	1.091	0.7727
29	3.5	1.6	8.23	1.07	0.7578
30	3.6	1.7	8.237	1.063	0.7528
31	3.7	1.8	8.226	1.074	0.7606
32	3.9	2.	8.2	1.1	0.779
33	4.	2.1	8.183	1.117	0.7911

Pond Creek #1

34	4.1	2.2	8.188	1.112	0.7875
35	4.2	2.3	8.214	1.086	0.7691
36	4.4	2.5	8.244	1.056	0.7479
37	4.5	2.6	8.256	1.044	0.7394
38	4.6	2.7	8.263	1.037	0.7344
39	4.7	2.8	8.266	1.034	0.7323
40	4.9	3.	8.254	1.046	0.7408
41	5.	3.1	8.242	1.058	0.7493
42	5.1	3.2	8.24	1.06	0.7507
43	5.2	3.3	8.249	1.051	0.7443
44	5.4	3.5	8.266	1.034	0.7323
45	5.5	3.6	8.273	1.027	0.7273
46	5.6	3.7	8.28	1.02	0.7224
47	5.7	3.8	8.28	1.02	0.7224
48	5.9	4.	8.28	1.02	0.7224
49	6.	4.1	8.275	1.025	0.7259
50	6.12	4.22	8.273	1.027	0.7273
51	6.24	4.34	8.277	1.023	0.7245
52	6.37	4.47	8.284	1.016	0.7195
53	6.49	4.59	8.294	1.006	0.7125
54	6.62	4.72	8.296	1.004	0.711
55	6.75	4.85	8.298	1.002	0.7096
56	6.87	4.97	8.301	0.999	0.7075
57	7.	5.1	8.298	1.002	0.7096
58	7.12	5.22	8.298	1.002	0.7096
59	7.25	5.35	8.298	1.002	0.7096
60	7.37	5.47	8.303	0.997	0.7061
61	7.5	5.6	8.308	0.992	0.7025
62	7.62	5.72	8.31	0.99	0.7011
63	7.75	5.85	8.312	0.988	0.6997
64	7.87	5.97	8.312	0.988	0.6997
65	8.	6.1	8.312	0.988	0.6997
66	8.12	6.22	8.312	0.988	0.6997
67	8.25	6.35	8.315	0.985	0.6976
68	8.37	6.47	8.315	0.985	0.6976
69	8.5	6.6	8.319	0.981	0.6948
70	8.62	6.72	8.319	0.981	0.6948
71	8.75	6.85	8.322	0.978	0.6926
72	8.87	6.97	8.322	0.978	0.6926
73	9.	7.1	8.324	0.976	0.6912
74	9.13	7.23	8.324	0.976	0.6912
75	9.25	7.35	8.327	0.973	0.6891
76	9.38	7.48	8.327	0.973	0.6891
77	9.5	7.6	8.329	0.971	0.6877
78	9.63	7.73	8.331	0.969	0.6863
79	9.75	7.85	8.331	0.969	0.6863
80	9.88	7.98	8.331	0.969	0.6863
81	10.	8.1	8.334	0.966	0.6841
82	10.13	8.23	8.334	0.966	0.6841
83	10.25	8.35	8.334	0.966	0.6841
84	10.38	8.48	8.336	0.964	0.6827
85	10.5	8.6	8.336	0.964	0.6827
86	10.63	8.73	8.338	0.962	0.6813
87	10.75	8.85	8.338	0.962	0.6813
88	10.88	8.98	8.341	0.959	0.6792
89	11.	9.1	8.341	0.959	0.6792
90	11.13	9.23	8.343	0.957	0.6778

Pond Creek #1

91	11.25	9.35	8.343	0.957	0.6778
92	11.38	9.48	8.343	0.957	0.6778
93	11.51	9.61	8.345	0.955	0.6763
94	11.63	9.73	8.345	0.955	0.6763
95	11.76	9.86	8.348	0.952	0.6742
96	11.88	9.98	8.348	0.952	0.6742
97	12.01	10.11	8.348	0.952	0.6742
98	12.13	10.23	8.348	0.952	0.6742
99	12.26	10.36	8.35	0.95	0.6728
100	12.38	10.48	8.35	0.95	0.6728
101	12.51	10.61	8.352	0.948	0.6714
102	12.63	10.73	8.352	0.948	0.6714
103	12.76	10.86	8.352	0.948	0.6714
104	12.88	10.98	8.355	0.945	0.6693
105	13.01	11.11	8.355	0.945	0.6693
106	13.13	11.23	8.355	0.945	0.6693
107	13.26	11.36	8.355	0.945	0.6693
108	13.38	11.48	8.357	0.943	0.6678
109	13.51	11.61	8.357	0.943	0.6678
110	13.63	11.73	8.357	0.943	0.6678
111	13.76	11.86	8.359	0.941	0.6664
112	13.88	11.98	8.359	0.941	0.6664
113	14.01	12.11	8.359	0.941	0.6664
114	14.14	12.24	8.359	0.941	0.6664
115	14.26	12.36	8.359	0.941	0.6664
116	14.39	12.49	8.362	0.938	0.6643
117	14.51	12.61	8.362	0.938	0.6643
118	14.64	12.74	8.362	0.938	0.6643
119	14.76	12.86	8.364	0.936	0.6629
120	14.89	12.99	8.364	0.936	0.6629
121	15.9	14.	8.369	0.931	0.6593
122	16.9	15.	8.371	0.929	0.6579
123	17.9	16.	8.376	0.924	0.6544
124	18.9	17.	8.378	0.922	0.653
125	19.9	18.	8.381	0.919	0.6508
126	20.9	19.	8.383	0.917	0.6494
127	21.9	20.	8.385	0.915	0.648
128	22.9	21.	8.388	0.912	0.6459
129	23.9	22.	8.39	0.91	0.6445
130	24.9	23.	8.392	0.908	0.6431
131	25.9	24.	8.395	0.905	0.6409
132	26.9	25.	8.397	0.903	0.6395
133	27.9	26.	8.399	0.901	0.6381
134	28.9	27.	8.399	0.901	0.6381
135	29.9	28.	8.402	0.898	0.636
136	30.9	29.	8.404	0.896	0.6346
137	31.9	30.	8.406	0.894	0.6331
138	32.9	31.	8.409	0.891	0.631
139	33.9	32.	8.409	0.891	0.631
140	34.9	33.	8.411	0.889	0.6296
141	35.9	34.	8.413	0.887	0.6282
142	36.9	35.	8.413	0.887	0.6282
143	37.9	36.	8.416	0.884	0.6261
144	38.9	37.	8.418	0.882	0.6246
145	39.9	38.	8.418	0.882	0.6246
146	40.9	39.	8.42	0.88	0.6232
147	41.9	40.	8.423	0.877	0.6211

Pond Creek #1

148	42.9	41	8.423	0.877	0.6211
149	43.9	42.	8.425	0.875	0.6197
150	44.9	43.	8.427	0.873	0.6183
151	45.9	44.	8.427	0.873	0.6183
152	46.9	45.	8.43	0.87	0.6161
153	47.9	46.	8.43	0.87	0.6161
154	48.9	47.	8.432	0.868	0.6147
155	49.9	48.	8.432	0.868	0.6147
156	50.9	49.	8.435	0.865	0.6126
157	51.9	50.	8.435	0.865	0.6126
158	52.9	51.	8.437	0.863	0.6112
159	53.9	52.	8.439	0.861	0.6098
160	54.9	53.	8.439	0.861	0.6098
161	55.9	54.	8.439	0.861	0.6098
162	56.9	55.	8.442	0.858	0.6076
163	57.9	56.	8.444	0.856	0.6062
164	58.9	57.	8.444	0.856	0.6062
165	59.9	58.	8.446	0.854	0.6048
166	60.9	59.	8.446	0.854	0.6048
167	61.9	60.	8.449	0.851	0.6027
168	62.9	61.	8.449	0.851	0.6027
169	63.9	62.	8.451	0.849	0.6013
170	64.9	63.	8.453	0.847	0.5999
171	65.9	64.	8.453	0.847	0.5999
172	66.9	65.	8.453	0.847	0.5999
173	67.9	66.	8.456	0.844	0.5977
174	68.9	67.	8.458	0.842	0.5963
175	69.9	68.	8.458	0.842	0.5963
176	70.9	69.	8.46	0.84	0.5949
177	71.9	70.	8.46	0.84	0.5949
178	72.9	71.	8.463	0.837	0.5928
179	73.9	72.	8.463	0.837	0.5928
180	74.9	73.	8.465	0.835	0.5914
181	84.9	83.	8.432	0.868	0.6147
182	94.9	93.	8.434	0.866	0.6133
183	104.9	103.	8.437	0.863	0.6112
184	114.9	113.	8.441	0.859	0.6084
185	124.9	123.	8.444	0.856	0.6062
186	134.9	133.	8.451	0.849	0.6013
187	164.9	163.	8.465	0.835	0.5914
188	194.9	193.	8.483	0.817	0.5786
189	224.9	223.	8.505	0.795	0.563
190	254.9	253.	8.523	0.777	0.5503
191	284.9	283.	8.542	0.758	0.5368
192	314.9	313.	8.558	0.742	0.5255
193	344.9	343.	8.58	0.72	0.5099
194	374.9	373.	8.603	0.697	0.4936
195	404.9	403.	8.617	0.683	0.4837
196	434.9	433.	8.631	0.669	0.4738
197	464.9	463.	8.652	0.648	0.4589
198	494.9	493.	8.676	0.624	0.4419
199	524.9	523.	8.685	0.615	0.4356
200	554.9	553.	8.702	0.598	0.4235
201	584.9	583.	8.716	0.584	0.4136
202	614.9	613.	8.732	0.568	0.4023
203	644.9	643.	8.746	0.554	0.3924
204	674.9	673.	8.762	0.538	0.381

Pond Creek #1

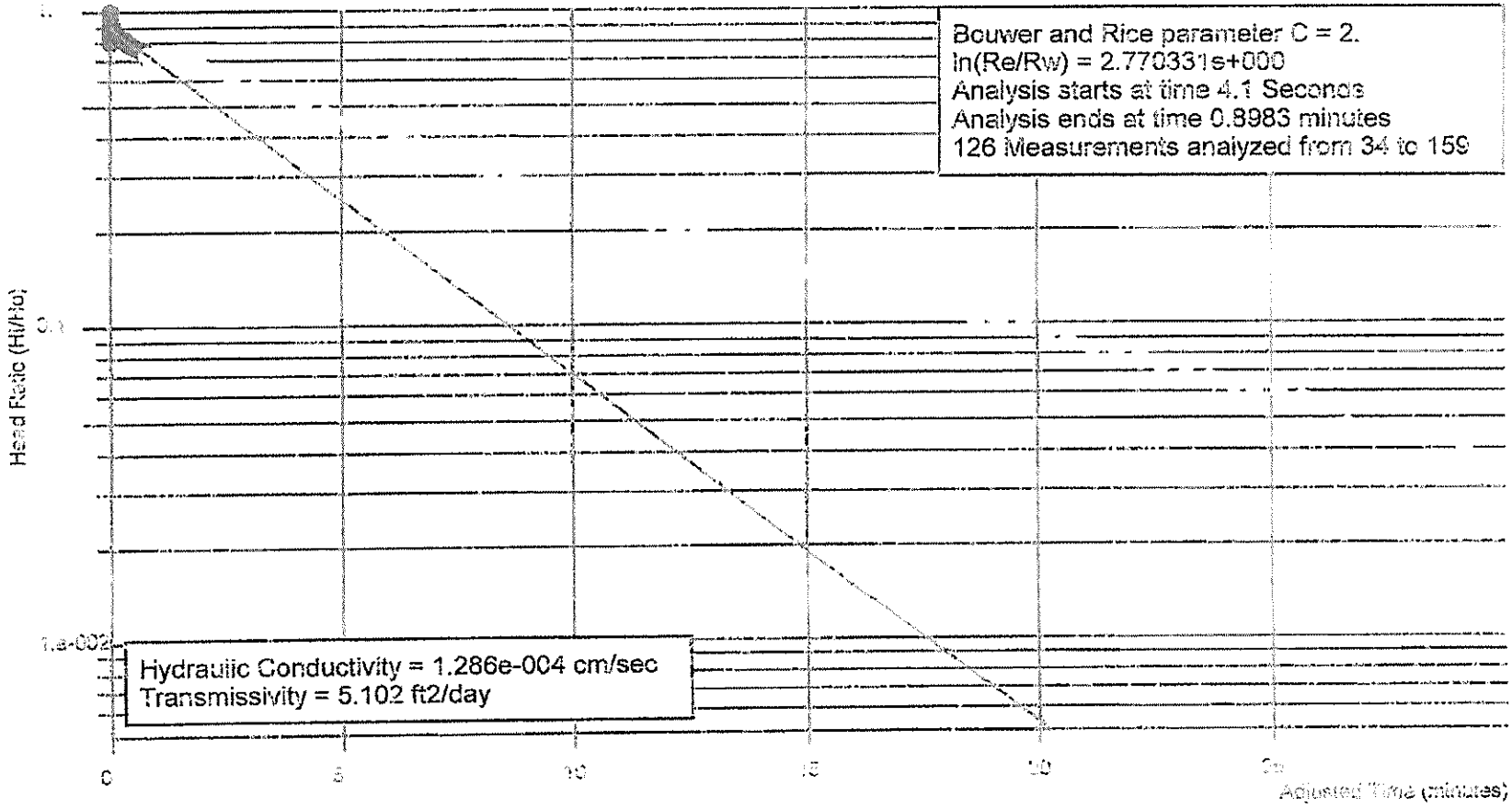
205	704.9	703.	8.774	0.526	0.3725
206	734.9	733.	8.786	0.514	0.364
207	764.9	763.	8.805	0.495	0.3506
208	794.9	793.	8.814	0.486	0.3442
209	824.9	823.	8.828	0.472	0.3343
210	854.9	853.	8.837	0.463	0.3279
211	884.9	883.	8.849	0.451	0.3194
212	914.9	913.	8.861	0.439	0.3109
213	944.9	943.	8.873	0.427	0.3024
214	974.9	973.	8.884	0.416	0.2946
215	1005	1003	8.896	0.404	0.2861
216	1035	1033	8.908	0.392	0.2776
217	1065	1063	8.915	0.385	0.2727
218	1095	1093	8.924	0.376	0.2663
219	1125	1123	8.929	0.371	0.2627
220	1155	1153	8.936	0.364	0.2578
221	1185	1183	8.945	0.355	0.2514
222	1215	1213	8.955	0.345	0.2443
223	1245	1243	8.964	0.336	0.238
224	1275	1273	8.974	0.326	0.2309
225	1305	1303	8.985	0.315	0.2231
226	1335	1333	9.03	0.27	0.1912
227	1365	1363	9.011	0.289	0.2047
228	1395	1393	9.013	0.287	0.2033
229	1425	1423	9.028	0.272	0.1926
230	1455	1453	9.032	0.268	0.1898
231	1485	1483	9.039	0.261	0.1848
232	1515	1513	9.049	0.251	0.1778
233	1545	1543	9.058	0.242	0.1714
234	1575	1573	9.065	0.235	0.1664
235	1605	1603	9.067	0.233	0.165
236	1635	1633	9.079	0.221	0.1565
237	1665	1663	9.084	0.216	0.153
238	1695	1693	9.096	0.204	0.1445
239	1725	1723	9.145	0.155	0.1098
240	1755	1753	9.114	0.186	0.1317

Rising Head Test October 18, 2016

Pond Creek #1 Williamson County

Bouwer and Rice Graph

GW-34



Project Number: 1146-300-16-02 for HFE

Analysis by Starpoint Software

Ho is 1.27 feet at 4.1 Seconds

R08215

Rising Head Test

Site Name:	Pond Creek #1
Location:	Williamson County
Test Date:	October 18, 2016
Client:	HFE
Project Number:	1146-300-16-02
Import File:	C:\Projects\Holcomb\Mach Mine\GW34 slug out.txt

Well Label:	GW-34
Aquifer Thickness:	14. feet
Screen Length:	10. feet
Casing Radius:	1. inches
Effective Radius:	4. inches
Static Water Level:	10. feet
Water Table to Screen Bottom:	14. feet
Anisotropy Ratio:	1.
Time Adjustment:	4.1 Seconds

Test starts with trial 20
There are 240 time and drawdown measurements
Maximum head is 1.456 feet
Minimum head is 0. feet

Trial	Time (Seconds)	Adjusted Time (Seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-4.1	9.958	4.2e-002	2.885e-002
2	0.1	-4.	9.963	3.7e-002	2.541e-002
3	0.2	-3.9	9.966	3.4e-002	2.335e-002
4	0.3	-3.8	9.97	3.e-002	2.06e-002
5	0.5	-3.6	9.975	2.5e-002	1.717e-002
6	0.6	-3.5	9.977	2.3e-002	1.58e-002
7	0.7	-3.4	9.98	2.e-002	1.374e-002
8	0.9	-3.2	9.982	1.8e-002	1.236e-002
9	1.	-3.1	9.987	1.3e-002	8.929e-003
10	1.1	-3.	9.991	9.e-003	6.181e-003
11	1.2	-2.9	9.991	9.e-003	6.181e-003
12	1.4	-2.7	9.954	4.6e-002	3.159e-002
13	1.5	-2.6	9.848	0.152	0.1044
14	1.6	-2.5	9.762	0.238	0.1635
15	1.7	-2.4	9.618	0.382	0.2624
16	1.9	-2.2	9.431	0.569	0.3908
17	2.	-2.1	9.126	0.874	0.6003
18	2.1	-2.	8.927	1.073	0.737
19	2.2	-1.9	8.76	1.24	0.8516
20	2.4	-1.7	8.619	1.381	0.9485
21	2.5	-1.6	8.544	1.456	1.
22	2.6	-1.5	8.566	1.434	0.9849
23	2.8	-1.3	8.601	1.399	0.9609
24	2.9	-1.2	8.645	1.355	0.9306
25	3.	-1.1	8.758	1.242	0.853
26	3.1	-1.	8.941	1.059	0.7273
27	3.2	-0.9	9.145	0.855	0.5872
28	3.4	-0.7	9.278	0.722	0.4959
29	3.5	-0.6	9.236	0.764	0.5247
30	3.6	-0.5	9.058	0.942	0.647
31	3.7	-0.4	8.943	1.057	0.726
32	3.9	-0.2	8.833	1.167	0.8015
33	4.	-1.e-001	8.765	1.235	0.8482

Pond Creek #1

34	4.1	0.	8.73	1.27	0.8723
35	4.2	0.1	8.788	1.212	0.8324
36	4.4	0.3	8.884	1.116	0.7665
37	4.5	0.4	8.955	1.045	0.7177
38	4.6	0.5	8.971	1.029	0.7067
39	4.7	0.6	8.934	1.066	0.7321
40	4.9	0.8	8.903	1.097	0.7534
41	5.	0.9	8.866	1.134	0.7788
42	5.1	1.	8.812	1.188	0.8159
43	5.2	1.1	8.795	1.205	0.8276
44	5.4	1.3	8.812	1.188	0.8159
45	5.5	1.4	8.845	1.155	0.7933
46	5.6	1.5	8.875	1.125	0.7727
47	5.7	1.6	8.891	1.109	0.7617
48	5.9	1.8	8.891	1.109	0.7617
49	6.	1.9	8.882	1.118	0.7679
50	6.12	2.02	8.87	1.13	0.7761
51	6.24	2.14	8.852	1.148	0.7885
52	6.37	2.27	8.842	1.158	0.7953
53	6.49	2.39	8.847	1.153	0.7919
54	6.62	2.52	8.856	1.144	0.7857
55	6.75	2.65	8.868	1.132	0.7775
56	6.87	2.77	8.873	1.127	0.774
57	7.	2.9	8.877	1.123	0.7713
58	7.12	3.02	8.875	1.125	0.7727
59	7.25	3.15	8.87	1.13	0.7761
60	7.37	3.27	8.866	1.134	0.7788
61	7.5	3.4	8.863	1.137	0.7809
62	7.62	3.52	8.863	1.137	0.7809
63	7.75	3.65	8.868	1.132	0.7775
64	7.87	3.77	8.873	1.127	0.774
65	8.	3.9	8.875	1.125	0.7727
66	8.12	4.02	8.875	1.125	0.7727
67	8.25	4.15	8.877	1.123	0.7713
68	8.37	4.27	8.877	1.123	0.7713
69	8.5	4.4	8.875	1.125	0.7727
70	8.62	4.52	8.875	1.125	0.7727
71	8.75	4.65	8.875	1.125	0.7727
72	8.87	4.77	8.877	1.123	0.7713
73	9.	4.9	8.88	1.12	0.7692
74	9.13	5.03	8.88	1.12	0.7692
75	9.25	5.15	8.882	1.118	0.7679
76	9.38	5.28	8.882	1.118	0.7679
77	9.5	5.4	8.885	1.115	0.7658
78	9.63	5.53	8.885	1.115	0.7658
79	9.75	5.65	8.885	1.115	0.7658
80	9.88	5.78	8.887	1.113	0.7644
81	10.	5.9	8.887	1.113	0.7644
82	10.13	6.03	8.889	1.111	0.763
83	10.25	6.15	8.889	1.111	0.763
84	10.38	6.28	8.889	1.111	0.763
85	10.5	6.4	8.892	1.108	0.761
86	10.63	6.53	8.892	1.108	0.761
87	10.75	6.65	8.894	1.106	0.7596
88	10.88	6.78	8.894	1.106	0.7596
89	11.	6.9	8.894	1.106	0.7596
90	11.13	7.03	8.896	1.104	0.7582

Pond Creek #1

91	11.25	7.15	8.896	1.104	0.7582
92	11.38	7.28	8.896	1.104	0.7582
93	11.51	7.41	8.899	1.101	0.7562
94	11.63	7.53	8.899	1.101	0.7562
95	11.76	7.66	8.899	1.101	0.7562
96	11.88	7.78	8.901	1.099	0.7548
97	12.01	7.91	8.901	1.099	0.7548
98	12.13	8.03	8.903	1.097	0.7534
99	12.26	8.16	8.903	1.097	0.7534
100	12.38	8.28	8.903	1.097	0.7534
101	12.51	8.41	8.906	1.094	0.7514
102	12.63	8.53	8.906	1.094	0.7514
103	12.76	8.66	8.908	1.092	0.75
104	12.88	8.78	8.908	1.092	0.75
105	13.01	8.91	8.908	1.092	0.75
106	13.13	9.03	8.908	1.092	0.75
107	13.26	9.16	8.91	1.09	0.7486
108	13.38	9.28	8.91	1.09	0.7486
109	13.51	9.41	8.91	1.09	0.7486
110	13.63	9.53	8.913	1.087	0.7466
111	13.76	9.66	8.913	1.087	0.7466
112	13.88	9.78	8.913	1.087	0.7466
113	14.01	9.91	8.915	1.085	0.7452
114	14.14	10.04	8.915	1.085	0.7452
115	14.26	10.16	8.915	1.085	0.7452
116	14.39	10.29	8.915	1.085	0.7452
117	14.51	10.41	8.917	1.083	0.7438
118	14.64	10.54	8.917	1.083	0.7438
119	14.76	10.66	8.917	1.083	0.7438
120	14.89	10.79	8.917	1.083	0.7438
121	15.9	11.8	8.924	1.076	0.739
122	16.9	12.8	8.929	1.071	0.7356
123	17.9	13.8	8.934	1.066	0.7321
124	18.9	14.8	8.938	1.062	0.7294
125	19.9	15.8	8.943	1.057	0.726
126	20.9	16.8	8.948	1.052	0.7225
127	21.9	17.8	8.953	1.047	0.7191
128	22.9	18.8	8.957	1.043	0.7163
129	23.9	19.8	8.962	1.038	0.7129
130	24.9	20.8	8.967	1.033	0.7095
131	25.9	21.8	8.971	1.029	0.7067
132	26.9	22.8	8.974	1.026	0.7047
133	27.9	23.8	8.978	1.022	0.7019
134	28.9	24.8	8.983	1.017	0.6985
135	29.9	25.8	8.988	1.012	0.6951
136	30.9	26.8	8.99	1.01	0.6937
137	31.9	27.8	8.995	1.005	0.6902
138	32.9	28.8	8.999	1.001	0.6875
139	33.9	29.8	9.002	0.998	0.6854
140	34.9	30.8	9.004	0.996	0.6841
141	35.9	31.8	9.009	0.991	0.6806
142	36.9	32.8	9.011	0.989	0.6793
143	37.9	33.8	9.016	0.984	0.6758
144	38.9	34.8	9.018	0.982	0.6745
145	39.9	35.8	9.023	0.977	0.671
146	40.9	36.8	9.025	0.975	0.6696
147	41.9	37.8	9.03	0.97	0.6662

Pond Creek #1

148	42.9	38.8	9.032	0.968	0.6648
149	43.9	39.8	9.037	0.963	0.6614
150	44.9	40.8	9.039	0.961	0.66
151	45.9	41.8	9.044	0.956	0.6566
152	46.9	42.8	9.046	0.954	0.6552
153	47.9	43.8	9.051	0.949	0.6518
154	48.9	44.8	9.053	0.947	0.6504
155	49.9	45.8	9.056	0.944	0.6484
156	50.9	46.8	9.061	0.939	0.6449
157	51.9	47.8	9.063	0.937	0.6435
158	52.9	48.8	9.065	0.935	0.6422
159	53.9	49.8	9.07	0.93	0.6387
160	54.9	50.8	9.072	0.928	0.6374
161	55.9	51.8	9.077	0.923	0.6339
162	56.9	52.8	9.079	0.921	0.6326
163	57.9	53.8	9.082	0.918	0.6305
164	58.9	54.8	9.086	0.914	0.6277
165	59.9	55.8	9.089	0.911	0.6257
166	60.9	56.8	9.091	0.909	0.6243
167	61.9	57.8	9.096	0.904	0.6209
168	62.9	58.8	9.098	0.902	0.6195
169	63.9	59.8	9.1	0.9	0.6181
170	64.9	60.8	9.103	0.897	0.6161
171	65.9	61.8	9.105	0.895	0.6147
172	66.9	62.8	9.107	0.893	0.6133
173	67.9	63.8	9.112	0.888	0.6099
174	68.9	64.8	9.114	0.886	0.6085
175	69.9	65.8	9.117	0.883	0.6065
176	70.9	66.8	9.119	0.881	0.6051
177	71.9	67.8	9.124	0.876	0.6016
178	72.9	68.8	9.126	0.874	0.6003
179	73.9	69.8	9.129	0.871	0.5982
180	74.9	70.8	9.131	0.869	0.5968
181	84.9	80.8	9.096	0.904	0.6209
182	94.9	90.8	9.107	0.893	0.6133
183	104.9	100.8	9.121	0.879	0.6037
184	114.9	110.8	9.138	0.862	0.592
185	124.9	120.8	9.154	0.846	0.581
186	134.9	130.8	9.175	0.825	0.5666
187	164.9	160.8	9.22	0.78	0.5357
188	194.9	190.8	9.267	0.733	0.5034
189	224.9	220.8	9.311	0.689	0.4732
190	254.9	250.8	9.353	0.647	0.4444
191	284.9	280.8	9.393	0.607	0.4169
192	314.9	310.8	9.431	0.569	0.3908
193	344.9	340.8	9.466	0.534	0.3668
194	374.9	370.8	9.496	0.504	0.3462
195	404.9	400.8	9.524	0.476	0.3269
196	434.9	430.8	9.553	0.447	0.307
197	464.9	460.8	9.578	0.422	0.2898
198	494.9	490.8	9.602	0.398	0.2734
199	524.9	520.8	9.625	0.375	0.2576
200	554.9	550.8	9.644	0.356	0.2445
201	584.9	580.8	9.663	0.337	0.2315
202	614.9	610.8	9.684	0.316	0.217
203	644.9	640.8	9.7	0.3	0.206
204	674.9	670.8	9.714	0.286	0.1964

Pond Creek #1

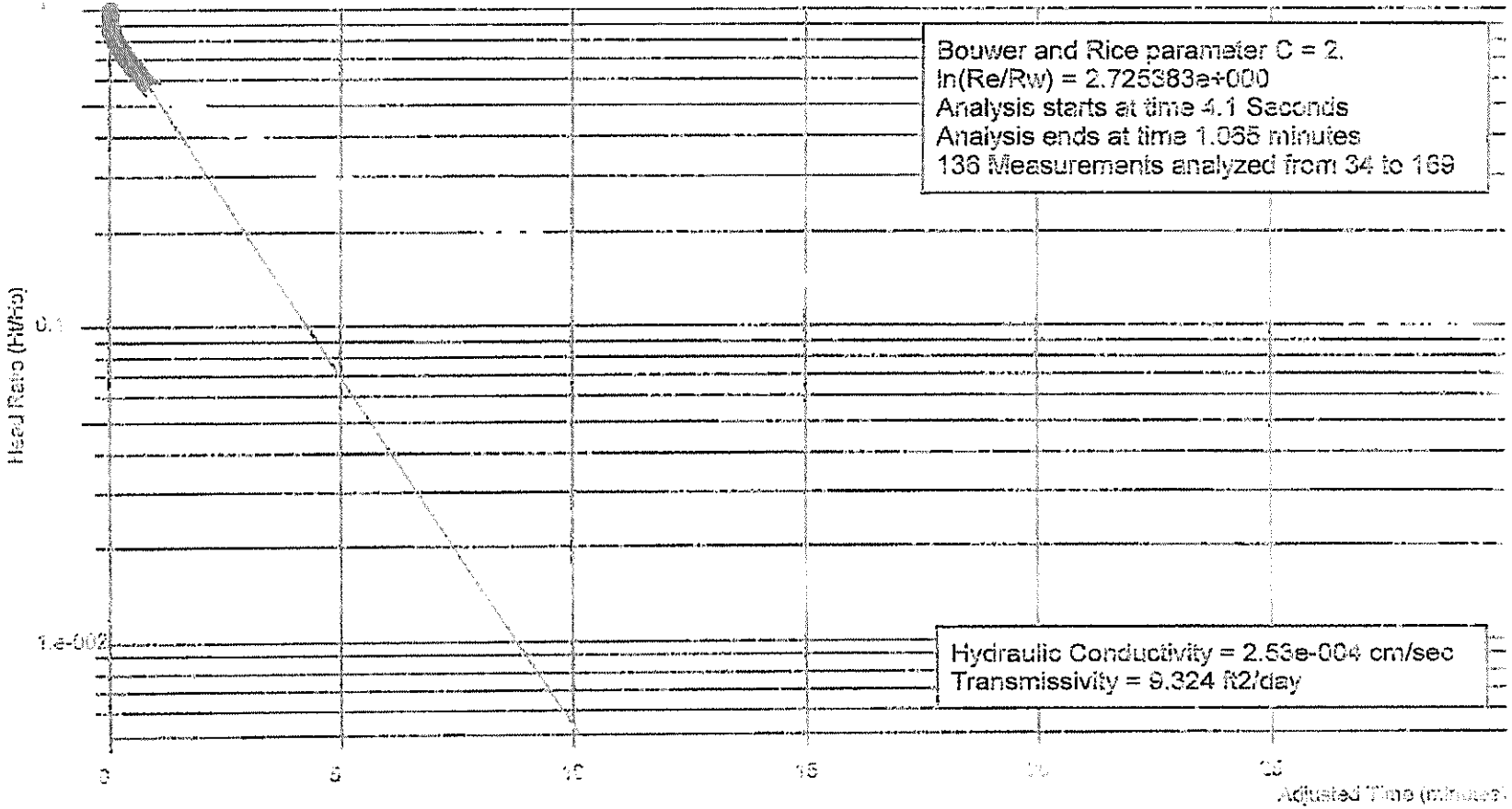
205	704.9	700.8	9.731	0.269	0.1848
206	734.9	730.8	9.747	0.253	0.1738
207	764.9	760.8	9.759	0.241	0.1655
208	794.9	790.8	9.771	0.229	0.1573
209	824.9	820.8	9.785	0.215	0.1477
210	854.9	850.8	9.794	0.206	0.1415
211	884.9	880.8	9.803	0.197	0.1353
212	914.9	910.8	9.813	0.187	0.1284
213	944.9	940.8	9.822	0.178	0.1223
214	974.9	970.8	9.834	0.166	0.114
215	1005	1001	9.841	0.159	0.1092
216	1035	1031	9.848	0.152	0.1044
217	1065	1061	9.85	0.15	0.103
218	1095	1091	9.86	0.14	9.615e-002
219	1125	1121	9.872	0.128	8.791e-002
220	1155	1151	9.874	0.126	8.654e-002
221	1185	1181	9.876	0.124	8.516e-002
222	1215	1211	9.883	0.117	8.036e-002
223	1245	1241	9.888	0.112	7.692e-002
224	1275	1271	9.895	0.105	7.212e-002
225	1305	1301	9.897	0.103	7.074e-002
226	1335	1331	9.9	1.e-001	6.868e-002
227	1365	1361	9.907	9.3e-002	6.387e-002
228	1395	1391	9.914	8.6e-002	5.907e-002
229	1425	1421	9.916	8.4e-002	5.769e-002
230	1455	1451	9.921	7.9e-002	5.426e-002
231	1485	1481	9.923	7.7e-002	5.288e-002
232	1515	1511	9.923	7.7e-002	5.288e-002
233	1545	1541	9.928	7.2e-002	4.945e-002
234	1575	1571	9.93	7.e-002	4.808e-002
235	1605	1601	9.94	6.e-002	4.121e-002
236	1635	1631	9.942	5.8e-002	3.984e-002
237	1665	1661	9.944	5.6e-002	3.846e-002
238	1695	1691	9.942	5.8e-002	3.984e-002
239	1725	1721	9.944	5.6e-002	3.846e-002
240	1755	1751	9.949	5.1e-002	3.503e-002

Rising Head Test October 18, 2016

Pond Creek #1 Williamson County

Bouwer and Rice Graph

GW-33



Project Number: 1146-300-16-02 for HFE

Analysis by Starpoint Software

Ho is 1.377 feet at 4.1 Seconds

Rising Head Test

Site Name:	Pond Creek #1
Location:	Williamson County
Test Date:	October 18, 2016
Client:	HFE
Project Number:	1146-300-16-02
Import File:	C:\Projects\Holcomb\Mach Mine\GW35 slug out.txt

Well Label:	GW-35
Aquifer Thickness:	13. feet
Screen Length:	10. feet
Casing Radius:	1. inches
Effective Radius:	4. inches
Static Water Level:	7.4 feet
Water Table to Screen Bottom:	13. feet
Anisotropy Ratio:	1.
Time Adjustment:	4.1 Seconds

Test starts with trial 26
There are 240 time and drawdown measurements
Maximum head is 1.529 feet
Minimum head is 0. feet

Trial	Time (Seconds)	Adjusted Time (Seconds)	Drawdown (feet)	Head (feet)	Head Ratio
1	0.	-4.1	7.343	5.7e-002	3.728e-002
2	0.1	-4.	7.345	5.5e-002	3.597e-002
3	0.2	-3.9	7.348	5.2e-002	3.401e-002
4	0.3	-3.8	7.353	4.7e-002	3.074e-002
5	0.5	-3.6	7.353	4.7e-002	3.074e-002
6	0.6	-3.5	7.355	4.5e-002	2.943e-002
7	0.7	-3.4	7.357	4.3e-002	2.812e-002
8	0.9	-3.2	7.36	4.e-002	2.616e-002
9	1.	-3.1	7.362	3.8e-002	2.485e-002
10	1.1	-3.	7.364	3.6e-002	2.354e-002
11	1.2	-2.9	7.367	3.3e-002	2.158e-002
12	1.4	-2.7	7.343	5.7e-002	3.728e-002
13	1.5	-2.6	7.308	9.2e-002	6.017e-002
14	1.6	-2.5	7.268	0.132	8.633e-002
15	1.7	-2.4	7.233	0.167	0.1092
16	1.9	-2.2	7.179	0.221	0.1445
17	2.	-2.1	7.095	0.305	0.1995
18	2.1	-2.	7.034	0.366	0.2394
19	2.2	-1.9	6.797	0.603	0.3944
20	2.4	-1.7	6.56	0.84	0.5494
21	2.5	-1.6	6.386	1.014	0.6632
22	2.6	-1.5	6.307	1.093	0.7148
23	2.8	-1.3	6.283	1.117	0.7305
24	2.9	-1.2	6.194	1.206	0.7888
25	3.	-1.1	6.07	1.33	0.8698
26	3.1	-1.	5.934	1.466	0.9588
27	3.2	-0.9	5.871	1.529	1.
28	3.4	-0.7	5.957	1.443	0.9438
29	3.5	-0.6	6.039	1.361	0.8901
30	3.6	-0.5	6.065	1.335	0.8731
31	3.7	-0.4	6.084	1.316	0.8607
32	3.9	-0.2	6.077	1.323	0.8653
33	4.	-1.e-001	6.044	1.356	0.8869

Pond Creek #1

34	4.1	0.	6.023	1.377	0.9006
35	4.2	0.1	6.025	1.375	0.8993
36	4.4	0.3	6.047	1.353	0.8849
37	4.5	0.4	6.068	1.332	0.8712
38	4.6	0.5	6.079	1.321	0.864
39	4.7	0.6	6.093	1.307	0.8548
40	4.9	0.8	6.098	1.302	0.8515
41	5.	0.9	6.103	1.297	0.8483
42	5.1	1.	6.11	1.29	0.8437
43	5.2	1.1	6.119	1.281	0.8378
44	5.4	1.3	6.129	1.271	0.8313
45	5.5	1.4	6.138	1.262	0.8254
46	5.6	1.5	6.145	1.255	0.8208
47	5.7	1.6	6.147	1.253	0.8195
48	5.9	1.8	6.15	1.25	0.8175
49	6.	1.9	6.157	1.243	0.8129
50	6.12	2.02	6.164	1.236	0.8084
51	6.24	2.14	6.168	1.232	0.8058
52	6.37	2.27	6.173	1.227	0.8025
53	6.49	2.39	6.178	1.222	0.7992
54	6.62	2.52	6.183	1.217	0.7959
55	6.75	2.65	6.185	1.215	0.7946
56	6.87	2.77	6.187	1.213	0.7933
57	7.	2.9	6.19	1.21	0.7914
58	7.12	3.02	6.194	1.206	0.7888
59	7.25	3.15	6.199	1.201	0.7855
60	7.37	3.27	6.201	1.199	0.7842
61	7.5	3.4	6.206	1.194	0.7809
62	7.62	3.52	6.208	1.192	0.7796
63	7.75	3.65	6.211	1.189	0.7776
64	7.87	3.77	6.213	1.187	0.7763
65	8.	3.9	6.215	1.185	0.775
66	8.12	4.02	6.218	1.182	0.7731
67	8.25	4.15	6.222	1.178	0.7704
68	8.37	4.27	6.225	1.175	0.7685
69	8.5	4.4	6.227	1.173	0.7672
70	8.62	4.52	6.232	1.168	0.7639
71	8.75	4.65	6.234	1.166	0.7626
72	8.87	4.77	6.234	1.166	0.7626
73	9.	4.9	6.236	1.164	0.7613
74	9.13	5.03	6.236	1.164	0.7613
75	9.25	5.15	6.241	1.159	0.758
76	9.38	5.28	6.243	1.157	0.7567
77	9.5	5.4	6.246	1.154	0.7547
78	9.63	5.53	6.248	1.152	0.7534
79	9.75	5.65	6.251	1.149	0.7515
80	9.88	5.78	6.253	1.147	0.7502
81	10.	5.9	6.253	1.147	0.7502
82	10.13	6.03	6.255	1.145	0.7489
83	10.25	6.15	6.258	1.142	0.7469
84	10.38	6.28	6.26	1.14	0.7456
85	10.5	6.4	6.262	1.138	0.7443
86	10.63	6.53	6.265	1.135	0.7423
87	10.75	6.65	6.267	1.133	0.741
88	10.88	6.78	6.267	1.133	0.741
89	11.	6.9	6.269	1.131	0.7397
90	11.13	7.03	6.269	1.131	0.7397

Pond Creek #1

91	11.25	7.15	6.272	1.128	0.7377
92	11.38	7.28	6.274	1.126	0.7364
93	11.51	7.41	6.276	1.124	0.7351
94	11.63	7.53	6.279	1.121	0.7332
95	11.76	7.66	6.279	1.121	0.7332
96	11.88	7.78	6.281	1.119	0.7319
97	12.01	7.91	6.283	1.117	0.7305
98	12.13	8.03	6.283	1.117	0.7305
99	12.26	8.16	6.286	1.114	0.7286
100	12.38	8.28	6.286	1.114	0.7286
101	12.51	8.41	6.288	1.112	0.7273
102	12.63	8.53	6.29	1.11	0.726
103	12.76	8.66	6.293	1.107	0.724
104	12.88	8.78	6.295	1.105	0.7227
105	13.01	8.91	6.295	1.105	0.7227
106	13.13	9.03	6.297	1.103	0.7214
107	13.26	9.16	6.297	1.103	0.7214
108	13.38	9.28	6.3	1.1	0.7194
109	13.51	9.41	6.3	1.1	0.7194
110	13.63	9.53	6.302	1.098	0.7181
111	13.76	9.66	6.304	1.096	0.7168
112	13.88	9.78	6.304	1.096	0.7168
113	14.01	9.91	6.307	1.093	0.7148
114	14.14	10.04	6.309	1.091	0.7135
115	14.26	10.16	6.309	1.091	0.7135
116	14.39	10.29	6.309	1.091	0.7135
117	14.51	10.41	6.312	1.088	0.7116
118	14.64	10.54	6.314	1.086	0.7103
119	14.76	10.66	6.316	1.084	0.709
120	14.89	10.79	6.316	1.084	0.709
121	15.9	11.8	6.328	1.072	0.7011
122	16.9	12.8	6.337	1.063	0.6952
123	17.9	13.8	6.347	1.053	0.6887
124	18.9	14.8	6.356	1.044	0.6828
125	19.9	15.8	6.365	1.035	0.6769
126	20.9	16.8	6.375	1.025	0.6704
127	21.9	17.8	6.382	1.018	0.6658
128	22.9	18.8	6.391	1.009	0.6599
129	23.9	19.8	6.401	0.999	0.6534
130	24.9	20.8	6.408	0.992	0.6488
131	25.9	21.8	6.415	0.985	0.6442
132	26.9	22.8	6.424	0.976	0.6383
133	27.9	23.8	6.431	0.969	0.6337
134	28.9	24.8	6.438	0.962	0.6292
135	29.9	25.8	6.445	0.955	0.6246
136	30.9	26.8	6.452	0.948	0.62
137	31.9	27.8	6.459	0.941	0.6154
138	32.9	28.8	6.466	0.934	0.6109
139	33.9	29.8	6.473	0.927	0.6063
140	34.9	30.8	6.478	0.922	0.603
141	35.9	31.8	6.485	0.915	0.5984
142	36.9	32.8	6.49	0.91	0.5952
143	37.9	33.8	6.497	0.903	0.5906
144	38.9	34.8	6.502	0.898	0.5873
145	39.9	35.8	6.509	0.891	0.5827
146	40.9	36.8	6.516	0.884	0.5782
147	41.9	37.8	6.52	0.88	0.5755

Pond Creek #1

148	42.9	38.8	6.525	0.875	0.5723
149	43.9	39.8	6.532	0.868	0.5677
150	44.9	40.8	6.537	0.863	0.5644
151	45.9	41.8	6.544	0.856	0.5598
152	46.9	42.8	6.548	0.852	0.5572
153	47.9	43.8	6.556	0.844	0.552
154	48.9	44.8	6.56	0.84	0.5494
155	49.9	45.8	6.567	0.833	0.5448
156	50.9	46.8	6.572	0.828	0.5415
157	51.9	47.8	6.577	0.823	0.5383
158	52.9	48.8	6.581	0.819	0.5356
159	53.9	49.8	6.586	0.814	0.5324
160	54.9	50.8	6.593	0.807	0.5278
161	55.9	51.8	6.595	0.805	0.5265
162	56.9	52.8	6.602	0.798	0.5219
163	57.9	53.8	6.605	0.795	0.5199
164	58.9	54.8	6.612	0.788	0.5154
165	59.9	55.8	6.614	0.786	0.5141
166	60.9	56.8	6.619	0.781	0.5108
167	61.9	57.8	6.624	0.776	0.5075
168	62.9	58.8	6.628	0.772	0.5049
169	63.9	59.8	6.633	0.767	0.5016
170	64.9	60.8	6.638	0.762	0.4984
171	65.9	61.8	6.642	0.758	0.4957
172	66.9	62.8	6.647	0.753	0.4925
173	67.9	63.8	6.652	0.748	0.4892
174	68.9	64.8	6.654	0.746	0.4879
175	69.9	65.8	6.659	0.741	0.4846
176	70.9	66.8	6.661	0.739	0.4833
177	71.9	67.8	6.666	0.734	0.4801
178	72.9	68.8	6.67	0.73	0.4774
179	73.9	69.8	6.673	0.727	0.4755
180	74.9	70.8	6.677	0.723	0.4729
181	84.9	80.8	6.658	0.742	0.4853
182	94.9	90.8	6.684	0.716	0.4683
183	104.9	100.8	6.708	0.692	0.4526
184	114.9	110.8	6.726	0.674	0.4408
185	124.9	120.8	6.747	0.653	0.4271
186	134.9	130.8	6.771	0.629	0.4114
187	164.9	160.8	6.818	0.582	0.3806
188	194.9	190.8	6.865	0.535	0.3499
189	224.9	220.8	6.909	0.491	0.3211
190	254.9	250.8	6.946	0.454	0.2969
191	284.9	280.8	6.984	0.416	0.2721
192	314.9	310.8	7.007	0.393	0.257
193	344.9	340.8	7.028	0.372	0.2433
194	374.9	370.8	7.052	0.348	0.2276
195	404.9	400.8	7.071	0.329	0.2152
196	434.9	430.8	7.087	0.313	0.2047
197	464.9	460.8	7.101	0.299	0.1956
198	494.9	490.8	7.118	0.282	0.1844
199	524.9	520.8	7.129	0.271	0.1772
200	554.9	550.8	7.134	0.266	0.174
201	584.9	580.8	7.146	0.254	0.1661
202	614.9	610.8	7.155	0.245	0.1602
203	644.9	640.8	7.16	0.24	0.157
204	674.9	670.8	7.169	0.231	0.1511

Pond Creek #1

205	704.9	700.8	7.174	0.226	0.1478
206	734.9	730.8	7.179	0.221	0.1445
207	764.9	760.8	7.183	0.217	0.1419
208	794.9	790.8	7.195	0.205	0.1341
209	824.9	820.8	7.197	0.203	0.1328
210	854.9	850.8	7.2	0.2	0.1308
211	884.9	880.8	7.207	0.193	0.1262
212	914.9	910.8	7.209	0.191	0.1249
213	944.9	940.8	7.211	0.189	0.1236
214	974.9	970.8	7.214	0.186	0.1216
215	1005	1001	7.218	0.182	0.119
216	1035	1031	7.223	0.177	0.1158
217	1065	1061	7.223	0.177	0.1158
218	1095	1091	7.228	0.172	0.1125
219	1125	1121	7.23	0.17	0.1112
220	1155	1151	7.23	0.17	0.1112
221	1185	1181	7.232	0.168	0.1099
222	1215	1211	7.237	0.163	0.1066
223	1245	1241	7.237	0.163	0.1066
224	1275	1271	7.235	0.165	0.1079
225	1305	1301	7.239	0.161	0.1053
226	1335	1331	7.242	0.158	0.1033
227	1365	1361	7.242	0.158	0.1033
228	1395	1391	7.244	0.156	0.102
229	1425	1421	7.247	0.153	0.1001
230	1455	1451	7.247	0.153	0.1001
231	1485	1481	7.247	0.153	0.1001
232	1515	1511	7.251	0.149	9.745e-002
233	1545	1541	7.251	0.149	9.745e-002
234	1575	1571	7.251	0.149	9.745e-002
235	1605	1601	7.254	0.146	9.549e-002
236	1635	1631	7.256	0.144	9.418e-002
237	1665	1661	7.256	0.144	9.418e-002
238	1695	1691	7.254	0.146	9.549e-002
239	1725	1721	7.261	0.139	9.091e-002
240	1755	1751	7.256	0.144	9.418e-002

LABTEST ASSIGNMENTS AND CHAIN OF CUSTODY

Holcomb Engineering (618) 529-5262
P. O. Box 88
Carbondale, IL 62903

HFE Project No: H-14179
Project Title: [illegible]
Project Site: [illegible] CREEK NO. 1
Samples Contain Has Mat'ls? (note 1) No: Yes: Type:
NO SAMPLES TAKEN

Date ~~Samples Obtained~~ 10-18-16
Date of ~~Lab~~ Assignments 10-18-16
Target Date/Required 10-21-16
Assignments By: [illegible]

Date Rec'd 10-18
Rec'd By [illegible]

SAMPLE INFORMATION						TESTS REQUESTED (Mark "X" in box.)														
Item I. D.	Boring No.	Sample No.	Type: SS, ST, or Bulk	Depth -Nominal -Interval	Classification (if known) Or Comment	Mc	UW	Pen	QU	QU ST	Att Limit	Dry Sieve	Washed Sieve	Hyd.	pH	SpGr	Proctor (Std)	Proctor (Mod)	Perm	Comments Or Other Tests
1																				
2		NO DRILLING OR SAMPLES																		
3																				
4																				
5		SLUG TESTS TAKEN ON SITE 10-18-16 @ GW33, GW34, GW35																		
6																				
7		HFE WILL PROCESS DATA AND SUBMIT REPORTS.																		
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				

Note 1: If suspected, describe possible Haz Materials: samples requiring special handling or precautions, subject to additional processing fees.

R08227

CONSTRUCTION QUALITY ASSURANCE AND QUALITY CONTROL (CQA/QC)

SECTION I
GENERAL

SECTION I
(CONTINUED)

1.0 INTRODUCTION

This Construction Quality Assurance and Quality Control (CQA/QC) Plan has been prepared to provide the Owner, Engineer, Contractor and Subcontractor the means to govern the construction quality and to satisfy the environmental protection requirements. More specifically, this CQA/QC Plan addresses the installation of the clay liner at the proposed Water Holding Cells facility at Williamson Energy LLC's Pond Creek Mine.

The CQA/QC Plan is divided into the following sections:

- Section I, General;
- Section II, Site Preparation; Quality Assurance/Quality Control;
- Section III, Documentation, Quality Assurance

2.0 DEFINITIONS RELATING TO CONSTRUCTION QUALITY ASSURANCE

2.1 Construction Quality Assurance and Construction Quality Control

This CQA/QC Plan is devoted to construction quality assurance/quality control for the construction quality assurance only of the liner system to be installed at Water Holding Cells facility at the Pond Creek Mine. In the context of this plan, construction quality assurance and construction quality control are defined as follows:

Construction Quality Assurance (CQA) - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service. Construction Quality Control (CQC) - Those actions which provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements

2.2 Use of Terms in This Plan

In the context of this document:

- Construction Quality Assurance refers to means and actions employed by the Owner to assure conformity of the clay liner preparation and construction with this CQA/QC Plan, Contract Drawings, and the Specifications.

- Construction Quality Control refers to those actions taken by Contractors or Subcontractors to ensure that the materials and the workmanship meet the requirements of this CQA/QC Plan and the Specifications.

SECTION I
(CONTINUED)

3.0 PARTIES TO CONSTRUCTION QUALITY ASSURANCE

3.1 Descriptions of the Parties

The parties to Construction Quality Assurance include the Owner, Project Manager, Engineer, Contractor and Subcontractors.

3.1.1 Engineer

The Engineer is responsible for the engineering design, drawings, plans, and specifications for the Water Holding Cells facility. The engineer is also responsible for certifying construction of the segments necessary for state and federal regulatory agencies. There may be multiple engineers employed by the owner or the contactor.

3.1.2 Contractor and Subcontractors

The Contractor and Subcontractors are responsible for the site preparation and construction of the clay liner system. The owner may elect to perform work designated herein to be performed by the contactor. The Contractor and Subcontractor may be employees of the owner.

3.1.3 Owner

The Owner is Williamson Energy, LLC, who is responsible for the facility.

3.1.4 Project Manager

The Project Manager is the official representative of the Owner and may also be an employee of the owner. In this CQA Plan, the term "Project Manager" will apply equally to "Construction Coordinator" or "Owner's Representative", i.e., the individual or company in charge of coordinating construction activities.

3.2 Qualifications of the Parties

The following qualifications are required of all parties involved with the design and construction of the Water Holding Cells facility. These qualifications must be submitted to the Project Manager for review and approval.

3.2.1 Engineer

The Engineer should be a qualified engineer, registered as required by regulation. The Engineer should have a history which demonstrates familiarity with clay liner systems, as appropriate, including detailed design methods and procedures.

SECTION I
(CONTINUED)

3.2.2 Contractor and Subcontractors

Qualifications of the Contractor and Subcontractors are specific to the construction contract and independent of this CQA/QC Plan. It is the Contractor's responsibility to ensure that the equipment, materials and construction techniques meet the Specifications of the project. The Contractor and Subcontractor may be employed by the owner.

4.0 SCOPE OF CONSTRUCTION QUALITY ASSURANCE

The scope of this CQA/QC Plan includes the CQA of construction of the clay liner system at the Water Holding Cells facility proposed for the Pond Creek Mine. The CQA of the selection, evaluation is included in the scope.

5.0 REFERENCES

The CQA/QC Plan includes references to the test procedures of the American Society for Testing and Materials (ASTM). It is the responsibility of the entity performing the work to assure the most recent version of the testing procedures is being used.

6.0 SITE AND PROJECT CONTROL

To guarantee a high degree of quality during construction, clear, open channels of communication are essential. To that end, meetings are critical.

6.1 Pre-Construction Meeting

A Pre-Construction Meeting will be held at the site. At a minimum, the meeting will be attended by the Owner, Engineer, the Contractor, and the Project Manager.

Specific topics considered for this meeting include:

- Communicate to all parties any relevant documents;
- Review critical design details of the project;
- Review the site-specific CQA/QC Plan;
- Make any appropriate modifications to the CQA/QC Plan;
- Review the responsibilities of each party;
- Review lines of authority and communication;
- Review methods for documenting and reporting, and for distributing documents and reports;

- Establish protocols for testing;
- Establish protocols for handling deficiencies, repairs, and retesting;
- Review the time schedule for all operations;
- Outline procedures for packaging and storing archive samples;
- Review repair procedures; and,
- Establish soil stockpiling locations (if any).

6.2 Progress Meetings

Progress meetings will be held between the Superintendent, the Contractor, the Project Manager, and any other concerned parties as necessary. These meetings will discuss current progress, planned activities which lie ahead, and any new business or revisions to the work. The CQA Manager will log any problems, decisions, or questions arising at this meeting. Any matter requiring action which is raised in this meeting will be reported to the appropriate parties.

6.3 Problem or Work Deficiency Meeting

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by all interested parties, the Project Manager, and the Contractor. If the problem requires a design modification, the Engineer should also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and,
- Implement an action plan to resolve the problem or deficiency.

The meeting will be documented by a person designated at the meeting and minutes will be transmitted to affected parties.

SECTION II
SITE PREPARATION QUALITY ASSURANCE

SECTION II
(CONTINUED)

1.0 INTRODUCTION

This section of the CQA/QC Plan addresses the site preparation and outlines the CQA/QC program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

Construction Specifications

1. Soil to be used for soil liner construction shall be classified as CL, ML, CL-ML or CH (ASTM Unified Classification). Soil shall be free of grass, vines, vegetation, and rock or stones greater than 4 inches.

2. Soil liner construction shall be completed in general accordance with the following procedures. Soil shall be delivered to the construction area with construction trucks, wheel tractor scrapers, tractor and pull behind scraper combinations, or dozers. The soil is to be spread to appropriate thickness using a bulldozer or soil compactor. If deemed necessary, a tractor/disk combination is to be used to process the soil (e.g., break down clods, dry soil, or mix in water). Each processed lift is then to be compacted with a soil compactor (e.g., CAT 815 or similar), pull behind sheepsfoot roller and or rubber tired or track equipment.

3. Each soil lift shall be placed to a 12 to 24 inch loose thickness depending on compaction results of the material being placed.

4. If soft areas are encountered, they shall be removed, as well as dry material, within 2 feet in any direction of the soft material. Suitable material will be placed in the excavation and replaced in accordance with these specifications.

5. Each lift shall be compacted to the minimum standard Proctor density (ASTM D698) identified by Item 19 below, at a moisture content 0% to 5% above the optimum moisture content of the soil.

6. Soil liner construction shall proceed to ensure consistent achievement of density, moisture content, and hydraulic conductivity for each successive lift.

7. The placement of frozen material or the placement of material on frozen ground shall be prohibited.

8. If drying or freezing occur the surface will be scarified.

9. Construction shall proceed only during favorable climatic conditions.

10. Soil liner construction shall be completed in a manner which reduces void spaces within the soil and liner.

SECTION II
(CONTINUED)

11. All construction stakes shall be removed during construction, and all test holes (e.g., Shelby tube samples) are to be backfilled with bentonite.

12. The soil liner shall be constructed in a manner to achieve a uniform barrier with a hydraulic conductivity of $1x10^{-7}$ cm/sec.

13. If acceptable compaction results are not achieved, the soil lift shall be reprocessed, or removed and replaced. If the moisture content is less than optimum, or greater than 5% above optimum, the failing material shall be wetted or dried to a moisture content within specification and then recompacted. If the dry density is below specification, the failing material shall be recompacted until a passing test is achieved.

14. In the event of a failing conductivity test, the soil may be removed or recompacted and retested until a passing result is obtained; or the soil immediately above and below the test specimen from the same Shelby tube may be tested. If both tests pass, the original test shall be nullified. If either test fails, that portion of the liner shall be rejected and shall be reconstructed and retested until passing results are obtained. The limits of necessary reconstruction shall be determined by additional sampling and testing within the failed region, thereby isolating the failing area of work.

15. Construction additives are not permitted for soil liner construction unless testing is completed to ensure that hydraulic conductivity requirements can be met after incorporation of the products and unless written approval is provided by the IDNR.

Testing Specifications

16. Prior to initiating soil liner construction, borrow soils shall be identified, qualified, and verified. At a minimum, a representative sample of each soil type identified within the borrow area is to be collected and analyzed for gradation, compaction, and hydraulic conductivity characteristics.

17. Samples collected from the borrow area shall be evaluated in accordance with ASTM D422, D4318, and D2487 to ensure classification criteria are met.

18. Samples collected from the borrow area shall be tested in accordance with ASTM D698 to determine maximum dry density and optimum moisture content of the soil.

19. Samples collected from the borrow area shall be compacted to 90% and 95% standard Proctor density at or near optimum moisture content. The hydraulic conductivity of the recompacted samples shall be determined in accordance with ASTM D5084 procedures. The results of this testing shall be used to establish the

SECTION II
(CONTINUED)

The Project Manager shall monitor and document the construction of all components. Monitoring the construction work for the subgrade layer includes the following:

- Monitoring the action of the compaction and/or heavy hauling equipment on the construction surface (i.e., penetration, pumping, cracking, etc.).

2.2 Construction Quality Control Testing Frequency

All Construction Quality Control testing will be conducted in conjunction with the CQC testing by the qualified personnel in accordance with the project Specifications or as directed by the Owner or the Project Manager. Documentation and reporting of test results will be in accordance with the regulatory requirements.

Pre-construction testing will be conducted on material samples obtained from the borrow source and/or stockpile(s). Pre-construction testing will consist of material evaluation tests as described in Subsection 3 of this section of the CQA/QC Plan. Construction Quality Control testing will be conducted on samples taken from the material during the course of the work.

Sampling locations will be selected by the Project Manager.

2.3 Deficiencies

If a defect is discovered in the site preparation, the Project Manager will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Project Manager will determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Project Manager deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Project Manager will define the limits and nature of the defect.

2.3.1 Notification

After determining the extent and nature of a defect, the Project Manager will notify the Owner and Contractor and schedule appropriate retests when the work deficiency is corrected.

2.3.2 Repairs and Retesting

The Contractor will correct the deficiency to the satisfaction of the Project Manager. If a project Specification criterion cannot be met, or unusual weather conditions hinder work, then the Project Manager will develop and present to the Owner suggested solutions for his approval.

All retests recommended by the Project Manager must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The Project Manager will also verify that all installation requirements are met and that all submittals are provided.

SECTION III
(CONTINUED)

1.0 DOCUMENTATION

An effective CQA plan depends largely on recognition of all construction activities that should be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The Project Manager will document that all quality assurance requirements have been addressed and satisfied.

The Contractor or Superintendent will provide the Project Manager and Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The Project Manager will also maintain at the job site a complete file of plans and Specifications, a CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

1.1 Recordkeeping

Standard reporting procedures will include preparation of a report which, at a minimum, will consist of: (a) field notes, including memoranda of meetings and/or discussions with the Contractor or Superintendent; (b) observation logs, and testing data sheets; and (c) construction problem and solution data sheets. This information will be regularly submitted to and reviewed by the Project Manager and/or the Engineer.

1.1.1 Memorandum of Discussion with Earthwork Contractor or Subcontractors

A memorandum will be prepared periodically, summarizing discussions between the Project Manager and Contractor or Superintendent. At a minimum, the memorandum will include the following information:

- date, project name, location, and other identification;
- name of parties to discussion;
- relevant subject matter or issues;
- activities planned and schedule; and,
- signature of the Contractor or Superintendent and/or Project Manager.

1.1.2 Observation Logs and Testing Data Sheets

Observation logs and testing data sheets will be prepared periodically. At a minimum, these logs and data sheets will include the following information:

- an identifying sheet number for cross referencing and document control;

SECTION III
(CONTINUED)

- date, project name, location, and other identification;
- data on weather conditions;
- a reduced-scale Site Plan showing all proposed work areas and test locations;
- descriptions and locations of ongoing construction;
- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- locations where tests and samples were taken;
- a summary of test results;
- calibrations or recalibrations of test equipment, and actions taken as a result of recalibration;
- off site materials received, including quality verification documentation;
- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and,
- the Project Manager's signature.

DOCUMENT

36

S. Twait

R08241

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397
BRUCE RAUNER, GOVERNOR ALEC MESSINA, ACTING DIRECTOR

Memorandum

DATE: 13 December 2016

TO: Iwona Ward

FROM: Scott Twait ST

SUBJECT: WQBELs
Williamson Energy, LLC – Pond Creek Mine
NPDES Permit No. IL007766 (Williamson County)

The subject facility discharges to the unnamed tributaries of Pond Creek through Outfalls 001 – 008 at a point where 0 cfs of flow exists upstream of the outfalls during critical 7Q10 low-flow conditions. The unnamed tributaries of Pond Creek are classified as a General Use Water. The unnamed tributaries of Pond Creek are not listed as a biologically significant streams in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor are they given an integrity rating in that document. The unnamed tributaries of Pond Creek, tributary to Waterbody Segment, NG-02, is not listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List since they have not been assessed. The unnamed tributaries of Pond Creek are not subject to enhanced dissolved oxygen standards.

The subject facility proposes to discharge to Pond Creek through Outfall 009 at a point where 0 cfs of flow exists upstream of the outfalls during critical 7Q10 low-flow conditions. Pond Creek is classified as a General Use Water. Pond Creek is not listed as a biologically significant streams in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor is it given an integrity rating in that document. Pond Creek, Waterbody Segment, NG-02, is listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List as impaired for aquatic life use with potential causes given as alteration in stream-side or littoral vegetative cover (non-pollutant), changes in stream depth and velocity patterns (non-pollutant), chlorides, loss of instream cover (non-pollutant), dissolved oxygen (non-pollutant), and sedimentation/siltation. Primary contact recreation and secondary contact uses are fully supported. Pond Creek is not subject to enhanced dissolved oxygen standards.

Outfalls 001 through 005 are alkaline mine drainage and outfalls 006 - 009 are acid mine drainage. The NPDES application did not indicate any watershed sizes or flow expected for mixing, however, Outfall 009 has mixing based on the stream flow and the stream chloride concentration.

Chloride should be regulated as a daily maximum at the water quality standard of 500 mg/L for all of the outfalls, except Outfall 009 which will be based on stream flow and chloride concentration as mentioned below.

Where appropriate, Manganese should be regulated as a daily maximum at the water quality standard of 1.0 mg/L.

The Sulfate limit is determined according to the water quality standards at 302.208(h)(2). The chloride and hardness data is from AWQMN station NG-02, Pond Creek, South edge of West Frankfort, downstream of the Williamson Energy, LLC – Pond Creek Mine No. 1 property, so this limit should be used for all outfalls. Flow data was not provided, so calculation of mixing was not completed. No mixing for sulfate in Outfall 009 is necessary. No mixing was used in the derivation of the effluent limit. The following table shows the results of downstream chloride and hardness.

Outfalls	Average Receiving Stream Chloride (mg/L)	Receiving Stream Critical Hardness (mg/L)	Sulfate Water Quality Standard (mg/L)
001-009	21.5	141	1250

The sulfate values in the far right column are applied as daily maximum permit limits.

Monitoring for chloride, sulfate and hardness should be periodically required at a downstream location from each outfall, or downstream of the mine property, during the course of the permit. This data will be used to recalculate sulfate limits for the next renewed or modified permit.

Cadmium, Chromium (Trivalent), Copper, Fluoride, Lead, Manganese, Nickel, and Zinc standards are based on hardness data collected at AWQMN station NG-02, Pond Creek, S edge of West Frankfort, with a critical hardness value of 141 mg/L as $CaCO_3$. Water quality standards identified in the table are expressed in units of mg/L except where noted. Dissolved metals standards have been converted to total metal except where noted. All data was provided by the discharger.

Outfall 001

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.018	1	6.2	0.1116	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	0.067	1	6.2	0.4154	0.1104	-	Yes
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	0.025	1	6.2	0.155	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 001, the parameters relevant to this policy are Cadmium, Nickel, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Nickel sample was reported less than the acute water quality standard. My conclusion is that no regulation of Nickel is necessary and that no monitoring beyond the routine requirements is needed.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 002

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.031	1	6.2	0.1922	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.001	1	6.2	0.0062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 002, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 003

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.024	1	6.2	0.1488	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 003, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 004

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.024	1	6.2	0.1488	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*

Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 004, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 005

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.043	1	6.2	0.2666	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	2	3.8	0.0038	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 005, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 006

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.03	1	6.2	0.186	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	0.014	1	6.2	0.0868	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 006, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 007

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.044	1	6.2	0.2728	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	0.028	1	6.2	0.1736	0.1635	-	Yes
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 007, the parameters relevant to this policy are Cadmium, Silver, Zinc, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Zinc sample was reported less than the acute water quality standard. My conclusion is that no regulation of Zinc is necessary and that no monitoring beyond the routine requirements is needed.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 008

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.008	1	6.2	0.0496	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Manganese	0.011	1	6.2	0.0682	5.51	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	0.005	1	6.2	0.031	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 008, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

The Cadmium sample was reported less than the acute water quality standard. My conclusion is that no regulation of Cadmium is necessary and that no monitoring beyond the routine requirements is needed.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 009 (Pond Creek)

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	0.002	9	1.8	0.0036	0.3600	-	No RP*
Cadmium	< 0.0002	9	1.8	0.0004	0.0144	-	No RP*
Chromium (Total)	0.008	9	1.8	0.0144	2.3009	-	No RP*
Cyanide (WAD)	< 0.002	9	1.8	0.0036	0.0220	-	No RP*
Copper	0.024	9	1.8	0.0432	0.0245	-	Yes

Iron (Dissolved)	0.419	9	1.8	0.7542	-	1.0	No RP*
Lead	< 0.001	9	1.8	0.0018	0.1482	-	No RP*
Manganese	0.21	9	1.8	0.378	5.51	-	No RP*
Mercury (ng/L)	< 0.002	9	1.8	0.0036	-	12.0	No RP*
Nickel	0.009	9	1.8	0.0162	0.1104	-	No RP*
Phenols	0.03	9	1.8	0.054	-	0.1	No RP*
Silver	< 0.001	9	1.8	0.0018	-	0.005	No RP*
Zinc	< 0.02	9	1.8	0.036	0.1635	-	No RP*
Selenium	0.011	9	1.8	0.0198	-	1.0	No RP*

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

There is a reasonable potential to exceed the acute water quality standard for Copper. Copper should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

Chloride should be limited in the NPDES permit at the limits described below. All other parameters will meet water quality standards at the end of the pipe. According to the effluent data received, Chloride needs mixing to allow water quality standards to be achieved at the edge of allowed mixing.

A mixing analysis was performed and detailed in a document by AquAeTer, Inc. titled "Williamson Energy Mine – Proposed Pond Creek Discharge Mixing Zone Analysis".

The permit only allows a discharge when the receiving stream is flowing. The permittee should use the following equation to demonstrate that water quality standards will be met downstream of the discharge.

$C_{DS} = [C_E Q_E + 0.25 C_{US} Q_{US}] / (0.25 Q_{US} + Q_E)$

Where:

C_E = Effluent concentration (mg/L)
Q_E = Effluent flow rate (cfs) for Outfall 017
Q_{US} = Upstream flow rate (cfs)
C_{US} = Upstream concentration (mg/L)
C_{DS} = Downstream concentration (mg/L)

The permittee has committed to install a gauging station and TDS monitor upstream of the discharge to determine an upstream flow (Q_{US}) and a chloride concentration (C_{US}) correlated to the TDS value. In addition, the permittee has agreed to install a continuous TDS monitor downstream to ensure that the chloride concentration (correlated to the TDS value) stays within the chloride water quality standard.

The "calculated" downstream concentration shall be less than 500 mg/L for chloride and reported on the discharge monitoring reports (DMRs).

If there is no upstream mixing available for Outfall 009, the NPDES permit should be regulated at 500 mg/L for chlorides and 1250 mg/L for sulfates.

Recommendations:

My evaluation of the metals and other substances given in the first table finds that water quality based permit limits are necessary for Cadmium in Outfalls 001, 002, 003, 004, 005, 006, and 007 at the limit below. Permit limits identified in the table are expressed in units of mg/L.

Substance	Daily Maximum
Cadmium	0.0144

My evaluation of the metals and other substances given in the first table finds that water quality based permit limits are necessary for Copper in Outfall 009 at the limit below. Permit limits identified in the table are expressed in units of mg/L.

Substance	Daily Maximum
Copper	0.0245

These recommendations reflect a water quality standards perspective only and should not be construed as being inclusive of all factors that must be taken into consideration by the permit writer.

Attachment

cc: Bob Mosher
FOS Region 7 Manager
Carol Selinger
Chron

DOCUMENT

37

R08252

S. Twait

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397
BRUCE RAUNER, GOVERNOR ALEC MESSINA, ACTING DIRECTOR

Memorandum

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASABLE
AUG 02 2019
REVIEWER: SAB

DATE: 13 December 2016

TO: Iwona Ward

FROM: Scott Twait ST

SUBJECT: WQBELs
Williamson Energy, LLC – Pond Creek Mine
NPDES Permit No. IL007766 (Williamson County)

The subject facility discharges to the unnamed tributaries of Pond Creek through Outfalls 001 – 008 at a point where 0 cfs of flow exists upstream of the outfalls during critical 7Q10 low-flow conditions. The unnamed tributaries of Pond Creek are classified as a General Use Water. The unnamed tributaries of Pond Creek are not listed as a biologically significant streams in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor are they given an integrity rating in that document. The unnamed tributaries of Pond Creek, tributary to Waterbody Segment, NG-02, is not listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List since they have not been assessed. The unnamed tributaries of Pond Creek are not subject to enhanced dissolved oxygen standards.

The subject facility proposes to discharge to Pond Creek through Outfall 009 at a point where 0 cfs of flow exists upstream of the outfalls during critical 7Q10 low-flow conditions. Pond Creek is classified as a General Use Water. Pond Creek is not listed as a biologically significant streams in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor is it given an integrity rating in that document. Pond Creek, Waterbody Segment, NG-02, is listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List as impaired for aquatic life use with potential causes given as alteration in stream-side or littoral vegetative cover (non-pollutant), changes in stream depth and velocity patterns (non-pollutant), chlorides, loss of instream cover (non-pollutant), dissolved oxygen (non-pollutant), and sedimentation/siltation. Primary contact recreation and secondary contact uses are fully supported. Pond Creek is not subject to enhanced dissolved oxygen standards.

Outfalls 001 through 005 are alkaline mine drainage and outfalls 006 - 009 are acid mine drainage. The NPDES application did not indicate any watershed sizes or flow expected for mixing, however, Outfall 009 has mixing based on the stream flow and the stream chloride concentration.

Chloride should be regulated as a daily maximum at the water quality standard of 500 mg/L for all of the outfalls, except Outfall 009 which will be based on stream flow and chloride concentration as mentioned below.

Where appropriate, Manganese should be regulated as a daily maximum at the water quality standard of 1.0 mg/L.

The Sulfate limit is determined according to the water quality standards at 302.208(h)(2). The chloride and hardness data is from AWQMN station NG-02, Pond Creek, South edge of West Frankfort, downstream of the Williamson Energy, LLC – Pond Creek Mine No. 1 property, so this limit should be used for all outfalls. Flow data was not provided, so calculation of mixing was not completed. No mixing for sulfate in Outfall 009 is necessary. No mixing was used in the derivation of the effluent limit. The following table shows the results of downstream chloride and hardness.

Outfalls	Average Receiving Stream Chloride (mg/L)	Receiving Stream Critical Hardness (mg/L)	Sulfate Water Quality Standard (mg/L)
001-009	21.5	141	1250

The sulfate values in the far right column are applied as daily maximum permit limits.

Monitoring for chloride, sulfate and hardness should be periodically required at a downstream location from each outfall, or downstream of the mine property, during the course of the permit. This data will be used to recalculate sulfate limits for the next renewed or modified permit.

Cadmium, Chromium (Trivalent), Copper, Fluoride, Lead, Manganese, Nickel, and Zinc standards are based on hardness data collected at AWQMN station NG-02, Pond Creek, S edge of West Frankfort, with a critical hardness value of 141 mg/L as $CaCO_3$. Water quality standards identified in the table are expressed in units of mg/L except where noted. Dissolved metals standards have been converted to total metal except where noted. All data was provided by the discharger.

Outfall 001

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.018	1	6.2	0.1116	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	0.067	1	6.2	0.4154	0.1104	-	Yes
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	0.025	1	6.2	0.155	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 001, the parameters relevant to this policy are Cadmium, Nickel, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Nickel sample was reported less than the acute water quality standard. My conclusion is that no regulation of Nickel is necessary and that no monitoring beyond the routine requirements is needed.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 002

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.031	1	6.2	0.1922	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.001	1	6.2	0.0062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 002, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 003

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.024	1	6.2	0.1488	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 003, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 004

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.024	1	6.2	0.1488	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*

Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 004, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 005

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.043	1	6.2	0.2666	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	2	3.8	0.0038	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 005, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 006

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.03	1	6.2	0.186	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	0.014	1	6.2	0.0868	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 006, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 007

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.044	1	6.2	0.2728	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	< 0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	< 0.01	1	6.2	0.062	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	0.028	1	6.2	0.1736	0.1635	-	Yes
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 007, the parameters relevant to this policy are Cadmium, Silver, Zinc, and Mercury and have been evaluated as follows:

There is a reasonable potential to exceed the acute water quality standard for Cadmium. Cadmium should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

The Zinc sample was reported less than the acute water quality standard. My conclusion is that no regulation of Zinc is necessary and that no monitoring beyond the routine requirements is needed.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 008

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	< 0.002	1	6.2	0.0124	0.3600	-	No RP*
Cadmium	0.008	1	6.2	0.0496	0.0144	-	Yes
Chromium (Total)	< 0.006	1	6.2	0.0372	2.3009	-	No RP*
Copper	0.003	1	6.2	0.0186	0.0245	-	No RP*
Lead	< 0.0075	1	6.2	0.0465	0.1482	-	No RP*
Manganese	0.011	1	6.2	0.0682	5.51	-	No RP*
Nickel	< 0.01	1	6.2	0.062	0.1104	-	No RP*
Phenols	0.005	1	6.2	0.031	-	0.1	No RP*
Silver	< 0.002	1	6.2	0.0124	-	0.005	Yes
Zinc	< 0.001	1	6.2	0.0062	0.1635	-	No RP*
Selenium	< 0.002	1	6.2	0.0124	-	1.0	No RP*
Mercury	< 0.002	1	6.2	0.0124	0.0026	-	Yes

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

Under Agency policy, substances designated in the first table as being in need of further analysis, and for which five or fewer effluent results are available, will not be evaluated for reasonable potential to exceed standards per the USEPA *Technical Support Document for Water Quality Based Toxics Control.* Rather, these substances will be directly evaluated against the water quality standards applicable to the receiving stream. We do not believe that the USEPA procedure is valid when only a very small sample population exists due to the high multipliers applied. We believe that our approach is appropriate for facilities that have been previously identified through the pre-treatment program as having a low risk for high levels of metals and other industrial pollutants in their treated domestic waste effluents. For the Williamson Energy – Pond Creek Mine #1 Outfall 008, the parameters relevant to this policy are Cadmium, Silver, and Mercury and have been evaluated as follows:

The Cadmium sample was reported less than the acute water quality standard. My conclusion is that no regulation of Cadmium is necessary and that no monitoring beyond the routine requirements is needed.

The Williamson Energy – Pond Creek Mine #1 facility STP had no detections reported for Silver and Mercury. My conclusion is that no regulation of Silver and Mercury is necessary and that no monitoring beyond the routine requirements is needed.

Outfall 009 (Pond Creek)

Substance	Max. Eff. Conc.	No. of Samples	Multiply by	95% Potential	Acute Standard	302.208(g) standard	Further Analysis?
Arsenic	0.002	9	1.8	0.0036	0.3600	-	No RP*
Cadmium	< 0.0002	9	1.8	0.0004	0.0144	-	No RP*
Chromium (Total)	0.008	9	1.8	0.0144	2.3009	-	No RP*
Cyanide (WAD)	< 0.002	9	1.8	0.0036	0.0220	-	No RP*
Copper	0.024	9	1.8	0.0432	0.0245	-	Yes

Iron (Dissolved)	0.419	9	1.8	0.7542	-	1.0	No RP*
Lead	< 0.001	9	1.8	0.0018	0.1482	-	No RP*
Manganese	0.21	9	1.8	0.378	5.51	-	No RP*
Mercury (ng/L)	< 0.002	9	1.8	0.0036	-	12.0	No RP*
Nickel	0.009	9	1.8	0.0162	0.1104	-	No RP*
Phenols	0.03	9	1.8	0.054	-	0.1	No RP*
Silver	< 0.001	9	1.8	0.0018	-	0.005	No RP*
Zinc	< 0.02	9	1.8	0.036	0.1635	-	No RP*
Selenium	0.011	9	1.8	0.0198	-	1.0	No RP*

* No RP = no reasonable potential to exceed water quality standards.

Further Analysis:

There is a reasonable potential to exceed the acute water quality standard for Copper. Copper should be regulated as a daily maximum in the NPDES permit at the acute water quality standard using the default metals translator.

Chloride should be limited in the NPDES permit at the limits described below. All other parameters will meet water quality standards at the end of the pipe. According to the effluent data received, Chloride needs mixing to allow water quality standards to be achieved at the edge of allowed mixing.

A mixing analysis was performed and detailed in a document by AquAeTer, Inc. titled "Williamson Energy Mine – Proposed Pond Creek Discharge Mixing Zone Analysis".

The permit only allows a discharge when the receiving stream is flowing. The permittee should use the following equation to demonstrate that water quality standards will be met downstream of the discharge.

$C_{DS} = [C_E Q_E + 0.25\ C_{US}\ Q_{US}] / (0.25\ Q_{US} + Q_E)$

Where:

C_E = Effluent concentration (mg/L)
Q_E = Effluent flow rate (cfs) for Outfall 017
Q_{US} = Upstream flow rate (cfs)
C_{US} = Upstream concentration (mg/L)
C_{DS} = Downstream concentration (mg/L)

The permittee has committed to install a gauging station and TDS monitor upstream of the discharge to determine an upstream flow (Q_{US}) and a chloride concentration (C_{US}) correlated to the TDS value. In addition, the permittee has agreed to install a continuous TDS monitor downstream to ensure that the chloride concentration (correlated to the TDS value) stays within the chloride water quality standard.

The "calculated" downstream concentration shall be less than 500 mg/L for chloride and reported on the discharge monitoring reports (DMRs).

If there is no upstream mixing available for Outfall 009, the NPDES permit should be regulated at 500 mg/L for chlorides and 1250 mg/L for sulfates.

Recommendations:

My evaluation of the metals and other substances given in the first table finds that water quality based permit limits are necessary for Cadmium in Outfalls 001, 002, 003, 004, 005, 006, and 007 at the limit below. Permit limits identified in the table are expressed in units of mg/L.

Substance	Daily Maximum
Cadmium	0.0144

My evaluation of the metals and other substances given in the first table finds that water quality based permit limits are necessary for Copper in Outfall 009 at the limit below. Permit limits identified in the table are expressed in units of mg/L.

Substance	Daily Maximum
Copper	0.0245

These recommendations reflect a water quality standards perspective only and should not be construed as being inclusive of all factors that must be taken into consideration by the permit writer.

Attachment

cc: Bob Mosher
FOS Region 7 Manager
Carol Selinger
Chron

DOCUMENT

38

S. Twait

R08263

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

BRUCE RAUNER, GOVERNOR ALEC MESSINA, ACTING DIRECTOR

Memorandum

Date: 13 December 2016

To: Iwona Ward

From: Scott Twait ST

Subject: Williamson Energy, LLC - Pond Creek Mine
Antidegradation Assessment for RDA No. 3, Outfall 005, and Outfall 009
NPDES Permit No. IL0077666 (Williamson County)

Williamson Energy, LLC –Pond Creek Mine No. 1 is creating a new Refuse Disposal Area No. 3. This proposed disposal area will tie into the existing Refuse Disposal Area No. 1 & 2. Associated with the new Refuse Disposal Area No. 3, a new sediment basin will be installed to control the rainfall that falls on the out-slopes of the sediment basin and will discharge through new Outfall 009.

The facility is also requesting a modification to Outfall 005. The facility is proposing to stop using the geotextile tubes, which were operated in a no discharge configuration. The facility was using the geotextile tubes to remove fine refuse and collecting the water and pumping it to the existing refuse disposal area. Williamson Energy, LLC is requesting to modify the drainage control plan to allow stormwater runoff from the area to discharge through sediment ditches and spillway, into Ditch D-5C and through Pond 005. This drainage pattern is not a deviation from the originally approved drainage plan. Due to the nature of the geotextile tubes, surface water quality is not anticipated to be affected once the geotextile tubes are out of service and no longer being utilized.

To not increase chlorides and sulfates due to the construction of RDA No. 3, the mine is eliminating or reclaiming the outslopes of RDA No. 1 and RDA No. 2 that previously discharged through Outfalls 007 and 008. Therefore, there will not be an increase in loading due to the construction of RDA No. 3.

The information in this antidegradation assessment came from the December 2014 NPDES Renewal #2 for Permit #IL0077666 report by Alliance Consulting, Inc. titled "Pond Creek Mine No. 1 & Refuse Disposal Area No. 3" and the anti-degradation assessment provided on November 18, 2016.

Identification and Characterization of the Affected Water Body.

The subject facility proposed to discharge to Pond Creek through Outfall 009 at a point where 0 cfs of flow exists upstream of the outfalls during critical 7Q10 low-flow conditions. Pond Creek is classified as a General Use Water. Pond Creek is not listed as a biologically significant streams in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor is it given an integrity rating in that document. Pond Creek, Waterbody Segment, NG-02, is listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List as impaired for aquatic life use with potential causes given as alteration in stream-side or littoral vegetative cover (non-pollutant), changes in stream depth and velocity patterns (non-pollutant), chlorides, loss of instream cover (non-pollutant), dissolved oxygen (non-pollutant), and sedimentation/siltation. Primary contact recreation and secondary contact uses are fully supported. Pond Creek is not subject to enhanced dissolved oxygen standards.

Identification of Proposed Pollutant Load Increases or Potential Impacts on Uses.

The mine outfalls will be classified as acid mine drainage. Suspended solids will be treated in the sedimentation ponds. Effluent discharged from these ponds will contain suspended solids loadings that are similar to those occurring from the land in its present use. Sulfates and chlorides will undergo an increase in loading to the receiving streams as a result of the mining activities. Based on estimated effluent concentrations for this mine, chloride and sulfate will meet water quality standards in the receiving stream based on the mixing provided by my December 13, 2016 water quality memo.

Fate and Effect of Parameters Proposed for Increased Loading.

Suspended solids discharged will eventually be incorporated into bed sediments and will continue to move downstream. Sulfate and chloride will remain dissolved in the water and will move through the downstream continuum. Small amounts of these substances will be removed by organisms as these substances are necessary for life. No adverse impacts to the receiving streams will occur as all water quality standards will be met.

Purpose and Social & Economic Benefits of the Proposed Activity.

The disposal of excess water, including the water infiltrating the mine, will allow the mine to continue to operate. The Pond Creek Mine is expected to generate 5 - 6 million tons of useable coal. According to information given in a document dated November 18, 2016 entitled Anti-degradation Assessment, Pond Creek No. 1 Mine, NPDES Permit IL0077666, continued operation of the existing mine will continue to provide jobs for 203 employees with an annual payroll of approximately $18 million. In addition to these 203 direct employees, it is estimated that another 100 persons are employed in daily work associated with the Mine's production. This includes truck drivers, supply and support personnel, train crews, and technical personnel. In addition, other local businesses would also benefit from the wealth created by the mine. The operation of the mine provides tax revenues through payroll, coal severance, and mineral resource taxes for the surrounding counties and the State of Illinois. The total local, state, and federal revenues generated by the continuation of this Mine are approximately $78 million annually. Current employment statistics indicate that the unemployment rate for Williamson County was 7.5%.

Assessments of Alternatives for Less Increase in Loading or Minimal Environmental Degradation.

Alternatives to discharge through Outfall 009 have been evaluated by the mine company in a document dated November 18, 2016 entitled Anti-degradation Assessment, Pond Creek No. 1 Mine, NPDES Permit and are summarized as follows:

Chloride and Sulfate

Membrane Processes. Standard reverse osmosis (RO) treatment results in a waste stream of water with a high concentration of contaminants that is typically 25% of the flow being sent to the RO treatment system. The reject stream must still be disposed of in a responsible manner. Due to the disposal issue, the Membrane Process is not viable.

Deep Well Injection of the Entire Groundwater Stream. The untreated groundwater infiltrate could be discharged directly to a deep well. Considering the cost and operational difficulties experienced to date for the two wells that have been installed at the nearby Sugar Camp Coal facility to accept 0.45 MGD each, deep well injection of the untreated groundwater infiltrate is not considered either applicable or feasible for the operation of the Mine.

Discharge to POTW or Other Sources. POTWs are not designed to treat wastewaters containing dissolved substances such as chloride or sulfate. This option is not feasible.

No discharge. Given the climate of Franklin County, the mine company concludes that evaporation is not a viable option for disposal of the stormwater runoff mine effluent.

Mechanical Evaporation. Mechanical evaporation uses high temperatures and pressure to remove the water. The equipment is expensive to construct/install, operate, and maintain. Also, there would be materials to dispose of either in a landfill or in the Injection Wells that have been found to be unreliable for nearby mines. Therefore, this option is not considered either applicable or feasible for the operation of the mine.

Crystallizaton. Crystallizastion equipment is expensive to construct/install, operate and maintain. The cost is estimated at $0.25/gallon, the mine company concludes that crystallization is not a viable option for disposal of the stormwater runoff mine effluent.

Cost Effective Sulfate Removal (CESR) process. This is a proprietary technology that uses hydrated lime and proprietary chemicals to precipitate gypsum, metals and ettringite. Sludge would be produced that would require landfill disposal. The proprietary technology is still being developed. Additionally, this method is not proven to remove chlorides. These drawbacks make the CESR process infeasible for use at the coal mine.

Chemical Precipitation. Alkaline chemicals may be added to acid mine effluent to precipitate metals. The sludge produced must be disposed of and in some cases will contain hazardous materials added to the wastewater to attain precipitation. The additives used require mining in their own right. The water discharged may contain these additives, such as aluminum, in elevated concentrations. Additionally, this method is not proven to remove chlorides. These drawbacks make chemical precipitation infeasible.

Sedimentation/Siltation

Sedimentation. The facility is proposing to pump the groundwater infiltration to a Water Staging Cell where the water will have an opportunity for solids to settle out. The water will then be discharged to the Big Muddy River though the diffuser.

Use alternate sediment control and treatment devices. Alternatives to the use of sediment control ponds exist for control of discharge of settleable solids. Such alternatives include chemical soil stabilizers, erosion control blankets, geotextile filter bags, fiber rolls, silt fencing, straw mulch, straw bale dikes, and temporary seeding. These measures are aimed at minimization of the generation of settable solids. Most of these measures have been used previously during the construction and operations and in accordance with the current permit, as supplemental treatment and prevention of generation of settable solids. The use of alternative sediment control measures is considered practical and cost effective for the treatment and control of surface runoff in conjunction with sediment control ponds. However, the use of these practices to eliminate the proposed sediment control ponds is not feasible. Instead, it is being proposed that these BMPs be incorporated into the proposed alternative as needed.

No discharge. Given the climate of Franklin County, the mine company concludes that evaporation is not a viable option for disposal of the stormwater runoff mine effluent.

Filtration. Filtration is a technology that is not feasible for the proposed facility because: filtration is much more expensive than sediment ponds, filtration processes require a steady stream of water for

treatment which is not the case in treating stormwater runoff, a large area of land would be required for such a facility, and maintenance and supervision of the filtration and sludge disposal operation would be burdensome and would increase production costs.

Constructed Wetlands. Constructed wetlands have proven to be effective for treatment of suspended solids with several limitations. These limitations include; low and consistent rates of inflow, eventual sludge accumulation requiring dredging and wetland reconstruction, and release of hydrogen sulfide and other digestive gases into the atmosphere from sulfate digestion processes. Use of wetlands in mine stormwater runoff treatment would be limited by the enormous amount of land required to construct a wetland of sufficient size for the flow rates to be expected from such an operation.

Chemical Precipitation. Alkaline chemicals may be added to acid mine effluent to precipitate metals. The sludge produced must be disposed of and in some cases will contain hazardous materials added to the wastewater to attain precipitation. The additives used require mining in their own right. The water discharged may contain these additives, such as aluminum, in elevated concentrations. Concerns with the use of chemical precipitation at the proposed coal mine include; worker safety regarding the chemicals to be used, treatment costs, process operation and maintenance, disposal of precipitate sludge in a landfill, necessity of treatment considering that acid water is not considered a factor for the proposed operation, susceptibility to system malfunction due to high volume flows from storm events, and improbability of actual improvement in overall water quality when compared to the use of sediment ponds. These drawbacks make chemical precipitation infeasible.

Summary Comments of the Illinois Department of Natural Resources, Regional Planning Commissions, Zoning Boards or Other Entities

On November 2, 2016, the IDNR EcoCAT web-based tool was used and indicated that there were no aquatic endangered/threatened species present in the vicinity of the discharge. While the IDNR EcoCAT web-based tool did not terminate the consultation because of the nearby presence of Chuck-Will's-Willow (*Caprimulgus carolinensis*), future termination is likely.

Agency Conclusion.

This preliminary assessment was conducted pursuant to the Illinois Pollution Control Board regulation for Antidegradation found at 35 Ill. Adm. Code 302.105 (antidegradation standard) and was based on the information available to the Agency at the time the draft permit was written. We tentatively find that the proposed activity will result in the attainment of water quality standards; that all existing uses of the receiving stream will be maintained; that all technically and economically reasonable measures to avoid or minimize the extent of the proposed increase in pollutant loading have been incorporated into the proposed activity; and that this activity will benefit the community at large by allowing the continuation of coal mining with all of its economic benefits to the local economy. Comments received during the NPDES permit public notice period will be evaluated before a final decision is made by the Agency.

cc: Bob Mosher
FOS Region 7 Manager
Carol Selinger
Chron

DOCUMENT

39

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397
BRUCE RAUNER, GOVERNOR ALEC MESSINA, ACTING DIRECTOR

Memorandum

DATE: 12 December 2016

TO: Iwona Ward

FROM: Scott Twait ST

SUBJECT: WQBELs for the Big Muddy River discharge (Outfall 011)
Williamson Energy, LLC – Pond Creek Mine
NPDES Permit No. IL0077666 (Williamson County)

The subject facility proposes to discharge to the Big Muddy River through Outfall 011 at a point where 37.0 cfs of flow exists upstream of the outfall during critical 7Q10 low-flow conditions. The Big Muddy River is classified as a General Use Water. The Big Muddy River is not listed as a biologically significant stream in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor is it given an integrity rating in that document. The Big Muddy River, Waterbody Segment, N-11, is listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List as impaired for aquatic life use with potential causes given as iron, dissolved oxygen (non-pollutant), sedimentation/siltation (non-pollutant), and total suspended solids; fish consumption use with potential causes given as mercury and polychlorinated biphenyls; and primary contact recreation use with potential cause given as fecal coliform. Aesthetic quality use is fully supported. This segment of the Big Muddy River is not subject to enhanced dissolved oxygen standards.

Chloride should be limited in the NPDES permit at the limits described below. All other parameters will meet water quality standards at the edge of the mixing zone. According to the effluent data received; Chloride, Sulfate, chronic Nickel, and Copper need mixing to allow water quality standards to be achieved at the edge of the mixing zone and ZID for Copper. The maximum flow from Outfall 011 is 5,000 gpm (11.1 cfs) and the maximum chloride concentration is 12,000 mg/L. As long as the Chloride water quality standard is met, then Sulfate, chronic Nickel, and Copper water quality standards will be met in the receiving stream also. Based on the data, the permit section should determine if an effluent standard is needed for Iron (total).

The permit only allows a discharge when the receiving stream is flowing above 30 cfs. A mixing zone study was performed and detailed in a document by AquAeTer, Inc. titled "Draft Conceptual Diffuser Design, Big Muddy River, near Plumfield, Illinois". The maximum dispersion required for all water quality parameters is 34:1. Model predictions have been made for a maximum effluent total flow rate of 11.1 cfs. At the maximum chloride concentration of 12,000 mg/L, this maximum discharge requires a river flow of 1,734 cfs to meet a dispersion of 34:1 in less than 25 % of the river volume. The water quality standards were met for all scenarios within the regulatory limits for a mixing zone. The maximum mixing zone to meet the water quality standard for all scenarios is 251 feet downstream with a plume width of 25 feet. The maximum zone of initial dilution to meet the acute Copper water quality standard for all scenarios is 18.2 feet downstream with a plume width of 4 feet.

The permittee should use the following equation to demonstrate that water quality standards will be met downstream of the discharge.

$$C_{DS} = [C_E Q_E + 0.25\, C_{US}\, Q_{US}] / (0.25\, Q_{US} + Q_E)$$

Where:

C_E = Effluent concentration (mg/L)
Q_E = Effluent flow rate (cfs) for Outfall 011
Q_{US} = Upstream flow rate (cfs)
C_{US} = Upstream concentration (mg/L)
C_{DS} = Downstream concentration (mg/L)

The upstream flow (Q_{US}) should be based on the US Army Corps of Engineers (USACE) dam at Rend Lake plus the flow from the upstream Sugar Camp Coal discharge and the chloride concentration can be based on the 90th percentile of the existing data of 30.1 mg/L plus the maximum permitted discharge from the Sugar Camp Coal discharge upstream. This results in a maximum concentration of 151 mg/L.

The "calculated" downstream concentration shall be less than 500 mg/L for chloride and reported on the discharge monitoring reports (DMRs).

These recommendations reflect a water quality standards perspective only and should not be construed as being inclusive of all factors that must be taken into consideration by the permit writer.

If there is no upstream mixing available for Outfall 011, the NPDES permit should be regulated at 500 mg/L for chlorides and 1163 mg/L for sulfates.

The NPDES permit should require periodic stream sampling for chloride downstream of the mixing zone to verify that the equations are being operated correctly.

Attachment

cc: Bob Mosher ✓
Region 7 Manager
Carol Selinger
Chron

DOCUMENT

40

S. Twait

R08271

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397
BRUCE RAUNER, GOVERNOR ALEC MESSINA, ACTING DIRECTOR

Memorandum

Date: 12 December 2016

To: Iwona Ward

From: Scott Twait ST

Subject: Williamson Energy, LLC – Pond Creek Mine
Antidegradation Assessment for Big Muddy River Mixing
NPDES Permit No. IL0077666 (Williamson County)

Williamson Energy, LLC operates the Pond Creek No. 1 Mine which is located in Williamson County. The mining complex contains an estimated 383.3 million tons of clean, recoverable coal reserves. Williamson Energy commenced construction of the Mine in 2005. The Mine has a life expectancy of more than 20 years. The mine has one operating longwall system. The Preparation Plant facilities are capable of processing 2,000 tons of coal per hour. The productive capacity of the mine is 7.5 million tons per year. Coal is shipped by rail, truck and barge (via railroad).

Williamson currently operates the mine under the existing Permit 375 and Permit 417 from the Illinois Department of Natural Resources, Office of Mines and Minerals (IDNR-OMM). The Mine currently discharges under NPDES Permits IL0077666.

The Pond Creek Mine has submitted an antidegradation report as part of the following NPDES permit activities:

- To respond to the over capacity of water on-site, a new outfall to the Big Muddy River is proposed. The outfall structure will be a multi-port diffuser and a mixing zone is being requested for the discharge; and
- The mine permit modification request includes the discharge of stormwater from stormwater ponds associated with the proposed Refuse Disposal Area No. 3 to Pond Creek. (Discussed under another antidegradation assessment) A mixing zone is being requested for Pond Creek.

The mine uses water in two areas of operation; dust suppression during coal extraction and wash water in the preparation plant. The water used in the coal extraction process is fresh, untreated water purchased from the City of Johnson City and it not recoverable. The water used to wash the coal in the preparation plant comes from the fresh water lake. Over time, the fine solid particles present in the thickener underflow that is pumped to the Slurry Impoundment/RDA No. 3 settle to the bottom of the impoundment leaving clarified water on the surface. There is some loss of water during the washing process. Additionally, since the fines do not all settle immediately in the slurry impoundment, the quality of the clarified water results in a need for additional water for the preparation plant. Therefore, preparation plant water is supplemented with mine infiltration water and/or stormwater.

An aquifer above the coal seam has caused an influx in water into the Mine. The infiltrating groundwater is from a saline aquifer, with a chloride content of approximately 1,099 to 2,799 mg/L. The sulfate ranges between 1,720 and 2,120 mg/L. Presently, the mine is removing 2.7 MGD of this high-chloride groundwater from the active mine. During normal coal processing operations, the preparation plant

requires approximately 2.3 MGD. It is necessary to remove the water from the mine to protect the health and safety of the workforce, as well as, the overall mining operation.

Water will be stored in the Water Staging Cell and will be pumped to the Big Muddy River diffuser for mixing. An evaluation of the mixing zone will be reported in a separate memo.

The information in this antidegradation assessment came from the December 2014 NPDES Renewal #2 for Permit #IL0077666 report by Alliance Consulting, Inc. titled "Pond Creek Mine No. 1 & Refuse Disposal Area No. 3" and the anti-degradation assessment provided on November 18, 2016 entitled Anti-degradation Assessment, Pond Creek No. 1 Mine, NPDES Permit IL0077666

Identification and Characterization of the Affected Water Body.

The subject facility proposes to discharge to the Big Muddy River through Outfall 011 at a point where 37.0 cfs of flow exists upstream of the outfall during critical 7Q10 low-flow conditions. The Big Muddy River is classified as a General Use Water. The Big Muddy River is not listed as a biologically significant stream in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System*, nor is it given an integrity rating in that document. The Big Muddy River, Waterbody Segment, N-11, is listed on the draft 2016 Illinois Integrated Water Quality Report and Section 303(d) List as impaired for aquatic life use with potential causes given as iron (dissolved), dissolved oxygen (non-pollutant), sedimentation/siltation (non-pollutant), and total suspended solids; fish consumption use with potential causes given as mercury and polychlorinated biphenyls; and primary contact recreation use with potential cause given as fecal coliform. Aesthetic quality use is fully supported. This segment of the Big Muddy River is not subject to enhanced dissolved oxygen standards.

Identification of Proposed Pollutant Load Increases or Potential Impacts on Uses.

The constituents of concern are chloride, sulfates, manganese, iron, and total suspended solids. The chloride loading will range from 19,141 to 1,197,698 lbs/day at a concentration ranging from 1,699 to 12,000 mg/L. The sulfate loading will range from 9,720 to 476,031 lbs/day at a concentration ranging from 820 to 2,120 mg/L. The manganese loading will range from 33 to 336 lbs/day at a concentration ranging from 0.125 to 0.419 mg/L. The Iron (total) loading will range from 34 to 348 lbs/day at a concentration ranging from 0.216 to 1.835 mg/L. Iron (dissolved) is only a fraction of the Iron (total) and will meet the water quality standard at the end-of-pipe or at the edge of the mixing zone. The Nickel loading will range from 1 to 8 lbs/day at a concentration ranging from 0.004 to 0.014 mg/L. The Copper loading will range from 1 to 8 lbs/day at a concentration ranging from 0.011 to 0.32 mg/L. The TSS loading will range from 2,337 to 118,332 lbs/day at a concentration ranging from 7 to 70 mg/L.

Fate and Effect of Parameters Proposed for Increased Loading.

Chloride and sulfates would remain dissolved in the water and would move through the downstream continuum. Manganese, iron, Nickel, Copper, and total suspended solids will most likely settle and become part of the bed sediment load in the river. A mixing zone in the Big Muddy River will be utilized to dissipate chloride and sulfate to water quality standard levels. A zone of initial dilution will be utilized to dissipate Copper to water quality standard levels. Small amounts of chloride and sulfates would be removed by organisms as these substances are necessary for life. No adverse impacts to streams would occur as all water quality standards are expected to be met in the receiving water.

Purpose and Social & Economic Benefits of the Proposed Activity.

The disposal of excess water, including the water infiltrating the mine, will allow the mine to continue to operate. The Pond Creek Mine is expected to generate 5 - 6 million tons of useable coal. According to information given in a document dated November 18, 2016 entitled Anti-degradation Assessment, Pond Creek No. 1 Mine, NPDES Permit IL0077666, continued operation of the existing mine will continue to provide jobs for 203 employees with an annual payroll of approximately $18 million. In addition to these 203 direct employees, it is estimated that another 100 persons are employed in daily work associated with the Mine's production. This includes truck drivers, supply and support personnel, train crews, and technical personnel. In addition, other local businesses would also benefit from the wealth created by the mine. The operation of the mine provides tax revenues through payroll, coal severance, and mineral resource taxes for the surrounding counties and the State of Illinois. The total local, state, and federal revenues generated by the continuation of this Mine are approximately $78 million annually. Current employment statistics indicate that the unemployment rate for Williamson County was 7.5%.

Assessments of Alternatives for Less Increase in Loading or Minimal Environmental Degradation.

Excess water is proposed to be discharged to the Big Muddy River. Alternatives to this system have been evaluated by the mine company in a document dated November 18, 2016 entitled Anti-degradation Assessment, Pond Creek No. 1 Mine, NPDES Permit and are summarized as follows:

Chloride and Sulfate

Membrane Processes. Standard reverse osmosis (RO) treatment results in a waste stream of water with a high concentration of contaminants that is typically 25% of the flow being sent to the RO treatment system. The reject stream must still be disposed of in a responsible manner. Due to the disposal issue, the Membrane Process is not viable.

Deep Well Injection of the Entire Groundwater Stream. The untreated groundwater infiltrate could be discharged directly to a deep well. Considering the cost and operational difficulties experienced to date for the two wells that have been installed at the nearby Sugar Camp Coal facility to accept 0.45 MGD each, deep well injection of the untreated groundwater infiltrate is not considered either applicable or feasible for the operation of the Mine.

Discharge to POTW or Other Sources. POTWs are not designed to treat wastewaters containing dissolved substances such as chloride or sulfate. This option is not feasible.

No discharge. Given the climate of Franklin County, the mine company concludes that evaporation is not a viable option for disposal of the stormwater runoff mine effluent.

Mechanical Evaporation. Mechanical evaporation uses high temperatures and pressure to remove the water. The equipment is expensive to construct/install, operate, and maintain. Also, there would be materials to dispose of either in a landfill or in the Injection Wells that have been found to be unreliable for nearby mines. Therefore, this option is not considered either applicable or feasible for the operation of the mine.

Crystallizaton. Crystallizastion equipment is expensive to construct/install, operate and maintain. The cost is estimated at $0.25/gallon, the mine company concludes that crystallization is not a viable option for disposal of the stormwater runoff mine effluent.

Cost Effective Sulfate Removal (CESR) process. This is a proprietary technology that uses hydrated lime and proprietary chemicals to precipitate gypsum, metals and ettringite. Sludge would be produced that would require landfill disposal. The proprietary technology is still being developed. Additionally, this method is not proven to remove chlorides. These drawbacks make the CESR process infeasible for use at the coal mine.

Chemical Precipitation. Alkaline chemicals may be added to acid mine effluent to precipitate metals. The sludge produced must be disposed of and in some cases will contain hazardous materials added to the wastewater to attain precipitation. The additives used require mining in their own right. The water discharged may contain these additives, such as aluminum, in elevated concentrations. Additionally, this method is not proven to remove chlorides. These drawbacks make chemical precipitation infeasible.

Sedimentation/Siltation

Sedimentation. The facility is proposing to pump the groundwater infiltration to a Water Staging Cell where the water will have an opportunity for solids to settle out. The water will then be discharged to the Big Muddy River though the diffuser.

Use alternate sediment control and treatment devices. Alternatives to the use of sediment control ponds exist for control of discharge of settleable solids. Such alternatives include chemical soil stabilizers, erosion control blankets, geotextile filter bags, fiber rolls, silt fencing, straw mulch, straw bale dikes, and temporary seeding. These measures are aimed at minimization of the generation of settable solids. Most of these measures have been used previously during the construction and operations and in accordance with the current permit, as supplemental treatment and prevention of generation of settable solids. The use of alternative sediment control measures is considered practical and cost effective for the treatment and control of surface runoff in conjunction with sediment control ponds. However, the use of these practices to eliminate the proposed sediment control ponds is not feasible. Instead, it is being proposed that these BMPs be incorporated into the proposed alternative as needed.

No discharge. Given the climate of Franklin County, the mine company concludes that evaporation is not a viable option for disposal of the stormwater runoff mine effluent.

Filtration. Filtration is a technology that is not feasible for the proposed facility because: filtration is much more expensive than sediment ponds, filtration processes require a steady stream of water for treatment which is not the case in treating stormwater runoff, a large area of land would be required for such a facility, and maintenance and supervision of the filtration and sludge disposal operation would be burdensome and would increase production costs.

Constructed Wetlands. Constructed wetlands have proven to be effective for treatment of suspended solids with several limitations. These limitations include; low and consistent rates of inflow, eventual sludge accumulation requiring dredging and wetland reconstruction, and release of hydrogen sulfide and other digestive gases into the atmosphere from sulfate digestion processes. Use of wetlands in mine stormwater runoff treatment would be limited by the enormous amount of land required to construct a wetland of sufficient size for the flow rates to be expected from such an operation.

Chemical Precipitation. Alkaline chemicals may be added to acid mine effluent to precipitate metals. The sludge produced must be disposed of and in some cases will contain hazardous materials added to the wastewater to attain precipitation. The additives used require mining in their own right. The water discharged may contain these additives, such as aluminum, in elevated concentrations. Concerns with the use of chemical precipitation at the proposed coal mine include; worker safety regarding the chemicals to be used, treatment costs, process operation and maintenance, disposal of precipitate sludge in a landfill,

necessity of treatment considering that acid water is not considered a factor for the proposed operation, susceptibility to system malfunction due to high volume flows from storm events, and improbability of actual improvement in overall water quality when compared to the use of sediment ponds. These drawbacks make chemical precipitation infeasible.

Summary Comments of the Illinois Department of Natural Resources, Regional Planning Commissions, Zoning Boards or Other Entities.

On November 2, 2016, the IDNR EcoCAT web-based tool was used and indicated that there were no aquatic endangered/threatened species present in the vicinity of the discharge. While the IDNR EcoCAT web-based tool did not terminate the consultation because of the nearby presence of Chuck-Will's-Willow (*Caprimulgus carolinensis*), future termination is likely.

Agency Conclusion.

This preliminary assessment was conducted pursuant to the Illinois Pollution Control Board regulation for Antidegradation found at 35 Ill. Adm. Code 302.105 (antidegradation standard) and was based on the information available to the Agency at the time the draft permit was written. We tentatively find that the proposed activity will result in the attainment of water quality standards; that all existing uses of the receiving stream will be maintained; that all technically and economically reasonable measures to avoid or minimize the extent of the proposed increase in pollutant loading have been incorporated into the proposed activity; and that this activity will benefit the community at large by allowing the continuation of coal mining with all of its economic benefits to the local economy. Comments received during the NPDES permit public notice period will be evaluated before a final decision is made by the Agency.

cc: Bob Mosher
FOS Region 7 Manager
Carol Selinger
Chron

DOCUMENT

41

Twait, Scott

From: Muir, David
Sent: Friday, December 09, 2016 9:57 AM
To: Twait, Scott
Subject: RE: Causes of impairment for N-11

Yes. This is based on a sample from 1/17/2013 at station N-11. On that date dissolved iron was 2350 ug/L and total iron was 5180 ug/L.

From: Twait, Scott
Sent: Friday, December 09, 2016 9:43 AM
To: Muir, David
Subject: Causes of impairment for N-11

Dave,

Iron is listed as a cause of aquatic life impairment for the Big Muddy River. Is that listing based on iron (dissolved)?

Thanks,
Scott

Scott Twait
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276
217-558-2012
217-782-9891 (fax)

State of Illinois - CONFIDENTIALITY NOTICE: The information contained in this communication is confidential, may be attorney-client privileged or attorney work product, may constitute inside information or internal deliberative staff communication, and is intended only for the use of the addressee. Unauthorized use, disclosure or copying of this communication or any part thereof is strictly prohibited and may be unlawful. If you have received this communication in error, please notify the sender immediately by return e-mail and destroy this communication and all copies thereof, including all attachments. Receipt by an unintended recipient does not waive attorney-client privilege, attorney work product privilege, or any other exemption from disclosure.

R08278

Pond 1

Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020			
Arsenic																		
Barium																		
Cadmium																		
Chromium (Hex)																		
Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.222	1	0.379	1	0.112	1	0.087	1	0.386	1							0.386	5
Lead																		
Manganese																		
Mercury	9.53	1	14.7	1	13.6	1	12.6	1	12.7	1	12.6	1	12.7	1	12.5	1	14.7	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

Pond 2

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020
Arsenic								

08279

Barium																				
Cadmium																				
Chromium (Hex)																				
Chromium (Total)																				
Cyanide (available)																				
Copper																				
Fluoride																				
Iron (Dissolved)	0.307	1	0.63	1	< 0.05	1	< 0.05	1	< 0.05	1									0.63	5
Lead																				
Manganese																				
Mercury	3.32	1	3.67	1	0.743	1	0.657	1	<0.5	1	<0.5	1	0.542	1	0.761	1			3.67	8
Nickel																				
Phenols																				
Silver																				
Zinc																				
Selenium																				
Boron																				
Sulfate																				
Chloride																				
Benzene																				
Ethylbenzene																				
Toluene																				
Xylene																				
Mercury																				

Pond 3								
Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020
Arsenic								
Barium								
Cadmium								
Chromium (Hex)								

Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.351	1	0.478	1	0.217	1	0.218	1	0.488	1							0.478	5
Lead																		
Manganese																		
Mercury	10	1	9.83	1	8.53	1	7.15	1	6.99	1	7.3	1	6.36	1	6.43	1	10	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

Pond 4								
Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020
Arsenic								
Barium								
Cadmium								
Chromium (Hex)								
Chromium (Total)								
Cyanide (available)								
Copper								

08281

Fluoride																		
Iron (Dissolved)	0.42	1	0.245	1	< 0.05	1	< 0.05	1	0.074	1							0.42	5
Lead																		
Manganese																		
Mercury	3.41	1	1.94	1	1.21	1	0.924	1	1.08	1	0.593	1	0.834	1	0.794	1	3.4	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

Pond 5																		
Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020			
Arsenic																		
Barium																		
Cadmium																		
Chromium (Hex)																		
Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.198	1	0.37	1	0.135	1	0.073	1	0.2	1							0.37	5
Lead																		

Manganese																		
Mercury	6.62	1	8.22	1	7.1	1	6.28	1	5.89	1	5.38	1	5.03	1	4.9	1	8.22	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

Pond 6																		
Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020			
Arsenic																		
Barium																		
Cadmium																		
Chromium (Hex)																		
Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.24	1	0.07	1	< 0.05	1	< 0.05	1	0.051	1							0.24	5
Lead																		
Manganese																		
Mercury	5.81	1	0.932	1	1.34	1	0.859	1	1.36	1	5.37	1	0.569	1	0.775	1	5.81	8
Nickel																		

08283

Phenols																				
Silver																				
Zinc																				
Selenium																				
Boron																				
Sulfate																				
Chloride																				
Benzene																				
Ethylbenzene																				
Toluene																				
Xylene																				
Mercury																				

Pond 7																				
Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020					
Arsenic																				
Barium																				
Cadmium																				
Chromium (Hex)																				
Chromium (Total)																				
Cyanide (available)																				
Copper																				
Fluoride																				
Iron (Dissolved)	0.337	1	0.244	1	< 0.05	1	< 0.05	1	0.113	1									0.337	5
Lead																				
Manganese																				
Mercury	16.3	1	1.36	1	1.27	1	0.698	1	1.15	1	8.24	1	1.4	1	1.36	1			16.3	8
Nickel																				
Phenols																				
Silver																				
Zinc																				

R08284

Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

Pond 8																		
Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020			
Arsenic																		
Barium																		
Cadmium																		
Chromium (Hex)																		
Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.219	1	0.253	1	< 0.05	1	< 0.05	1	0.097	1							0.253	5
Lead																		
Manganese																		
Mercury	12.1	1	1.22	1	1.47	1	0.817	1	1.27	1	1.84	1	1.15	1	1.75	1	12.1	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		

RD8285

Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

Pond 9

Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020			
Arsenic																		
Barium																		
Cadmium																		
Chromium (Hex)																		
Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.235	1	0.107	1	< 0.05	1	< 0.05	1	0.125	1							0.235	5
Lead																		
Manganese																		
Mercury	7.11	1	1.44	1	1.38	1	2.2	1	1.18	1	0.93	1	0.887	1	1.19	1	7.11	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		

Toluene
Xylene
Mercury

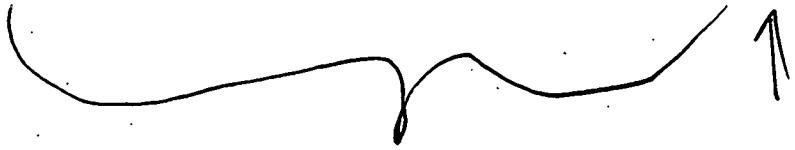
Cell 417

Date Sampled	1/10/2020		1/13/2020		1/15/2020		1/17/2020		1/20/2020		1/22/2020		1/27/2020		1/29/2020			
Arsenic																		
Barium																		
Cadmium																		
Chromium (Hex)																		
Chromium (Total)																		
Cyanide (available)																		
Copper																		
Fluoride																		
Iron (Dissolved)	0.104	1	0.058	1	< 0.05	1											0.104	3
Lead																		
Manganese																		
Mercury	5.08	1	1.09	1	1.32	1	1.65	1	0.673	1	2.8	1	0.588	1	0.846	1	5.8	8
Nickel																		
Phenols																		
Silver																		
Zinc																		
Selenium																		
Boron																		
Sulfate																		
Chloride																		
Benzene																		
Ethylbenzene																		
Toluene																		
Xylene																		
Mercury																		

5.08

Pond Creek

Date Sampled	application	##########	##########	11/6/2019	##########	##########	12/6/2019	1/6/2020	##########	##########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total	Total
Arsenic	< 0.002	< 0.01	0.001	0.002	< 0.001	< 0.001	0.002									7
Barium																0
Cadmium	0.018	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002									7
Chromium (Hex)																0
Chromium (Total)	< 0.006	< 0.005	0.002	0.002	< 0.001	0.002	0.004									7
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02									6
Copper	< 0.003	< 0.005	0.003	0.004	< 0.001	< 0.001	< 0.001									7
Fluoride																0
Iron (Dissolved)		< 0.1	0.063	< 0.05	0.085	0.197	0.253		0.109	0.139	< 0.05	0.362	0.4	0.247		12
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	0.002									7
Manganese		< 0.01	< 0.02	0.044	< 0.02	0.057	0.074									6
Mercury		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	4.44								7
Nickel	0.067	< 0.005	0.002	0.001	< 0.001	0.003	< 0.001									7
Phenols	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01									7
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001									7
Zinc	0.025	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05									7
Selenium	< 0.002	< 0.01	< 0.002	0.011	< 0.002	< 0.002	0.002									7
Boron																0
Sulfate	5150	113	100	120	115	120	82									7
Chloride		80	56	52	54	60	34									6
Benzene																0
Ethylbenzene																0
Toluene																0
Xylene																0
Mercury	< 0.002															1



Date Sampled	Application	##########	##########	11/5/2019	##########	##########	12/6/2019	1/6/2020	##########	##########	1/2/2020	1/3/2020	1/6/2020	1/8/2020		Total
Arsenic	< 0.002	0.002	< 0.001	0.002	< 0.001	0.001	< 0.001									7
Barium																0
Cadmium	0.031	0.0017	0.0008	< 0.0002	0.0008	0.0013	0.0038									7
Chromium (Hex)																0
Chromium (Total)	< 0.006	0.0022	0.002	0.002	0.001	0.002	0.004									7
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02									6
Copper	< 0.003	0.013	0.004	0.004	< 0.001	0.005	< 0.001									7
Fluoride																0
Iron (Dissolved)		< 0.05	< 0.05	0.063	0.068	0.104	0.149		< 0.05	< 0.05	< 0.05	< 0.05	0.085	< 0.05		12
Lead	< 0.0075	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002									7
Manganese		0.219	0.323	< 0.02	0.511	0.641	1.185									6
Mercury		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.783								7
Nickel	< 0.01	0.031	0.019	0.005	< 0.001	0.029	0.074									7
Phenols	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01									7
Silver	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001									7
Zinc	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.059									7
Selenium	< 0.002	0.008	0.004	0.015	0.003	0.006	0.016									7
Boron																0
Sulfate	95	867	350	540	660	590	640									7
Chloride		250	52	26	156	172	175									6
Benzene																0
Ethylbenzene																0

P08288

| | | |

R88289

| | | |

308290

| | | |

R08291

8

Date Sampled	Application	##########	##########	11/6/2019	##########	##########	12/6/2019	1/6/2020	##########	##########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total
Arsenic	< 0.002	< 0.01	0.002	0.003	0.001	0.004	0.003								7
Barium															0
Cadmium	0.008	0.0031	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.001								7
Chromium (Hex)															0
Chromium (Total)	< 0.006	< 0.005	0.007	0.01	0.014	0.015	0.012								7
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02								6
Copper	0.003	0.0155	0.004	0.004	0.072	< 0.001	0.505								7
Fluoride															0
Iron (Dissolved)		< 0.1	0.103	< 0.05	< 0.05	0.366	0.311		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	12
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								7
Manganese	0.011	3.61	0.197	0.356	0.416	0.566	0.694								7
Mercury		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.974							7
Nickel	< 0.01	0.1	0.009	0.01	< 0.001	0.012	0.024								7
Phenols	0.005	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01								7
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001								7
Zinc	< 0.001	0.288	< 0.05	< 0.05	< 0.05	< 0.05	0.185								7
Selenium	< 0.002	< 0.01	0.009	0.02	0.016	0.024	0.016								6
Boron															0
Sulfate	1100	1633	967	1867	1700	2000	940								7
Chloride		1590	1516	1799	1500	1969	1000								6
Benzene															0
Ethylbenzene															0
Toluene															0
Xylene															0
Mercury	< 0.002														1

9

Date Sampled	Table 2. Pond 00	##########	##########	11/6/2019	##########	##########	12/6/2019	1/6/2020	##########	##########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total
Arsenic	0.002	9 < 0.01	0.002	0.003	< 0.001	0.004	0.003								15
Barium															0
Cadmium	< 0.0002	9 < 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0019								15
Chromium (Hex)															0
Chromium (Total)	0.008	9 < 0.005	0.009	0.008	0.01	0.013	0.01								15
Cyanide (available)	< 0.002	9 < 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02								15
Copper	0.024	9 < 0.005	0.001	0.004	0.008	< 0.001	< 0.001								15
Fluoride															0
Iron (Dissolved)	0.419	9 < 0.1	< 0.05	< 0.05	0.085	0.166	0.103		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	21
Lead	< 0.001	9 < 0.006	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								15
Manganese	0.21	9 < 0.01	0.351	< 0.02	< 0.02	0.048	0.661								15
Mercury		< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	1.29							7
Nickel	0.009	9 0.0341	0.026	0.013	< 0.001	0.027	0.048								15
Phenols	0.03	9 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01								15
Silver	< 0.001	9 < 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001								15
Zinc	< 0.02	9 < 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05								15
Selenium	0.011	9 0.0172	0.022	0.021	0.016	0.027	0.027								14
Boron															

Pond 1

Date Sampled	application	########	########	11/6/2019	########	########	12/6/2019	1/6/2020	########	########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total	Total	
Arsenic	< 0.002	< 0.01	0.001	0.002	< 0.001	< 0.001	0.002									7	Arsenic
Barium																0	Barium
Cadmium	0.018	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002									7	Cadmium
Chromium (Hex)																0	Chromium (Hex)
Chromium (Total)	< 0.006	< 0.005	0.092	0.002	< 0.001	0.002	0.004									7	Chromium (Total)
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02									6	Cyanide (available)
Copper	< 0.003	< 0.005	0.013	0.004	< 0.001	< 0.001	< 0.001									7	Copper
Fluoride																0	Fluoride
Iron (Dissolved)		< 0.1	0.03	< 0.05	0.035	0.197	0.253		0.109	0.139	< 0.05	0.362	0.4	0.247		12	Iron (Dissolved)
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	0.002									7	Lead
Manganese		< 0.01	< 0.02	0.044	< 0.02	0.057	0.074									6	Manganese
Mercury								4.44						4.54		2	Mercury
Nickel	0.067	< 0.005	0.002	0.001	< 0.001	0.003	< 0.001									7	Nickel
Phenols	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01									7	Phenols
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001									7	Silver
Zinc	0.025	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05									7	Zinc
Selenium	< 0.002	< 0.01	< 0.002	0.011	< 0.002	< 0.002	0.002									7	Selenium
Boron																0	Boron
Sulfate	5150	113	100	120	115	129	82									7	Sulfate
Chloride		80	56	52	54	60	34									6	Chloride
Benzene																0	Benzene
Ethylbenzene																0	Ethylbenzene
Toluene																0	Toluene
Xylene																0	Xylene
Mercury	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002									7	Mercury

Pond 1

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020		
Arsenic										
Barium										
Cadmium										
Chromium (Hex)										
Chromium (Total)										
Cyanide (available)										
Copper										
Fluoride										
Iron (Dissolved)	0.222	0.378	0.112	0.087	0.386				0.386	5
Lead										
Manganese										
Mercury	9.53	14.7	13.6	12.6	12.7	12.6	12.7	12.5	14.7	8
Nickel										
Phenols										
Silver										
Zinc										
Selenium										
Boron										
Sulfate										
Chloride										
Benzene										
Ethylbenzene										
Toluene										
Xylene										
Mercury										

Pond 2

Date Sampled	Application	########	########	11/5/2019	########	########	12/6/2019	1/6/2020	########	########	1/2/2020	1/3/2020	1/6/2020	1/8/2020		Total	
Arsenic	< 0.002	0.002	< 0.001	0.002	< 0.001	0.001	< 0.001									7	Arsenic
Barium																0	Barium
Cadmium	0.031	0.0017	0.0008	< 0.0002	0.0008	0.0013	0.0038									7	Cadmium
Chromium (Hex)																0	Chromium (Hex)
Chromium (Total)	< 0.006	0.0022	0.002	0.002	0.001	0.002	0.004									7	Chromium (Total)
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02									6	Cyanide (available)
Copper	< 0.003	0.013	0.004	< 0.001	0.005	< 0.001	< 0.001									7	Copper
Fluoride																0	Fluoride
Iron (Dissolved)		< 0.05	< 0.05	0.063	0.068	0.104	0.149		< 0.05	< 0.05	< 0.05	< 0.05	0.085	< 0.05		12	Iron (Dissolved)
Lead	< 0.0075	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002									7	Lead
Manganese		0.219	0.333	< 0.02	0.511	0.641	1.185									6	Manganese
Mercury								0.783						0.514		2	Mercury
Nickel	< 0.01	0.031	0.019	0.005	< 0.001	0.029	0.074									7	Nickel
Phenols	< 0.001	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01									7	Phenols
Silver	< 0.002	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001									7	Silver
Zinc	< 0.001	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.059									7	Zinc
Selenium	< 0.002	0.008	0.004	0.015	0.003	0.006	0.016									7	Selenium
Boron																0	Boron
Sulfate	95	867	350	540	660	590	630									7	Sulfate
Chloride		250	52	26	156	172	175									6	Chloride
Benzene																0	Benzene
Ethylbenzene																0	Ethylbenzene
Toluene																0	Toluene
Xylene																0	Xylene
Mercury	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002									7	Mercury

Pond 2

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020		
Arsenic										
Barium										
Cadmium										
Chromium (Hex)										
Chromium (Total)										
Cyanide (available)										
Copper										
Fluoride										
Iron (Dissolved)	0.307	0.63	< 0.05	< 0.05	< 0.05				0.63	5
Lead										
Manganese										
Mercury	3.32	3.67	0.743	0.657	< 0.5	< 0.5	0.542	0.761	3.67	8
Nickel										
Phenols										
Silver										
Zinc										
Selenium										
Boron										
Sulfate										
Chloride										
Benzene										
Ethylbenzene										
Toluene										
Xylene										
Mercury										

Pond 3

Date Sampled	Application	########	########	11/6/2019	########	########	12/6/2019	1/6/2020	########	########	1/2/2020	1/3/2020	1/6/2020	1/8/2020		Total	
Arsenic	< 0.002	< 0.01	0.003	0.003	< 0.001	0.002	0.002									7	Arsenic
Barium																0	Barium
Cadmium	0.024	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002									7	Cadmium
Chromium (Hex)																0	Chromium (Hex)
Chromium (Total)	< 0.006	< 0.005	0.001	0.002	< 0.001	< 0.001	0.004									7	Chromium (Total)
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02									6	Cyanide (available)
Copper	< 0.003	< 0.005	0.003	0.003	< 0.001	< 0.001	< 0.001									7	Copper
Fluoride																0	Fluoride
Iron (Dissolved)		< 0.1	0.106	0.073	0.209	0.262	0.324		0.222	0.25	< 0.05	0.573	0.73	0.595		12	Iron (Dissolved)
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	0.002									7	Lead
Manganese		< 0.01	0.025	< 0.02	< 0.02	0.146	0.103							3.72		7	Manganese
Mercury								3.65								1	Mercury
Nickel	< 0.01	< 0.005	0.002	0.002	< 0.001	0.002	< 0.002									7	Nickel
Phenols	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01									7	Phenols
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001									7	Silver
Zinc	< 0.001	< 0.02	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05									7	Zinc
Selenium	< 0.002	< 0.01	< 0.002	0.009	< 0.002	< 0.002	< 0.002									7	Selenium
Boron																0	Boron
Sulfate	88	40	46	108	63	68	41									7	Sulfate
Chloride		15	< 10	60	12	16	< 10									6	Chloride
Benzene																0	Benzene
Ethylbenzene																0	Ethylbenzene
Toluene																0	Toluene
Xylene																0	Xylene
Mercury	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002									7	Mercury

Pond 3

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020		
Arsenic										
Barium										
Cadmium										
Chromium (Hex)										
Chromium (Total)										
Cyanide (available)										
Copper										
Fluoride										
Iron (Dissolved)	0.351	0.478	0.217	0.218	0.488				0.478	5
Lead										
Manganese										
Mercury	10	9.83	8.53	7.15	6.99	7.3	6.36	6.43	10	8
Nickel										
Phenols										
Silver										
Zinc										
Selenium										
Boron										
Sulfate										
Chloride										
Benzene										
Ethylbenzene										
Toluene										
Xylene										
Mercury										

R08292

Pond 4

Date Sampled	Application	########	########	11/6/2019	########	########	12/6/2019	1/6/2020	########	########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total
Arsenic	< 0.002	< 0.01	0.001	0.002	< 0.001	0.001	0.001								7
Barium															0
Cadmium	0.024	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002								7
Chromium (Hex)															0
Chromium (Total)	< 0.006	< 0.005	0.002	0.002	< 0.001	< 0.001	0.002								7
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02								6
Copper	< 0.003	< 0.005	0.004	0.002	0.019	< 0.001	< 0.001								7
Fluoride															0
Iron (Dissolved)		< 0.1	0.067	< 0.05	0.058	0.118	0.151		< 0.05	0.123	< 0.05	0.126	0.28	0.118	12
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								7
Manganese		< 0.01	< 0.02	< 0.02	< 0.02	0.04	0.736								6
Mercury								0.963						0.831	2
Nickel	< 0.01	< 0.005	0.003	0.002	< 0.001	0.005	< 0.001								7
Phenols	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01								7
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001								7
Zinc	< 0.001	0.0203	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05								7
Selenium	< 0.002	< 0.01	0.004	0.008	< 0.002	< 0.002	< 0.002								6
Boron															0
Sulfate	210	93	56	100	107	117	95								7
Chloride		30	14	36	22	24	18								6
Benzene															0
Ethylbenzene															0
Toluene															0
Xylene															0
Mercury	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								7

Pond 4

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020	
Arsenic									
Barium									
Cadmium									
Chromium (Hex)									
Chromium (Total)									
Cyanide (available)									
Copper									
Fluoride									
Iron (Dissolved)	0.42	0.245	< 0.05	< 0.05	0.074				0.42 5
Lead									
Manganese									
Mercury	3.41	1.94	1.21	0.924	1.08	0.593	0.834	0.794	3.4 8
Nickel									
Phenols									
Silver									
Zinc									
Selenium									
Boron									
Sulfate									
Chloride									
Benzene									
Ethylbenzene									
Toluene									
Xylene									
Mercury									

Pond 5

Date Sampled	Application	########	########	11/6/2019	########	########	12/6/2019	1/6/2020	########	########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total
Arsenic	< 0.002	< 0.01	0.002	0.002	< 0.001	0.001	0.001								7
Barium															0
Cadmium	0.043	< 0.002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002								7
Chromium (Hex)															0
Chromium (Total)	< 0.006	< 0.005	0.002	0.002	< 0.001	0.001	0.003								7
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02								6
Copper	0.003	< 0.005	0.002	0.002	< 0.001	< 0.001	< 0.001								7
Fluoride															0
Iron (Dissolved)		< 0.1	0.521	0.245	0.147	0.241	0.349		< 0.05	0.107	< 0.05	0.179	0.299	0.265	12
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								7
Manganese		< 0.01	0.0135	0.126	< 0.02	0.131	0.149								6
Mercury								3.57						3.36	2
Nickel	< 0.01	< 0.005	0.003	0.003	< 0.001	0.003	< 0.001								7
Phenols	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01								7
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001								7
Zinc	< 0.001 2	0.0255	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05								8
Selenium	< 0.002	< 0.01	< 0.002	0.007	< 0.002	< 0.002	< 0.002								6
Boron															0
Sulfate	390	60	108	145	130	135	90								7
Chloride		18	180	34	38	38	20								6
Benzene															0
Ethylbenzene															0
Toluene															0
Xylene															0
Mercury	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								7

Pond 5

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020	
Arsenic									
Barium									
Cadmium									
Chromium (Hex)									
Chromium (Total)									
Cyanide (available)									
Copper									
Fluoride									
Iron (Dissolved)	0.195	0.37	0.135	0.073	0.2				0.37 5
Lead									
Manganese									
Mercury	6.62	8.22	7.1	6.28	5.89	5.38	5.03	4.9	8.22 8
Nickel									
Phenols									
Silver									
Zinc									
Selenium									
Boron									
Sulfate									
Chloride									
Benzene									
Ethylbenzene									
Toluene									
Xylene									
Mercury									

Pond 6

Date Sampled	Application	########	########	11/6/2019	########	########	12/6/2019	1/6/2020	########	########	1/2/2020	1/3/2020	1/6/2020	1/8/2020	Total
Arsenic	< 0.002	< 0.01	0.002	0.002	< 0.001	0.002	0.002								7
Barium															0
Cadmium	0.03	< 0.002	0.0073	0.0014	0.0007	0.0009	0.006								7
Chromium (Hex)															0
Chromium (Total)	< 0.006	< 0.005	0.012	0.004	0.007	0.006	0.006								7
Cyanide (available)		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02								6
Copper	< 0.003	< 0.005	0.004	0.002	< 0.001	0.012	< 0.001								7
Fluoride															0
Iron (Dissolved)		< 0.1	0.147	0.112	0.058	0.071	0.128		0.082	< 0.05	< 0.05	0.2	< 0.05	< 0.05	12
Lead	< 0.0075	< 0.006	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002								7
Manganese		< 0.01	1.749	0.39	0.508	0.629	1.603								6
Mercury								< 0.5						0.564	2
Nickel	< 0.01	0.0165	0.094	0.024	< 0.001	0.028	0.103								7
Phenols	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01								7
Silver	< 0.002	< 0.005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001								7
Zinc	0.014	0.0217	< 0.05	< 0.05	< 0.05	< 0.05	0.095								7
Selenium	< 0.002	< 0.01	< 0.001	0.009	0.009	0.016	0.022								6
Boron															0
Sulfate	3500	1320	1567	560	760	933	760								7

Pond 6

Date Sampled	1/10/2020	1/13/2020	1/15/2020	1/17/2020	1/20/2020	1/22/2020	1/27/2020	1/29/2020	
Arsenic									
Barium									
Cadmium									
Chromium (Hex)									
Chromium (Total)									
Cyanide (available)									
Copper									
Fluoride									
Iron (Dissolved)	0.24	0.07	< 0.05	< 0.05	0.051				0.24 5
Lead									
Manganese									
Mercury	5.81	0.932	1.34	0.559	1.36	5.37	0.569	0.775	5.81 8
Nickel									
Phenols									
Silver									
Zinc									
Selenium									
Boron									
Sulfate									

R08293

| | | |

(5)

Outfall - Monitoring Location - Limit Set: 001 - 1 - 0

Mon Pd End Date:	Chloride (as Cl) 500 mg/L DAILY MX	Chloride (as Cl) Mon mg/L 30DA AVG	Chloride (as Cl) Mon mg/L MO MIN	Flow, in conduit or thru treatmei Mon MGD 30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	5800	5800	5800	.576
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C

09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	28	28	28	.036
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	32	32	32	.036
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	<= 80	70	>= 60	.0108
11/30/2019	60	60	60	.0144
12/31/2019	45	45	45	.0144

Outfall - Monitoring Location - Limit Set: 002 - 1 - 0

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmer
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	4149	3924	3699	.936
08/31/2015	4149	3135	NODI: X	NODI: X
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	3350	3350	3350	.108
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	3500	2670	1840	.432
04/30/2016	3600	1638.67	246	.252
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	2950	2950	2950	1.44
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C

05/31/2017	2333	2333	2333	.864
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	62	62	62	.0504
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	690	690	690	.05
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2019	NODI: C	NODI: C	NODI: C	NODI: C

(1)

Outfall - Monitoring Location - Limit Set: 003 - 1 - 0

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmei
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C

01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C

12/31/2019	<= 10	10	<= 10	.00432

(2)

Outfall - Monitoring Location - Limit Set: 004 - 1 - 0

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmei
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	50	29	12	.062
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C

08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	16	16	16	.029
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2019	NODI: C	NODI: C	NODI: C	NODI: C

2

Outfall - Monitoring Location - Limit Set: 005 - 1 - 0

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmer
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C

04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	10	< 10	< 10	.058
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2019	<= 14	11.3	>= 10	.24

3 **Outfall - Monitoring Location - Limit Set: 006 - 1 - 0**

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmei
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	2899	2524	2149	.252
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C

01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	2300	2300	2300	.72
04/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2018	1600	1600	1600	.36
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C

12/31/2019	NODI: C	NODI: C	NODI: C	NODI: C

Outfall - Monitoring Location - Limit Set: 007 - 1 - 0 (4)

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmer
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	4499	3249.5	2000	.324
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	2450	2450	2450	1.332
04/30/2016	930	930	930	1.728
05/31/2016	3050	3050	3050	.576
06/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C

08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2019	NODI: C	NODI: C	NODI: C	NODI: C

Outfall - Monitoring Location - Limit Set: 008 - 1 - 0

	Chloride (as Cl)	Chloride (as Cl)	Chloride (as Cl)	Flow, in conduit or thru treatmei
	500 mg/L	Mon mg/L	Mon mg/L	Mon MGD
Mon Pd End Date:	DAILY MX	30DA AVG	MO MIN	30DA AVG
04/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2015	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2015	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
02/29/2016	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2016	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2016	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2017	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2017	NODI: C	NODI: C	NODI: C	NODI: C

04/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2017	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2017	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2018	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2018	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2018	NODI: C	NODI: C	NODI: C	NODI: C
01/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
02/28/2019	NODI: C	NODI: C	NODI: C	NODI: C
03/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
04/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
05/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
06/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
07/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
08/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
09/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
10/31/2019	NODI: C	NODI: C	NODI: C	NODI: C
11/30/2019	NODI: C	NODI: C	NODI: C	NODI: C
12/31/2019	NODI: C	NODI: C	NODI: C	NODI: C

R08306

Pond 9

Substance		ax. Eff. Co	of Sam	Multiply b	% Potent	cute Standa	onic Stan	208(g) stan	her Analy
Arsenic		0.003	15	1.5	0.0045	0.3600	0.1900	-	No RP*
Barium				0.0	0	-	-	5.0	No Data
Cadmium		0.0019	15	1.5	0.0029	0.0144	0.0015	-	**Yes**
Chromium (Hex)				0.0	0	0.0160	0.0110	-	No Data
Chromium (Total)		0.013	15	1.5	0.0195	2.3009	0.2742	-	No RP*
Cyanide (available)	<	0.02	15	1.5	0.03	0.0220	0.0052	-	Yes
Copper		0.024	15	1.5	0.036	0.0245	0.0159	-	**Yes**
Fluoride				0.0	0	12.10	4.00	-	No Data
Iron (Dissolved)		0.419	26	1.3	0.5447	-	-	1.0	No RP*
Lead	<	0.006	15	1.5	0.009	0.1482	0.0311	-	No RP*
Manganese		0.351	15	1.5	0.5265	5.51	2.34	-	No RP*
Mercury (ng/L) **		7.11	10	1.7	12.087	-	-	12.0	Yes
Nickel		0.0341	15	1.5	0.0512	0.1104	0.0067	-	**Yes**
Phenols		0.03	15	1.5	0.045	-	-	0.1	No RP*
Silver	<	0.005	15	1.5	0.0075	-	-	0.005	Yes
Zinc	<	0.05	15	1.5	0.075	0.1635	0.0424	-	Yes
Selenium		0.0172	14	1.5	0.0258	-	-	1.0	No RP*
Boron				0.0	0	40.1	7.6	-	No Data
Sulfate		1733	15	1.5	2599.5	-	-	1287.0	**Yes**
Chloride		1530	6	2.1	3213	-	-	500.0	**Yes**
Benzene				0.0	0	4.2	0.86	-	No Data
Ethylbenzene				0.0	0	0.15	0.014	-	No Data
Toluene				0.0	0	2	0.6	-	No Data
Xylene				0.0	0	0.92	0.36	-	No Data
Mercury				0.0	0	**0.0026**	**0.0013**	-	No Data

* No RP = no reasonable potential to exceed water quality standards.

** derived water quality criteria.

** all results in ng/L. Human Health standard given.

**** COV was calculated for Zinc.

Cell 417

Substance		ax. Eff. Co	of Sam	Multiply b	% Potent	cute Standa	onic Stand	208(g) stan	her Analy
Arsenic		0.004	7	2.0	0.008	0.3600	0.1900	-	No RP*
Barium				0.0	0	-	-	5.0	No Data
Cadmium		0.008	7	2.0	0.016	0.0144	0.0015	-	**Yes**
Chromium (Hex)				0.0	0	0.0160	0.0110	-	No Data
Chromium (Total)		0.015	7	2.0	0.03	2.3009	0.2742	-	No RP*
Cyanide (available)	<	0.02	6	2.1	0.042	0.0220	0.0052	-	Yes
Copper		0.505	7	2.0	1.01	0.0245	0.0159	-	**Yes**
Fluoride				0.0	0	12.10	4.00	-	No Data
Iron (Dissolved)		0.366	15	1.5	0.549	-	-	1.0	No RP*
Lead	<	0.0075	7	2.0	0.015	0.1482	0.0311	-	No RP*
Manganese		0.145	7	2.0	0.29	5.51	2.34	-	No RP*
Mercury (ng/L) **		5.08	10	1.7	8.636	-	-	12.0	No RP*
Nickel		0.1	7	2.0	0.2	0.1104	0.0067	-	**Yes**
Phenols	<	0.01	7	2.0	0.02	-	-	0.1	No RP*
Silver	<	0.005	7	2.0	0.01	-	-	0.005	Yes
Zinc	<	0.05	7	2.0	0.1	0.1635	0.0424	-	Yes
Selenium		0.024	6	2.1	0.0504	-	-	1.0	No RP*
Boron				0.0	0	40.1	7.6	-	No Data
Sulfate		2000	7	2.0	4000	-	-	1287.0	**Yes**
Chloride		1969	6	2.1	4134.9	-	-	500.0	**Yes**
Benzene				0.0	0	4.2	0.86	-	No Data
Ethylbenzene				0.0	0	0.15	0.014	-	No Data
Toluene				0.0	0	2	0.6	-	No Data
Xylene				0.0	0	0.92	0.36	-	No Data
Mercury				0.0	0	**0.0026**	**0.0013**	-	No Data

* No RP = no reasonable potential to exceed water quality standards.

** derived water quality criteria.

** all results in ng/L. Human Health standard given.

**** COV was calculated for Zinc.

DOCUMENT

42

2445-116
R08309
Due date: 12-30-16

Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

November 18, 2016

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASABLE
AUG 02 2019
REVIEWER: SAB

Permit Manager
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2309 West Main Street, Suite 116
Marion, IL 62959

Re: Williamson Energy, LLC – Anti-Degradation Document for Pond Creek Mine
NPDES Permit IL0077666

Please find attached one (1) copy of the Anti-degradation Assessment report regarding the NPDES permit IL0077666 for Williamson Energy, LLC's Pond Creek Mine. This assessment was performed for the proposed addition of a new outfall to the Big Muddy River to facilitate water management at the facility, as well as, protect water quality in the River. Also included in this Anti-degradation Assessment is the addition of a new outfall in Pond Creek and associated stormwater mixing zone.

Two copies of this submittal have also been submitted to Bob Mosher at the IEPA office in Springfield.

We appreciate your assistance with the matter. If you have any questions, or require additional information, please contact me at (217) 710-7713.

Respectfully submitted,

WILLIAMSON ENERGY, LLC

Simon Stepp, P.E.

RECEIVED
NOV 21 2016
IL Environmental Protection Agency
MARION REGIONAL OFFICE

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASABLE

AUG 02 2019

REVIEWER: SAB

ANTI-DEGRADATION ASSESSMENT
POND CREEK NO. 1 MINE
NPDES PERMIT IL0077666

November 18, 2016

R08311

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASED

AUG 02 2019

REVIEWER: SAB

SECTION 1
INTRODUCTION

Williamson Energy, LLC (Williamson) operates the Pond Creek No. 1 Mine (Mine) which is located in Williamson County. The mining complex contains an estimated 383.3 million tons of clean, recoverable coal reserves. Williamson Energy commenced construction of the Mine in 2005. The Mine has a life expectancy of more than 20 years. The Mine has one operating longwall system. The Preparation Plant facilities are capable of processing 2,000 tons of coal per hour. The productive capacity of the mine is 7.5 million tons per year. Coal is shipped by rail, truck and barge (via railroad). The site diagram is presented in Figure 1-1.

Williamson currently operates the mine under the existing Permit 375 and Permit 417 from the Illinois Department of Natural Resources, Office of Mines and Minerals (IDNR-OMM). The Mine currently discharges under National Pollutant Discharge Elimination System (NPDES) Permit IL0077666.

Williamson currently has an approved Individual Section 404 Permit from the U.S. Army Corps of Engineers (USACE) and an IDNR Section 401 water quality certification for impacts associated with the new refuse disposal area. Details of the pond designs, collection ditches, and outfall points are included in the permit submittal in the approved IDNR-OMM Permit 375 and Permit 417 applications. Included within this document are attachments that indicate mine location, general mine surface facility layout, and water quality reports for receiving streams.

The mine currently discharges to an unnamed tributary of Pond Creek at a point where 0 cubic feet per second (cfs) of flow exists upstream of the outfall during critical 7Q10 low-flow conditions. The outfalls are located between 2 miles and 7 miles from the confluence of the unnamed tributary and Pond Creek. The unnamed tributary of Pond Creek is classified as a "General Use Water". Neither the unnamed tributary of Pond Creek nor Pond Creek itself are rated under the IDNR Biological Stream Characterization (BSC) program. In 2004, it was reported by the Illinois Environmental Protection Agency (IEPA) that the Illinois Natural History Survey did not list the unnamed tributary of Pond Creek or Pond Creek itself as biologically significant streams according to the 1992 publication "Biological Significant Illinois Streams". The 1997 through 2007 revised biological data illustrated on the Biological Stream Rating Viewer did not indicate the stream was a Biologically Significant Stream. Additionally, the stream was not rated for integrity or diversity. The IDNR EcoCAT system indicated that no threatened or endangered species of aquatic life were present in the vicinity of the project area.

The unnamed tributary of Pond Creek, which is a tributary to Water Segment NG-02 of Pond Creek, is not found on the 2014 or 2016 Illinois 303(d) list. However, Pond Creek itself, Waterbody Segment NG-02, is found on the 2014 and 2016 Illinois 303(d) List. Pond Creek is listed in the 2014 and 2016 Section 303(d) list for impaired waters due to alteration in stream-side or littoral vegetative covers, chloride, dissolved oxygen, sedimentation/siltation, changes in stream depth and

velocity patterns, and loss of instream cover. The causes are listed as channelization, impacts from abandoned mine lands, loss of riparian habitat, streambank modifications/destabilization, crop production, agriculture, urban runoff/storm sewers, and dams or impoundments. The potential sources associated with the impairment are channelization, impacts from abandoned mine lands, loss of riparian habitat, streambank modifications/destabilization, urban runoff/storm sewers, agricultural, crop production, and source unknown.

Water is used in numerous mining activities and in coal processing. Therefore, water management is of the utmost importance to the success of the Mine. To manage stormwater runoff, mine infiltration water, and process wastewater in a manner that will maintain safe conditions onsite, protect aquatic resources, and allow operations to continue at the mine, Williamson is proposing to:

1. Construct a new outfall to the Big Muddy River to discharge process water and infiltration water. The process water and mine infiltration water will no longer be discharged to the unnamed tributary to Pond Creek. The outfall structure will be a multi-port diffuser and a mixing zone is being requested for the discharge; and
2. Construct a new outfall directly to Pond Creek to discharge stormwater from the existing sediment ponds and a mixing zone is being requested for the discharge.

Williamson is submitting this Antidegradation Assessment Report as part of the following NPDES permit activities:

1. A renewal application for NPDES Permit IL0077666;
2. Request a permit modification and a proposed mixing zone for discharge of mine infiltration water and process wastewater through a multi-port diffuser outfall that will discharge to the Big Muddy River; and
3. Request a mine permit modification to include a new outfall to Pond Creek for the discharge of stormwater from existing sediment ponds. This permit modification includes a total reduction of chloride loading to Pond Creek and is demonstrated in this application.

This Antidegradation Assessment Report addresses the potential loading to the Big Muddy River and Pond Creek, characteristics of the streams and discharges, benefits of the project, and treatment alternatives. This report follows the outline presented in Illinois Administrative Code Title 35 Part 302.105.

SECTION 2
CURRENT PLANT OPERATIONS AND WATER MANAGEMENT

Water is used by the Mine in two areas of the operation. The Mine uses water in the coal extraction process to suppress dust and to wash the coal in the Preparation Plant. Concurrently, mine infiltration water is removed from the mine to protect workers and allow mining to occur.

The water used in the coal extraction process is fresh, untreated water purchased from the City of Johnston City, Illinois. The purchased water is pumped to Pond 005. During mining operations, the water from Pond 005 is pumped to the mine to extract coal. After use during the coal extraction process, this water is not recoverable.

Raw coal is separated from rock in the Preparation Plant. The larger rocks that are mined are screened off from the incoming feed to the Preparation Plant where they are deposited onto the refuse belt. This material is used to construct the coarse refuse embankment.

Water used to wash the coal in the Preparation Plant comes from the Fresh Water Lake. The fine material ultimately ends up at the thickener units. The thickener units attached to the Preparation Plant require approximately 1,600 gallons per minute (gpm) of incoming water while in operation. The makeup water required for the thickener units is pumped to the plant from the Fresh Water Lake. The underflow from the thickeners is pumped to the Slurry Impoundment/Refuse Disposal Area (RDA) No. 3.

Over time, the fine solid particles present in the thickener underflow that is pumped to the Slurry Impoundment/RDA No. 3 settle to the bottom of the impoundment leaving clarified water on the surface. The clarified water is able to be recycled by pumping it from the impoundment back to the Fresh Water Lake where it can be pumped into the Preparation Plant and reused in the process. As a result, the majority of the wash water is recovered.

There is some loss of water during the washing process. Additionally, since the fines do not all settle immediately in the slurry impoundment, the quality of the clarified water results in a need for additional water for the Preparation Plant. Therefore, Preparation Plant water is supplemented with mine infiltration water and/or stormwater.

An aquifer above the coal seam has caused an influx in water into the Mine (infiltrating groundwater). It is necessary to remove the water from the mine to protect the health and safety of the workforce, as well as, the overall mining operation. The Mine currently has an excess of water onsite due to the infiltrating groundwater. To manage this excess water, the Mine utilizes the infiltrating groundwater during the coal washing processes. Currently, the Mine is discharging a limited amount of excess water through Outfall 006 in compliance with effluent limits; however, this

is a temporary arrangement until a long term solution can be reached. This discharge does not meet the needs of operations to maintain a safe amount of water onsite due to the limited amount of water that can be discharged to the local streams.

There are two currently inactive slurry impoundments at the Mine. These slurry impoundments are referenced as RDA No. 1 and RDA No. 2. These impoundments still collect stormwater; however, they are no longer receiving slurry from the Preparation Plant.

The Water Flow Diagram for the current operations is presented in Figure 1-2. Below is a description of the current water use during mining operations.

Saline Infiltrating Groundwater

Groundwater seeps into the mine from an overlaying saline aquifer. The infiltrating groundwater is from a saline zone and the chloride and sulfate content of this water typically exceeds the water quality standard allowed to be discharged into receiving waters. The chloride concentration values of the mine water range between 1,099 mg/L and 2,799 mg/L, depending on the location of the water underground. The average chloride concentration of the samples taken is 2,237 mg/L. The sulfate concentration of the infiltrating water also depends upon the location of the water underground. The sulfate values range between 1,720 mg/L and 2,120 mg/l. The average sulfate concentration of the samples taken is 1,940 mg/L.

The infiltrating groundwater is pumped from the mine to the Fresh Water Lake for use in the Preparation Plant. Surplus mine water that cannot be utilized in the Preparation Plant is stored in the sealed areas of the mine (if/when possible), the Slurry Impoundment/RDA No. 3, or the Water Holding Cell.

The mine has recently experienced a total surplus of water due to an excess of infiltration water. This is most likely due to the fact that the active mining district is currently in the area in which the overlying water bearing sandstones have the greatest thickness and closest proximity to the coal seam, producing an increased amount of infiltration water that must be removed from the mine. This water must be properly managed onsite through a water management system.

The current total daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2,700,000 gallons per day (gpd). Approximately 2,237,000 gpd of the mine infiltration water is currently required to be pumped out of the current active District No. 2 area of the mine snd an average of approximately 463,000 gpd is currently being pumped out of the sealed District No. 1 area. Water must be pumped out of the sealed area to keep water off of the seals in accordance with the mine's approved Ventilation Plan. The water in the sealed area of District 1 acts as a water holding reservoir with approximately 1 billion gallons of storage and can be managed as long as it is not impounded against the mine seals. This area is currently at or near capacity and cannot be used to properly manage the water unless the ability to dewater into a mixing zone exists.

The mine infiltration water is pumped from the mine to the surface where it is then pumped to the Preparation Plant. During normal coal processing operations, the Preparation Plant requires

approximately 2,300,000 gpd. Not taking into account stormwater or clarified decant water, this leaves an average daily surplus of approximately 400,000 gpd of mine water. Surplus mine water that cannot be utilized in the Preparation Plant is stored in the sealed area(s) of the mine, if and when possible, the Slurry Impoundment/RDA No. 3, or the Water Holding Cell. Due to the finite capacities of the sealed area(s), the Slurry Impoundment/RDA No. 3, and the Water Holding Cell, a mixing zone is being requested in the Big Muddy River to optimize the water management system onsite. An inability to dispose of water infiltrating the mine poses a serious safety risk to the miners working underground, a serious environmental risk in holding back water properly, and a serious risk of property damage due to the potential of flooding the mine, which has cost hundreds of millions of dollars to develop.

Ponds 001, 002, 003, 004

Ponds 001, 002, 003, and 004 collect stormwater runoff from undeveloped areas, the mine yard, the raw coal pile, and access roads. Solids settle in the ponds prior to discharge. Because of the quality of the stormwater, water collected in these ponds is the preferred source of water for the Preparation Plant. If needed to control water levels in the ponds at appropriate levels, water can be discharged from the ponds to an unnamed tributary of Pond Creek via Outfalls 001, 002, 003, and 004, respectively. If additional water is needed at the Preparation Plant, water from the ponds can be pumped to the Fresh Water Lake.

Pond 005

Pond 005 collects stormwater runoff from undeveloped areas, the clean coal pile, and access roads. Solids settle in the ponds prior to discharge. In addition to the stormwater runoff, water from the Johnson City Lake is pumped to Pond 005 at a rate of 0.72 million gallons per day (mgd) to supply water for mining operations. If needed to control water levels in the ponds at appropriate levels, water can be released to an unnamed tributary of Pond Creek via Outfall 005.

Pond 006

Pond 006 receives stormwater runoff from the raw coal pile and from the Water Holding Cell during precipitation events. Solids settle in the pond prior to discharge. Water can be pumped from Pond 006 to the Fresh Water Lake, if necessary to supply water to the Preparation Plant. Water can be discharged from Pond 006 to an unnamed tributary of Pond Creek via Outfall 006 if needed to maintain appropriate water levels in the ponds. Outfall 006 is currently maintained such that discharges only occur during precipitation events.

Pond 007/008

The stormwater runoff from the slopes of RDA No. 1 and RDA No. 2 is collected in Pond 007/008. The underdrain from the currently inactive slurry impoundments discharges a small quantity of water to Pond 007/008. Solids settle in the ponds prior to discharge. Water from this pond can be pumped to the Fresh Water Lake. If needed, excess water in Pond 007/008 can be discharged through Outfalls 007 and 008 to an unnamed tributary of Pond Creek if needed to

maintain appropriate levels in the ponds.

Pond 009

The stormwater runoff from the slopes of the RDA No. 3 is collected in Pond 009. Construction of Pond 009 was approved in Permit No. 2015-MA-3432. Currently, the pond does not have a NPDES permit to discharge from Outfall 009 and a permit modification request is being submitted to allow discharge from Pond 009 to Pond Creek. Solids settle in the pond prior to discharge. Water from this pond must be pumped to the Fresh Water Lake where it can be used in the Preparation Plant as process water. Currently, water from Pond 009 can also be pumped to the Slurry Impoundment/RDA No. 3. While stormwater can be utilized effectively for process water, sending all of the stormwater from the refuse facilities to the Fresh Water Lake for a long term solution is not feasible. Water would continue to build at the site and, over time, would be significantly detrimental to the operation. Excess stormwater must be discharged for the mine to continue operation. Williamson is requesting a permit modification to be able to directly discharge Pond 009 to the Pond Creek mixing zone as described in this Antidegradation Assessment Report.

Fresh Water Lake

The Fresh Water Lake collects water to be used in the Preparation Plant. The water must be maintained at a certain level for operation of the Plant. The pond receives water from the stormwater ponds, Ponds 001-004, 006-009 and Water Holding Cell. If needed to maintain appropriate water level in the active Slurry Impoundment and Water Holding Cell, mine infiltration water can be pumped to the Fresh Water Lake.

Slurry Impoundment/RDA No. 3 (East of Dwina Refuse Area)

The Slurry Impoundment/RDA No. 3 receives coarse and fine coal refuse from the Preparation Plant. The currently active Slurry Impoundment/RDA No. 3 may also receive water directly from the Preparation Plant. Pond 009 may also be pumped to the Slurry Impoundment/RDA No. 3 for temporary storage of stormwater if this water cannot be discharged through the respective pond outlets. The solids in the process water are allowed to settle in the impoundment. Decant water from the active Slurry Impoundment is pumped to the Water Holding Cell to stage the water prior to being pumped to the Fresh Water Lake. During precipitation events, decant water can be pumped to Pond 006 to maintain appropriate water levels in the impoundment.

Currently Inactive Slurry Impoundments/RDA No. 1 and RDA No. 2

RDA No. 1 and RDA No. 2 are currently inactive refuse disposal areas in which coarse and fine refuse are not currently being placed. However, coarse refuse is placed on the east side of RDA No. 1 and RDA No. 2 to create the west embankment for RDA No. 3. Stormwater that collects in RDA No. 1 and RDA No. 2 is pumped to the Fresh Water Lake. Stormwater runoff from the slopes of these impoundments flows to Ponds 007/008 and the underdrain from these impoundments is also connected to these ponds. To date, 21 acres of slope have been reclaimed, decreasing constituent loadings to Ponds 007/008. This is illustrated in Figure 1-1.

Water Holding Cell

Mine infiltration water is sent to the Water Holding Cell. Decant water can be pumped from the active Slurry Impoundment to the Water Holding cell if needed to maintain appropriate water levels in the impoundment. From the Water Holding Cell, water is sent to the Fresh Water Lake to be utilized in the Preparation Plant. Water may be pumped from the Water Holding Cell to Pond 006, but only during precipitation events. Water in the Water Holding Cell is not allowed to directly discharge from the facility to any waterway.

SECTION 3

BIG MUDDY RIVER

302.105(F)(1)(A) RECEIVING WATER CHARACTERIZATION

The Big Muddy River is a natural channel river approximately 166 miles long. The River is dammed 103.7 miles from the Mississippi River, creating Rend Lake. The drainage area of the Big Muddy River above Rend Lake is 100.27 square miles. The Big Muddy River Basin is mainly an agricultural area of southern Illinois. Surrounding land that is not being used for agricultural purposes is generally wooded or is residential. In addition, the surrounding area contains other sub-surface coal mines including abandoned mines.

The proposed outfall will be located at approximately 37°52'37"N 89°01'49"W, and will discharge to Big Muddy River Reach Il_N-11, as shown in Figure 2-1. The outfall location will be approximately 14 miles downstream from the Rend Lake Dam and 12.5 miles downstream from Outfall 017 approved in NPDES Permit IL0078565 for Sugar Camp Energy, LLC. The Big Muddy River, Reach IL_N-11, is classified as a Category 5 stream, not supporting aquatic life and fish consumption. It has been assessed as fully supporting the following uses: primary contact and secondary contact. It has not been assessed for the following use: aesthetic quality. The Big Muddy River is listed in the 2014 Section 303 (d) list for sedimentation/siltation, sulfates, total suspended solids (TSS), mercury, and polychlorinated biphenyl (PCBs). The site is on the 2016 Section 303(d) list for impaired waters due to sedimentation/siltation, TSS, mercury, PCBs, iron, dissolved oxygen, pH, and fecal coliform.

Water Quality

The constituents of concern are those compounds for which the Big Muddy River reach is listed on the 2014 or 2016 303(d) list, there is a water quality standard and the compound is potentially found in the discharge, or the compound is on the current NPDES permit for monitoring or has a permit limit. The constituents of concern are:

- Sedimentation/siltation (cause of 2014 and 2016 303(d) listing, TSS and settleable solids are the parameters that monitor this parameter);
- Sulfates (cause of 2014 303(d) listing, water quality standard, listed in the NPDES permit);
- TSS (cause of 2014 and 2016 303(d) listing);
- Mercury (cause of 2014 and 2016 303(d) listing);
- PCBs (cause of 2014 and 2016 303(d) listing);
- Iron (cause of 2016 303(d) listing, water quality standard, and listed in the NPDES

permit);

- Dissolved oxygen (cause of 2016 303(d) listing);
- pH (cause of 2016 303(d) listing);
- Fecal coliform (cause of 2016 303(d) listing);
- Settleable solids (parameter, along with TSS, to monitor sedimentation impairment, and listed on the NPDES permit);
- Chloride (water quality standard and listed on the NPDES permit);
- Phenols (water quality standard and possibly present in discharge);
- Manganese (water quality standards and listed on the NPDES permit);
- Cadmium, copper, nickel, zinc (water quality standards and possibly present in discharge);
- Arsenic (water quality standard);
- Chromium, (water quality standard);
- Selenium, (water quality standard);
- Silver (water quality standard);
- Cyanide (water quality standard); and
- Copper (water quality standard and present in discharge).

Upon evaluation, it was determined that several of the constituents of concern do not require further analysis. The Mine's discharge has been sampled and analyzed as part of permitting requirements. Cyanide, phenols, arsenic, chromium, mercury, selenium, cadmium, zinc, and silver sampling results have been non-detect. PCBs are not expected in the Mine's discharge because the Mine was constructed more than 30 years after the ban of PCBs and it is not anticipated that any activities would use PCBs. Fecal coliform is another constituent that is not expected to be present in the discharge. Because the discharge is from mining operations, it is not expected to have an impact on dissolved oxygen levels in the receiving stream. Therefore, the proposed discharge will not further impair the Big Muddy River for these potential constituent of concern and these constituents are not discussed further below.

Background for the Big Muddy River upstream of the proposed discharge location will be influenced by the recently permitted, but not yet operational, discharge from the upstream Sugar Camp Mine. For this antidegradation analysis and the mixing zone evaluation performed during the conceptual design of the diffuser, background concentrations were estimated using the background concentrations for the Big Muddy River upstream of the Sugar Camp Mine, as provided by IEPA, and the estimated discharge from the Sugar Camp Mine through the recently permitted outfall location. A summary of estimated background concentrations and applicable water quality

standards and details of the analysis are presented in the Conceptual Diffuser Design Report in Attachment 1.

River Flow

The flow in the Big Muddy River at the proposed discharge location is controlled by the USACE dam at Rend Lake. The minimum flow maintained by the USACE appears to be 30 cfs, although there have been four instances with recorded flows less than 30 cfs since the installation of the dam in March 1973. In addition, the United States Geological Survey (USGS) maintains a gage at Plumfield, Illinois and the data from that gage were evaluated as well. The flow regimes, along with their respective percentage of occurrences, are presented in the Conceptual Diffuser Design Report in Attachment 1.

Mixing Zone Study

A mixing zone is allowed under the Clean Water Act and is used by many permittees to meet criteria for salts such as chloride. A conceptual design for a diffuser has been prepared for the proposed discharge to the Big Muddy River, as presented in the Attachment 1. The conceptual diffuser consists of five individually staged single-port diffusers. The diffuser design concept allows the Mine to discharge based on the flow in the River. The mixing zone size will be kept as small as possible while ensuring that water quality standards are met. All of the mixing zone criteria specified in IL Title 35 are met, including the design criteria that the maximum size of the mixing zone will be limited to less than or equal to 25% of the volume of flow or cross-sectional area.

The mixing zone modeling was conducted using chloride at a potential maximum concentration. The potential maximum concentration of 12,000 mg/L is a result of the analysis of mine infiltration water at the Sugar Camp Mine. To date, the average chloride concentration in the Pond Creek Mine's infiltration water has been found to be far less than the concentration than has been found at the Sugar Camp Mine, but this value has been used as a possible maximum in this analysis.

The mixing zone evaluation conducted as part of the diffuser conceptual design demonstrates that the water quality standard for chloride will not be exceeded if the chloride concentration in the discharge is at the potential maximum of 12,000 mg/L, the background river flow is at a minimum of 30 cfs, and the allowable discharge from the Mine is 0.23 cfs. Also, the results show that when the discharge flow is at the capacity flow for the diffuser, which is 11.1 cfs, and the chloride concentration is at the potential maximum of 12,000 mg/L, the minimum background flow that will be required in the River will be 1,469 cfs to ensure that the water quality standard for chloride is not exceeded.

302.105(F)(1)(B) INCREASES IN POLLUTANT LOADING

Discharge will only be allowed when the water quality standards as defined in IL Title 35

Subtitle C Chapter I Part 302: Water Quality Standards will be met in the Big Muddy River. To calculate predicted loadings to the Big Muddy River, samples collected from the Water Holding Cell were selected as representative concentrations for the proposed discharge. This data were used to calculate the potential loadings for chloride, sulfate, TSS, iron, manganese, nickel, and copper as discussed below. The data are presented in Table 2-1. As discussed in the Conceptual Diffuser Design Report, the discharge flow rate will be limited by chloride, as well as, the pumping rate. There are also two cases for background flows. In the first case, the minimum flowrate is equal to the minimum flow from Rend Lake as set by USACE, 30 cfs. In the second case, the background flow is back-calculated using the chloride discharge conditions at the maximum pump rate. The estimated loadings are discussed below.

Estimated Chloride Loading

A range of potential loadings of chloride at the edge of the mixing zone has been calculated and presented in Table 2-2. The components of the estimated background were the upstream background 90th percentile value of the chloride concentration data provided by IEPA, 30.1 mg/L, and two estimated concentrations for the Sugar Camp Mine discharge, resulting in two cases that were analyzed. The modeling results indicate that the dispersion needed to meet the chloride water quality standard with a background concentration of 31.2 mg/L ranges from 3.6 to 25.5. The target dispersion needed for chlorides at the maximum theoretical concentration from the Mach Mine facility ranges from 25.5:1 to 34.0:1. The range of downstream loadings for these dispersion scenarios that will meet the water quality standard at the edge of the mixing zone is then calculated as 19,141 lbs/day to 183,585 lbs/day for the 31.2 mg/L background concentration and 24,456 lbs/day to 1,197,698 lbs/day for the 151 mg/L background concentration.

Estimated Sulfate Loading

A range of potential loadings of sulfate was calculated using the same background flow and allowable discharge flow determined during the modeling for chloride, as shown in Table 2-3. The minimum and maximum background flows are 30 and 1,093 cfs for the 40.5 mg/L background concentration 30 and 1,469 cfs, for the 60.1 mg/L background concentration, respectively. The allowable discharge minimum and maximum flows, as calculated for chloride, are 1.1 and 11.1 cfs, respectively. A minimum, average, and maximum sulfate discharge concentration that have been found in samples collected from the Water Holding Cell of 820 mg/L, 1,741 mg/L, and 2,120 mg/L were used in the calculation. The range of downstream loadings for these scenarios, that will also meet the water quality standard at the edge of the mixing zone, is 19,515 to 238,643 lbs/day for the 40.5 mg/L background concentration and 9,720 to 476,031 lbs/day for the 60.1 mg/L background concentration.

Estimated TSS Loading

The reach is impaired due to sedimentation/siltation and the parameter used to monitor this is total suspended solids. However, there are no water quality standards for total suspended solids. A range of potential loadings of TSS was calculated using the same

background flow and allowable discharge flow determined during the modeling for chloride, as shown in Table 2-4. The minimum and maximum background flows were 30 and 1,469 cfs, respectively. The allowable discharge minimum and maximum flows were 0.2 cfs and 11.1 cfs, respectively. Minimum, average, and maximum TSS discharge concentrations that have been found in samples collected from the Water Holding Cell of 7 mg/L, 37 mg/l, and 72 mg/L were used in the loading calculation. The Water Holding Cell samples represent a maximum probable case since they were collected prior to settling. Experience at other sites show that non-detect levels can be achieved and this would be expected to be the case at the Pond Creek Mine. The range of downstream loadings for these scenarios is 2,337 lbs/day to 118,332 lbs/day.

Estimated Iron Loading

A range of potential loadings of iron was calculated using the same background flow and allowable discharge flow determined during the modeling for chloride, as shown in Table 2-5. The minimum and maximum background flows were 30 to 219 cfs for the 0.192 mg/L background concentration and 30 to 294 cfs for the 0.220 mg/L background concentration, respectively. The allowable discharge minimum and maximum flows are 1.1 cfs and 11.1 cfs, respectively. A minimum, average, and maximum iron discharge concentration that have been found in samples collected from the Water Holding Cell of 0.216 mg/L, 0.685 mg/L, and 1.835 mg/L were used in the calculation. The range of downstream loadings for these scenarios, that will also meet the water quality standard at the edge of the mixing zone, is 34 to 226 lbs/day for the 0.192 mg/L background concentration and 36 to 348 lbs/day for the 0.220 mg/L background concentration.

Estimated Manganese Loading

A range of potential loadings of manganese was calculated using the same background flow and allowable discharge flow determined during the modeling for chloride, as shown in Table 2-6. The minimum and maximum background flows are 30 to 219 cfs for the 0.194 mg/L background concentration and 30 to 294 cfs for the 0.212 mg/L background concentration, respectively. The allowable discharge minimum and maximum flows are 1.1 cfs and 11.1 cfs, respectively. A minimum, average, and maximum iron discharge concentration that have been found in samples collected from the Water Holding Cell of 0.125 mg/L, 0.204 mg/L, and 0.419 mg/L were used in the calculation. The range of downstream loadings for these scenarios, that will also meet the water quality standard at the edge of the mixing zone, is 33 to 229 lbs/day for the 0.194 mg/L background concentration and to 34 to 336 lbs/day for the 0.212 mg/L background concentration.

Nickel

A range of potential loadings of nickel was calculated using the same background flow and allowable discharge flow determined during the modeling for chloride, as shown in Table 2-7. The minimum and maximum background flows are 30 to 294 cfs for the 0.005 mg/L background concentration. The allowable discharge minimum and maximum flows are 1.1 cfs

and 11.1 cfs, respectively. A minimum, average, and maximum iron discharge concentration that have been found in samples collected from the Water Holding Cell of 0.004 mg/L, 0.008 mg/L, and 0.014 mg/ were used in the calculation. The range of downstream loadings for these scenarios, that will also meet the water quality standard at the edge of the mixing zone, is 1 to 8 lbs/day.

Copper

A range of potential loadings of copper was calculated using the same background flow and allowable discharge flow determined during the modeling for chloride, as shown in Table 2-8. The minimum and maximum background flows are 30 to 294 cfs for the 0.005 mg/L background concentration. The allowable discharge minimum and maximum flows are 1.1 cfs and 11.1 cfs, respectively. A minimum, average, and maximum iron discharge concentration that have been found in samples collected from the Water Holding Cell of 0.011 mg/L, 0.023 mg/L, and 0.032 mg/ were used in the calculation. The range of downstream loadings for these scenarios, that will also meet the water quality standard at the edge of the mixing zone, is 1 to 8 lbs/day.

302.105(F)(1)(C) PURPOSE & SOCIAL/ECONOMIC BENEFITS

Williamson commenced construction of the Mine in July 2005 and the first coal was produced in 2006. The current estimated annual clean coal production is 5 to 6 million tons per year. The mine has a life expectancy of more than 10 years. The Mine has one longwall and two continuous miner units. The Preparation Plant facilities are capable of processing 2,000 raw tons per hour. The productive capacity of this mine is in excess of 7 million clean tons per year. Coal is shipped by rail, truck and barge (via railroad).

The purpose of this project is to allow the continued operation of a longwall coal mine that employs many persons and provides a significant contribution toward the energy security of our nation. The Mine makes a substantial contribution to the local community, as well as, to the region, through economic benefit and employment opportunities. The following is a discussion of the importance of the Mine from an economic and social development perspective with emphasis on the negative effect should the Mine be unable to continue operation.

Illinois ranks fifth among the states producing coal in the United States. Many other coal producing states have experienced declining coal production in the last few years. Illinois, however, is actually producing at a rate in excess of 2013 with production up by approximately 5.6% by the end of the year. Illinois coal mining ended the year of 2015 with clean coal production in excess of 56 million tons.

Assuming an average price of $50 per ton, the State's 2014 coal production generated $2.6 billion in gross revenues for the State's producers. Illinois has the largest reported bituminous coal resources with almost 25% of our nation's reserves according to the Illinois Coal Association (ICA). Illinois coal is classified as bituminous with energy content ranging from 10,000 to 14,000 Btu/lb and is said to contain more energy than the oil reserves of Saudi Arabia and Kuwait combined. The coal industry remains a mainstay of the economy in

downstate Illinois. For many decades, coal mining has been a major impact on the employment of Illinoisans, on their culture, and on their communities.

The Mine directly employs 203 full time personnel with an annual payroll of approximately $18 million. In addition to these 203 direct employees, it is estimated that another 100 persons are employed in daily work associated with the Mine's production. This includes truck drivers, supply and support personnel, train crews, and technical personnel. According to ICA, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job, an additional 609 persons are employed as a result of this Mine. All told, approximately 912 persons should enjoy continued employment by the continuation of mining at this site.

Employment statistics indicate that the current average unemployment rate for Williamson County is at 7.5%. The estimated available work force is 31,936 persons and, therefore, 2,400 persons are unemployed. Due to the relatively high rate of unemployment in the County, and the small labor force base, the importance of the continued operation of this Mine on the economy of the county and the region is significant.

Total labor and benefits provided to employees that translate to money infused directly into the local economy is approximately $10 million per year. Supplies and services purchased from local and regional vendors results in expenditures of about $25 million per year. This expenditure includes items such as equipment, maintenance, fuel, tires, equipment supplies, oil, filters, rock dust, roof bolts, cribbing, props, and numerous miscellaneous supply and service items. Estimated annual coal sales related costs paid by the Mine is approximately $3 million which includes state and local tax shares, but does not include mineral reserve and sales related royalties. The estimated real estate tax totals approximately $1.3 million per year. The total local, state, and federal revenues generated by the continuation of this Mine are approximately $78 million annually.

Summarizing, continuation of mining and coal sales at the Mine will benefit the local community in many ways including the employment of approximately 912 people and local and regional economic development. Coal mined at the site will provide economic benefits that are necessary to power the state and national economy and assist in improving the quality of life for the citizenry. The benefit to the local, state, and regional social climate and economic development provided by continuation of mining at this location clearly justifies the changes in Mine operations and resulting discharge of waters from this Mine.

302.105(F)(1)(D) ALTERNATIVES ANALYSIS – CHLORIDES, SULFATES, MANGANESE, COPPER, A N D IRON

Alternative 1: Proposed Alternative – Discharge to the Big Muddy River

Williamson is proposing to add two additional outfalls, one to the Big Muddy River that will

discharge through as diffuser structure and the second to Pond Creek, in an effort to maintain water quality in the receiving streams and maintain safe operating conditions in the ponds on-site. The new Pond Creek outfall is described in the Pond Creek section of this Antidegradation Assessment Report. The details of the design and operation of the Big Muddy River outfall is provided in the Diffuser Conceptual Design Report, provided in Attachment 1. In summary, the Mine is proposing an engineered solution that will provide enhanced mixing for the discharge of the excess water onsite to the Big Muddy River through a diffuser. In addition, a pipeline will be constructed to discharge the Mine's process water and infiltration groundwater to the Big Muddy River. This alternative is considered the most effective based on the construction and operation costs and ability to meet the water management needs for the Mine, as well as, water quality in both the Big Muddy River and Pond Creek.

The volume of water discharged to the Big Muddy River will be dependent upon the flow in the Big Muddy River and the chloride concentration of the water in the Water Holding Cell and the chloride concentration coming downstream for a similar discharge that has been accounted for in the calculations.

The typical water flow diagram for the proposed operations is presented in Figure 2-2. The proposed typical water management process is described below.

Saline Infiltration Groundwater

An anticipated maximum flow rate of infiltration water from the mine of 3.5 mgd will continue to be managed through water management processes. Mine infiltration water will be pumped to the Water Holding Cell for discharge through the diffuser at Outfall 011. As an alternative, the infiltration water can be pumped to the Freshwater Lake for use in the Preparation Plant.

Ponds 001, 002, 003, and 004

Ponds 001, 002, 003, and 004 will continue to collect stormwater runoff from undeveloped areas, the mine yard, the raw coal pile, and access roads. Solids settle in the ponds prior to discharge. Because of the quality of the stormwater, water collected in these ponds is the preferred source of water for the Preparation Plant. In the proposed alternative, they will continue to serve as the preferred source of make-up water to the Preparation Plant. If additional water is needed at the Preparation Plant, water from the ponds can be pumped to the Fresh Water Lake. If needed to control water levels in the ponds at appropriate levels, water can be discharged from the ponds to an unnamed tributary of Pond Creek via Outfalls 001, 002, 003, and 004, respectively.

Pond 005

Pond 005 will continue to collect stormwater runoff from undeveloped areas, the clean coal pile, and access roads. Solids settle in the pond prior to discharge. In addition to the stormwater runoff, water from the Johnson City Lake will continue to be pumped to Pond 005 at a rate of 0.72 million gallons per day (mgd) to supply water for mining operations. If needed to control water

levels in the ponds at appropriate levels and if water quality standards will be met, water can be released to an unnamed tributary of Pond Creek via Outfall 005.

Pond 006

Pond 006 will continue to receive stormwater runoff from the raw coal pile, but will no longer receive water from the Water Holding Cell during precipitation events. Solids settle in the pond prior to discharge. Water can be pumped from Pond 006 to the Fresh Water Lake, if necessary to supply water to the Preparation Plant. Water can be discharged from Pond 006 to an unnamed tributary of Pond Creek via Outfall 006 if needed to maintain appropriate water levels in the ponds.

Pond 007/008

The stormwater runoff from the slopes of the currently inactive slurry impoundments, RDA No. 1 and RDA No. 2, will continue to be collected in Ponds 007/008. The underdrain from the inactive slurry impoundments will also continue to discharge to Ponds 007/008. Solids settle in the ponds prior to discharge. Water from these ponds will be pumped to Pond 009. Water may also be pumped to the Fresh Water Lake. If needed, excess water in Ponds 007/008 can be discharged through Outfalls 007 and 008 to an Unnamed Tributary of Pond Creek if needed to maintain appropriate levels in the ponds if water quality standards will be met in the receiving stream.

Pond 009

The stormwater runoff from the slopes of the active Slurry Impoundment/RDA No. 3, is collected in Pond 009. Construction of Pond 009 was approved in Permit No. 2015-MA-3432. Currently, the pond does not have a NPDES permit to discharge from Outfall 009 and a permit modification request is being submitted to allow discharge from Pond 009 to Pond Creek. Solids settle in the pond prior to discharge. Excess water from this pond must be pumped to the Fresh Water Lake where it can be used in the Preparation Plant as process water. Currently, water from Pond 009 can also be pumped to the active Slurry Impoundment/RDA No. 3 While stormwater can be utilized effectively for process water, sending all of the stormwater from the refuse facilities to the Fresh Water Lake for a long term solution is not feasible. Water would continue to build at the site and, over time, would be significantly detrimental to the operation. Excess stormwater must be discharged for the mine to continue operation. Williamson is requesting a permit modification to be able to directly discharge Pond 009 to the Pond Creek mixing zone as described in the Pond Creek Section of this Antidegradation Assessment Report.

Fresh Water Lake

The Fresh Water Lake collects water to be used in the Preparation Plant. The water must be maintained at a certain level for operation of the Plant. The pond receives water from the stormwater ponds, Ponds 001-004, 006-009, Slurry Impoundment/RDA No. 3, and Water Holding Cell. If needed to maintain appropriate water level in the active Slurry Impoundment and Water Holding Cell, mine infiltration water can be pumped to the Fresh Water Lake.

Slurry Impoundment/RDA No. 3 (East of Dwina Refuse Area)

The Slurry Impoundment (RDA No. 3) will continue to receive coarse and fine coal refuse from the Preparation Plant. The solids in the process water are allowed to settle in the impoundment. Clarified decant water will be pumped directly to the Fresh Water Lake to be reused in the coal cleaning process in the Preparation Plant. Decant water may also be pumped to the Water Holding Cell to be staged prior to discharge to the Big Muddy River as described in the Big Muddy River section of this Antidegradation Assessment Report. If necessary to manage water volume on-site, the slurry impoundment may also receive mine infiltration water or water from Pond 009.

Currently Inactive Slurry Impoundment/RDA No. 1 and RDA No. 2

Coarse refuse will continue to be placed on the east side of RDA No. 1 and RDA No. 2 to create the west embankment for RDA No. 3. Stormwater that collects in RDA No. 1 and RDA No. 2 will continue to be pumped to the Fresh Water Lake. Stormwater runoff from the slopes of the inactive slurry impoundments will continue to flow to Ponds 7/8 and the underdrain from these impoundments is also connected to these ponds. To date, 21 acres of slope have been reclaimed, decreasing constituent loadings to Ponds 007/008. An additional 24 acres of slope is planned for reclamation, for a total of 45 acres of reclaimed slope. As a result, constituent loadings to Ponds 007/008 will continue to decrease. This is illustrated in Figure 1-1.

Water Holding Cell

Mine infiltration water will continue to be pumped to the Water Holding Cell. Decant water will continue to be able to be pumped from the active Slurry Impoundment to the Water Holding cell if needed to maintain appropriate water levels in the impoundment. From the Water Holding Cell, water will continue to be sent to the Fresh Water Lake to be utilized in the Preparation Plant. As part of the permit modification request, Williamson is proposing that a new outfall and diffuser structure be constructed to allow discharge from the Water Holding Cell to the Big Muddy River. The conceptual design and operation of the outfall are presented in the attached Diffuser Conceptual Design Report. As a result, process water and mine infiltration water will no longer be stored in stormwater ponds on-site.

Alternative 2: Do Not Mine

Presently, and for the foreseeable future, coal is essential to the generation of electricity in Illinois, the United States and most countries around the world. The need for low cost electricity in today's economy is essential to allow recovery from what has been termed the most serious economic downturn in our lifetimes. The coal industry is crucial to the economic health of Illinois and the country. Hundreds of millions of dollars are generated for the people of Illinois through direct mining jobs, taxes and support industry jobs.

If no mining is conducted at this site, the following economic losses are estimated to occur:

- Loss of approximately 203 direct jobs with a payroll of approximately $18 million

annually. Many of these employees are long term miners and are not currently trained for other employment. In addition to the direct employees, approximately 100 additional persons such as truck drivers, engineers, and support personnel are employed full time through operation of the mine. Further, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job (ICA), an additional 609 persons are employed as a result of this mine.

- The mining industry is vitally important to the local economy of Williamson County and the surrounding counties as well as to the region and state.
- Since over 30% of the electricity produced in the U.S. and nearly 47% of the electricity produced in Illinois comes from coal-fired plants, it is, vital to the local, state and national economy that available high quality coal be mined to maintain a continuous supply of fuel to the coal-fired plants. Economic losses beyond the local economy will occur if sufficient electricity is not provided to private and commercial energy consumers. If the Mine produced no coal, approximately 2.4 million American households' worth of energy would have to be replaced (likely at a higher cost) or foregone to meet the world's energy demand.
- The loss in tax revenue to Illinois, Williamson County, and Franklin County, both direct and indirect, would be significant, particularly when a replacement industry is unknown.

In addition, the Mine has significant resources invested in the acquisition of land, coal reserves, permitting expenses, mining equipment, and etc. in this project. The economic loss to the company should mining at the site cease would be substantial because of the significant investment in land, coal reserves, permitting expenses, and mining equipment made by the company using a business plan dependent on maximizing recovery of the coal reserve.

Considering the above economic contributions and the importance of coal to our society, the "Do Not Mine" alternative is not considered a reasonable alternative.

Alternative 3: Reverse Osmosis (RO)

RO systems treat dissolved solids. In RO, water for treatment is pumped through a closed membrane system at extremely high pressures. Purified water is produced and the salt is trapped on the membrane. The contaminants are periodically released from the membrane by backwashing at high pressure. This creates a waste stream of water with a high concentration of contaminants that is typically 25% of the flow being sent to the RO treatment system. The reject stream must still be disposed of in a responsible manner.

In a September 24, 1981 opinion adopting rules relating to total dissolved solids (TDS), chlorides, and sulfates, the Board considered RO impractical because of technologies involved large amounts of energy consumption, and the concentrated brines which still required ultimate disposal See In Re: Proposed Amendments to Title 35, Subtitle D, 1983 WL 486412, at *3. Thus, the Board concluded that "no economically reasonable treatment [is] available for TDS

discharges, [and] compliance with the water quality standards depends on process changes and location close to large rivers with adequate dilution." (Id) In 2007, in PCB case number R07-09, the IEPA's reasoning for its new sulfate rules, which the PCB adopted, states, "At mines, the best degree of treatment is provided by collecting site drainage, which is relatively high in suspended sediments, into treatment ponds where settling occurs. The treated water is then discharged into water bodies where a significant amount of water from the un-mined watershed also enters the stream during the discharge, thus providing the necessary dilution to ensure compliance with applicable standards." Likewise, IEPA considers "[s]ulfate [as] part of a small group of substances for which treatment is usually infeasible and for which mixing becomes an important option in regulation. The other common substances for which treatment does not exist are chloride, boron and fluoride." Testimony of Bob Mosher, R07-09, p. 3-4. "Sulfate and other dissolved salts [] are not amenable to treatment." (Id, p. 22).

One of the primary reasons RO is not feasible for these dissolved constituents is the waste stream that is created. As recently as 2012, in a rulemaking related to boron and fluoride, "IEPA indicated the drawback to reverse osmosis was the production of a high concentration waste requiring disposal." IN THE MATTER OF: TRIENNIAL REVIEW OF WATER QUALITY STANDARDS FOR BORON, FLUORIDE AND MANGANESE: AMENDMENTS TO 35 ILL. ADM. CODE 301.106, 302.SUBPARTSB, C, E, F AND 303.312, 2012 WL 6851776, at *26. Because of this complication, "in every case for site-specific water quality standards or adjusted standards brought before the Board, **Illinois EPA has concluded that no reasonable treatment exists.**" (Id.)

In conclusion, the process is very expensive, and reliability and longevity are unknown. Considering the above, RO technology, is not considered either applicable or feasible as a treatment system for the operation of the Mine as a long-term solution.

Alternative 4: Deep Well Injection of the Mine Infiltration Water

The mine infiltration water could be discharged directly to a deep well. Considering the cost and operational difficulties that can be experienced when attempting to discharge to a deep well, deep well injection of the mine infiltration water is not considered either applicable or feasible for the operation of the Mine.

Alternative 6: Evaporation

The groundwater could be evaporated, leaving a TDS residue in a constructed evaporation pond. Criteria for design include being located in a moisture deficient area, sufficient surface area to evaporate the total annual waste water volume plus precipitation that would fall on the pond, using the maximum wet year, and using the minimum evaporation year of record. Evaporation ponds require large land areas, and the area would not be expected to be productive once it is used for this purpose (salt accumulation). It is recommended that the land for this system be naturally flat or the pond be designed to provide a uniform depth, and that a large land area be available. The current anticipated maximum flow rate for the collection of the

groundwater is 3.5 mgd. Given the amount of water to be evaporated and the need to ensure that there are no overflows, the evaporation ponds would need to be extremely large and therefore, costly to construct. The area is not considered moisture deficient. Therefore, this method is not ideal for use in this region. Therefore, this option is not considered either applicable or feasible for the operation of the mine because of the design criteria and cost to construct. In discussions with the IEPA, a salt water pond would not be desired by the Agency. This would make permitting this option problematic.

Alternative 7: Mechanical Evaporation

Mechanical evaporation could be used to reduce the groundwater volume. Mechanical evaporation uses high temperature and pressure to remove the water. The recovered water (55 to 60%) would be of high quality and could be used onsite. The concentrated TDS brine stream (40 to 45%) can be converted to salt cake (see Crystallization) or disposed in an Injection Well. The salt cake would then be disposed in a landfill. The equipment is expensive to construct/install, operate, and maintain. The energy usage of such an apparatus makes its environmental benefits negligible, in the very best case. Also, there would be materials to dispose of either in a landfill or in the Injection Wells that have been found to be unreliable for nearby mines. Therefore, this option is not considered either applicable or feasible for the operation of the Mine.

Alternative 8: Crystallization

Crystallization is the process that converts the concentrated TDS brine generated in the mechanical evaporator or reverse osmosis process to a salt cake. This process offers an alternative to the underground injection of the salt reject stream from a reverse osmosis or mechanical evaporator system.

It is possible that the salt cake can be sold, but it is more likely that it will be disposed in a landfill. Crystallization equipment is expensive to construct/install, operate and maintain. Mobile evaporator units are available. The cost is estimated at $0.25/gallon. Therefore, this option is not considered either applicable or feasible for the operation of the Mine.

Alternative 9: Cost Effective Sulfate Removal (CESR) Process

CESR is a proprietary technology developed to improve sulfate removing technology. It is a four step process as follows 1) the addition of hydrated lime to the feed water to precipitate gypsum, 2) the non-hazardous gypsum sludge is removed by dewatering and filtration. Step two involves additional liming to raise the pH to 10.5 and results in the precipitation of dissolved metals as metal hydroxides which is also removed by dewatering and filtration, 3) additional liming to increase pH to 11.5 and the addition of a proprietary reagent to precipitate ettringite, and 4) Reducing the pH with CO2 to meet local discharge criteria. This step also involves clarification with accompanying sludge removal from the clarifier.

With additional consideration to the extreme complexity and unproven theory aspect of this technology, it is considered impractical for use at the Mine because 1) each precipitation

step is time consuming and would require the use of large amounts of land 2) infrastructure costs, including the installations of tanks and storage handling equipment is high, this proprietary technology is still being developed and is cost-prohibitive at this time, 4) this technology is plagued by severe scaling and precipitation of minerals, 5) the very large amounts of resultant sludge would need to be disposed of as solid or hazardous waste, 6) the water treated in this system has a high specific conductivity and a high concentration of total dissolved solids, and 7) there is a high supervision and maintenance requirement to use this technology. Moreover, it is not proven to remove the primary constituent of concern in this instance – chlorides. This process would exacerbate the TDS concentration without materially reducing chloride concentrations and is therefore not a feasible option.

Alternative 10: Coagulation (Chemical) Precipitation

This process consists of the addition of alkaline chemicals to acid mine effluent to induce metals, such as iron and manganese, to precipitate and to reduce acidity. Chemicals typically used include hydrated lime, limestone, soda ash, caustic soda and ammonia. Variables that are considered in the design and application of such a system include the level of acidity, suspended solids, iron and manganese concentrations, and flow rates.

Concerns with the use of chemical precipitation at the proposed coal mine include 1) worker safety regarding the chemicals to be used, 2) treatment cost, 3) process operation and maintenance, 4) disposal of precipitate sludge in a landfill possibly considered a hazardous substance, 5) necessity of such treatment considering that acid water is not considered a factor for the proposed operation, 6) susceptibility to system malfunction due to high volume flows from storm events, 7) improbability of actual improvement in overall water quality when compared to the use of sedimentation ponds. This process would also exacerbate the TDS concentration without materially reducing chloride concentrations.

Considering the above, the use of this technology is considered inappropriate at the Mine.

Alternative 11: Supervac

Supervac is a technology to handle solid wastes and sludge that result from other water treatment technologies. This technology would be appropriate only in conjunction with another water treatment technology. This technology would not be feasible for use at the Mine because it is not a stand-alone water treatment technology.

302.105(f)(1)(D) ALTERNATIVES ANALYSIS – TOTAL SUSPENDED SOLIDS, TOTAL SETTLEABLE SOLIDS, AND SEDIMENTATION/SILTATION

Alternative 1: Proposed Alternative – Discharge to the Big Muddy River

Williamson is proposing to add two additional outfalls, one to the Big Muddy River that will discharge through as diffuser structure and the second to Pond Creek, in an effort to maintain water quality in the receiving streams and maintain safe operating conditions in the ponds on-site. The

new Pond Creek outfall is described in the Pond Creek section of this Antidegradation Assessment Report. The details of the design and operation of the Big Muddy River outfall is provided in that attached Diffuser Conceptual Design Report, provided in Attachment 1. In summary, the Mine is proposing an engineered solution that will provide enhanced mixing for the discharge of the excess water onsite to the Big Muddy River through a diffuser. In addition, and pipeline would be constructed to discharge the Mine's process water and infiltration groundwater to the Big Muddy River. This alternative is considered the most effective based on the construction and operation costs and ability to meet the water management needs for the Mine, as well as, water quality in both the Big Muddy River and Pond Creek.

The volume of water discharged to the Big Muddy River will be dependent upon the flow in the Big Muddy River and the chloride concentration of the water in the Water Holding Cell and the chloride concentration coming downstream for a similar discharge that has been accounted for in the calculations.

The typical water flow diagram for the proposed operations is presented in Figure 2-2. The proposed typical water management process is described below.

Saline Infiltration Groundwater

An anticipated maximum flow rate of infiltration water from the mine of 3.5 mgd will continue to be managed through water management processes. Mine infiltration water will be pumped to the Water Holding Cell for discharge through the diffuser at Outfall 011. As an alternative, the infiltration water can be pumped to the Freshwater Lake for use in the Preparation Plant.

Ponds 001, 002, 003, and 004

Ponds 001, 002, 003, and 004 will continue to collect stormwater runoff from undeveloped areas, the mine yard, the raw coal pile, and access roads. Solids settle in the ponds prior to discharge. Because of the quality of the stormwater, water collected in these ponds is the preferred source of water for the Preparation Plant. In the proposed alternative, they will continue to serve as the preferred source of make-up water to the Preparation Plant. If additional water is needed at the Preparation Plant, water from the ponds can be pumped to the Fresh Water Lake. If needed to control water levels in the ponds at appropriate levels, water can be discharged from the ponds to an unnamed tributary of Pond Creek via Outfalls 001, 002, 003, and 004, respectively.

Pond 005

Pond 005 will continue to collect stormwater runoff from undeveloped areas, the clean coal pile, and access roads. Solids settle in the pond prior to discharge. In addition to the stormwater runoff, water from the Johnson City Lake will continue to be pumped to Pond 005 at a rate of 0.72 million gallons per day (mgd) to supply water for mining operations. If needed to control water levels in the ponds at appropriate levels, and if water quality standards will be met, water can be released to an unnamed tributary of Pond Creek via Outfall 005.

Pond 006

Pond 006 will continue to receive stormwater runoff from the raw coal pile, but will no longer receive water from the Water Holding Cell during precipitation events. Solids settle in the pond prior to discharge. Water can be pumped from Pond 006 to the Fresh Water Lake, if necessary to supply water to the Preparation Plant. Water can be discharged from Pond 006 to an unnamed tributary of Pond Creek via Outfall 006 if needed to maintain appropriate water levels in the ponds.

Ponds 007/008

The stormwater runoff from the slopes of the currently inactive slurry impoundments, RDA No. 1 and RDA No. 2, will continue to be collected in Ponds 007/008. The underdrain from the inactive slurry impoundments will also continue discharge to Ponds 007/008. Solids settle in the ponds prior to discharge. Water from these will be pumped to Pond 009. Water may also be pumped to the Fresh Water Lake. If needed, excess water in Ponds 007/008 can be discharged through Outfalls 007 and 008 to an unnamed tributary of Pond Creek if needed to maintain appropriate levels in the ponds if water quality standards will be met in the receiving stream.

Pond 009

The stormwater runoff from the slopes of the active Slurry Impoundment/RDA No. 3, is collected in Pond 009. Construction of Pond 009 was approved in Permit No. 2015-MA-3432. Currently, the pond does not have a NPDES permit to discharge from Outfall 009 and a permit modification request is being submitted to allow discharge from Pond 009 to Pond Creek. Solids settle in the pond prior to discharge. Excess water from this pond must be pumped to the Fresh Water Lake where it can be used in the Preparation Plant as process water. Currently, water from Pond 009 can also be pumped to the active Slurry Impoundment/RDA No. 3 While stormwater can be utilized effectively for process water, sending all of the stormwater from the refuse facilities to the Fresh Water Lake for a long term solution is not feasible. Water would continue to build at the site and, over time, would be significantly detrimental to the operation. Excess stormwater must be discharged for the mine to continue operation. Williamson is requesting a permit modification to be able to directly discharge Pond 009 to the Pond Creek mixing zone as described in the Pond Creek Section of this Antidegradation Assessment Report.

Fresh Water Lake

Slurry The Fresh Water Lake will continue to be used to collect water to be used in the Preparation Plant. The water must be maintained at a certain level for operation of the Plant. The pond receives water from the stormwater ponds, Ponds 001-004, 006-009, Slurry Impoundment/RDA No. 3, and Water Holding Cell. If needed to maintain appropriate water level in the active Slurry Impoundment and Water Holding Cell, mine infiltration water can be pumped to the Fresh Water Lake.

Impoundment/RDA No. 3 (East of Dwina Refuse Area)

The Slurry Impoundment (RDA No. 3) will continue to receive coarse and fine coal refuse from the Preparation Plant. The solids in the process water are allowed to settle in the impoundment. Clarified decant water will be pumped directly to the Fresh Water Lake to be reused in the coal cleaning process in the Preparation Plant. Decant water may also be pumped to the Water Holding Cell to be staged prior to discharge to the Big Muddy River through Outfall 011. If necessary to manage water volume on-site, the slurry impoundment may also receive mine infiltration water or water from Pond 009.

Currently Inactive Slurry Impoundment/RDA No. 1 and RDA No. 2

Coarse refuse will continue to be placed on the east side of RDA No. 1 and RDA No. 2 to create the west embankment for RDA No. 3. Stormwater that collects in RDA No. 1 and RDA No. 2 will continue to be pumped to the Fresh Water Lake. Stormwater runoff from the slopes of the inactive slurry impoundments will continue to flow to Ponds 7/8 and the underdrain from these impoundments is also connected to these ponds. To date, 21 acres of slope have been reclaimed, decreasing constituent loadings to Ponds 007/008. An additional 24 acres of slope is planned for reclamation, for a total of 45 acres of reclaimed slope. As a result, constituent loadings to Ponds 007/008 will continue to decrease. This is illustrated in Figure 1-1.

Water Holding Cell

Mine infiltration water will continue to be pumped to the Water Holding Cell. Decant water will continue to be able to be pumped from the active Slurry Impoundment to the Water Holding cell if needed to maintain appropriate water levels in the impoundment. From the Water Holding Cell, water will continue to be sent to the Fresh Water Lake to be utilized in the Preparation Plant. As part of the permit modification request, Williamson is proposing that a new outfall and diffuser structure be constructed to allow discharge from the Water Holding Cell to the Big Muddy River. The conceptual design and operation of the outfall are presented in the attached Diffuser Conceptual Design Report. As a result, process water and mine infiltration water will no longer be stored in stormwater ponds on-site.

Alternative 2: Do Not Mine

Presently, and for the foreseeable future, coal is essential to the generation of electricity in Illinois, the United States and most countries around the world. The need for low cost electricity in today's economy is essential to allow recovery from what has been termed the most serious economic downturn in our lifetimes. The coal industry is crucial to the economic health of Illinois and the country. Hundreds of millions of dollars are generated for the people of Illinois through direct mining jobs, taxes and support industry jobs.

If no mining is conducted at this site, the following economic losses are estimated to occur:

- Loss of approximately 203 direct jobs with a payroll of approximately $18 million annually. Many of these employees are long term miners and are not currently trained for

other employment. In addition to the direct employees, approximately 100 additional persons such as truck drivers, engineers, and support personnel are employed full time through operation of the mine. Further, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job (ICA), an additional 609 persons are employed as a result of this mine.

- The mining industry is vitally important to the local economy of Williamson County and the surrounding counties as well as to the region and state.
- Since over 30% of the electricity produced in the U.S. and nearly 47% of the electricity produced in Illinois comes from coal-fired plants, it is, vital to the local, state and national economy that available high quality coal be mined to maintain a continuous supply of fuel to the coal-fired plants. Economic losses beyond the local economy will occur if sufficient electricity is not provided to private and commercial energy consumers. If the Mine produced no coal, approximately 2.4 million American households' worth of energy would have to be replaced (likely at a higher cost) or foregone to meet the world's energy demand.
- The loss in tax revenue to Illinois, Williamson County, and Franklin County, both direct and indirect, would be significant, particularly when a replacement industry is unknown.

In addition, the Mine has significant resources invested in the acquisition of land, coal reserves, permitting expenses, mining equipment, and etc. in this project. The economic loss to the company should mining at the site cease would be substantial because of the significant investment in land, coal reserves, permitting expenses, and mining equipment made by the company using a business plan dependent on maximizing recovery of the coal reserve.

Considering the above economic contributions and the importance of coal to our society, the "Do Not Mine" alternative is not considered a reasonable alternative.

Alternative 3: No Discharge of Stormwater

Considering that the area of the Mine receives in excess of 41 inches of precipitation as an annual average, often times in high intensity over short periods, total containment with no discharge of stormwater is not technically feasible. The surface area required to accomplish such a feat is massive, and would begin to crowd out other productive land uses, such as farming. Even if held through the precipitation event, there is no feasible way to perpetually store the water or consume the water in the mining operations, never discharging it. Discharges from sedimentation ponds are in accordance with applicable regulation in the State of Illinois so long as the quality of discharged water remains within the water quality parameters required.

Total elimination of stormwater discharges from the mine is not an available option.

Alternative 4: Reduce the Number of Outfalls

While combining certain outfall points from within the permit area is possible, such

combinations would not result in any improvements in receiving stream water quality. Any combination of outfalls will result in the same amount of total water discharge to the receiving streams. It is likely that the resulting water quality would remain the same as the total of the water quality from the planned discharge points.

Since a reduction in the number of outfalls will not result in improvement in water quality or quantity, this option is ruled out for further consideration.

Alternative 5: Use Alternative Control and Treatment Devices

Alternatives to the use of sediment control ponds exist for control of discharge of settleable solids. Such alternatives include chemical soil stabilizers, erosion control blankets, geotextile filter bags, fiber rolls, silt fencing, straw mulch, straw bale dikes, and temporary seeding. These measures are aimed at minimization of the generation of settable solids. Most of these measures have been used previously during the construction and operations and in accordance with the current permit, as supplemental treatment and prevention of generation of settable solids.

The use of alternative sediment control measures is considered practical and cost effective for the treatment and control of surface runoff in conjunction with sediment control ponds. However, the use of these practices to eliminate the proposed sediment control ponds is not feasible. Instead, it is being proposed that these best management practices (BMPs) be incorporated into the proposed alternative as needed.

Alternative 6: Alternate Treatment Technologies

Filtration

Filtration is a water treatment process by which discharge water is passed through a physical barrier which removes particulate matter from the water stream. Filtration of mine water and stormwater would involve installation of a very large and elaborate filtration system. These systems would remove settleable solids and produce an effluent or sludge with similar characteristics as the proposed settling ponds. The effluent or sludge would need to be disposed in a landfill or other treatment facility. It is considerably more expensive to operate a full-scale filtration system than the sediment ponds proposed for this facility. Another impracticality associated with filtration is that a relatively steady flow of water is required into the system. This is not the case for stormwater runoff from mining operations, as storm surges would need to be held for processing.

Filtration is a technology that is not feasible for the proposed facility because 1) filtration is much more expensive than sediment ponds both in initial cost and long-term maintenance and operation, 2) filtration processes require a steady stream of water for treatment which is not the case in treating stormwater runoff, 3) a large area of land would be required for such a facility, and 4) maintenance and supervision of the filtration and sludge disposal operation would be burdensome and would increase production costs.

Constructed Wetland

A constructed wetland is the use of treatment wetlands to create anaerobic and aerobic environments to remove sulfates, some metals, and other contaminants. In addition, suspended solids can be removed. Water is pumped into the wetland in a controlled flow rate and allowed to slowly travel through the system to achieve treatment.

Constructed wetlands have proven to be effective for treatment of suspended solids with several limitations. These limitations include 1) low and consistent rates of inflow, 2) eventual sludge accumulation requiring dredging and wetland reconstruction, and 3) release of hydrogen sulfide and other digestive gases into the atmosphere from sulfate digestion processes. Use of wetlands in mine stormwater runoff treatment would be limited by the enormous amount of land required to construct a wetland of sufficient size for the flow rates to be expected from such an operation.

Sugar Camp Energy and Hillsboro Energy both have pilot wetlands. These are experiments that are designed to determine if constructed wetlands will benefit an already compliant NPDES discharge. The wetlands are each designed to treat less than 100 gpm, which is a small fraction of the total mine water and stormwater managed at the operations. Even at the small flow rate, the surface area used by the wetlands is significant. Even if the wetlands can sufficiently and reliably treat effluent, the surface area required for the amount of water generated by the Mine operations including expansions is enormous and would begin to crowd out other beneficial land uses.

Even if shown to be beneficial on the small scale, it is not expected that constructed wetland can treat the volume of stormwater expected at this facility.

Coagulation (Chemical) Precipitation

This process consists of the addition of alkaline chemicals to acid mine effluent to induce metals to precipitate and to reduce acidity. However, it is not normally used to remove total suspended solids. Chemicals typically used include hydrated lime, limestone, soda ash, caustic soda and ammonia. Variables that are considered in the design and application of such a system include the level of acidity, suspended solids, iron and manganese concentrations, and flow rates.

Concerns with the use of chemical precipitation at the proposed coal mine include 1) worker safety regarding the chemicals to be used, 2) treatment cost, 3) process operation and maintenance, 4) disposal of precipitate sludge in a landfill possibly considered a hazardous substance, 5) necessity of such treatment considering that acid water is not considered a factor for the proposed operation, 6) susceptibility to system malfunction due to high volume flows from storm events, 7) improbability of actual improvement in overall water quality when compared to the use of sedimentation ponds.

Considering the above, the use of this technology is considered inappropriate at the Mine.

SECTION 4

POND CREEK

302.105(F)(1)(A) RECEIVING WATER CHARACTERIZATION

Currently, the Mine is permitted to discharge to an Unnamed Tributary of Pond Creek through eight permitted outfalls. Pond Creek is a natural stream that is approximately 62 miles long, with the site being approximately 20 miles upstream from the confluence with the Big Muddy River. Pond Creek is in the Big Muddy River Basin. The drainage area of Pond Creek is approximately 104 square miles. The Big Muddy River Basin is mainly an agricultural area of southern Illinois. Surrounding land that is not being used for agricultural purposes is generally wooded or residential. In addition, the surrounding area contains other sub-surface coal mines including abandoned mines. The discharge points in the Unnamed Tributary are located where 0 cfs flow exists upstream of the outfalls during 7Q10 low-flow conditions. The Unnamed Tributary is classified as a "General Use Water" and is not found on the 2014 or 2016 303(d) List.

The Mine proposes to add a discharge outfall to allow discharge of stormwater runoff directly to Pond Creek. The proposed outfall will be located at approximately 37°51'19"N 88°49'36"W, and will discharge to Pond Creek Reach Il_NG-02, as shown in Figure 2-1. Pond Creek, Reach Il_NG-02, is classified as a Category 5 stream, not supporting aquatic life. It has been assessed as fully supporting the following uses: primary contact and secondary contact. It has not been assessed for the following uses: fish consumption and aesthetic quality. Pond Creek is listed in the 2014 and 2016 Section 303(d) List for impaired waters due to alteration in stream-side or littoral vegetative covers, chloride, dissolved oxygen, sedimentation/siltation, changes in stream depth and velocity patterns, and loss of instream cover. The causes are listed as channelization, impact from abandoned mine lands, loss of riparian habitat, streambank modifications/destabilization, crop production, agriculture, urban runoff/storm sewers, and sources unknown.

Compounds that were evaluated and not found to be a concern, either because of the nature of the discharge or have been found to be non-detect in samples collected from the Pond 009 representative sample, are dissolved oxygen, cadmium, silver, zinc, and cyanide. For phenols, chromium, arsenic, copper, nickel, and selenium, the results show that the effluent will meet the water quality standards at the end of pipe. Therefore, the proposed discharge will not further impair Pond Creek River for any of these constituents. These compounds are not discussed in detail below. TSS, chlorides, sulfate, and manganese have been determined to be constituents of concern and are discussed further below.

Background samples from Pond Creek have been collected upstream of the influence of the current discharges to the Unnamed Tributary of Pond Creek. The background sample results and applicable water quality standards are presented in the Pond Creek Mixing Zone Report

provided in Attachment 2.

302.105(F)(1)(B) INCREASES IN POLLUTANT LOADING

Discharge to Pond Creek will only be allowed when the water quality standards as defined in IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards will be met. A mixing zone is allowed under the Clean Water Act and is used by many permittees to meet criteria for salts such as chloride. A study to determine possible allowable discharges from the Mine under different stream flows has been conducted and the findings are presented in the Mixing Zone Study Report provided in Attachment 2. The Mine is proposing to discharge effluent at rates that will meet the water quality standards at the edge of a mixing zone in Pond Creek at all times during any discharge. As shown in the findings of the study, the Mine will only discharge during or after storm events.

As described in in the Mixing Zone Study Report, the discharge flow rate from the Mine will be limited by chloride and iron. The mixing zone size will be kept as small as possible while ensuring that water quality standards are met. All of the mixing zone criteria specified in IL Title 35 are met, including the design criteria that the maximum size of the mixing zone will be limited to less than or equal to 25% of the volume of flow or cross-sectional area. To calculate the dispersion from the Mine into Pond Creek, samples collected from Pond 009 were selected as representative concentrations of the proposed discharge. Chloride and iron are the only constituents of concern that are greater than the water quality standard at the end of pipe. The predicted effluent flows to meet the chloride and iron water quality standards were used to predict the potential loading of the other constituents. Thus, it is confirmed that the predicted concentrations of the constituents of concern will be less than the water quality standards when the Mine discharges from Pond 009 under the described conditions. The loadings are presented in the report in Attachment 2.

302.105(F)(1)(C) PURPOSE & SOCIAL/ECONOMIC BENEFITS

Williamson commenced construction of the Mine in July 2005 and the first coal was produced in 2006. The current estimated annual clean coal production is 5 to 6 million tons per year. The Mine has a life expectancy of more than 10 years. The Mine has one longwall and two continuous miner units. The Preparation Plant facilities are capable of processing 2,000 raw tons per hour. The productive capacity of this Mine is in excess of 7 million clean tons per year. Coal is shipped by rail, truck and barge (via railroad).

The purpose of this project is to allow the continued operation of a longwall coal mine that employs many persons and provides a significant contribution toward the energy security of our nation. The Mine makes a substantial contribution to the local community, as well as, to the region, through economic benefit and employment opportunities. The following is a discussion of the importance of the Mine from an economic and social development perspective with emphasis on the negative effect should the Mine be unable to continue operation.

Illinois ranks fifth among the states producing coal in the United States. Many other coal producing states have experienced declining coal production in the last few years. Illinois,

however, is actually producing at a rate in excess of 2013 with production up by approximately 5.6% by the end of the year. Illinois coal mining ended the year of 2015 with clean coal production in excess of 56 million tons.

Assuming an average price of $50 per ton, the State's 2014 coal production generated $2.6 billion in gross revenues for the State's producers. Illinois has the largest reported bituminous coal resources with almost 25% of our nation's reserves according to the Illinois Coal Association (ICA). Illinois coal is classified as bituminous with energy content ranging from 10,000 to 14,000 Btu/lb and is said to contain more energy than the oil reserves of Saudi Arabia and Kuwait combined. The coal industry remains a mainstay of the economy in downstate Illinois. For many decades, coal mining has been a major impact on the employment of Illinoisans, on their culture and on their communities.

The Mine directly employs 203 full time personnel with an annual payroll of approximately $18 million. In addition to these 203 direct employees, it is estimated that another 100 persons are employed in daily work associated with the Mine's production. This includes truck drivers, supply and support personnel, train crews, and technical personnel. According to ICA, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job, an additional 609 persons are employed as a result of this Mine. All told, approximately 912 persons should enjoy continued employment by the continuation of mining at this site.

Employment statistics indicate that the current average unemployment rate for Williamson County is at 7.5%. The estimated available work force is 31,936 persons and, therefore, 2,400 persons are unemployed. Due to the relatively high rate of unemployment in the County, and the small labor force base, the importance of the continued operation of this Mine on the economy of the county and the region is significant.

Total labor and benefits provided to employees that translate to money infused directly into the local economy is approximately $10 million per year. Supplies and services purchased from local and regional vendors results in expenditures of about $25 million per year. This expenditure includes items such as equipment, maintenance, fuel, tires, equipment supplies, oil, filters, rock dust, roof bolts, cribbing, props, and numerous miscellaneous supply and service items. Estimated annual coal sales related costs paid by the Mine is approximately $3 million which includes state and local tax shares, but does not include mineral reserve and sales related royalties. The estimated real estate tax totals approximately $1.3 million per year. The total local, state, and federal revenues generated by the continuation of this Mine are approximately $78 million annually.

Summarizing, continuation of mining and coal sales at the Mine will benefit the local community in many ways including the employment of approximately 912 people and local and regional economic development. Coal mined at the site will provide economic benefits that are necessary to power the state and national economy and assist in improving the quality of life for the citizenry. The benefit to the local, state, and regional social climate and economic

development provided by continuation of mining at this location clearly justifies the changes in Mine operations and resulting discharge of waters from this Mine.

302.105(F)(1)(D) ALTERNATIVES ANALYSIS – MANGANESE, CHLORIDE, SULFATE, AND IRON

Pollutants of concern are manganese, cadmium, iron, nickel, zinc, chloride, and sulfate. Options were examined to determine whether the measures are technically feasible and economically reasonable and would result in a lesser load increase, no load increase, or minimal environmental degradation to the receiving stream. This assessment includes consideration of the following alternatives:

1. Proposed alternative – treatment in sedimentation pond, Pond 009, and discharge during storm events;
2. No mining;
3. Reverse osmosis (RO);
4. Deep well injection;
5. Evaporation;
6. Mechanical evaporation;
7. Crystallization;
8. Cost Effective Sulfate Removal (CESR);
9. Coagulation/Precipitation; and
10. Supervac.

Alternative 1: Proposed Alternative – Discharge to Pond Creek

For the proposed alternative, the Mine will continue to have the option to discharge stormwater from stormwater collection ponds to an Unnamed Tributary to Pond Creek when water quality standards in the tributary will be met. However, an additional option is proposed in order to alleviate water volume concerns while maintaining water quality in Pond Creek. The option is to construct a new outfall to be able to discharge from Pond 009 to a mixing zone in Pond Creek. As part of the overall proposed project, mine infiltration water will be able to be discharged to the Big Muddy River as described in the Big Muddy River section of this Antidegradation Assessment Report. The volume of water that will be discharged to Pond Creek will be dependent upon the flow in the Creek and the concentration of chloride and iron in Pond 009. This option is described in detail in the Mixing Zone Study Report, provided in Attachment 2. This alternative is considered the most effective based on the construction and operation costs and ability to meet the water management needs for the Mine, as well as, water quality in Pond Creek.

The proposed typical water management process is described below and summarized in

Figure 2-2.

Saline Infiltration Groundwater

As part of the permit modification request and described in the Big Muddy River section of this Antidegradation Assessment Report, mine infiltration water will be pumped to the Fresh Water Lake to be discharged to the Big Muddy River and, if needed, for use in the Preparation Plant.

Ponds 001, 002, 003, and 004

Ponds 001, 002, 003, and 004 will continue to collect stormwater runoff from undeveloped areas, the mine yard, the raw coal pile, and access roads. Solids settle in the ponds prior to discharge. Because of the quality of the stormwater, water collected in these ponds is the preferred source of water for the Preparation Plant. In the proposed alternative, they will continue to serve as the preferred source of make-up water to the Preparation Plant and water will be pumped from these ponds to the Fresh Water Lake. If needed to control water levels in the ponds at appropriate levels, water can be discharged from the ponds to an Unnamed Tributary of Pond Creek via Outfalls 001, 002, 003, and 004, respectively.

Pond 005

Stormwater runoff from undeveloped areas, the clean coal pile, and access roads will continue to be collected in Pond 5. In addition to the stormwater runoff, water from the Johnson City Lake is pumped to Pond 005 at a rate of 0.72 million gallons per day (mgd). Solids settle in the pond prior to discharge. Pond 005 supplies water for mining operations, but has the capability to discharge to the Unnamed Tributary of Pond Creek through Outfall 005. If needed to control water levels in the ponds at appropriate levels and if water quality standards will be met, water can be released to an Unnamed Tributary of Pond Creek via Outfall 005.

Pond 006

Pond 006 will continue to receive stormwater runoff from the raw coal pile, but will no longer receive water from the Water Holding Cell during precipitation events. Solids settle in the pond prior to discharge. Water can be pumped from Pond 006 to the Fresh Water Lake, if necessary to supply water to the Preparation Plant. Water can be discharged from Pond 006 to an Unnamed Tributary of Pond Creek via Outfall 006 if needed to maintain appropriate water levels in the ponds

Ponds 007/008

The stormwater runoff from the slopes of the currently inactive slurry impoundments, RDA No. 1 and RDA No. 2, will continue to be collected in Ponds 007/008. The underdrain from the inactive slurry impoundments will also continue to discharge to Ponds 007/008. Solids settle in the ponds prior to discharge. Water from these ponds will be pumped to Pond 009. Water may also be pumped to the Fresh Water Lake. If needed, excess water in Ponds 007/008 can be discharged through Outfalls 007 and 008 to an Unnamed Tributary of Pond Creek if needed to maintain appropriate levels in the ponds if water quality standards will be met in the receiving stream.

Pond 009

Construction of Pond 009 was approved in Permit No. 2015-MA-3432. However, the Mine does not have an NPDES permit to discharge from Outfall 009. As part of the project to improve water management practices on-site, a permit modification request is being submitted to allow discharge from Pond 009 to Pond Creek. The stormwater runoff from the slopes of the active Slurry Impoundment/RDA3 will continue to be collected in Pond 009. Solids settle in the pond prior to discharge. Water from this pond will continue to be pumped to the Fresh Water Lake where it can be used in the Preparation Plant as process water or to the active Slurry Impoundment/RDA3. While stormwater can be utilized effectively for process water, sending all of the stormwater from the refuse facilities to the Fresh Water Lake for a long term solution is not feasible. The volume of water would continue to build up at the site and, over time, would be significantly detrimental to mine operations. Excess stormwater must be discharged for the Mine to continue operation and, therefore, the proposed alternative includes discharge of stormwater to the Pond Creek mixing zone.

Fresh Water Lake

The Fresh Water Lake will continue to be used to collect water to be used in the Preparation Plant. The water must be maintained at a certain level for operation of the Plant. The pond receives water from the stormwater ponds, Ponds 001-004, 006-009, Slurry Impoundment/RDA No. 3, and Water Holding Cell. If needed to maintain appropriate water level in the active Slurry Impoundment and Water Holding Cell, mine infiltration water can be pumped to the Fresh Water Lake.

Active Slurry Impoundment/ RDA3 (East of Dwina Refuse Area)

The Slurry Impoundment (RDA No. 3) will continue to receive coarse and fine coal refuse from the Preparation Plant. The solids in the process water are allowed to settle in the impoundment. Clarified decant water will be pumped directly to the Fresh Water Lake to be reused in the coal cleaning process in the Preparation Plant. Decant water may also be pumped to the Water Holding Cell to be staged prior to discharge to the Big Muddy River as described in the Big Muddy River section of this Antidegradation Assessment Report. If necessary to manage water volume on-site, the slurry impoundment may also receive mine infiltration water or water from Pond 009.

Currently Inactive Slurry Impoundments/RDA No. 1 and RDA No. 2

Coarse refuse will continue to be placed on the east side of RDA No. 1 and RDA No. 2 to create the west embankment for RDA3. Stormwater that collects in RDA No. 1 and RDA No. 2 will continue to be pumped to the Fresh Water Lake. Stormwater runoff from the slopes of the inactive slurry impoundments will continue to flow to Ponds 007/008 and the underdrain from these impoundments will continue to be connected to these ponds. To date, 21 acres of slope have been reclaimed, decreasing constituent loadings to Ponds 007/008. An additional 24 acres of slope is planned for reclamation, for a total of 45 acres of reclaimed slope. As a result, constituent loadings to Ponds 007/008 will continue to decrease. This is illustrated in Figure 1-1.

Water Holding Cell

Mine infiltration water will continue to be pumped to the Water Holding Cell. Decant water will continue to be able to be pumped from the active Slurry Impoundment to the Water Holding cell if needed to maintain appropriate water levels in the impoundment. From the Water Holding Cell, water will continue to be sent to the Fresh Water Lake to be utilized in the Preparation Plant. As part of the permit modification request, Williamson is proposing that a new outfall and diffuser structure be constructed to allow discharge from the Water Holding Cell to the Big Muddy River as described in the Big Muddy River section of the Antidegradation Assessment Report. As a result, process water and mine infiltration water will no longer be stored in stormwater ponds on-site.

Alternative 2: Do Not Mine

Presently, and for the foreseeable future, coal is essential to the generation of electricity in Illinois, the United States and most countries around the world. The need for low cost electricity in today's economy is essential to allow recovery from what has been termed the most serious economic downturn in our lifetimes. The coal industry is crucial to the economic health of Illinois and the country. Hundreds of millions of dollars are generated for the people of Illinois through direct mining jobs, taxes and support industry jobs.

If no mining is conducted at this site, the following economic losses are estimated to occur:

- Loss of approximately 203 direct jobs with a payroll of approximately $18 million annually. Many of these employees are long term miners and are not currently trained for other employment. In addition to the direct employees, approximately 100 additional persons such as truck drivers, engineers, and support personnel are employed full time through operation of the Mine. Further, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job (ICA), an additional 609 persons are employed as a result of this Mine.
- The mining industry is vitally important to the local economy of Williamson County and the surrounding counties as well as to the region and state.
- Since over 30% of the electricity produced in the U.S. and nearly 47% of the electricity produced in Illinois comes from coal-fired plants, it is, vital to the local, state and national economy that available high quality coal be mined to maintain a continuous supply of fuel to the coal-fired plants. Economic losses beyond the local economy will occur if sufficient electricity is not provided to private and commercial energy consumers. If the Pond Creek No. 1 Mine produced no coal, approximately 2.4 million American households' worth of energy would have to be replaced (likely at a higher cost) or foregone to meet the world's energy demand.
- The loss in tax revenue to Illinois, Williamson County, and Franklin County, both direct and indirect, would be significant, particularly when a replacement industry is unknown.

In addition, Pond Creek No. 1 Mine has significant resources invested in the acquisition of

land, coal reserves, permitting expenses, mining equipment, and etc. in this project. The economic loss to the company should mining at the site cease would be substantial because of the significant investment in land, coal reserves, permitting expenses, and mining equipment made by the company using a business plan dependent on maximizing recovery of the coal reserve.

Considering the above economic contributions and the importance of coal to our society, the "Do Not Mine" alternative is not considered a reasonable alternative.

Alternative 3: Reverse Osmosis (RO)

RO systems treat dissolved solids. In RO, water for treatment is pumped through a closed membrane system at extremely high pressures. Purified water is produced and the salt is trapped on the membrane. The contaminants are periodically released from the membrane by backwashing at high pressure. This creates a waste stream of water with a high concentration of contaminants that is typically 25% of the flow being sent to the RO treatment system. The reject stream must still be disposed of in a responsible manner.

In a September 24, 1981 opinion adopting rules relating to TDS, chlorides, and sulfates, the Board considered RO impractical because of technologies involved large amounts of energy consumption, and the concentrated brines which still required ultimate disposal See In Re: Proposed Amendments to Title 35, Subtitle D, 1983 WL 486412, at *3. Thus, the Board concluded that "no economically reasonable treatment [is] available for TDS discharges, [and] compliance with the water quality standards depends on process changes and location close to large rivers with adequate dilution." Id. In 2007, in PCB case number R07-09, the IEPA's reasoning for its new sulfate rules, which the PCB adopted, states, "At mines, the best degree of treatment is provided by collecting site drainage, which is relatively high in suspended sediments, into treatment ponds where settling occurs. The treated water is then discharged into water bodies where a significant amount of water from the un-mined watershed also enters the stream during the discharge, thus providing the necessary dilution to ensure compliance with applicable standards." Likewise, IEPA considers "[s]ulfate [as] part of a small group of substances for which treatment is usually infeasible and for which mixing becomes an important option in regulation. The other common substances for which treatment does not exist are chloride, boron and fluoride." Testimony of Bob Mosher, R07-09, p. 3-4. "Sulfate and other dissolved salts [] are not amenable to treatment." Id., p. 22.

One of the primary reasons RO is not feasible for these dissolved constituents is the waste stream that is created. As recently as 2012, in a rulemaking related to boron and fluoride, "IEPA indicated the drawback to reverse osmosis was the production of a high concentration waste requiring disposal." IN THE MATTER OF: TRIENNIAL REVIEW OF WATER QUALITY STANDARDS FOR BORON, FLUORIDE AND MANGANESE: AMENDMENTS TO 35 ILL. ADM. CODE 301.106, 302.SUBPARTSB, C, E, F AND 303.312, 2012 WL 6851776, at *26. Because of this complication, "in every case for site-specific water quality standards or adjusted standards brought before the Board, **Illinois EPA has concluded that no**

reasonable treatment exists." Id.

In conclusion, the process is very expensive, and reliability and longevity are unknown. Considering the above, RO technology, is not considered either applicable or feasible as a treatment system for the operation of the Mine as a long-term solution.

Alternative 4: Deep Well Injection of the Mine Infiltration Water

The mine infiltration water could be discharged directly to a deep well. Considering the cost and operational difficulties that can be experienced when attempting to discharge to a deep well, deep well injection of the mine infiltration water is not considered either applicable or feasible for the operation of the Mine.

Alternative 6: Evaporation

The groundwater could be evaporated, leaving a TDS residue in a constructed evaporation pond. Criteria for design include being located in a moisture deficient area, sufficient surface area to evaporate the total annual waste water volume plus precipitation that would fall on the pond, using the maximum wet year, and using the minimum evaporation year of record. Evaporation ponds require large land areas, and the area would not be expected to be productive once it is used for this purpose (salt accumulation). It is recommended that the land for this system be naturally flat or the pond be designed to provide a uniform depth, and that a large land area be available. The current anticipated maximum flow rate for the collection of the groundwater is 3.5 mgd. Given the amount of water to be evaporated and the need to ensure that there are no overflows, the evaporation ponds would need to be extremely large and therefore, costly to construct. The area is not considered moisture deficient. Therefore, this method is not ideal for use in this region. Therefore, this option is not considered either applicable or feasible for the operation of the Mine because of the design criteria and cost to construct. In discussions with the IEPA, a salt water pond would not be desired by the Agency. This would make permitting this option problematic.

Alternative 7: Mechanical Evaporation

Mechanical evaporation could be used to reduce the groundwater volume. Mechanical evaporation uses high temperature and pressure to remove the water. The recovered water (55 to 60%) would be of high quality and could be used on-site. The concentrated TDS brine stream (40 to 45%) can be converted to salt cake (see Crystallization) or disposed in an Injection Well. The salt cake would then be disposed in a landfill. The equipment is expensive to construct/install, operate, and maintain. The energy usage of such an apparatus makes its environmental benefits negligible, in the very best case. Also, there would be materials to dispose of either in a landfill or in the Injection Wells that have been found to be unreliable for nearby mines. Therefore, this option is not considered either applicable or feasible for the operation of the Mine.

Alternative 8: Crystallization

Crystallization is the process that converts the concentrated TDS brine generated in the mechanical evaporator or reverse osmosis process to a salt cake. This process offers an alternative to the underground injection of the salt reject stream from a reverse osmosis or mechanical evaporator system.

It is possible that the salt cake can be sold, but it is more likely that it will be disposed in a landfill. Crystallization equipment is expensive to construct/install, operate and maintain. Mobile evaporator units are available. The cost is estimated at $0.25/gallon. Therefore, this option is not considered either applicable or feasible for the operation of the Mine.

Alternative 9: Cost Effective Sulfate Removal (CESR) Process

CESR is a proprietary technology developed to improve sulfate removing technology. It is a four step process as follows: Step one includes the addition of hydrated lime to the feed water to precipitate gypsum; the non-hazardous gypsum sludge is removed by dewatering and filtration. Step two involves additional liming to raise the pH to 10.5 and results in the precipitation of dissolved metals as metal hydroxides which is also removed by dewatering and filtration. Step 3 involves additional liming to increase pH to 11.5 and the addition of a proprietary reagent to precipitate ettringite. Step four involves reducing the pH with CO2 to meet local discharge criteria. This step also involves clarification with accompanying sludge removal from the clarifier.

With additional consideration to the extreme complexity and unproven theory aspect of this technology, it is considered impractical for use at the Pond Creek No. 1 Mine because 1) each precipitation step is time consuming and would require the use of large amounts of land 2) infrastructure costs, including the installations of tanks and storage handling equipment is high, this proprietary technology is still being developed and is cost-prohibitive at this time, 4) this technology is plagued by severe scaling and precipitation of minerals, 5) the very large amounts of resultant sludge would need to be disposed of as solid or hazardous waste, 6) the water treated in this system has a high specific conductivity and a high concentration of total dissolved solids, and 7) there is a high supervision and maintenance requirement to use this technology. Moreover, it is not proven to remove the primary constituent of concern in this instance – chlorides. This process would exacerbate the TDS concentration without materially reducing chloride concentrations and is therefore not a feasible option.

Alternative 10: Coagulation (Chemical) Precipitation

This process consists of the addition of alkaline chemicals to acid mine effluent to induce metals, such as iron and manganese, to precipitate and to reduce acidity. Chemicals typically used include hydrated lime, limestone, soda ash, caustic soda and ammonia. Variables that are considered in the design and application of such a system include the level of acidity, suspended solids, iron and manganese concentrations, and flow rates.

Concerns with the use of chemical precipitation at the proposed coal mine include 1) worker safety regarding the chemicals to be used, 2) treatment cost, 3) process operation and maintenance, 4) disposal of precipitate sludge in a landfill possibly considered a hazardous substance, 5) necessity of such treatment considering that acid water is not considered a factor for the proposed operation, 6) susceptibility to system malfunction due to high volume flows from storm events, 7) improbability of actual improvement in overall water quality when compared to the use of sedimentation ponds. This process would also exacerbate the TDS concentration without materially reducing chloride concentrations.

Considering the above, the use of this technology is considered inappropriate at the Pond Creek No. 1 Mine.

Alternative 11: Supervac

Supervac is a technology to handle solid wastes and sludge that result from other water treatment technologies. This technology would be appropriate only in conjunction with another water treatment technology. This technology would not be feasible for use at the Pond Creek No. 1 Mine because it is not a stand-alone water treatment technology.

302.105(f)(1)(D) ALTERNATIVES ANALYSIS – TOTAL SUSPENDED SOLIDS, TOTAL SETTLEABLE SOLIDS, AND SEDIMENTATION/SILTATION

Pollutants of concern are total settleable solids and sedimentation/siltation. TSS is the surrogate parameter to monitor control of solids discharged to the waterbody. Options were examined to determine whether the measures are technically feasible and economically reasonable and would result in a lesser load increase, no load increase, or minimal environmental degradation to the receiving stream. This assessment includes consideration of the following alternatives:

1. Proposed alternative – treatment in a sedimentation pond, Pond 009, and discharge during storm events;
2. No mining;
3. No discharge of stormwater from the site;
4. Reduction in the number of outfall points;
5. Use of alternative sediment control and treatment devices; and
6. Alternative Treatment Technologies: A) Filtration, B) Constructed Wetland, and C) Coagulation (Chemical) Precipitation.

Alternative 1: Proposed Alternative – Discharge to Pond Creek

For the proposed alternative, the Mine will continue to have the option to discharge stormwater from stormwater collection ponds to an Unnamed Tributary to Pond Creek when water quality standards in the tributary will be met. However, an additional option is proposed in order to alleviate water volume concerns while maintaining water quality in Pond Creek. The option is to

construct a new outfall to be able to discharge from Pond 009 to a mixing zone in Pond Creek. As part of the overall proposed project, mine infiltration water will be able to be discharged to the Big Muddy River as described in the Big Muddy River section of this Antidegradation Assessment Report. The volume of water that will be discharged to Pond Creek will be dependent upon the flow in the Creek and the concentration of chloride and iron in Pond 009. This option is described in detail in the Mixing Zone Study Report, provided in Attachment 2. This alternative is considered the most effective based on the construction and operation costs and ability to meet the water management needs for the Mine, as well as, water quality in Pond Creek.

The proposed typical water management process is described below and summarized in Figure 2-2.

Saline Infiltration Groundwater

As part of the permit modification request and described in the Big Muddy River section of this Antidegradation Assessment Report, mine infiltration water will be pumped to the Fresh Water Lake to be discharged to the Big Muddy River and, if needed, for use in the Preparation Plant.

Ponds 001, 002, 003, and 004

Ponds 001, 002, 003, and 004 will continue to collect stormwater runoff from undeveloped areas, the mine yard, the raw coal pile, and access roads. Solids settle in the ponds prior to discharge. Because of the quality of the stormwater, water collected in these ponds is the preferred source of water for the Preparation Plant. In the proposed alternative, they will continue to serve as the preferred source of make-up water to the Preparation Plant and water will be pumped from these ponds to the Fresh Water Lake. If needed to control water levels in the ponds at appropriate levels, water can be discharged from the ponds to an Unnamed Tributary of Pond Creek via Outfalls 001, 002, 003, and 004, respectively.

Pond 005

Stormwater runoff from undeveloped areas, the clean coal pile, and access roads will continue to be collected in Pond 5. In addition to the stormwater runoff, water from the Johnson City Lake is pumped to Pond 005 at a rate of 0.72 million gallons per day (mgd). Solids settle in the pond prior to discharge. Pond 005 supplies water for mining operations, but has the capability to discharge to the Unnamed Tributary of Pond Creek through Outfall 005. If needed to control water levels in the ponds at appropriate levels and if water quality standards will be met, water can be released to an Unnamed Tributary of Pond Creek via Outfall 005.

Pond 006

Pond 006 will continue to receive stormwater runoff from the raw coal pile, but will no longer receive water from the Water Holding Cell during precipitation events. Solids settle in the pond prior to discharge. Water can be pumped from Pond 006 to the Fresh Water Lake, if necessary to supply water to the Preparation Plant. Water can be discharged from Pond 006 to an Unnamed Tributary of

Pond Creek via Outfall 006 if needed to maintain appropriate water levels in the ponds.

Ponds 007/008

The stormwater runoff from the slopes of the currently inactive slurry impoundments, RDA No. 1 and RDA No. 2, will continue to be collected in Ponds 007/008. The underdrain from the inactive slurry impoundments will also continue to discharge to Ponds 007/008. Solids settle in the ponds prior to discharge. Water from these ponds will be pumped to Pond 009. Water may also be pumped to the Fresh Water Lake. If needed, excess water in Ponds 007/008 can be discharged through Outfalls 007 and 008 to an Unnamed Tributary of Pond Creek if needed to maintain appropriate levels in the ponds if water quality standards will be met in the receiving stream.

Pond 009

Construction of Pond 009 was approved in Permit No. 2015-MA-3432. However, the Mine does not have an NPDES permit to discharge from Outfall 009. As part of the project to improve water management practices on-site, a permit modification request is being submitted to allow discharge from Pond 009 to Pond Creek. The stormwater runoff from the slopes of the active Slurry Impoundment/RDA3 will continue to be collected in Pond 009. Solids settle in the pond prior to discharge. Water from this pond will continue to be pumped to the Fresh Water Lake where it can be used in the Preparation Plant as process water or to the active Slurry Impoundment/RDA3. While stormwater can be utilized effectively for process water, sending all of the stormwater from the refuse facilities to the Fresh Water Lake for a long term solution is not feasible. The volume of water would continue to build up at the site and, over time, would be significantly detrimental to mine operations. Excess stormwater must be discharged for the Mine to continue operation and, therefore, the proposed alternative includes discharge of stormwater to the Pond Creek mixing zone.

Fresh Water Lake

The Fresh Water Lake continues to be used to collect water to be used in the Preparation Plant. The water must be maintained at a certain level for operation of the Plant. The pond receives water from the stormwater ponds, Ponds 001-004, 006-009, Slurry Impoundment/RDA No. 3, and Water Holding Cell. If needed to maintain appropriate water level in the active Slurry Impoundment and Water Holding Cell, mine infiltration water can be pumped to the Fresh Water Lake.

Active Slurry Impoundment/ RDA3 (East of Dwina Refuse Area

The Slurry Impoundment (RDA No. 3) will continue to receive coarse and fine coal refuse from the Preparation Plant. The solids in the process water are allowed to settle in the impoundment. Clarified decant water will be pumped directly to the Fresh Water Lake to be reused in the coal cleaning process in the Preparation Plant. Decant water may also be pumped to the Water Holding Cell to be staged prior to discharge to the Big Muddy River as described in the Big Muddy River section of this Antidegradation Assessment Report. If necessary to manage water volume on-site, the slurry impoundment may also receive mine infiltration water or water from Pond 009.

Inactive Slurry Impoundments/RDA No. 1 and RDA No. 2

Coarse refuse will continue to be placed on the east side of RDA No. 1 and RDA No. 2 to create the west embankment for RDA3. Stormwater that collects in RDA No. 1 and RDA No. 2 will continue to be pumped to the Fresh Water Lake. Stormwater runoff from the slopes of the inactive slurry impoundments will continue to flow to Ponds 007/008 and the underdrain from these impoundments will continue to be connected to these ponds. To date, 21 acres of slope have been reclaimed, decreasing constituent loadings to Ponds 007/008. An additional 24 acres of slope is planned for reclamation, for a total of 45 acres of reclaimed slope. As a result, constituent loadings to Ponds 007/008 will continue to decrease. This is illustrated in Figure 1-1.

Water Holding Cell

Mine infiltration water will continue to be pumped to the Water Holding Cell. Decant water will continue to be able to be pumped from the active Slurry Impoundment to the Water Holding cell if needed to maintain appropriate water levels in the impoundment. From the Water Holding Cell, water will continue to be sent to the Fresh Water Lake to be utilized in the Preparation Plant. As part of the permit modification request, Williamson is proposing that a new outfall and diffuser structure be constructed to allow discharge from the Water Holding Cell to the Big Muddy River as described in the Big Muddy River section of the Antidegradation Assessment Report. As a result, process water and mine infiltration water will no longer be stored in stormwater ponds on-site.

Alternative 2: Do Not Mine

Presently, and for the foreseeable future, coal is essential to the generation of electricity in Illinois, the United States and most countries around the world. The need for low cost electricity in today's economy is essential to allow recovery from what has been termed the most serious economic downturn in our lifetimes. The coal industry is crucial to the economic health of Illinois and the country. Hundreds of millions of dollars are generated for the people of Illinois through direct mining jobs, taxes and support industry jobs.

If no mining is conducted at this site, the following economic losses are estimated to occur:

- Loss of approximately 203 direct jobs with a payroll of approximately $18 million annually. Many of these employees are long term miners and are not currently trained for other employment. In addition to the direct employees, approximately 100 additional persons such as truck drivers, engineers, and support personnel are employed full time through operation of the Mine. Further, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job (ICA), an additional 609 persons are employed as a result of this Mine.
- The mining industry is vitally important to the local economy of Williamson County and the surrounding counties as well as to the region and state.
- Since over 30% of the electricity produced in the U.S. and nearly 47% of the electricity produced in Illinois comes from coal-fired plants, it is, vital to the local, state and national

economy that available high quality coal be mined to maintain a continuous supply of fuel to the coal-fired plants. Economic losses beyond the local economy will occur if sufficient electricity is not provided to private and commercial energy consumers. If the Pond Creek No. 1 Mine produced no coal, approximately 2.4 million American households' worth of energy would have to be replaced (likely at a higher cost) or foregone to meet the world's energy demand.

- The loss in tax revenue to Illinois, Williamson County, and Franklin County, both direct and indirect, would be significant, particularly when a replacement industry is unknown.

In addition, Pond Creek No. 1 Mine has significant resources invested in the acquisition of land, coal reserves, permitting expenses, mining equipment, and etc. in this project. The economic loss to the company should mining at the site cease would be substantial because of the significant investment in land, coal reserves, permitting expenses, and mining equipment made by the company using a business plan dependent on maximizing recovery of the coal reserve.

Considering the above economic contributions and the importance of coal to our society, the "Do Not Mine" alternative is not considered a reasonable alternative.

Alternative 3: No Discharge of Stormwater

Considering that the area of the Pond Creek No. 1 Mine receives in excess of 41 inches of precipitation as an annual average, often times in high intensity over short periods, total containment with no discharge of stormwater is not technically feasible. The surface area required to accomplish such a feat is massive, and would begin to crowd out other productive land uses, such as farming. Even if held through the precipitation event, there is no feasible way to perpetually store the water or consume the water in the mining operations, never discharging it. Discharges from sedimentation ponds are in accordance with applicable regulation in the State of Illinois so long as the quality of discharged water remains within the water quality parameters required.

Total elimination of stormwater discharges from the Mine is not an available option.

Alternative 4: Reduce the Number of Outfalls

While combining certain outfall points from within the permit area is possible, such combinations would not result in any improvements in receiving stream water quality. Any combination of outfalls will result in the same amount of total water discharge to the receiving streams. It is likely that the resulting water quality would remain the same as the total of the water quality from the planned discharge points.

Since a reduction in the number of outfalls will not result in improvement in water quality or quantity, this option is ruled out for further consideration.

Alternative 5: Use Alternative Sediment Control and Treatment Devices

Alternatives to the use of sediment control ponds exist for control of discharge of settleable solids. Such alternatives include chemical soil stabilizers, erosion control blankets, geotextile

filter bags, fiber rolls, silt fencing, straw mulch, straw bale dikes, and temporary seeding. These measures are aimed at minimization of the generation of settable solids. Most of these measures have been used previously during the construction and operations and in accordance with the current permit, as supplemental treatment and prevention of generation of settable solids.

The use of alternative sediment control measures is considered practical and cost effective for the treatment and control of surface runoff in conjunction with sediment control ponds. However, the use of these practices to eliminate the proposed sediment control ponds is not feasible. Instead, it is being proposed that these BMPs be incorporated into the proposed alternative as needed.

Alternative 6: Alternative Treatment Technologies

Filtration

Filtration is a water treatment process by which discharge water is passed through a physical barrier which removes particulate matter from the water stream. Filtration of mine water and stormwater would involve installation of a very large and elaborate filtration system. These systems would remove settleable solids and produce an effluent or sludge with similar characteristics as the proposed settling ponds. The effluent or sludge would need to be disposed in a landfill or other treatment facility. It is considerably more expensive to operate a full-scale filtration system than the sediment ponds proposed for this facility. Another impracticality associated with filtration is that a relatively steady flow of water is required into the system. This is not the case for stormwater runoff from mining operations, as storm surges would need to be held for processing.

Filtration is a technology that is not feasible for the proposed facility because: 1) filtration is much more expensive than sediment ponds both in initial cost and long-term maintenance and operation, 2) filtration processes require a steady stream of water for treatment which is not the case in treating stormwater runoff, 3) a large area of land would be required for such a facility, and 4) maintenance and supervision of the filtration and sludge disposal operation would be burdensome and would increase production costs.

Constructed Wetland

A constructed wetland is the use of treatment wetlands to create anaerobic and aerobic environments to remove sulfates, some metals, and other contaminants. In addition, suspended solids can be removed. Water is pumped into the wetland in a controlled flow rate and allowed to slowly travel through the system to achieve treatment.

Constructed wetlands have proven to be effective for treatment of suspended solids with several limitations. These limitations include 1) low and consistent rates of inflow, 2) eventual sludge accumulation requiring dredging and wetland reconstruction, and 3) release of hydrogen sulfide and other digestive gases into the atmosphere from sulfate digestion processes. Use of

wetlands in mine stormwater runoff treatment would be limited by the enormous amount of land required to construct a wetland of sufficient size for the flow rates to be expected from such an operation.

Sugar Camp Energy and Hillsboro Energy both have pilot wetlands. These are experiments that are designed to determine if constructed wetlands will benefit an already compliant NPDES discharge. The wetlands are each designed to treat less than 100 gpm, which is a small fraction of the total mine water and stormwater managed at the operations. Even at the small flow rate, the surface area used by the wetlands is significant. Even if the wetlands can sufficiently and reliably treat effluent, the surface area required for the amount of water generated by the Pond Creek No. 1 Mine operations including expansions is enormous and would begin to crowd out other beneficial land uses.

Even if shown to be beneficial on the small scale, it is not expected that constructed wetland can treat the volume of stormwater expected at this facility.

Coagulation (Chemical) Precipitation

This process consists of the addition of alkaline chemicals to acid mine effluent to induce metals to precipitate and to reduce acidity. However, it is not normally used to remove total suspended solids. Chemicals typically used include hydrated lime, limestone, soda ash, caustic soda and ammonia. Variables that are considered in the design and application of such a system include the level of acidity, suspended solids, iron and manganese concentrations, and flow rates.

Concerns with the use of chemical precipitation at the proposed coal mine include 1) worker safety regarding the chemicals to be used, 2) treatment cost, 3) process operation and maintenance, 4) disposal of precipitate sludge in a landfill possibly considered a hazardous substance, 5) necessity of such treatment considering that acid water is not considered a factor for the proposed operation, 6) susceptibility to system malfunction due to high volume flows from storm events, 7) improbability of actual improvement in overall water quality when compared to the use of sedimentation ponds.

Considering the above, the use of this technology is considered inappropriate at the Pond Creek No. 1 Mine.

SECTION 5
302.105(F)(1)(F) ENDANGERED SPECIES CONSULTATION

An endangered species consultation was initiated using the IDRN Ecological Compliance Assessment Tool (Eco-CAT) website on November 2, 2016.

The Illinois Natural Heritage Database showed that the following species may be in the vicinity of the project location:

- Chuck-Will's-Willow (*Caprimulgus carolinensis*)

Since these are not aquatic species, they are not likely to be impacted by the proposed discharge; however, a formal response from IDNR has not yet been received.

SECTION 6
CONCLUSIONS

Williamson Energy is submitting a permit modification request to add a discharge point to the Big Muddy River and another to Pond Creek to manage water onsite. The antidegradation analysis, conducted in accordance with Illinois Administrative Code Title 35 Part 302.105, demonstrates that the proposed activities will not degrade the waters of the state. Evaluation of benefits and alternatives, as well as, the impact to the receiving streams, demonstrates that treatment option comprised of BMPs, sedimentation ponds, the mixing zone and discharge release program is the best alternative for the Mine that will allow continued operation of a vital economic benefit to the community and also ensure that water quality is maintained in the receiving streams.

FIGURES

R08358

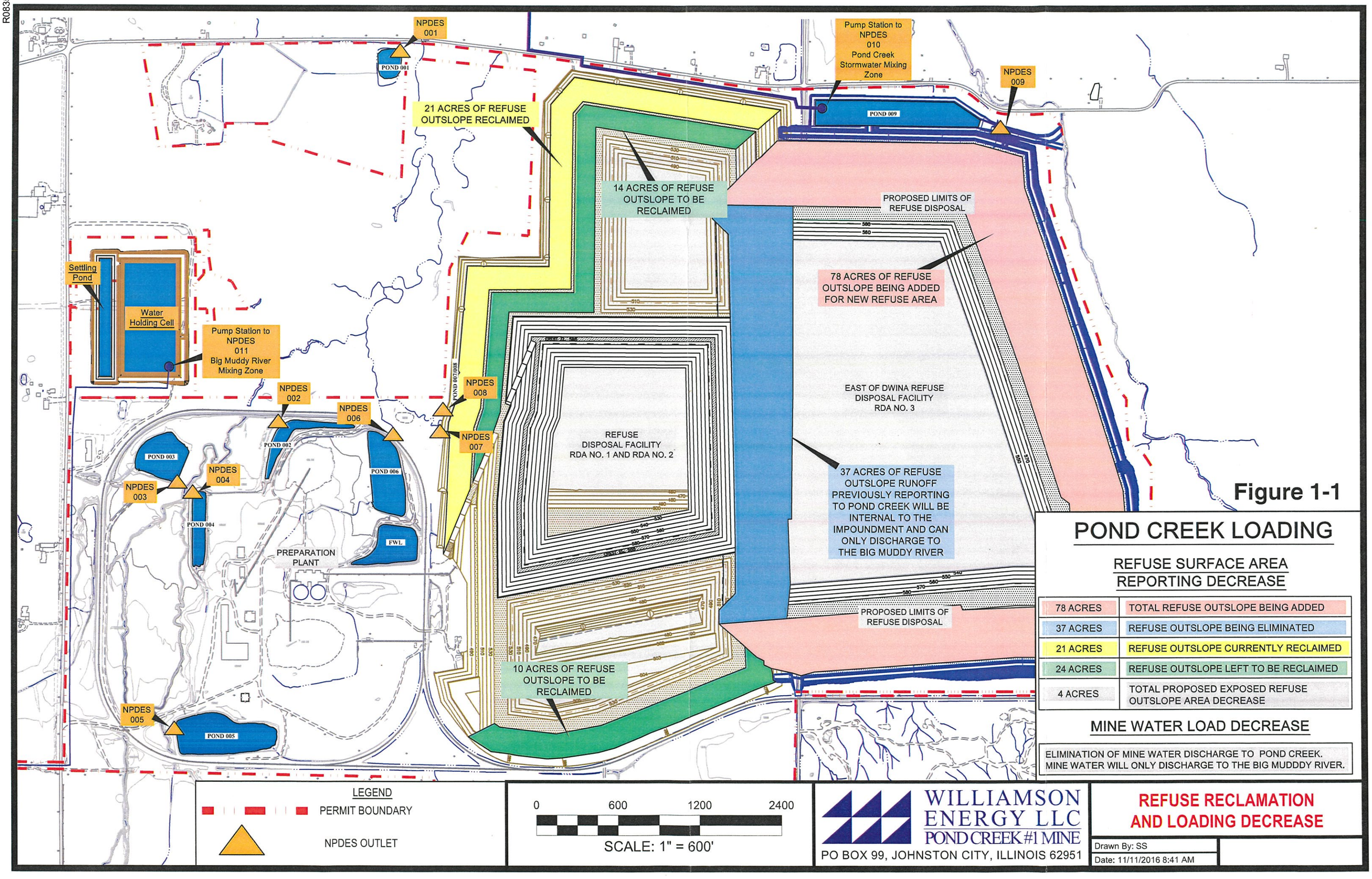


Figure 1-1

POND CREEK LOADING

REFUSE SURFACE AREA REPORTING DECREASE

78 ACRES	TOTAL REFUSE OUTSLOPE BEING ADDED
37 ACRES	REFUSE OUTSLOPE BEING ELIMINATED
21 ACRES	REFUSE OUTSLOPE CURRENTLY RECLAIMED
24 ACRES	REFUSE OUTSLOPE LEFT TO BE RECLAIMED
4 ACRES	TOTAL PROPOSED EXPOSED REFUSE OUTSLOPE AREA DECREASE

MINE WATER LOAD DECREASE

ELIMINATION OF MINE WATER DISCHARGE TO POND CREEK.
MINE WATER WILL ONLY DISCHARGE TO THE BIG MUDDDY RIVER.

WILLIAMSON ENERGY LLC
POND CREEK #1 MINE
PO BOX 99, JOHNSTON CITY, ILLINOIS 62951

REFUSE RECLAMATION AND LOADING DECREASE

Drawn By: SS
Date: 11/11/2016 8:41 AM

R08359

Slope Bottom VTP - 120,000 gpd

District #1 Bleeder Shaft VTP - 0 gpd

TG#1 XC 136 VTP - 432,000 gpd

DISTRICT 1 (SEALED) TURBINE PUMPS

DISTRICT 2 (ACTIVE) TURBINE PUMPS

District #2 Bleeder Shaft VTP - 1,145,000 gpd

TG#2 XC 142 VTP - 495,000 gpd

TG#2 XC 104 VTP - 397,374 gpd

TG#2 2 XC 49 VTP - 120,000 gpd

TG#2 XC 27 VTP - - 80,000 gpd

Pond pumps run as necessary to supply additional processing water for the preparation plant.

Not permitted to discharge.

009

POND 009

001
37°50'59.2"
88°49'37.5"

POND 001

003
37°50'26"
88°49'58"

POND 003

004
37°50'25"
88°49'56.6"

POND 004

002
37°50'26"
88°49'51.5"

POND 002

006
37°50'28.4"
88°50'40.6"

POND 006

008
37°50'31.4"
88°49'33.9"

007
37°50'29.5"
88°49'34"

POND 007/008

Decant Pump(s) on RDA No. 1 and RDA No. 2 utilized for stormwater evacuation

RDA No. 1 and RDA No. 2

WATER HOLDING CELL

RDA No. 3 (East of Dwina Refuse Area)

Groundwater Infiltration - Approx. 2.7 million gpd

Prep Plant Supply - 2,300,000 gpd

SHUT-OFF VALVE

PREPARATION PLANT

FLOAT SYSTEM TO CONTROL POOL LEVEL

FRESH WATER LAKE

Mine

Mine Intake - 720,000 gpd

005
37°50'09.1"
88°50'00"

POND 005

Johnston City Lake Pumps - 720,000 gpd

LEGEND

- Mine/Plant Fresh Water Supply
- Pond Dewatering
- Fresh Water Intake Supply
- Mine Pumpage
- RDA Decant Water
- Plant Slurry Pumpage
- Water Holding Cell

Figure 1-2

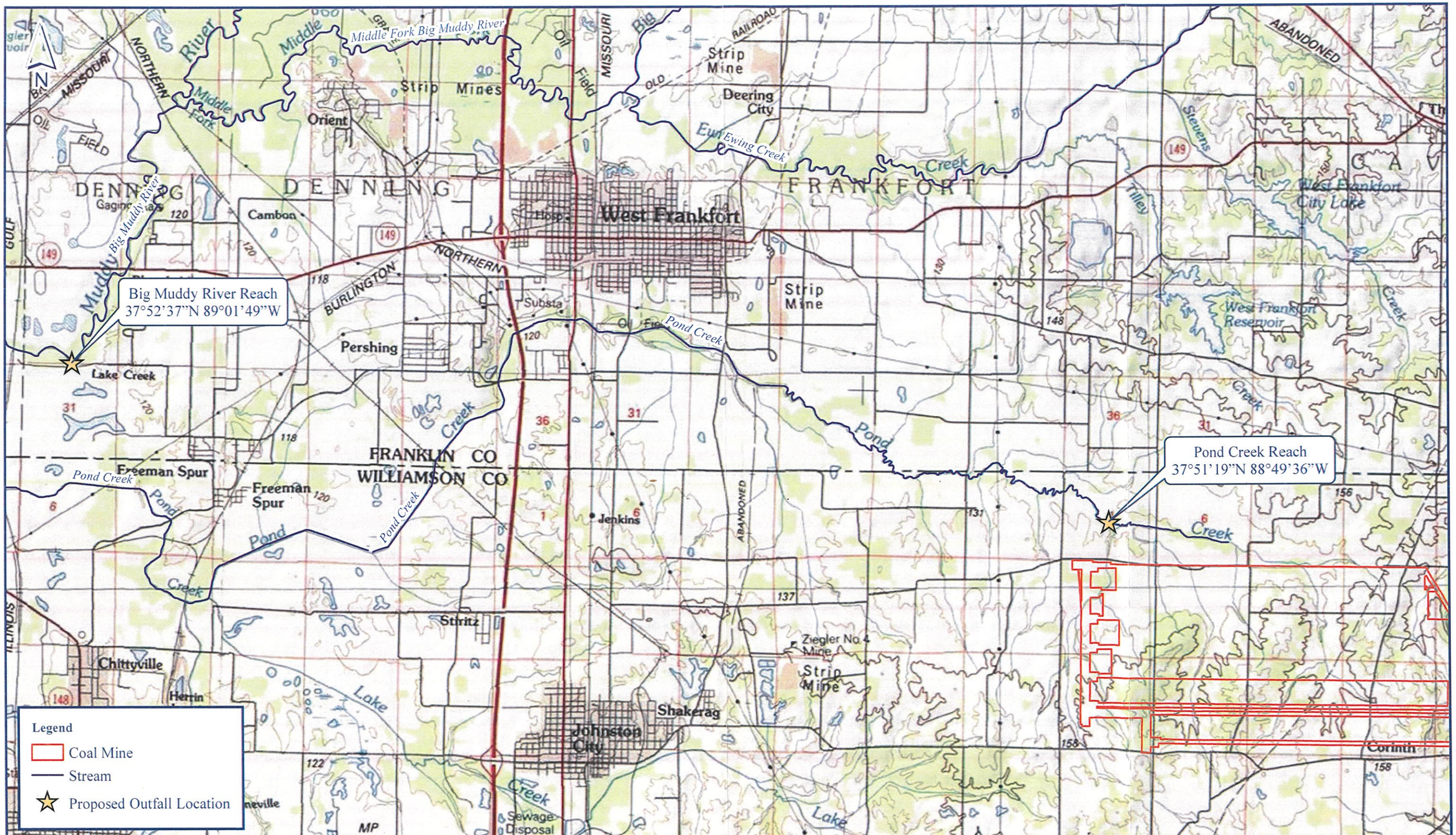
WATER FLOW DIAGRAM CURRENT SYSTEM

WILLIAMSON ENERGY LLC
POND CREEK #1 MINE
PO BOX 99, JOHNSTON CITY, ILLINOIS 62951

Drawn By: SS
Date: 11/11/2016 12:38 PM

SCALE: NTS

R08360



0 0.5 1 2 3 4 Miles

CLIENT: Foresight Energy
LOCATION: Benton, Illinois
PROJECT FILE: 142336

FIGURE 2-1

Document Path: I:\DATA\GIS Projects\142336 - Sugar Camp\BigMuddy_PondCreek_ProposedOutfallLoc.mxd

Date Saved: 11/9/2016 12:09:02 PM

R08361

Mine Intake - 720,000 gpd

Mine

Anticipated Maximum Combined for All Turbine Pumps - 3,500,000 gpd

Stormwater pond dewatering pumps run as necessary to supply additional processing water for the preparation plant.

Proposed NPDES Outlet 010-0
Lat: /Long: 37°51'19" 88°49'36"

Pond Creek Stormwater Mixing Zone

010

POND 001

001
37°50'59.2"
88°49'37.5"

POND 003

003
37°50'26"
88°49'58"

POND 004

004
37°50'25"
88°49'56.6"

POND 002

002
37°50'30"
88°49'51.5"

POND 006

006
37°50'28.4"
88°50'40.6"

POND 009

009
37°50'52.3"
88°48'43.7"

POND 005

005
37°50'09.1"
88°50'00"

Johnston City Lake Pumps - 720,000 gpd

Prep Plant Supply - 2,300,000 gpd

SHUT-OFF VALVE

PREPARATION PLANT

FLOAT SYSTEM TO CONTROL POOL LEVEL

FRESH WATER LAKE

POND 007/008

008
37°50'31.4"
88°49'33.9"

007
37°50'29.5"
88°49'34"

RDA No. 1 and RDA No. 2

RDA No. 3 (East of Dwina Refuse Area)

Proposed NPDES Outlet 011-0
Lat: /Long: 37°52'37" 89°01'49"

011

Big Muddy River Mixing Zone

WATER HOLDING CELL

Figure 2-2

LEGEND

- Mine/Plant Fresh Water Supply
- Pond Dewatering / Stormwater Mixing Zone
- Fresh Water Intake Supply
- Mine Pumpage
- RDA Decant Water
- Plant Slurry Pumpage
- Big Muddy River Mixing Zone
- Existing NPDES Outlet
- Proposed NPDES Outlet

WILLIAMSON ENERGY LLC
POND CREEK #1 MINE
PO BOX 99, JOHNSTON CITY, ILLINOIS 62951

WATER FLOW DIAGRAM PROPOSED SYSTEM

Drawn By: SS
Date: 11/11/2016 12:38 PM

SCALE: NTS

TABLES

TABLE 2-1. WATER HOLDING CELL DATA
Representative Sample for Discharge to Big Muddy River

CONSTITUENT	SAMPLE COLLECTION DATE/LABORATORY REPORT NUMBER									AVERAGE (mg/L)	MAXIMUM (mg/L)	MINIMUM (mg/L)	IL WQ STANDARD (1) CHRONIC (mg/L)	WQ STANDARD TMZ (mg/L)
	30-Sep-16 18089-1 (mg/L)	6-Oct-16 18095-1 (mg/L)	10-Oct-16 18097-1 (mg/L)	13-Oct-16 18114-1 (mg/L)	17-Oct-16 18118-1 (mg/L)	19-Oct-16 18124-1 (mg/L)	27-Oct-16 18149-1 (mg/L)	31-Oct-16 18165-1 (mg/L)	2-Nov-16 18176-1 (mg/L)					
pH	7.2	7.4	7.5	7.1	7.1	7.8	8.0	7.0	7.0	7.3	8.0	7.0	6.5-9.0	--
Acidity	<10	18	<10	20	24	<10	22	10	20	ND	ND	ND	--	--
Alkalinity	492	64	468	440	612	588	608	444	464	464	612	64	--	--
Hardness	760	610	712	870	970	950	970	640	770	806	970	610	--	--
Chlorides	2,049	1,699	2,199	2,799	2,229	2,449	2,449	2,349	2,040	2,251	2,799	1,699	--	500
Sulfates	1,880	1,720	2,000	1,880	2,040	2,120	820	1,400	1,809	1,741	2,120	820	--	500
Settleable solids	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TSS	10	53	43	72	47	44	7	21	38	37	72	7	--	--
Cyanide	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ND	ND	ND	0.005	--
Phenols, TR	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	ND	ND	ND	--	--
Antimony	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	0.002	0.002	0.002	--	--
Arsenic	0.001	<0.001	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.002	0.002	0.002	0.190	--
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	--	--
Cadmium, total	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0005	0.0005	0.0007	0.0005	0.001	--
Cadmium, dissolved	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	0.0004	0.0004	0.0006	0.0004	0.001	--
Chromium	0.008	0.002	0.005	0.008	0.005	0.003	0.004	0.003	0.003	0.005	0.008	0.002	0.161	--
Copper	0.024	0.011	0.026	0.031	0.032	0.018	0.022	0.022	0.022	0.023	0.032	0.011	0.010	--
Iron, total	0.216	0.28	0.946	1.835	1.332	0.569	0.253	0.402	0.332	0.685	1.835	0.216	--	--
Iron, dissolved	0.159	0.28	0.441	0.709	0.347	0.137	0.061	0.078	0.153	0.263	0.709	0.061	--	--
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	0.014	--
Manganese, total	0.419	0.163	0.183	0.313	0.212	0.149	0.125	0.133	0.142	0.204	0.419	0.125	1.65	--
Manganese, dissolved	0.405	0.163	0.2	0.264	0.212	0.134	0.121	0.131	0.135	0.192	0.405	0.121	1.62	--
Mercury	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ND	ND	ND	0.001	--
Nickel, total	0.014	0.004	0.007	0.006	0.007	0.006	0.006	0.010	0.01	0.008	0.014	0.004	0.005	--
Nickel, dissolved	0.013	0.004	0.007	0.004	0.007	0.006	0.006	0.010	0.009	0.007	0.013	0.004	0.004	--
Selenium	0.008	0.006	0.007	0.007	0.004	0.004	0.004	0.008	0.009	0.006	0.009	0.004	--	--
Silver	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	--	--
Thallium	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	ND	ND	ND	--	--
Zinc	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	ND	ND	ND	0.028	--
PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOTES:
1. 88.4 mg/L hardness value was used to calculate the IL Title 35 Subtitle C

R08363

TABLE 2-2. DISCHARGE FLOW AND LOADING - CHLORIDE
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	CHLORIDE WQS (3) (mg/L)	REQUIRED DISPERSION	BKG FLOW (cfs)		ALLOWABLE/CAPACITY DISCHARGE FLOW (cfs)		LOADING (lbs/day)
1,699	31.2	500	3.6	30	(4)	2.9	(6)	31,901
	31.2		3.6	114	(5)	11.1	(7)	19,141
	151		4.4	30	(4)	2.2	(6)	24,456
	151		4.4	153	(5)	11.1	(7)	124,873
2,251	31.2		4.7	30	(4)	2.0	(6)	29,409
	31.2		4.7	166	(5)	11.1	(7)	27,953
	151		6.0	30	(4)	1.5	(6)	24,456
	151		6.0	224	(5)	11.1	(7)	182,362
2,799	31.2		5.9	30	(4)	1.5	(6)	28,119
	31.2		5.9	219	(5)	11.1	(7)	36,701
	151		7.6	30	(4)	1.1	(6)	24,456
	151		7.6	294	(5)	11.1	(7)	239,435
12,000	31.2		25.5	30	(4)	0.3	(6)	24,820
	31.2		25.5	1,093	(5)	11.1	(7)	183,585
	151		34.0	30	(4)	0.23	(6)	24,456
	151		34.0	1,469	(5)	11.1	(7)	1,197,698

NOTES:
1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations. The 12,000 represents the expected future concentration based on nearby mining operations to the north.
2. Background was determined using the Big Muddy River 90th Percentile background value and the projected concentrations from the upstream permitted discharge.
3. IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards.
4. The minimum flow maintained by the USACE appears to be 30 cubic feet per second (cfs).
5. Minimum flow calculated using the diffuser design flow and required dispersion.
6. Allowable flow calculated using the required dispersion and minimum background flow.
7. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by diffuser design.

R08364

TABLE 2-3. DISCHARGE FLOW AND LOADING - SULFATE
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	SULFATE WQS (3) (mg/L)	REQUIRED DISPERSION	BKG FLOW (cfs)		ALLOWABLE/CAPACITY DISCHARGE FLOW (5) (cfs)		LOADING (lbs/day)
820	40.5	500	1.7	30	(4)	2.9	(5)	19,515
	40.5		1.7	114	(5)	11.1	(5),(6)	24,881
	60.1		1.7	30	(4)	2.2	(5)	9,720
	60.1		1.7	153	(5)	11.1	(5),(6)	49,631
1,741	40.5		3.7	30	(4)	2.0	(5)	25,399
	40.5		3.7	166	(5)	11.1	(5),(6)	36,336
	60.1		3.8	30	(4)	1.5	(5)	9,720
	60.1		3.8	224	(5)	11.1	(5),(6)	72,481
2,120	40.5		4.5	30	(4)	1.5	(5)	24,031
	40.5		4.5	1,093	(5)	11.1	(5),(6)	238,643
	60.1		4.7	30	(4)	1.1	(5)	9,720
	60.1		4.7	1,469	(5)	11.1	(5),(6)	476,031

NOTES:

1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations.
2. Background was determined using the Big Muddy River 90th Percentile background value and the projected concentrations from the upstream permitted discharge.
3. IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards.
4. The minimum flow maintained by the USACE appears to be 30 cubic feet per second (cfs).
5. Minimum flows based on chloride discharge.
6. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by diffuser design.

R08365

TABLE 2-4. DISCHARGE FLOW AND LOADING - TSS
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	BKG FLOW (cfs)		ALLOWABLE DISCHARGE FLOW (cfs)		LOADING (lbs/day)
7	14.4	30	(3)	0.2	(5)	2,337
		1,469	(4)	11.1	(5), (6)	114,443
37		30		0.3	(5)	2,390
		1,469		11.1	(5), (6)	116,238
72		30		0.3	(5)	2,448
		1,469		11.1	(5), (6)	118,332

NOTES:

1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations.
2. Maximum background concentration found in samples collected from the Big Muddy River.
3. The minimum flow maintained by the USACE appears to be 30 cubic feet per second (cfs).
4. Flow is based on the chloride discharge limits
5. Flow is based on the chloride allowable discahrge
6. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by diffuser design.

R08366

TABLE 2-5. DISCHARGE FLOW AND LOADING - IRON
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	IRON WQS (3) (mg/L)	REQUIRED DISPERSION	BKG FLOW (cfs)		ALLOWABLE/CAPACITY DISCHARGE FLOW (cfs)		LOADING (lbs/day)
0.216	0.192	1	NA	30	(4)	2.9	(5)	34
	0.192		NA	114	(5)	11.1	(5),(6)	118
	0.220		NA	30	(4)	2.2	(5)	36
	0.220		NA	153	(5)	11.1	(5),(6)	182
0.685	0.192		NA	30	(4)	2.0	(5)	38
	0.192		NA	166	(5)	11.1	(5),(6)	172
	0.220		NA	30	(4)	1.5	(5)	36
	0.220		NA	224	(5)	11.1	(5),(6)	265
1.835	0.192		2.0	30	(4)	1.5	(5)	46
	0.192		2.0	219	(5)	11.1	(5),(6)	226
	0.220		2.1	30	(4)	1.1	(5)	36
	0.220		2.1	294	(5)	11.1	(5),(6)	348

NOTES:
1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations.
2. Data collected by AquAeTer on the Big Muddy River upstream from the Plumfield gage.
3. IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards.
4. The minimum flow at the upstream Rend Lake discharge maintained by the USACE appears to be 30 cubic feet per second (cfs).
5. The flowrates are based on the chloride loading table, which controls the allowable discharge.
6. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by pump capacity design.

R08367

TABLE 2-6. DISCHARGE FLOW AND LOADING - MANGANESE
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	MN WQS (3) (mg/L)	REQUIRED DISPERSION	BKG FLOW (cfs)		ALLOWABLE/CAPACITY DISCHARGE FLOW (cfs)		LOADING (lbs/day)
0.125	0.194	1.62	NA	30	(4)	2.9	(5)	33
	0.194		NA	114	(5)	11.1	(5),(6)	119
	0.212		NA	30	(4)	2.2	(5)	34
	0.212		NA	153	(5)	11.1	(5),(6)	175
0.204	0.194		NA	30	(4)	2.0	(5)	34
	0.194		NA	166	(5)	11.1	(5),(6)	174
	0.212		NA	30	(4)	1.5	(5)	34
	0.212		NA	224	(5)	11.1	(5),(6)	256
0.419	0.194		NA	30	(4)	1.5	(5)	35
	0.194		NA	219	(5)	11.1	(5),(6)	229
	0.212		NA	30	(4)	1.1	(5)	34
	0.212		NA	294	(5)	11.1	(5),(6)	336

NOTES:
1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations.
2. Data collected by AquAeTer on the Big Muddy River upstream from the Plumfield gage.
3. IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards.
4. The minimum flow at the upstream Rend Lake discharge maintained by the USACE appears to be 30 cubic feet per second (cfs).
5. The flowrates are based on the chloride loading table, which controls the allowable discharge.
6. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by pump capacity design.

R08368

TABLE 2-7. DISCHARGE FLOW AND LOADING - NICKEL
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	NI WQS (3) (mg/L)	REQUIRED DISPERSION	BKG FLOW (cfs)		ALLOWABLE/CAPACITY DISCHARGE FLOW (cfs)		LOADING (lbs/day)
0.004	0.005	0.010	NA	30	(4)	2.9	(5)	1
	0.005		NA	114	(5)	11.1	(5),(6)	3
	0.005		NA	30	(4)	2.2	(5)	1
	0.005		NA	153	(5)	11.1	(5),(6)	4
0.008	0.005		NA	30	(4)	2.0	(5)	1
	0.005		NA	166	(5)	11.1	(5),(6)	4
	0.005		NA	30	(4)	1.5	(5)	1
	0.005		NA	224	(5)	11.1	(5),(6)	6
0.014	0.005		1.8	30	(4)	1.5	(5)	1
	0.005		1.8	219	(5)	11.1	(5),(6)	6
	0.005		1.8	30	(4)	1.1	(5)	1
	0.005		1.8	294	(5)	11.1	(5),(6)	8

NOTES:
1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations.
2. Data collected by AquAeTer on the Big Muddy River upstream from the Plumfield gage. All values were non-detect (PQL = 0.010 mg/L).
3. IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards.
4. The minimum flow at the upstream Rend Lake discharge maintained by the USACE appears to be 30 cubic feet per second (cfs).
5. The flowrates are based on the chloride loading table, which controls the allowable discharge.
6. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by pump capacity design.

R08369

TABLE 2-8. DISCHARGE FLOW AND LOADING - COPPER
Big Muddy River

DISCHARGE CONC (1) (mg/L)	BKG CONC (2) (mg/L)	CU WQS (3) (mg/L)	REQUIRED DISPERSION	BKG FLOW (cfs)		ALLOWABLE/CAPACITY DISCHARGE FLOW (cfs)		LOADING (lbs/day)
0.011	0.005	0.010	1.2	30	(4)	2.9	(5)	1
	0.005		1.2	114	(5)	11.1	(5),(6)	3
	0.005		1.2	30	(4)	2.2	(5)	1
	0.005		1.2	153	(5)	11.1	(5),(6)	4
0.023	0.005		3.6	30	(4)	2.0	(5)	1
	0.005		3.6	166	(5)	11.1	(5),(6)	4
	0.005		3.6	30	(4)	1.5	(5)	1
	0.005		3.6	224	(5)	11.1	(5),(6)	6
0.032	0.005		5.4	30	(4)	1.5	(5)	1
	0.005		5.4	219	(5)	11.1	(5),(6)	6
	0.005		5.4	30	(4)	1.1	(5)	1
	0.005		5.4	294	(5)	11.1	(5),(6)	8

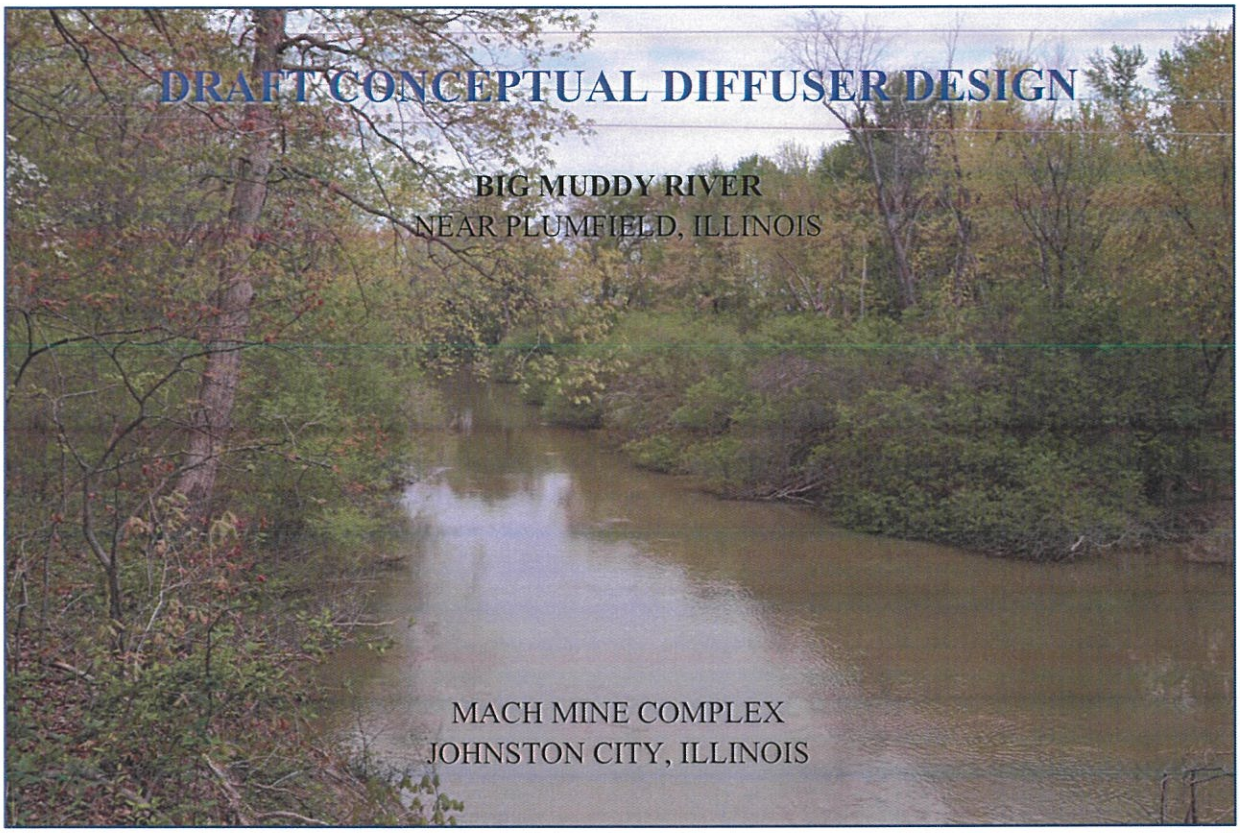
NOTES:

1. Minimum, average, and maximum sample results of the Holding Cell are used as representative of the current operations.
2. Data collected by AquAeTer on the Big Muddy River upstream from the Plumfield gage. All values were non-detect (PQL = 0.010 mg/L).
3. IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards.
4. The minimum flow at the upstream Rend Lake discharge maintained by the USACE appears to be 30 cubic feet per second (cfs).
5. The flowrates are based on the chloride loading table, which controls the allowable discharge.
6. Maximum effluent flow is restricted to 5,000 gpm (7.2 mgd or 11.1 cfs) by pump capacity design.

R08370

ATTACHMENT 1

CONCEPTUAL DIFFUSER DESIGN REPORT



Prepared by:

John Michael Corn, P.E.
Michael R. Corn, P.E. (IL), BCEE

AquAeTer, Inc.
Brentwood, TN

November 2016

TABLE OF CONTENTS

TABLE OF CONTENTS ii
LIST OF TABLES iv
LIST OF FIGURES iv
LIST OF APPENDICES v
EXECUTIVE SUMMARY vi
CONCEPTUAL EFFLUENT DIFFUSER DESIGN FOR MACH MINE COMPLEX vi
CONSTITUENT CONCENTRATIONS vi
DISPERSION REQUIRED TO MEET CRITERIA vii
MODEL RUNS vii
TOTAL FLOW THAT CAN BE DISCHARGED viii
SECTION 1.0 INTRODUCTION 1-1
PURPOSE OF STUDY 1-1
SECTION 2.0 DATA COLLECTIONS 2-1
RIVER CHARACTERISTICS 2-2
River Flow 2-2
River Velocity 2-2
River Bathymetry 2-3
River Density 2-3
Regulatory Mixing Zone Dimensions 2-4
EFFLUENT CHARACTERISTICS 2-4
Effluent Flowrate 2-4
Effluent TDS 2-4
Effluent Temperature 2-4
Effluent Density 2-5
EFFLUENT DISCHARGE CONFIGURATION 2-5
Number of Ports and Port Sizes 2-5
WATER QUALITY 2-7
SECTION 3.0 WATER QUALITY STANDARDS AND DILUTION REQUIRED 3-1
TARGET DISPERSION 3-1
Dispersion Calculation 3-1
STANDARDS 3-2
FUTURE STANDARDS 3-2
ENVIRONMENTAL BENEFITS OF A MIXING ZONE 3-2
SECTION 4.0 MIXING ZONE THEORY 4-1
JET MOMENTUM ZONE 4-2
RESTRATIFICATION ZONE 4-2
BUOYANT SPREADING ZONE 4-2
FAR-FIELD ZONE 4-2
INDEPENDENT ANALYSIS 4-3

Dispersion Required 4-3
NEAR-FIELD BULK DISPERSION ESTIMATE 4-3
Plume Stability Analyses 4-5
JMZ Unstable Plume Analysis 4-11
ACUTE ZONE FLUX AVERAGE DISPERSION 4-13
RESTRATIFICATION ANALYSIS 4-15
BUOYANT SPREADING ZONE ANALYSIS 4-16
FAR-FIELD MIXING ZONE 4-19
FAR FIELD FLUX AVERAGE DISPERSION 4-21
SECTION 5.0 CORMIX MODEL RESULTS 5-1
CORMIX 5-1
Model Inputs 5-2
Model Scenarios 5-3
MODEL RESULTS 5-4
SECTION 6.0 SUMMARY 6-1
MODEL RUNS 6-1

LIST OF TABLES

Table No.	Description	Page No.
Table 1 –	Frequency of Flows on the Big Muddy River	2-2
Table 2 –	Diffuser Design Guidelines	2-5
Table 3 –	Discharge Scenarios at 12,000 mg/L Chloride	2-6
Table 4 -	Water Quality Sample Results	2-8
Table 5 –	Dispersion Required	3-1
Table 6 –	Model Results to Meet WQS	5-5

LIST OF FIGURES

Figure No.	Description	Page No.
Figure 1 –	Location Map	1-2
Figure 2 –	Area Map	1-3
Figure 3 –	Conceptual Diffuser Design	2-9
Figure 4 –	Hydraulic Mixing Zone Concepts	4-1
Figure 5 –	Plume Entrainment	4-5
Figure 6 –	Plume Stability Analysis	4-6
Figure 7 –	Example Gaussian Plume and FAD Transformation	4-14
Figure 8 –	Model Results for Case 1 Minimum	5-6
Figure 9 –	Model Results for Case 1 Maximum	5-7
Figure 10 –	Model Results for Case 2 Minimum	5-8
Figure 11 –	Model Results for Case 2 Maximum	5-9
Figure 12 –	Model Results for Case 3 Minimum	5-10
Figure 13 –	Model Results for Case 3 Maximum	5-11
Figure 14 –	Model Results for Case 4 Minimum	5-12
Figure 15 –	Model Results for Case 4 Maximum	5-13
Figure 16 –	Model Results for Case 5 Minimum	5-14
Figure 17 –	Model Results for Case 5 Maximum	5-15

LIST OF APPENDICES

Appendix No.	Description
1.	River Data Provided by Foresight
2.	Laboratory Report
3.	Model Files

EXECUTIVE SUMMARY

The Mach Mine Complex is proposing to discharge water to the Big Muddy River to manage the water balance on-site. The site water includes process water from the coal processing, stormwater collected from on-site, and water recovered from the mine. For the purposes of meeting water quality, the mine water chloride concentration from the nearby Sugar Camp Complex was used to design the outfall. It is anticipated as the Mach Mine continues moving northward, the chloride concentration from the saltwater aquifer is expected to approach the same concentrations measured at the Sugar Camp Complex. At any time, some portion of the mine water could be discharged to the Big Muddy River. The amount of water that could be discharged will be dependent upon the chloride concentration in the discharge stream, the background chloride content and the flow in the Big Muddy River. The upper limit to the discharge will be based on pumping capacity at the facility. Both the process water and the mine water have salt concentrations that are greater than the water quality standards, with chlorides as the expected limiting parameter. Additional constituents are also evaluated. **AquAeTer** was hired to evaluate the potential for meeting the water quality standards through the use of a diffuser system that will meet the water quality standard for chloride within a mixing zone.

CONCEPTUAL EFFLUENT DIFFUSER DESIGN FOR MACH MINE COMPLEX

A conceptual diffuser has been designed for the proposed discharge to the Big Muddy River. The conceptual diffuser consists of 5 individual staged single-port diffusers. This design maximizes the mixing zone for each flow condition in the River while allowing the facility to discharge based on the flow in the River.

The diffuser consists of five individual single-port diffusers. This allows for a staged discharge based on flow in the River and the constituent concentration in the effluent. At the lowest flow condition and maximum constituent concentration, only one port will be utilized. As the flow in the River increases or the chloride concentration decreases, the additional ports can be brought on-line to use the additional volume. As the flow in the River decreases or the chloride concentration increases, the larger ports are taken off-line so that the water quality standards are maintained.

CONSTITUENT CONCENTRATIONS

The nature of the site operations leads to an unpredictable concentration for individual constituents. The constituents of concern that have the potential for exceeding the water quality standards are chloride, iron, copper, sulfate, and nickel. This diffuser has been designed assuming the worst case constituent concentration, which is chloride.

A chloride concentration of 12,000 milligrams per liter, which is a conservative estimate for the pure mine water from the Sugar Camp Complex to the north, was used. The salt aquifer that exists at Sugar Camp is also present at the Mach Mine. As the Mach Mine expands to the north, the mine water removed from this aquifer is expected to increase in chloride concentration to those currently experienced at the Sugar Camp Complex. Although this concentration has not been found at the southern location to date, the chloride concentration continues to increase over time. This will allow the Mine to be able to discharge some of the mine water at all times and continue to meet the water quality standards in the future.

During normal operations, the chloride concentrations are expected to be much less due to the addition of process water and stormwater. At these lower chloride concentrations, a larger volume of water can be discharged while still meeting the water quality standards and the regulatory mixing zone requirements. The flexibility to discharge a larger volume of water at a lower chloride concentration will better allow the Mach Mine facility to manage the on-site water balance. This is a key to operating the site while staying in compliance.

DISPERSION REQUIRED TO MEET CRITERIA

The target dispersion is determined based on the background concentration. The background concentration is expected to vary based on the Sugar Camp Complex discharge to the Big Muddy River. For the purposes of this report, the upstream permitted discharge was assumed to be discharging at the maximum allowable permit limits for the historic flow record. The target dispersion needed for chlorides at the maximum theoretical concentration from the Mach Mine facility ranges from 25.5:1 to 34:1, based on the projected background concentration. These dispersion estimates were used as the basis for the diffuser design. At lower effluent chloride concentrations, the required dispersion is also reduced. This dispersion was met for all cases modeled within a short distance downstream from the individual ports.

MODEL RUNS

Each port was modeled at the range in potential flow conditions. The dispersion achieved was then compared to the dispersion required.

For the first port, there were fourteen model runs because it is expected to be in continuous operation. The ports were then modeled at the maximum recommended flowrate to find the river flow condition at which the water quality standards are met.

TOTAL FLOW THAT CAN BE DISCHARGED

The Mach Mine has set a maximum pumping rate of 5,000 gallons per minute from the facility. Therefore, this was used as the overall maximum discharge. There would be additional allocation in the Big Muddy River at higher flow events. Model predictions have been made for a maximum effluent total flow rate of 5,000 gpm or 11.1 cfs. At the maximum effluent and background chloride concentrations, this maximum discharge requires a River flow of 1,734 cfs to meet a dispersion of 34.4:1 in less than 25% of the River volume. The intent is to always be discharging effluent from the minimum flow of 30 cfs (based on the minimum guaranteed release from Rend Lake) which can accommodate 0.23 cfs of effluent.

Based on the flow record in the River from 2007 through 2012, the total annual allowable discharge would have ranged from 681 million gallons to 1.729 billion gallons per year. This is equivalent to an average daily discharge of 1.86 to 4.73 mgd, respectively. This is less than the proposed pumping capacity.

SECTION 1.0

INTRODUCTION

Williamson Energy, LLC operates the Pond Creek Mine No. 1 (Mach Mine). The facility includes an underground coal mine with surface facilities for processing the coal.

Mach is located in southern Illinois as presented in Figure 1. The site is in northern Williamson County, east of Johnston City, Illinois, as shown in Figure 2. The Big Muddy River flows south from Rend Lake and enters Williamson County west of Johnston City. The Big Muddy River flows into the Mississippi River upstream from Cape Girardeau, Missouri.

PURPOSE OF STUDY

The Mach Mine requires a means to help balance the water balance on-site. We anticipate that the ability to discharge water to streams near the site will not be allowed in the near future. Therefore, a permitted discharge to the Big Muddy River will be necessary to allow the Mine to manage the on-site water balance.

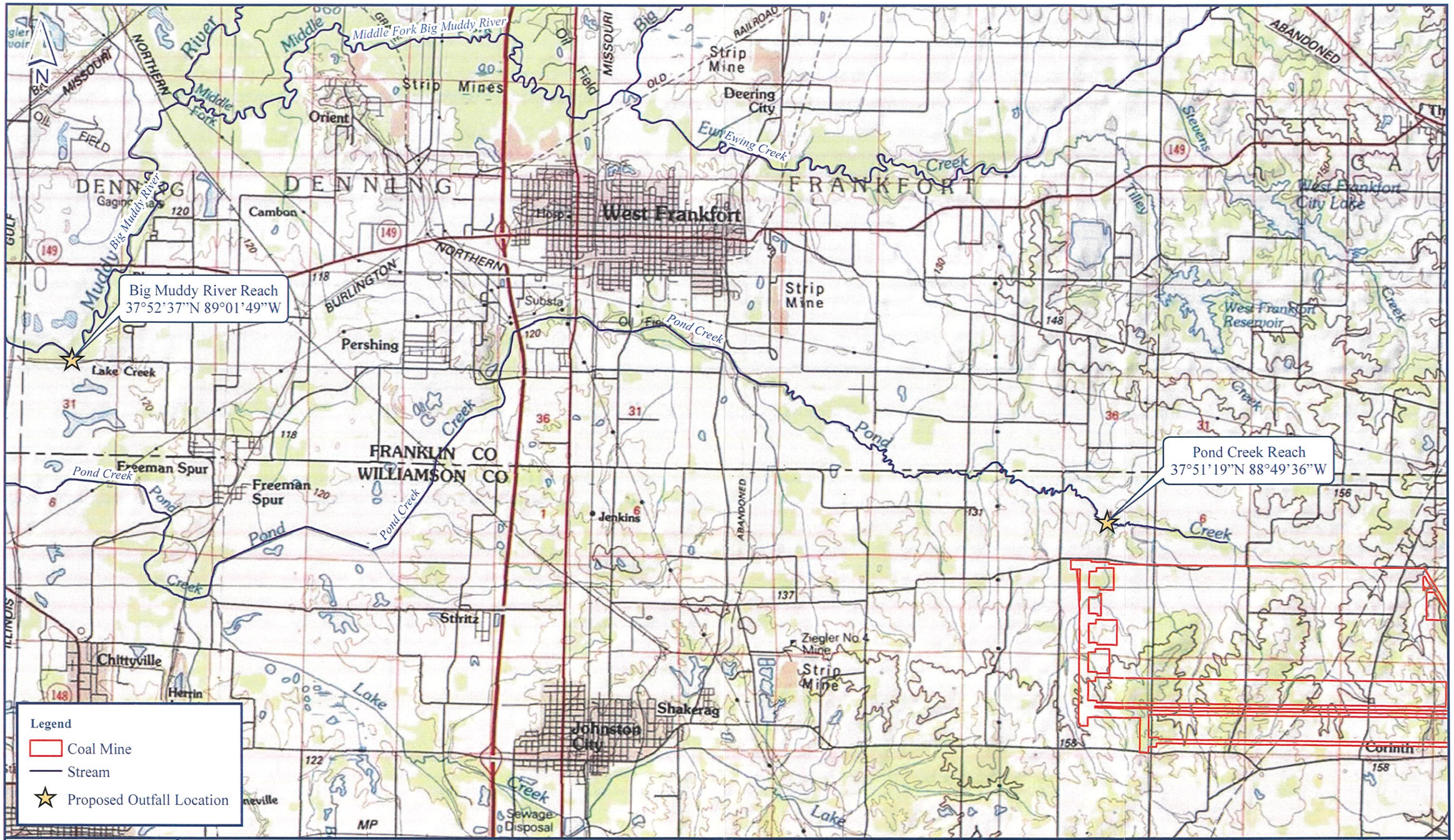
Mach Mine produces a groundwater that has elevated levels of chlorides due to the presence of a saline aquifer. As mining operations move north, the saline aquifer is expected to become more of an issue, based on the experience of the nearby Sugar Camp Mine. The Site currently stores this groundwater and uses it on-site. In addition to the groundwater, site process water and stormwater also add to the water balance. The site process water is re-used to an extent, but cannot be re-used infinitely. Make-up water is provided by stormwater or by fresh water from the local potable water supply.

A mixing zone would be required in order to meet the water quality standards criterion for chlorides. The purpose of this study was to determine if a mixing zone is possible and the total potential discharge rate that could be achieved.

At the request of Mach Mine, **AquAeTer, Inc.**, (**AquAeTer**) located in Brentwood, Tennessee, has performed diffuser simulations of the mixing zone dispersion that can be achieved.


N
Madison
Milwaukee
Grand Rapids
Racine
Kenosha
Dubuque
Waukegan
Rockford
Kalamazoo
Portage
Cedar Rapids
Chicago
Aurora
South Bend
Davenport
Gary
Illinois
Indiana
Peoria
Mansfield
Lafayette
Kokomo
Muncie
Champaign
Quincy
Springfield
Decatur
Indianapolis
Dayton
Columbus
Ohio
Terre Haute
Cincinnati
St Louis
West Virginia
Charleston
Louisville
Frankfort
Lexington
Kentucky
Mach Mine Complex
Cape Girardeau
Missouri
Bowling Green
Blacksburg
Bristol
Vancouver
Illinois
San Francisco
Los Angeles
UNITED STATES
MEXICO
Mexico
0 10 20 40 60 80 100
Miles
AquAeTer
CLIENT: Mach MZ
LOCATION: Johnston City,IL
PROJECT FILE: 152405
FIGURE 1
SIE LOCATION MAP
R08381

R08382



CLIENT:	Williamson Energy
LOCATION:	Johnston City, Illinois
PROJECT FILE:	152405

FIGURE 2

SECTION 2.0

DATA COLLECTIONS

A number of factors affect the characteristics of a mixing zone. This section details the water quality characteristics that were used in the development of the proposed multi-stage diffuser. A field study was conducted on November 12th and 13th, 2014 for the Sugar Camp Mine. Data collected on the Big Muddy River during this sampling event has been used for determining background concentrations. The Big Muddy River between the area of the proposed discharge and the gage at Plumfield, upstream from the proposed discharge, was investigated. Log jams present in the River prevented the field crew from reaching the proposed site. Transects of the stream were taken at four locations.

Individual mixing zones, and consequently, diffuser designs, are unique to each effluent discharge. They are dependent upon several factors that include the following:

1. River hydraulic and physical characteristics
    a. River flow
    b. River velocity;
    c. River depth and geometry;
    d. River density; and
    e. Regulatory Mixing Zone Dimensions

2. Effluent physical characteristics;
    a. Plume discharge flowrate;
    b. Plume density;

3. Effluent discharge and configuration;
    a. Side-channel discharge (not applicable for Foresight);
    b. Single-port submerged discharge; and
    c. Multi-port diffuser.

Regardless of the Regulatory Mixing Zone Dimensions specified, the diffuser design must still maximize the dispersion that can be achieved within the smallest area possible. This diffuser has been designed with multiple single-port diffusers to accommodate the range in flow conditions while meeting the water quality standards.

RIVER CHARACTERISTICS

River Flow

The flow in the Big Muddy River at the proposed discharge location is controlled by the United States Army Corps of Engineers (USACE) dam at Rend Lake. The minimum flow maintained by the USACE appears to be 30 cfs, although there have been 4 instances with recorded flows less than 30 cfs since the installation of the dam in March 1973. The flow regimes that were modeled cover more than 95% of the recorded flow conditions. In addition, the United States Geological Survey (USGS) maintains a gage at Plumfield, Illinois. These data were evaluated as well. The flow regimes for the period of record from April 1, 1973 through November 28, 2012, along with their respective percentage of occurrences, are presented in Table 1. The flow regimes represent the proposed base flow for the worse-case discharge condition from each port or group of ports. In addition to the percentage of times of occurrence, the longest period based on the flow record of operating under a specific flow regime for each case is presented.

Table 1 – Frequency of Flows on the Big Muddy River

FLOW REGIME	NUMBER OF OCCURRENCES	PERCENTAGE OF TIME	LONGEST PERIOD OF OPERATION (days)
Case 1: 30 – 53 cfs	1,809	13%	152
Case 2: 53 – 171 cfs	2,864	22%	100
Case 3: 171 – 382 cfs	2,004	15%	72
Case 4: 382 cfs – 844 cfs	2,857	22%	53
Case 5: 844 – 1,675 cfs	2,122	16%	131
Flows > 1,675 cfs	1,487	11%	-

River Velocity

The velocity of the river is utilized in mixing zone calculations. The ambient velocity affects the manner in which the effluent mixes with the receiving stream. During the November field study for Sugar Camp, velocity in the Big Muddy River upstream from Plumfield ranged from 0.13 to 0.63 feet per second (ft/sec), with an average of 0.53 ft/sec in the main channel. At the time of the measurement, the flow in the river from Rend Lake was measured as 126 cubic

feet per second. The discharge measurement was made following the United States Geological Survey (USGS) Techniques of Water-Resources Investigations Chapter A8 of Book 3.

The USGS collects velocity data at the gage at Plumfield, Illinois. Normally, a power curve fit could be applied to a flow versus velocity curve to derive a relationship. However, there is no discernible relationship between the flow and the velocity measurements. There is no indication within the gage information as to why the discrepancy is there. The velocity measurements that were recorded at or near the desired river flows were utilized in the mixing zone calculations.

River Bathymetry

For modeling purposes, the USGS field discharge measurements were used to estimate the depth of water for each flow condition.

River Density

Density is a function of the temperature of the water and the salt content of the water. The USGS gage site at Plumfield, Illinois has measured total dissolved salt (TDS) concentrations 18 times from 1980 through 1996. The average TDS was 336 mg/L. During the Field Study, the TDS in the Big Muddy River near the proposed discharge site was 178 mg/L. The long-term average TDS concentration was used for modeling purposes.

The river density can be calculated using the following formula from (http://www.csgnetwork.com/h2odenscalc.html):

$$\rho = \rho_T + A * \frac{C}{1{,}000} + B * \left(\frac{C}{1{,}000}\right)^{3/2} + 0.00048314 * \left(\frac{C}{1{,}000}\right)^2 \quad \textbf{1}$$

where: ρ = density of water at temperature, T, and TDS concentration, C, kilograms per cubic meter, (kg/m^3);
ρ_T = density of water at temperature, T, kg/m^3;
C = concentration of TDS, milligrams per liter;
A and B = coefficients.

$$\rho_T = 1{,}000 * \left(1 - \frac{T + 288.9414}{508{,}929.2 * (T + 68.12963)} * (T - 3.9863)^2\right) \quad \textbf{2}$$

$$A = 0.824493 - 0.0040899 * T + 0.000076538 * T^2 - 0.00000082467 * T^3 + 0.0000000053675 * T^4 \quad \textbf{3}$$

$$B = -0.005724 + 0.00010227 * T - 0.0000016546 * T^2 \quad \textbf{4}$$

A temperature of 20°C was used. This temperature was also used for the Mach discharge water. It is expected that both streams will have similar temperatures since both are open to the atmosphere. The background river density utilized for the model was 998.49 kilograms per cubic meter (kg/m^3).

Regulatory Mixing Zone Dimensions

The main constituent of concern is chloride. The water quality standard for this parameter is a single value standard. For the purposes of mixing zones, the single value standard is treated like a chronic standard and must be met at the edge of the mixing zone. Therefore, the mixing zone size will be kept as small as possible in order to meet the water quality standard. Additionally, a maximum size of the mixing zone will be kept at less than or equal to 25% of the volume of flow or cross-sectional area.

EFFLUENT CHARACTERISTICS

Effluent Flowrate

The effluent flowrate will be mostly limited by meeting the water quality standard in a mixing zone in the Big Muddy River. The calculations in this report determine the allowable flowrate based on the flow in the Big Muddy River. The discharge schedule was determined based on utilizing no more than 25% of the volume of water. The effluent flow calculated ranged from 102 gallons per minute (gpm) to 5,000 gpm. This is equivalent to 0.15 million gallons per day (mgd) to 7.2 mgd or 0.23 cubic feet per second (cfs) to 11.1 cfs.

Effluent TDS

An effluent TDS concentration of 20,000 mg/L was used to calculate the density. This is based on the measured value from the samples collected at the Sugar Camp facility by AquAeTer.

Effluent Temperature

As described previously with the River parameters, it is assumed that the effluent discharge temperature will be the same as the river temperature. Therefore, a temperature of 20°C was used. A range in temperature could be used, but since the temperatures are assumed to be equal to that of the River, any change to the effluent temperature would be mimicked by the exact same change in the background temperature value.

Effluent Density

The density was calculated using Equations 1 through 4 above and was determined to be 1,013.4 kg/m^3. The effluent is expected to be negatively buoyant or try to sink to the bottom of the stream until adequate mixing has occurred. By breaking the higher flowrates into multiple single-port diffusers, rapid mixing is maintained that assists in reducing the density of the effluent plume.

EFFLUENT DISCHARGE CONFIGURATION

The method of discharge to the receiving stream greatly influences the ability of the effluent to mix. Due to the variable discharge requirements, a staged array of single-port diffusers was determined to best meet the needs of the Mach discharge. The conceptual diffuser design is presented in Figure 3. The success of the multiple single ports will be dependent upon a Control Structure that directs flows to the proper ports depending on the flow in the River and thereby the dispersion that can be achieved for a specific flow range.

Number of Ports and Port Sizes

The ports are designed to discharge close to a target velocity of 10 feet per second, with a maximum flowrate of 18 feet per second. There are certain design guidelines for discharges, presented in Table 2. There are five planned ports with the following sizes:

Table 2 – Diffuser Design Guidelines

PARAMETER	GUIDELINE
Exit Velocity	Target exit velocity should be 10 feet/sec (ft/sec) to maximize initial mixing, thereby minimizing impacts to aquatic life in the river.
Maximum Exit Velocity	Should be kept under 15 to 18 ft/sec. This reduces the potential for scour of the ports, prolonging the life of the diffuser.
Port Area	The sum of the port areas should be 1/3 to 2/3 of the cross-sectional area of the header pipe.
Header Pipe	Should be sized to allow an effluent velocity greater than 3 ft/sec to prevent sediment build-up in the pipe.
Port Spacing	For uni-directional stream flow, ports should be spaced at 10* port diameter to increase entrainment and cause a smooth transition from the jet momentum zone.

Port 1: 3-inch diameter, planned flow rate of 102 to 397 gpm or 0.23 to 0.88 cfs;

Port 2: 3-inch diameter, planned flow rate of 102 to 397 gpm or 0.23 to 0.88 cfs;

Port 3: 4-inch diameter, planned flow rate of 342 to 705 gpm or 0.76 to 0.9 cfs;

Port 4: 6-inch diameter, planned flow rate of 770 to 1,587 gpm or 1.7 to 3.5 cfs;

Port 5: 8-inch diameter, planned flow rate of 1,473 to 2,821 gpm or 3.3 to 6.3 cfs.

The planned discharge configuration is presented in Table 3. These are based on a chloride concentration of 12,000 mg/L. An example of the discharge schedule based on an effluent chloride concentration of 1,000 mg/L is also presented in Table 3. The basic premise is that a controller tied to the discharge flow in the River will direct flow to the proper outfall pipe. The flow from each port will be maximized prior to bringing the next port on-line. If all ports were the same size, approximately 30 ports would be necessary to get the same total discharge rate. There is a potential to also tie the discharge to the salt content in the effluent and in the River.

Table 3 – Discharge Scenarios at 12,000 mg/L Chloride

SCENARIO	RIVER FLOW (cfs)	ACTIVE PORT(S)	TOTAL DISCHARGE (gpm)
Case 1, Min.	30	Port 1	102
Case 1, Max.	>=116	Port 1	396
Case 2, Min.	117	Ports 1 & 2	396
Case 2, Max.	>=233	Ports 1 & 2	793
Case 3, Min.	234	Ports 1, 2, & 3	793
Case 3, Max.	>=440	Ports 1, 2, & 3	1,499
Case 4, Min.	441	Ports 1, 2, 3, & 4	1,499
Case 4, Max.	>=906	Ports 1, 2, 3, & 4	3,085
Case 5, Min.	907	Ports 1, 2, 3, 4, & 5	3,085
Case 5, Max.	>=1,734	Ports 1, 2, 3, 4, & 5	5,905

One potential down-side to the individual ports is the potential for silting over, since only the first port is expected to be used continuously. The ability to discharge increased volumes at lower chloride concentrations will reduce the potential for siltation, since the ports will be used more often. This can be alleviated by routine maintenance, including line flushing and inspections.

The ports were spaced based on the results of the modeling to reduce interactions within the jet momentum zone while also remaining within the 25% of the cross-sectional area.

A multi-port diffuser is not recommended because there is no way to effectively control which ports are being used. Equipment, such as duckbill valves, designed to open under certain pressure conditions do not work after being exposed to natural conditions and they defeat the purpose of an open port that minimizes frictional losses and maximizes dispersion.

WATER QUALITY

The Big Muddy River in the proposed discharge area does not have a large database of parameters measured available from the USGS. The downstream gage has a number of sample results, as mentioned previously. Chloride, TDS, and sulfate are the main parameters of concern from the Mach Mine Water. In addition, the data from the Holding Cell indicate that iron, nickel, and copper have the potential to exceed the water quality standard. However, chloride requires the largest dispersion and therefore the largest mixing zone. The water quality standards for the other parameters will be met within the chloride mixing zone. If any acute water quality criteria are exceeded at the end of the pipe, these will be addressed specifically in the dispersions met in the acute zone. The results of the expected effluent samples are presented in Table 4. The results from the Big Muddy River in the area of the upstream permitted discharge are also presented in Table 4.

The IEPA has requested that we use their dataset for the Big Muddy River and use the 90th percentile value for the chloride data. This results in a chloride concentration in the background of 30.1 mg/L. In order to account for the upstream permitted discharge, the maximum permitted discharge was projected through the period of record. In other words, the historical background flowrates were used and the upstream discharge was input as if it existed in the past. The maximum permitted discharge was input for each daily flow. The projected background concentration at Plumfield is 31.2 to 151 mg/L. For the purposes of this exercise, the model projections have been made assuming the worse-case background concentration.

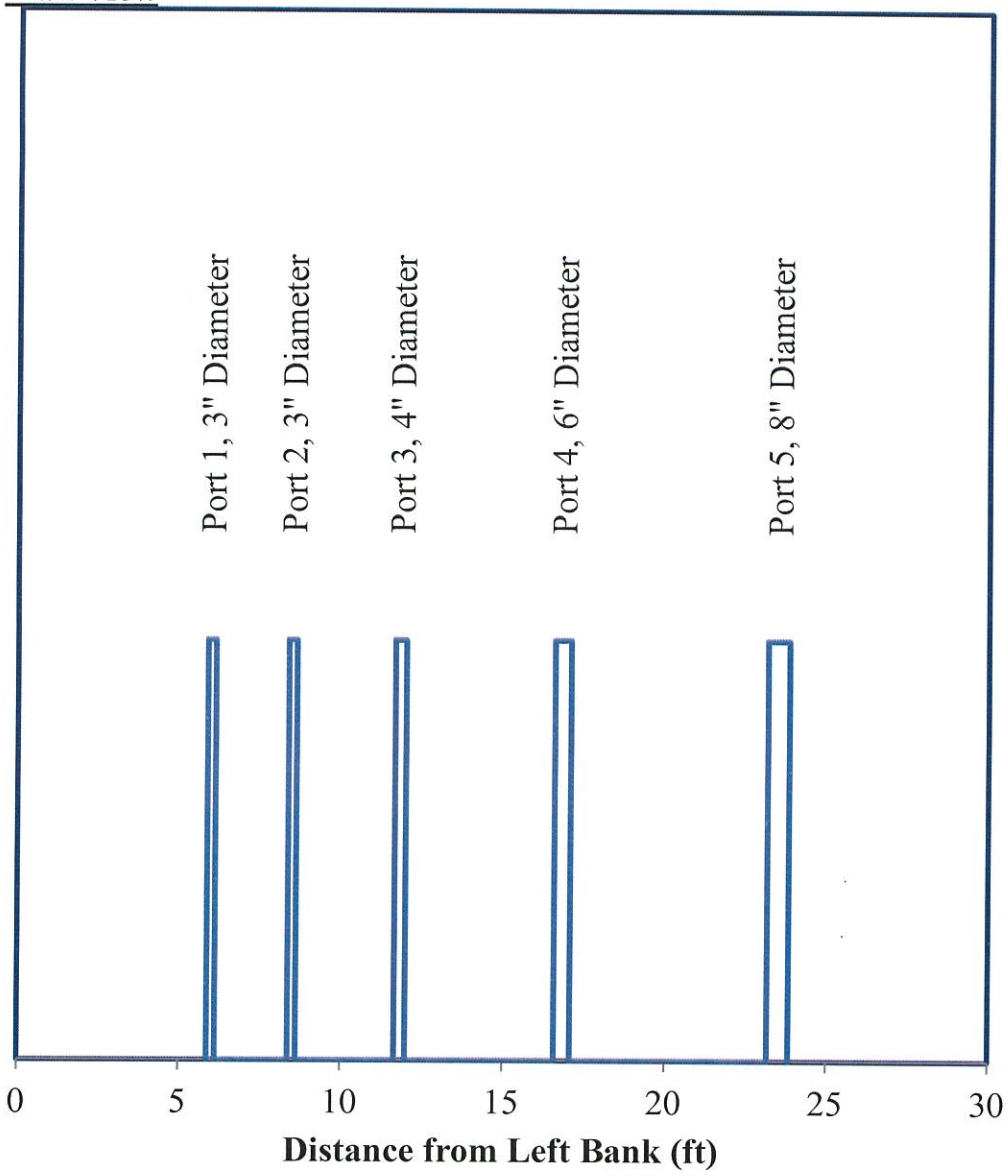
Table 4 - Water Quality Sample Results

PARAMETER	UNITS	ACUTE WQS (mg/L)	CHRONIC WQS (mg/L)	BIG MUDDY RIVER (mg/L)			HOLDING CELL		
				SAMPLE 1	SAMPLE 2	DUPLICATE	MIN.	AVG.	MAX.
Chloride	(mg/L)	-	500	17	26.3	16.2	1,699	2,251	12,000
Sulfate	(mg/L)		1,182	40	40.3	39	820	1,741	2,120
Hardness (as $CaCO_3$)	(mg/L)	-	-	90.9	87.6	86.6	610	806	970
TSS	(mg/L)			14.4	12	12.3	7	37	72
Iron (total)	(mg/L)		1	0.182	0.192	0.191	0.216	0.685	1.835
Nickel (dissolved)	(mg/L)	0.074	0.004	<0.01	<0.01	<0.01	0.004	0.008	0.014
Copper	(mg/L)	0.015	0.012	<0.01	<0.01	<0.01	0.011	0.023	0.032

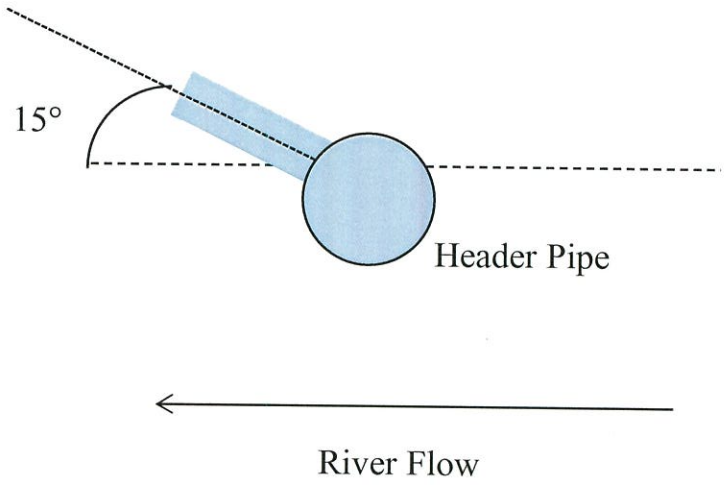
Notes: Background hardness was 88.4 mg/L.
Sulfate WQS calculated using the projected downstream hardness and chloride concentration at the edge of the mixing zone.

R08390

Plan View



ProfileView



Example Header Pipe and Outfall.
Port Diameter as specified for each port.
Header Pipe will be sized appropriately for each port to achieve the desired discharge rate.

AquAeTer

optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 3
CONCEPTUAL DIFFUSER

R08391

SECTION 3.0

WATER QUALITY STANDARDS AND DILUTION REQUIRED

Based on the results of the water quality samples taken from the Mine Water, chloride, sulfate, iron, copper, and nickel were the only parameters that were greater than the water quality standard.

TARGET DISPERSION

The dispersion required for each parameter in order to meet the water quality standards is presented in Table 5. The chloride is the limiting parameter, requiring a dispersion of 34:1 in order to meet the water quality standard of 500 mg/L.

Table 5 – Dispersion Required

PARAMETER	ACUTE / CHRONIC	WQS	CONCENTRATION		DISPERSION REQUIRED (__:1)
			BACKGROUND (mg/L)	MINE (mg/L)	
Chloride	Single Value	500	31.2	12,000	25.5
	Single Value	500	151	12,000	34.0
Sulfate	Single Value	1,182	60.1	2,120	1.8
Iron (total)	Aquatic Organisms	0.5	0.220	1.835	5.8
Nickel (dissolved)	Acute	0.0074	-	0.013	3.3
	Chronic	0.004	-	0.013	3.25
Copper	Acute	0.015	-	0.032	2.1
	Chronic	0.012	-	0.032	2.7

Dispersion Calculation

The dispersion required for any parameter is calculated as follows:

$$(S-1) * C_{background} + (1) * C_{Effluent} = (S) * C_{Standard} \quad 5$$

where: S = dispersion expressed as 1 part effluent to (S-1) parts background, unitless; and,

C = concentration.

STANDARDS

The standards that are applicable to the Big Muddy River were previously presented in Table 4.

FUTURE STANDARDS

The water quality criterion for chloride is currently under review by the USEPA. The possibility exists that the criterion for chloride concentration will be changed from a single number to a chronic and an acute criterion. The current single number standard in Illinois is 500 mg/L. For the purposes of a mixing zone, this single number standard must be met at the edge of the mixing zone. The new chronic criterion is expected to be 283 mg/L, although this has not been confirmed. The model runs were analyzed to ensure that it would adequately perform and exceed requirements if this event occurs. The new chronic dispersion requirement was calculated to be 89.9:1. For all model runs, the projected target dispersion of 89.9:1 will be met within the statutory limits for the mixing zone.

ENVIRONMENTAL BENEFITS OF A MIXING ZONE

The proposed discharge is approximately 11 miles away from the mine location. Currently, the mine is permitted to discharge through NPDES permitted outfalls around its mine location. The streams into which the mine is permitted to discharge are substantially smaller than the Big Muddy River at the point of the proposed mixing zone. While the mine's discharges are intermittent at best and any discharges are within its permitted limits, relocating the primary mine-water discharge point to the Big Muddy River will have an immediate positive impact to the mine-adjacent watershed by reducing pollutant loading into the smaller streams higher in the watershed. And, as shown in this report, the proposed discharge into the mixing zone will comply with water quality standards. Thus, the proposed mixing zone will be of environmental benefit to the watershed around the mine.

SECTION 4.0

MIXING ZONE THEORY

Regardless of how an effluent is discharged, the effluent will be mixed with the receiving stream in several distinct hydraulic mixing zones, as illustrated in Figure 4. These zones can be described as follows:

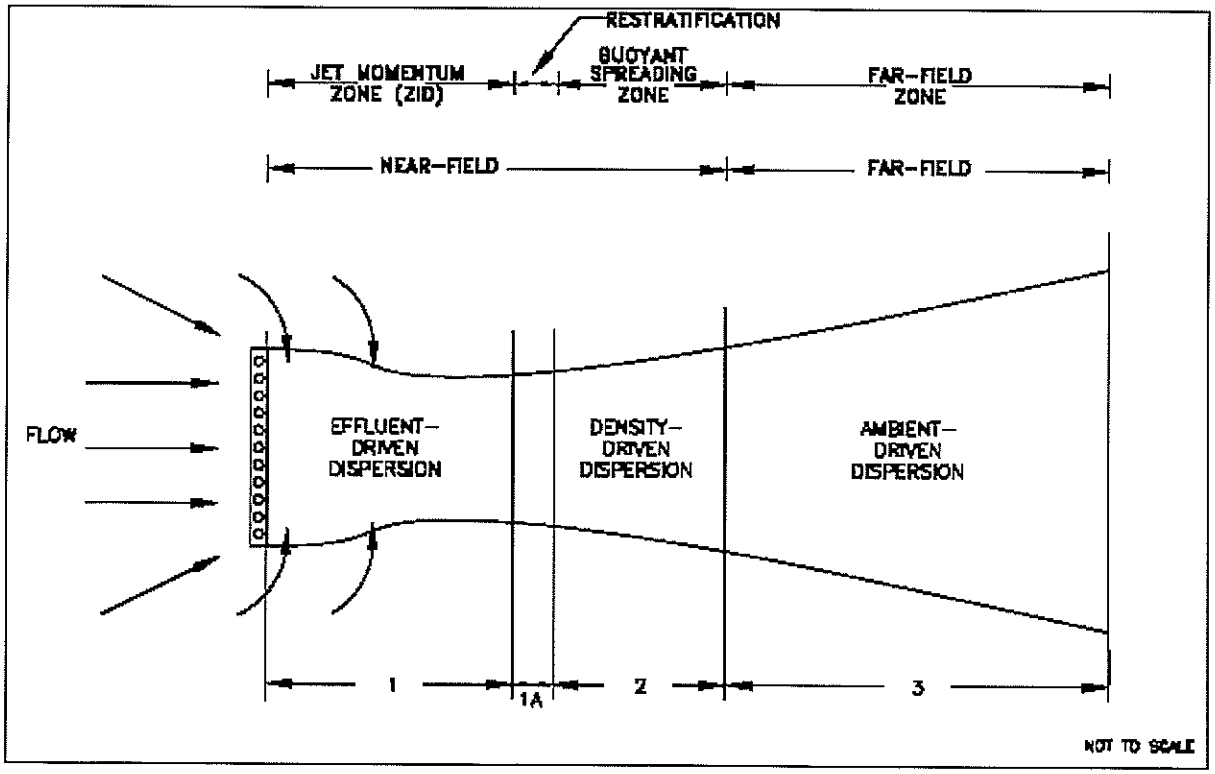
1. Jet Momentum or Entrainment Zone (JMZ) – mixing occurs almost exclusively due to the energy or initial jet momentum of the effluent discharge;

1A. Restratification Zone – the plume restratifies due to residual density differences (seldom occurs, but can occur for very positively or very negatively buoyant effluents);

2. Buoyant or Density Spreading Zone (BSZ) – transition zone where mixing occurs due to residual excess effluent energy (momentum), a density gradient between the effluent and the river, and ambient river diffusion; and

3. Far-Field Zone – longitudinal, lateral, and vertical mixing due to ambient diffusion alone.

Figure 4 – Hydraulic Mixing Zone Concepts



JET MOMENTUM ZONE

In regulatory language, the JMZ is commonly referred to as the Zone of Initial Dilution (ZID), or the zone of rapid and immediate mixing. The ZID, or JMZ, is where the maximum reduction in effluent concentration occurs. The size of the JMZ is directly related to the difference between the initial effluent velocity and the ambient river velocity (in the discharge area), the geometry of the discharge structure, the initial densimetric Froude Number, and the initial density gradient between the effluent and the river. Lee and Jirka (1980) define this near-field mixing zone as occurring within a distance described by them as "of order of the diffuser length" (i.e., meaning within ½ to 1½ diffuser lengths) downstream from the discharge structure, for low to stagnant ambient currents. Higher ambient velocities can extend the near-field mixing zone to distances greater than one diffuser length, because ambient velocity pushes the plume further downstream within the same time required for near-field jet zone mixing.

RESTRATIFICATION ZONE

Once the effluent plume has lost its jet momentum into the receiving stream, the remaining density difference between the plume and the river can cause the plume to restratify or form a density wedge. This can occur for strongly positively or negatively buoyant plumes, but generally not for plumes that are essentially neutral in density following the JMZ. The effect of restratification is to restrict the exchange of new water with the plume through physical density gradients.

BUOYANT SPREADING ZONE

Dispersion processes in the buoyant spreading zone (BSZ) arise due to the buoyant forces caused by the density difference of the mixed flow relative to the ambient diffusion (Fickian diffusion). Buoyant spreading, defined as "the horizontally transverse spreading of the mixed effluent flow while it is being advected downstream by the ambient current" (Doneker and Jirka, 1990), will normally occur in the cases of weakly buoyant or non-buoyant plumes. The buoyant spreading region occurs between the JMZ or Restratification zone and the far-field zone, and is a difficult to define zone of transition. This zone can physically extend 300 to 700 feet or more downstream from the discharge point.

FAR-FIELD ZONE

Far-field dispersion is totally dependent upon, and driven by, ambient river diffusion. The plume is mixed top to bottom and no density gradients remain. Parameters such as river velocity, morphology, and lateral and vertical dispersion coefficients, determine the rate and extent of ambient diffusion. Eventually, the effluent will become completely mixed laterally and

vertically across the river by the far-field dispersive forces. The distance to total mixing with the river is usually measured in miles, rather than in feet. The total regulatory mixing zone encompasses a small portion of the total far-field mixing zone.

INDEPENDENT ANALYSIS

Dispersion Required

The first thing that is considered for the mixing zone study is the dispersion required to achieve adequate mixing. The dispersion required is calculated using the following equation:

$$(S-1) * C_{background} + (1) * C_{Effluent} = (S) * C_{Standard} \quad 6$$

where:
- S = dispersion required (__:1, dimensionless);
- $C_{background}$ = background concentration in river (mg/L, or mass/volume);
- $C_{effluent}$ = effluent concentration (mg/L, or mass/volume); and
- $C_{Standard}$ = desired concentration (mg/L, or mass/volume).

Rearranging Equation 6 and solving for S yields the following:

$$S = \frac{C_{Effluent} - C_{background}}{C_{Standard} - C_{background}} \quad 7$$

As described in the Section 3, a dispersion of 34:1 is required to meet the chloride standard.

NEAR-FIELD BULK DISPERSION ESTIMATE

Dispersion, S, also called mixing, is defined as:

$$S = \frac{total\ volume\ of\ the\ sample}{volume\ of\ effluent\ in\ sample} \quad 8$$

Steady-state conditions are assumed in river analyses. Therefore, flow, mass, or concentration can be used in place of volume in this definition of dispersion. The mixing that occurs in the JMZ (near-field) can be crudely estimated by a bulk dispersion analysis of a one-second snap-shot of the system. During the one-second interval being studied, the effluent mixes with the volume of water that passes over the discharge. Substituting values from the data collected into Equation 8 yields an estimate of dispersion in the JMZ, given by the following equation:

$$S = \frac{Q_{river} + Q_{effluent}}{Q_{effluent}} \quad \textbf{9}$$

where: Q_{river} = river flow (cubic feet per second (cfs), or volume/time); and
$Q_{effluent}$ = effluent flow (cfs, or volume/time).

The river flow in the area is calculated by the following equation:

$$Q_{river} = L_D * D * u \quad \textbf{10}$$

where: L_D = effective length of the diffuser (ft, or distance);
D = river depth, (ft, or height); and
u = river velocity (ft/sec, or length/time).

The effective length is calculated for each port and is assumed to be 10 times the diameter of the port. For the lowest flow scenario, the River is estimated to be 1 foot deep. The velocity in the River was assumed to be 0.92 feet per second for the low flow scenario. Plugging these values into Equation 10 gives the following:

$$Q_{river} = 2.5 * 1 * 0.92$$

$$Q_{river} = 2.3\ cfs$$

The minimum effluent flow is 102 gpm, or 0.23 cubic feet per second (cfs). Plugging these values into Equation 9 yields:

$$S = \frac{2.3 + 0.23}{0.23}$$

$$S = 11$$

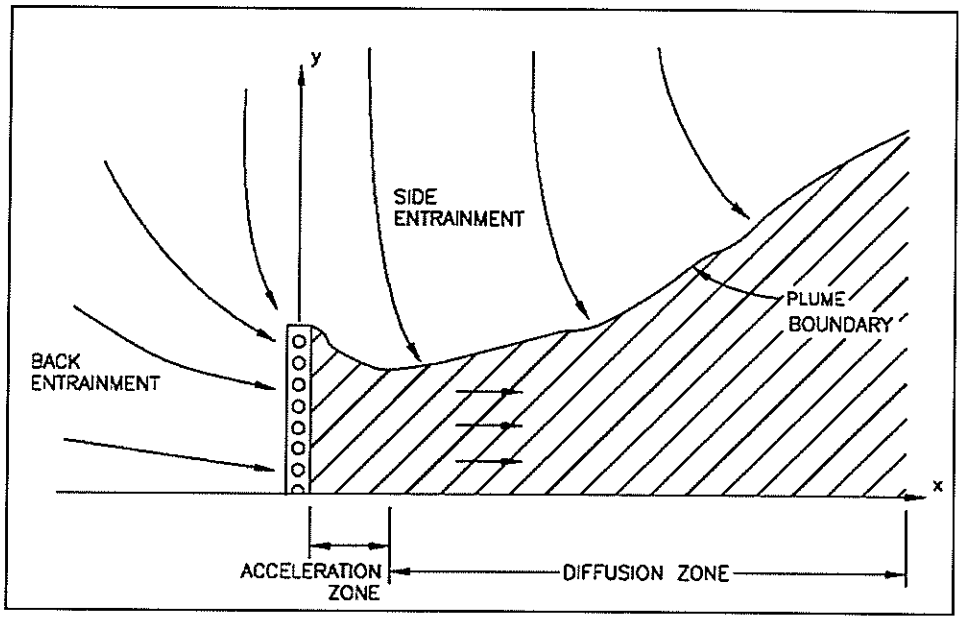
$$\therefore Dispersion\ of\ 11{:}1$$

The dispersion, S, in this calculation is a theoretical maximum dispersion if the full depth of the river at the outfall is used. This analysis assumes complete mixing and ignores entrainment of water from the side and from behind the diffuser. In actuality, the high velocity of the effluent exiting the diffuser (compared to the ambient velocity) creates a "vacuum" and entrains, or pulls, water into the plume from bordering waters, as illustrated in Figure 5. This entrained water has the effect of increasing dispersion, as more water is made available to mix with the effluent.

The bulk dispersion analysis presented above is an oversimplification of a quite complex plume development and mixing process. However, it is a "back of the envelope" method to estimate the order of magnitude of achievable dispersion. Actually, diffuser effluent flow-

induced entrainment of additional waters can typically increase dispersion, dependent on river velocity, by 10% to 30%, or more, over the dispersion available due to river water passing directly over the diffuser.

Figure 5 – Plume Entrainment



The initial plume behavior, and hence the resultant JMZ dispersion, is dependent upon the stability of the plume in the receiving body of water. Two general methods of solving for dispersion (that account for entrainment) exist for a multiport diffuser with a flowing ambient current:

1. Unstable discharge domain (shallow-water conditions) where flow recirculation and breakdown occur; and

2. Stable discharge domain (deep-water conditions).

In order to determine whether an unstable plume analysis or a stable plume analysis is appropriate for determining effluent dispersion, the plume stability must first be determined. In reality, most effluent plumes will undergo both unstable and stable dispersion depending on river stage and river velocity over the diffuser.

Plume Stability Analyses

Discharge flow patterns in the immediate diffuser vicinity are strongly dependent upon a combination of ambient conditions, discharge characteristics, and diffuser geometry. The purpose of plume stability analysis is to predict under what combination of conditions the effluent plume will exhibit stable or unstable characteristics. The stability classification, when

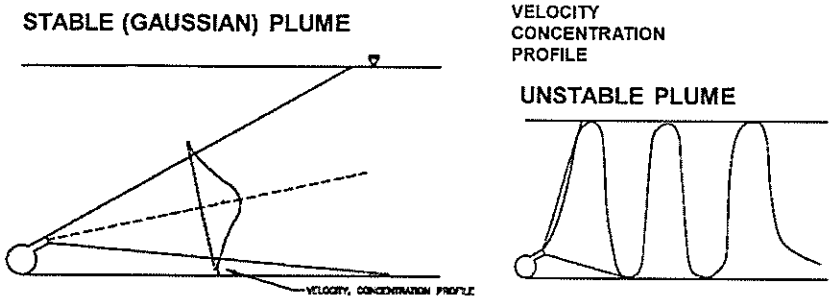
compared to observed field plume behavior, can give credence to, or disqualify from application, the various predictive dispersion equations or computer models available.

The definitions of stability and instability given by Jirka (1982) illustrate two broad classes of expected flow behavior. Depending on the combination of factors as mentioned above:

> *A stable near field is defined as one in which buoyant surface layer is formed which does not communicate with the initial buoyant jet zone...The near field is defined as unstable whenever the layered flow structure breaks down in the discharge vicinity, resulting in recirculating zones or mixing over the entire water depth...*

In simple terms, a stable plume is one which propagates downstream in a well-defined conical fashion, growing in size until the effluent is mixed top-to-bottom over the entire water column. A stable plume is typically described by a Gaussian profile, as illustrated in Figure 6. An unstable plume, on the other hand, will demonstrate a turbulent, and sometimes oscillatory, centerline trajectory with a tendency to mix top-to-bottom within a very short distance (on the order of one diffuser length) downstream from the diffuser. An unstable plume may appear as in Figure 6. The analogy of a garden hose discharging into a swimming pool (stable plume, slowly mixing), or into a one-gallon bucket (unstable plume, rapid and turbulent mixing) can be used to illustrate the concept of plume stability.

Figure 6 – Plume Stability Analysis



$$\frac{m_o}{p_o^{2/3}H} + \frac{m_a + m_o\cos\theta_o}{p_o^{2/3}H} \geq 0.54 \; unstable$$

$$< 0.54 \; stable$$

Jirka (1982)

where:		
	mo	= discharge momentum flux
	ma	= ambient momentum flux
	po	= buoyancy flux
	H	= water depth
	qo	= discharge angle

$$\frac{m_o\left(1 + m_o\cos^2\theta_o\right)^2 + m_a}{p_o^{2/3}H} \geq 0.54 \; unstable$$

$$< 0.54 \; stable$$

Adams (1982), Jirka (1973,1982)

The various mathematical equations that have been proposed to calculate bulk dispersion rely on knowledge of plume stability. There are two types of dispersion models, one based on stable plumes and one based on unstable plumes. The UDKHDEN model has been updated as the DKHW model, which is incorporated into Visual PLUMES. DKHW always assumes a stable plume, and approximates a Gaussian distribution for projecting the effluent dispersion. The Adams (1982) equation for bulk dispersion, for instance, is valid for shallow water plumes which are mixed top-to-bottom. By extension to the definition of stability, the Adams bulk dispersion analysis is applicable only to unstable plume situations. CORMIX will determine if a plume is stable or unstable and will then choose the appropriate calculations to model the plume.

Early work in dispersion modeling dealt primarily with positively buoyant plumes, such as those emanating from once-through cooling water discharges. A stability criterion reported by Jirka (1982) during this early work, and still widely used, is:

$$\frac{m_o}{p_o^{2/3}} + \frac{m_a + m_o * cos\theta_o}{p_o^{2/3} * H} = 0.54 \qquad \textbf{11}$$

where:
- m_o = discharge momentum flux;
- m_a = ambient momentum flux;
- p_o = buoyancy flux;
- H = water depth; and
- θ_o = discharge angle.

If the left hand side (LHS) of Equation 4-6 is greater than or equal to 0.54, then the plume is said to be unstable. A closer examination of Equation 11 shows that both the discharge momentum flux and any ambient momentum flux act as destabilizing agents. The tendency to instability is further increased if the discharge momentum also has a horizontal component (m_o*cos θ_o).

A slightly different form of Equation 11 is used by Adams (1982) and Jirka (1973, 1982).

$$\frac{m_o * (1 + cos^2\theta_o) + m_a}{p_o^{2/3} * H} = 0.54 \qquad \textbf{12}$$

Again, the criterion for stability is if the LHS of Equation 12 is greater than or equal to 0.54.

The CORMIX computer model, first developed by Akar and Jirka (1991), uses modified forms of Equation 12 in their rigorous flow classification scheme, depending on plume buoyancy. As stated previously, most early work dealt only with positively buoyant plumes. In the case of positively buoyant plumes, an ambient current momentum flux (m_a) will tend to accelerate the spreading of the plume and promote rapid top-to-bottom mixing. In this sense,

ambient momentum flux does play a destabilizing role, and thus m_a is added to the LHS of Equations 11 and 12. In the case of negatively buoyant plumes, however, an ambient current will act more in a stabilizing role; that is, an ambient current will moderate the tendency of the jet plume to oscillate and mix rapidly top-to-bottom. The following criterion from CORMIX accounts for the difference in plume and ambient densities, as well as the height of the diffuser from the water body floor:

$$Positive: \frac{m_o * (1 + cos^2\theta_o) + m_a - 0.1 * h_o * \frac{m_a}{m_o} * p_o^{2/3}}{p_o^{2/3} * H} = 0.54 \quad \textbf{13}$$

$$Negative: \frac{m_o * (1 + cos^2\theta_o) - m_a}{|p_o|^{2/3} * H} = 0.54 \quad \textbf{14}$$

where: h_o = elevation of discharge port above bottom.

The significant difference between Equations 12, 13, and 14 is the role played by the ambient momentum flux (m_a): that is, whether m_a is stabilizing ($+m_a$) or destabilizing ($-m_a$).

A negatively buoyant effluent condition exists, due to the salt loading, so values will be input into Equation 14.

The ambient momentum flux, m_a, in units of ft^3/sec^2 is defined by the following equation:

$$m_a = u_a^2 * H \quad \textbf{15}$$

where: u_a = ambient velocity (ft/sec).

The ambient momentum flux is then:

$$m_a = \left(0.92 \frac{ft}{sec}\right)^2 * 1\,ft$$

$$m_a = 0.846 \frac{ft^3}{sec^2}$$

The discharge momentum flux, m_o, in units of ft^3/sec^2, is defined by the following equation:

$$m_o = q_o * u_o \quad \textbf{16}$$

where: q_o = volume flux (ft^2/sec); and
u_o = discharge port exit velocity.

The volume flux can be calculated using the following equation:

$$q_o = \frac{Q_o}{L_D} \quad \textbf{17}$$

where: Q_o = discharge flow (cfs or volume/time); and
L_D = effective length of the diffuser (feet).

The discharge flow is 102 gpm. Converting this to cfs results in a port flow of 0.23 cfs. The effective length of the diffuser is 2.5 feet. The volume flux is then:

$$q_o = \frac{0.23\ cfs}{2.5\ ft}$$

$$q_o = 0.092\ \frac{ft^2}{sec}$$

The discharge port exit velocity can be calculated by the following equation:

$$u_o = \frac{Q_o}{n * A_{port}} \quad \textbf{18}$$

where: n = number of ports;
A_{port} = port cross-sectional area (ft^2).

The conceptual diffuser design has multiple single ports that are evaluated independently. The cross-sectional area for a 3-inch diameter port is calculated by $A=\pi r^2=\pi D^2/4$. Substituting these into Equation 18 yields the following:

$$u_o = \frac{Q_o}{n * A_{port}}$$

$$u_o = \frac{0.23\ cfs}{1 * \left(\frac{\pi * \left(\frac{3}{12}\right)^2}{4}\right) ft^2}$$

$$u_o = \frac{0.23}{0.049}$$

$$u_o = 4.69\ \frac{ft}{sec}$$

The discharge momentum flux is then:

$$m_o = q_o * u_o$$

$$m_o = 0.092\,\frac{ft^2}{sec} * 4.69\frac{ft}{sec}$$

$$m_o = 0.43\,\frac{ft^3}{sec^2}$$

The buoyancy flux, p_o, in units of ft^3/sec^3 is calculated by the following equation:

$$p_o = q_o * g_o' \qquad \textbf{19}$$

where: g_o' = initial buoyancy acceleration (ft/sec^2).

The initial buoyancy acceleration is calculated by the following equation:

$$g_o' = \frac{g * (\rho_a - \rho_o)}{\rho_a} \qquad \textbf{20}$$

where:
- g = the acceleration of gravity, 32.2 ft/sec^2;
- ρ_a = ambient density, (kg/m^3 or mass per volume); and
- ρ_o = density of the effluent (kg/m^3 or mass per volume).

The ambient density is 998.49 kg/m^3 at a TDS concentration of 336 mg/L. The modeled effluent density condition is 1,013.39 kg/m^3. Plugging these values into Equation 20 yields:

$$g_o' = \frac{g * (\rho_a - \rho_o)}{\rho_a}$$

$$g_o' = \frac{32.2\frac{ft}{sec^2} * \left(998.49\frac{kg}{m^3} - 1{,}013.39\frac{kg}{m^3}\right)}{998.49\frac{kg}{m^3}}$$

$$g_o' = -0.48\,\frac{ft}{sec^2}$$

Plugging this value into Equation 19 yields:

$$p_o = q_o * g_o'$$

$$p_o = 0.092\frac{ft^2}{sec} * (-0.48)\frac{ft}{sec^2}$$

$$p_o = -0.044\frac{ft^3}{sec^3}$$

Plugging m_o = 0.43, θ= 15°, m_a = 3.36, p_o = -0.044, and H = 3.97 into Equation 13 yields:

$$Negative: \frac{m_o * (1 + cos^2\theta_o) - m_a}{|p_o|^{2/3} * H} = LHS$$

$$\frac{0.43 * (1 + cos^2 15) - 0.846}{|-0.044|^{2/3} * 1} = LHS$$

$$\frac{0.43 * (1.93) - 0.846}{|-0.044|^{2/3} * 1} = LHS$$

$$\frac{-0.012}{0.124} = LHS$$

$$LHS = -0.1 < 0.54$$

The plume is expected to be stable, based on the data provided for this particular case. The plume stability is calculated to help in the selection of the model. As stated above, for cases with stable plumes, models such as DKHW or CORMIX can be used. For unstable plumes, however, DKHW should be used only as a confirmatory check of another model. It is a fundamental fact that whether the plume is either stable or unstable, the same amount of ambient water is available for mixing.

JMZ Unstable Plume Analysis

Adams (1982), Jirka (1982), and Holley and Jirka (1986) present analyses based on Adams's (1982) work that takes the simple bulk dispersion a step further by accounting for back entrainment. The Holley and Jirka equation is:

$$S = \frac{1}{2}V + \frac{1}{2}\left(V^2 + \frac{2 * m_o * H}{q_o^2} * cos\theta_o\right)^{0.5} \qquad \textbf{21}$$

where:

S	=	bulk dispersion (__:1, dimensionless);
V	=	volume flux ratio, or ambient mixing due to ambient current;
	=	u_aH/q_o
q_o	=	discharge flux per unit per unit length (ft^2/sec);
	=	u_oa_o/L
m_o	=	momentum flux (ft^3/sec^2);
	=	$u_o^2a_o/L$
L	=	port spacing (ft);
a_o	=	port area (ft^2);
u_o	=	port exit velocity (ft/sec); and
θ_o	=	port discharge angle.

It should be noted that Adams calculates the discharge momentum flux as a function of the total diffuser length, whereas Holley and Jirka define this discharge momentum flux as a function of port spacing.

The stability analysis presented above shows that the plume is stable. Therefore, Equation 14 is appropriate for this study. The stable plume dispersion would be:

1. $$V = \frac{u_a * H}{q_o} \qquad \textbf{22}$$

$$V = \frac{0.92\ \frac{ft}{sec} * 1ft}{0.092\ \frac{ft^2}{sec}} = 10$$

2. $$m_o = \frac{u_o^2 a_o}{L} \qquad \textbf{23}$$

$$m_o = \frac{\left(4.69\ \frac{ft}{sec}\right)^2 * 1 * \left(\frac{\pi * \left(\frac{3}{12}\right)^2}{4}\right) ft^2}{2.5\ ft} = 0.43\ \frac{ft^3}{sec^2}$$

3. $$q_o = \frac{u_o a_o}{L} \qquad \textbf{24}$$

$$q_o = \frac{4.69\ \frac{ft}{sec} * 1 * \left(\frac{\pi * \left(\frac{3}{12}\right)^2}{4}\right) ft^2}{2.5\ ft} = 0.092 \frac{ft^2}{sec}$$

$$\therefore\ S = \frac{1}{2}V + \frac{1}{2}\left(V^2 + \frac{2 * m_o * H}{q_o^2} * cos\theta_o\right)^{0.5}$$

$$S = \frac{1}{2}10 + \frac{1}{2}\left(10^2 + \frac{2 * 0.43 * 1}{0.092^2} * cos15\right)^{0.5}$$

$$S = 5 + 0.5 * \left(100 + \frac{0.863}{0.0085} * 0.966\right)^{0.5}$$

$$S = 5 + 0.5 * (198)^{0.5}$$

$$S = 5 + 0.5 * 14$$

$$S = 12$$

Thus, according to this JMZ model, a dispersion of 12:1 would be achieved within a short distance downstream from the diffuser. The reason that this dispersion is greater than that calculated from the bulk dispersion calculation is due to entrainment. Entrainment increases the available amount of water, or in this case, 12/11 * 100 = 109% increase in dispersion due to entrainment and adjustments in modeling. This percentage increase due to entrainment will be reduced for conditions with greater ambient velocities and will increase as the discharge velocity increases.

ACUTE ZONE FLUX AVERAGE DISPERSION

The stable plume dilution equations compute the maximum centerline concentration using a Gaussian distribution. That is, the centerline of the plume represents the least amount of dilution. In order to determine the average concentration that an aquatic species would be exposed to while swimming through the plume, a FAD is calculated. The CORMIX model reports results as a FAD. The plume face can be defined as the width of the diffuser plus one water depth, at the distance where plume height equals water depth. Shirazi and Davis (1974) and Prych (1977) suggested that the average concentration across a Gaussian plume can be estimated using $(2)^{1/2}\sigma$ (1.41σ) for plume boundaries (i.e., plume extending 1.41 standard deviations). This is equivalent to approximately 84% of the plume area (mass) in the JMZ (near-field). Unstable plumes do not form a Gaussian plume. However, since the unstable plume is mixed from top to bottom, the same calculation for the FAD will be valid, since the plume height equals water depth.

A normal Gaussian distribution is illustrated in Figure 7, and is mathematically defined by the following expression:

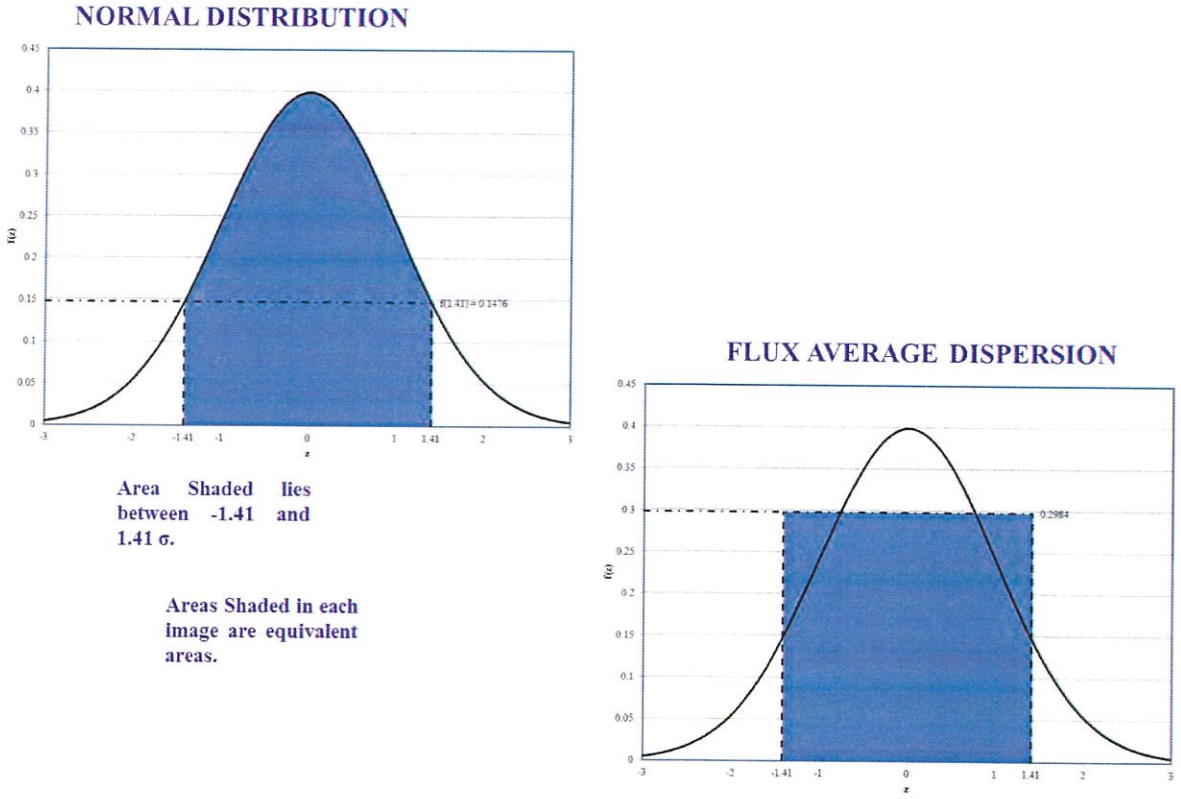
$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} dx \qquad \textbf{25}$$

where: f(x)= value of the normal distribution at any point;
σ = standard deviation;
x = distance from the mean;
μ = mean.

Transforming the equation by substituting $z = (x - \mu) / \sigma$ and $dx = \sigma\, dz$ yields:

$$f(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(z)^2} dz \qquad \textbf{26}$$

Figure 7 – Example Gaussian Plume and FAD Transformation



The maximum value of f(z) occurs at z = 0 in Figure 7, or at the centerline. This corresponds with the peak plume concentration:

$$z = 0, f(z) = \frac{1}{\sqrt{2\pi}} e^{0}$$

$$f(0) = 0.3989$$

This value thus represents 100% of the maximum value of f(z). As stated earlier, several researchers have defined the Gaussian effluent plume in the JMZ as extending to $\sqrt{2}\sigma$ (z = ±1.41, or at 1.41 standard deviations):

$$z = 1.41, f(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(1.41)^2}$$

$$f(1.41) = 0.1476$$

The value of the normal distribution at the edge of plume is at f(1.41), which represents 37% of the maximum value as calculated by:

$$\frac{f(1.41)}{f(0)} = \frac{0.1476}{0.3989} = 0.37$$

The FAD is calculated by recognizing that the area under the curve for z = ±1.41 accounts for 84.14% of the total area of the standard normal distribution f(z) (from standard normal distribution tables). Therefore, the normal distribution mass (area under the curve) represented by the area of ±1.41σ can be approximated as a rectangle of equivalent area, with a width of ±1.41σ and a height calculated as follows:

$$Height = \frac{Area}{Width} = FAD$$

where: Area = defined from normal distribution tables for 2σ; and
Width = 2σ (i.e., 2 * 1.41)

$$FAD(1.41\sigma) = \frac{0.8414}{2 * (1.41)} = 0.2984$$

Consequently, in this case the FAD corresponds to the average height of f(z) between z = ± 1.41.

The concept of FAD and "equivalent area" and "average box height" are illustrated previously in Figure 7.

The FAD represents 74.81% of the maximum centerline value (0.2984 / 0.3989 = 0.7481). Therefore, the maximum centerline concentration (or minimum centerline dispersion) divided by 0.7481 gives the FAD across the plume face. The dispersion at the edge of the plume is calculated as the minimum centerline dispersion divided by 0.37. This analysis allows translation between observed maximum centerline concentrations to finite edge of plume limits and to a flux average concentration in the main body of the plume. The Holley and Jirka equation and thus CORMIX assumes complete mixing in the JMZ with no variability in plume concentrations across the face of the plume either vertically or laterally so their predicted dilution, S, is already in terms of a FAD.

RESTRATIFICATION ANALYSIS

The restratification analysis is based on the densimetric Froude number. If the densimetric Froude number is greater than 0.6, the plume should not restratify. The equation to calculate the densimetric Froude number is as follows:

$$Froude\ Number = \frac{u_a}{\sqrt{|g_o'| * H}} \quad 27$$

When the Froude number is less than about 0.6 to 0.7, stratification may occur.

then:

$$Froude\ Number = \frac{u_a}{\sqrt{|g_o'| * H}}$$

$$Froude\ Number = \frac{0.92 \frac{ft}{sec}}{\sqrt{|-0.48| * 1ft}}$$

$$Froude\ Number = 1.33$$

$$Froude\ Number\ is\ 1.33 > 0.7$$

$$\therefore Plume\ not\ expected\ to\ restratify$$

Based on the densimetric Froude number calculated at the edge of the JMZ, the plume is not expected to restratify and will continue to mix in the buoyant spreading zone. The ports are angle slightly upward towards the surface to ensure adequate mixing with the entire water column.

BUOYANT SPREADING ZONE ANALYSIS

The second phase of the "near-field" mixing zone is the BSZ. First, the effluent still has excess energy and turbulent mixing with the river continues. The plume also may undergo lateral buoyant spreading due to any density differences (i.e., concentration gradients) that remain between the effluent and the river. Additionally, river ambient diffusion forces are also working to mix the river and effluent. The overall mixing process continues, but it is at a much slower rate in this zone, as compared to the previous jet momentum zone. The plume region may become wider in this area due to the lateral buoyant spreading. The zone slowly transcends over several hundred feet into the far-field mixing zone where river ambient diffusion completely dominates the mixing. Again, there are no clear boundaries to this transition zone between jet entrainment and far-field mixing. For the purposes of this calculation, the downstream edge of the BSZ is defined as the point where the plume velocity comes within 5% of the ambient velocity.

The residual plume velocity, u_i, at the edge of the mixing zone can be calculated using the following equations:

$$u_i = \frac{(S_i - 1)u_a + (1)u_o}{S_i} \quad \textbf{28}$$

$$u_i = 2 * \frac{S_i * Q_o}{L_D * H} \quad \textbf{29}$$

Equation 29 is not applicable for single port diffusers. The residual velocity is thus calculated using Equation 28:

$$u_i = \frac{(12 - 1)0.92 + (1)4.7}{12} = 2.22 \frac{ft}{sec}$$

The Lee and Jirka equations are for low to stagnant ambient velocities, which can be considered as around 0.25 ft/sec to 0.30 ft/sec or lower. Calculations from these equations are used, but must be considered as estimates.

Adams (1982) and Lee and Jirka (1980) discuss the shape of the plume at the end of the JMZ. At low to stagnant currents, the effluent plume will contract due to side entrainment of the receiving water into the plume, as shown previously in Figure 5, to a width equivalent to about one-half the diffuser length. At higher ambient velocities, this entrainment becomes negligible and the plume width at the end of the JMZ is on the order of one diffuser length. To calculate the width of the plume at the edge of the JMZ in shallow water, Holley (1986) postulates the following equation:

$$Width = C_c * L_d \quad \textbf{30}$$

where: C_c is a contraction coefficient.

The contraction coefficient is given by the following equation:

$$C_c = \frac{1}{2} + \frac{1}{2} * \left(1 + \frac{2 * m_o}{m_a}\right)^{-1/2} \quad \textbf{31}$$

then:

$$C_c = 0.5 + 0.5 * \left(1 + \frac{2 * 0.43}{3.4}\right)^{-1/2}$$

$$C_c = 0.85$$

$$\therefore Width = 0.85 * 2.5 = 2.1\ ft$$

The following equation is used to determine the plume velocity at the end of the buoyant spreading regions:

$$u = u_i * e^{-\phi*(x-x_i)} * \left[1 + \beta * \left(1 - e^{-\phi*(x-x_i)}\right)\right]^{-0.5} \quad 32$$

where:

u	= velocity at end of BSZ (ft/sec);	
ϕ	= far-field parameter (unitless);	
	$= \frac{f_o}{8H}$;	
f_o	= Moody friction factor, 0.035;	
x	= distance downstream from x_i (ft);	
x_i	= distance at end of JMZ, ~L_D (ft);	
β	$= \frac{2*a_2}{I_1*b_I*\phi}$	
a_2	= entrainment coefficient, 0.068 (unitless);	
I_1	= Integration constant	
	$= \frac{\sqrt{\pi}}{2}$; and	
b_I	= Half-length of diffuser.	

The ambient velocity is assumed to be 0.92 feet per second. As defined above, the edge of the BSZ can be defined as the point where the residual velocity comes within 5% of the ambient velocity, or $1.05*u_a = 0.966$ feet per second. By plugging this value into Equation 32, one can solve for x_i, the distance downstream.

$$u = u_i * e^{-\phi*(x-x_i)} * \left[1 + \beta * \left(1 - e^{-\phi*(x-x_i)}\right)\right]^{-0.5}$$

$$0.966 = 2.216 * e^{-0.004*(x-2.5)} * \left[1 + \frac{2 * 0.068}{\frac{\sqrt{\pi}}{2} * \frac{2.5}{2} * 0.004} * \left(1 - e^{-0.004*(x-2.5)}\right)\right]^{-0.5}$$

$$x = 30\,ft$$

The plume width at the end of the BSZ, b, can be calculated by the following equation:

$$b = b_i * \left(e^{\phi(x-x_i)} * (1 + \beta) - \beta\right) \quad 33$$

Plugging values into Equation 33 yields:

$$b = 1.25 * \left(e^{0.004(30-2.5)} * (1 + 28) - 28\right)$$

$$b = 6\,ft$$

The dispersion at the end of the BSZ can be calculated using the following equation:

$$S = S_i * \left[1 + \beta * \left(1 - e^{-\phi(x-x_i)}\right)\right]^{0.5} \quad 34$$

where: S = dilution at distance, x, within the BSZ;
S_i = dilution at the end of the JMZ.

At the end of the BSZ, the dispersion is thus:

$$S = S_i * \left[1 + \beta * \left(1 - e^{-\phi(x - x_i)}\right)\right]^{0.5}$$

$$S = 12 * \left[1 + 28 * \left(1 - e^{-0.004(30-2.5)}\right)\right]^{0.5}$$

$$S = 24.5$$

$$\therefore \textit{Dispersion is } 24.5\text{: } 1.$$

FAR-FIELD MIXING ZONE

The far-field mixing zone model is not required for these scenarios. However, the equations and their descriptions are included in case that they may be needed in the future.

A far-field dilution model first developed from equations by Prakash (1978) and Benedict (1978) and used by Benedict and Corn (1983) on the Delaware River was subsequently written in FORTRAN IV for a personal computer by Vlachos and Benedict (Thompson, 1990). The model has subsequently been written into Visual Basic for use in Excel®. This model has been used in Massachusetts (EPA, Region I), New Jersey and New York (EPA Region II), Illinois (EPA, Region V) and Iowa (EPA, Region VII) for establishing regulatory mixing zones. The far-field model, referred to as the BCV far-field model, was used to model effluent concentrations downstream from the BSZ.

At the edge of the BSZ, the cross-sectional shape of the plume resulting from the discharge can be approximated by a rectangle (plane source). In the case of a shallow river, the height of the plume is represented by the total water depth (assuming the plume is completely vertically mixed) and the width of the plume can be approximated with the output from the BSZ analysis. The plume enters the far-field region as a flux concentration, such as the S from Equation 34. There are several methods available for modeling an area source. The BCV model represents the area source as a number of vertical line sources adjacent to one another, and each with the same infinitesimal width. This methodology effectively approximates an area source with a source velocity equal to the ambient velocity. Concentrations calculated from each line source are additive at a specific point (linear superposition). The sum of the line source concentrations approximates the total concentration from the area source.

Prakash (1978) and Benedict (1978) utilized the method of images to calculate three-dimensional dispersion of a vertical line source. This technique incorporates lateral and vertical diffusion, as well as image reflection terms, that are controlled by the geometric boundaries of

the river (i.e., width and depth). The Prakash and Benedict dilution equation was further refined by Benedict and Corn (1983) for dilution modeling for a negatively buoyant effluent discharged through a multiport diffuser into the Delaware River, conducted at the request of the Delaware River Basin Commission and the New Jersey Department of Environmental Protection for a mixing zone granted under a NPDES Permit in EPA, Region II. The governing equation being modeled in the far-field mixing zone for a conservative constituent is as follows:

$$c(x,y,z) = \frac{C_o Q_o}{4(z_2 - z_1) * u * \left(\frac{\pi * D_y * x}{u}\right)^{0.5}} * \sum_{n=-\infty}^{n=+\infty} \sum_{m=-\infty}^{m=+\infty} F_1 F_2 \qquad 35$$

where:

$$F_1 = exp\left[-\frac{(y - y_o - 2 * n * B)^2}{\frac{4 * D_y * x}{u}}\right] + exp\left[-\frac{(y + y_o - 2 * n * B)^2}{\frac{4 * D_y * x}{u}}\right];$$

$$F_2 = erf\left[\frac{z + z_2 - 2mH}{2 * \left(\frac{D_z x}{u}\right)^{0.5}}\right] - erf\left[\frac{z + z_1 - 2mH}{2 * \left(\frac{D_z x}{u}\right)^{0.5}}\right] + erf\left[\frac{z - z_1 - 2mH}{2 * \left(\frac{D_z x}{u}\right)^{0.5}}\right] - erf\left[\frac{z - z_2 - 2mH}{2 * \left(\frac{D_z x}{u}\right)^{0.5}}\right];$$

c(x.y.z)	= concentration at location x,y.z (units);
x	= distance downstream from line source (ft);
y	= distance from channel bank (ft);
y_o	= location of line source from channel bank (ft);
z_1	= distance from water surface to top of line source (ft);
z_2	= distance from water surface to bottom of line source (ft);
u	= ambient river velocity (ft/sec);
D_y	= lateral dispersion coefficient (ft^2/sec);
	= $\beta u^*/H$;
u^*	= shear velocity (ft/sec)
	= 3.8 u n / $(H)^{1/6}$;
n	= Manning's n = 0.035;
D_z	= vertical dispersion coefficient (ft^2/sec);
	= $D_y/3$;
H	= river depth (ft);
B	= river width (ft);
Q_o	= initial source flow (ft^3/sec);
C_o	= initial source concentration (units);
erf	= error function;
n,m	= indices.

The error function can be simplified through an approximation formula suggested by Sagar (1982) as follows:

$$erf\left[\frac{x+A}{\sqrt{4k}}\right] - erf\left[\frac{x-A}{\sqrt{4k}}\right] = \frac{4A}{\sqrt{4\pi k}} exp\left[\frac{-x^2}{4k}\right] \quad \textbf{36}$$

where: x = z-2mh;
k = $D_z(x/u)$;
A = z_2 and $-z_1$; and

$$F_2 = (z_2 - z_1) * \frac{2}{\sqrt{\pi D_z \frac{x}{u}}} exp\left[\frac{-(z-2mh)^2}{4D_z\frac{x}{u}}\right]$$

The major limiting assumptions of the BCV model include the following:

1. Simplification approximation of F_2 (error function term) Sagar approximation formula (Sagar, 1982);
2. Series terms are significant for n = -3 to +3 and m = -3 to +3;
3. Area source can be modeled as a series of line sources of finite width. Concentrations from each line source are additive and sum to total concentration of area source at location (x,y,z);
4. Dilution is achieved only through ambient diffusion. No jet momentum exists as plume velocity is equal to ambient velocity;
5. The channel has uniform geometry across its length (constant width and depth);
6. The velocity profile is constant across the depth; and
7. The plume exhibits no densimetric buoyancy (source density is the same as ambient density).

None of these assumptions is considered unreasonable for the Big Muddy River modeling scenario. The River is assumed to be a straight channel in the area of the proposed discharge. An estimated value for β would be used in the model.

FAR FIELD FLUX AVERAGE DISPERSION

Doneker and Jirka (1990) use a plume width of 1.25σ to describe the dispersion across the plume in the far-field, where the plume has widened considerably. This value can be compared to the 1.41σ used for the JMZ in the near-field. For 1.25σ, the plume can be projected to be a projection of the maximum centerline dispersion across the plume face as follows:

$$z = 1.25, f(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{1}{2}(1.25)^2}$$

$$f(1.25) = 0.1826$$

The edge of plume concentration (dilution) is 45.78% (f(1.25) / f(0) = 0.1826 / 0.3989 = 0.4578) of the maximum (minimum) centerline concentration (dilution). Hence, the edge of plume dilution can be estimated by dividing the observed centerline dispersion by 0.4578. The plume that is bounded by ±1.25σ contains 78.88% of the plume mass (standard normal curve tables). Hence, the FAD, or average value of f(z) between z = ±1.25, is computed as follows:

$$FAD(1.25\sigma) = \frac{0.7888}{2 * (1.25)} = 0.3155$$

As calculated earlier, this value represents 79.09% of the maximum (minimum) centerline concentration (dispersion) [FAD (1.25σ) / f(0) = 0.3155 / 0.3989 = 0.7909]. Thus, the FAD can be estimated by dividing the observed centerline dilution by 0.7909. Again, this gives a means of calculating an observed concentration(s) in the plume center to a finite flux average across the face of the plume with a finite width. This FAD is representative of the exposure potential for aquatic life at the end of the regulatory total mixing zone.

SECTION 5.0

CORMIX MODEL RESULTS

CORMIX was used for this diffuser modeling. Generally speaking, this model is designed for ideal situations. The closer a river comes to an ideal, the better the model will predict. It is important to understand the limitations of the model. In the past, the models have generally predicted the dispersions within an acceptable amount of actual measured conditions (± 5%). One previous limitation of the original CORMIX model was the lack of side entrainment predicted in the calculations.

CORMIX

CORMIX is a computer-aided-design (CAD) system for outfall design and mixing zone analysis. The system contains several integrated software tools (subsystems) for specification, simulation, visualization, and documentation of mixing zones from point source discharges. Based upon input data, CORMIX employs the rule base to execute the appropriate hydrodynamic simulation model based upon the discharge and environment data specified.

CORMIX cannot model varying port sizes and with variable spacing within the River. Therefore, each port was modeled separately. CORMIX was used to predict the geometry and dilution characteristics of effluent flow resulting from a single port diffuser discharge of arbitrary density, location, and geometry into an ambient receiving water body. The results were then put together at the proper starting location for each port.

For the jet entrainment region, the diffuser plume is classified as stable (typically, deeper water and/or higher currents) or unstable (shallow water and/or low river velocities) depending on plume momentum and buoyancy as well as ambient velocity and depth. If the plume is stable, dispersion is calculated by simulating the plume as a two-dimensional wall jet (plane source). If the plume is unstable, CORMIX calculates bulk dispersion based on equations developed by Adams for shallow water plumes. The bulk dilution is based on the volume of water flowing over the diffuser plus entrained water for an unstable plume case. Adams assumes that the plume mixes vertically with the water column (within a downstream distance of 5 to 10 water depths as given by Holley and Jirka), versus going through a zone of flow establishment as assumed by stable plume analyses (e.g., DKHW). This means that the effluent may achieve the predicted mixing ratio closer to the diffuser than what might be predicted by stable plume analyses.

CORMIX should be used with discretion when predicting JMZ dispersion since the plume is simulated as a wall jet (plane source) for the stable plume case. For the unstable plume case, the Holley and Jirka (1986) unstable plume Equation 21 gives better estimates of plume

behavior than the unstable plume analysis given in CORMIX that was developed by Adams (1982) for long diffusers. In reality, the plume might be expected to undergo stable and unstable conditions over the changing seasonal and tidal environmental conditions.

Model Inputs

1. Effluent

    a. Port depth. For the first scenario (minimum River flow of 30 cfs and maximum chloride concentration), the minimum river depth was 3.97 feet. It should be noted that this depth was developed for the USGS gage at Plumfield, which appears to be shallower than the diffuser location, based on field observations. Therefore, the model results are expected to be very conservative in regards to the distances downstream where the mixing zone is met.

    b. A discharge concentration can be input. An input of 1,000 mg/L was used as a default. The model results that were used were the dispersions predicted, rather than the concentrations. This is because CORMIX assumes a background concentration of 0. Therefore, the dispersion reported by CORMIX is correct.

    c. Effluent flow rate. For the first scenario, the minimum effluent flow rate was 0.23 cfs.

    d. Effluent density. The input density was 1,013.39 kg/m^3.

2. Ambient Conditions

    a. Average depth and depth at discharge. For the purposes of the model, these were assumed to be the same. For the minimum flow scenario, a depth of 3.97 feet was used. For all other flow conditions, the depth was calculated based on the field measurements used by the USGS.

    b. The ambient velocity was 0.92 ft/sec based on field measurements taken at low flow conditions.

    c. The modeled density of the Big Muddy River was 998.49 kg/m^3

    d. The Manning's 'n' was input as 0.035.

    e. The river was modeled as bounded with an overall width of 41 feet for the low flow scenario.

f. The wind speed was left as the default value of 2 meters per second.

3. Discharge Conditions

a. The nearest bank. This was modeled as the left bank when the facing downstream.

b. Distance to nearest bank. This was input as close to the middle of the channel for the models. The actual port location was then selected based on meeting the desired mixing without interacting with the shoreline or the plume(s) from the other port(s).

c. Port diameters were input as follows:

i. Port 1 = 3 inches;

ii. Port 2 = 3 inches;

iii. Port 3 = 4 inches;

iv. Port 4 = 6 inches;

v. Port 5 = 8 inches;

d. The vertical port angle was set at 15°. This means the port is pointed at a slight angle up from the horizontal plane. A 0° port angle would be level. A 90° port angle would be pointed directly towards the surface. Since the effluent is expected to be negatively buoyant, the angle helps the effluent mix with more of the water column. However, due to the potential shallow nature of the River, a larger port angle could lead to surface effects where the plume would break the water surface.

e. The port angle was set at 0°, which is in the same direction as the normal River Flow, or co-flowing. This ensures the most efficient use of the River and effluent energy.

f. Port Height. The port height was set at 0.5 foot above the river bed for all ports.

Model Scenarios

All model output files are included in Appendix 3. The model scenario matrix was previously presented in Table 3.

MODEL RESULTS

The model results are presented in Table 6. The results for the various scenarios are presented in Figure 8 through 5-15Figure 17.

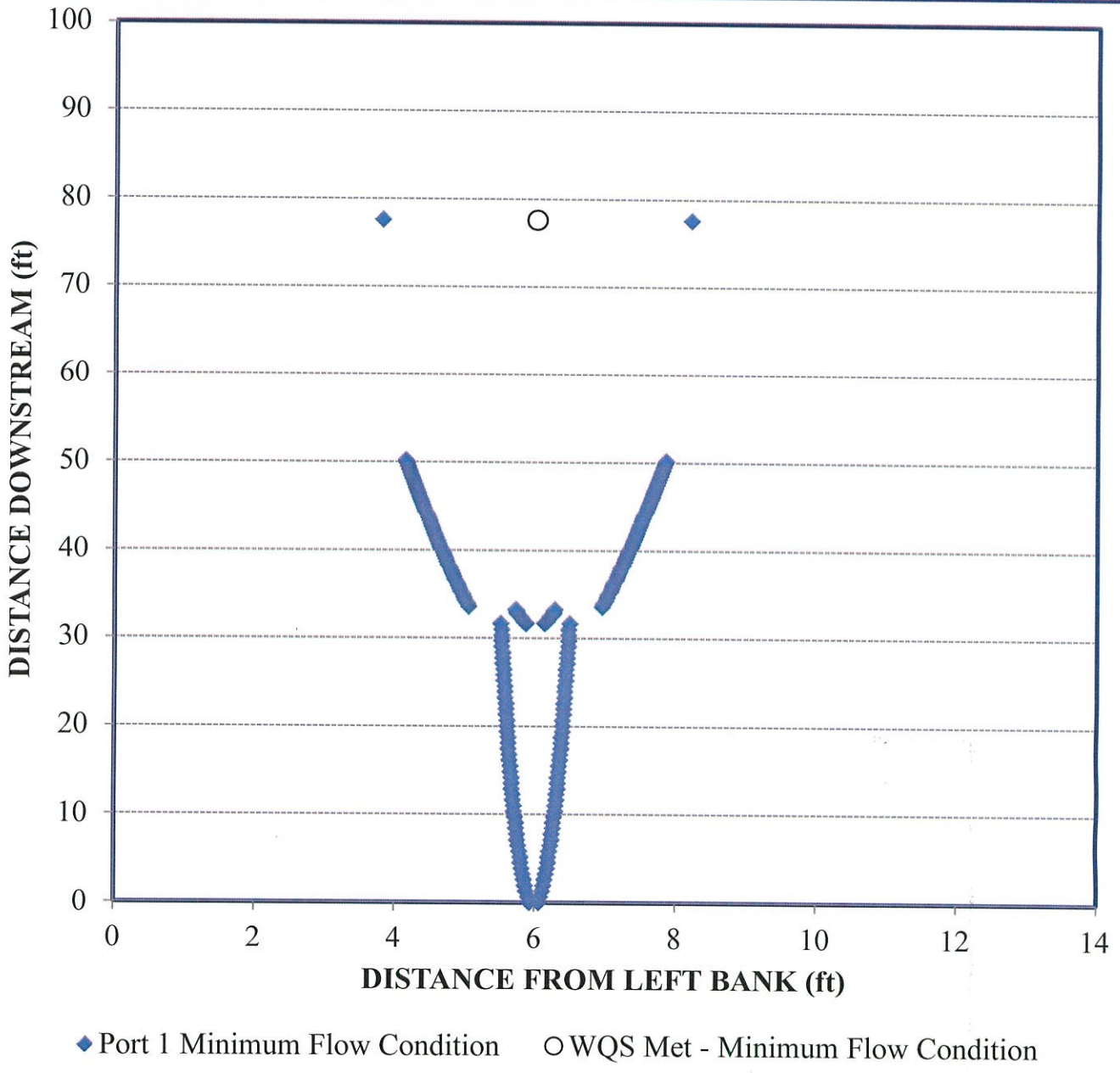
Table 6 – Model Results to Meet WQS

SCENARIO	RIVER FLOW (cfs)	ACTIVE PORT(S)	TOTAL DISCHARGE (gpm)	ACUTE ZONE DISTANCE (ft)	TOTAL MIXING ZONE DISTANCE (ft)
Case 1, Min.	30	Port 1	102	7.1	50
Case 1, Max.	>=116	Port 1	396	5.8	37
Case 2, Min.	117	Ports 1 & 2	396	4.4	36.6
Case 2, Max.	>=233	Ports 1 & 2	793	6.9	88
Case 3, Min.	234	Ports 1, 2, & 3	793	11.2	46
Case 3, Max.	>=440	Ports 1, 2, & 3	1,499	9.3	116
Case 4, Min.	441	Ports 1, 2, 3, & 4	1,499	13.9	176
Case 4, Max.	>=906	Ports 1, 2, 3, & 4	3,085	11.4	147
Case 5, Min.	907	Ports 1, 2, 3, 4, & 5	3,085	18.2	231.8
Case 5, Max.	>=1,734	Ports 1, 2, 3, 4, & 5	5,905	14.5	251

Notes: * 3.3:1 is the worse-case acute zone dispersion required, previously presented in Table 5.

R08420

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	102	**102**
2	0	
3	0	
4	0	
5	0	



AquAeTer

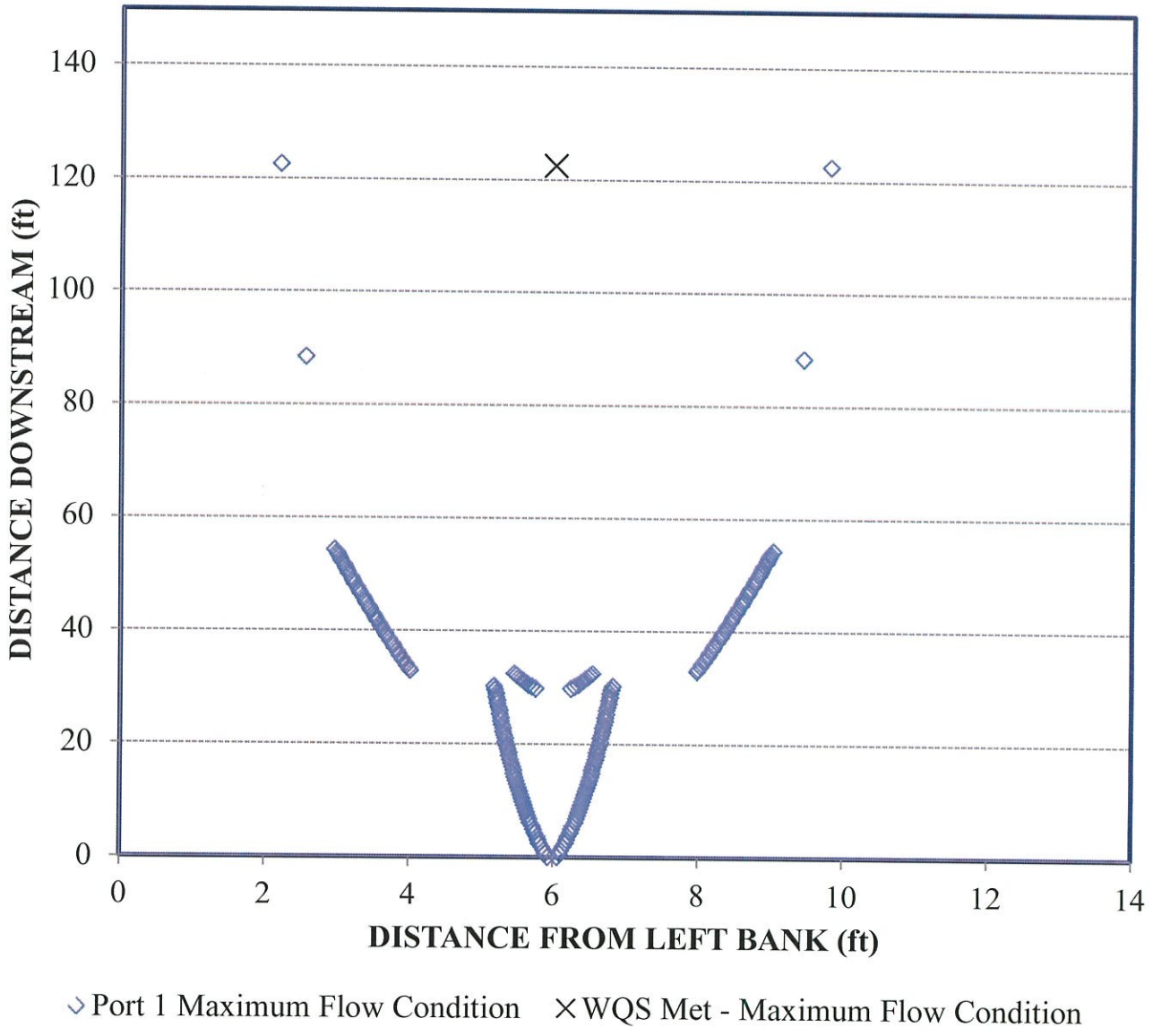
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 8
MODEL RESULTS FOR CASE 1 MINIMUM FLOW

R08421

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	396	**396**
2	0	
3	0	
4	0	
5	0	



AquAeTer

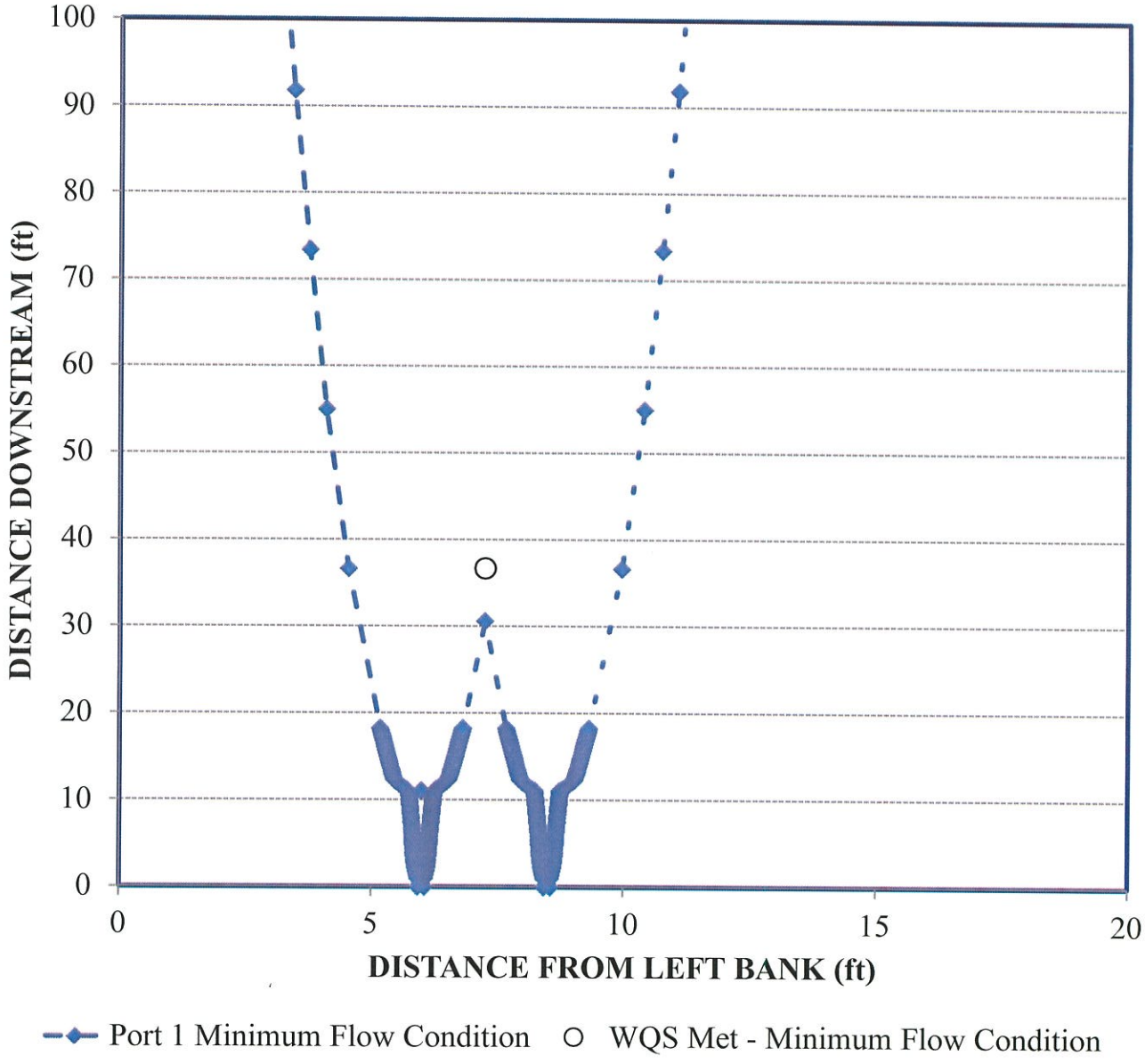
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 9
MODEL RESULTS FOR CASE 1 MAXIMUM FLOW

R08422

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	198	**396**
2	198	
3	0	
4	0	
5	0	



AquAeTer

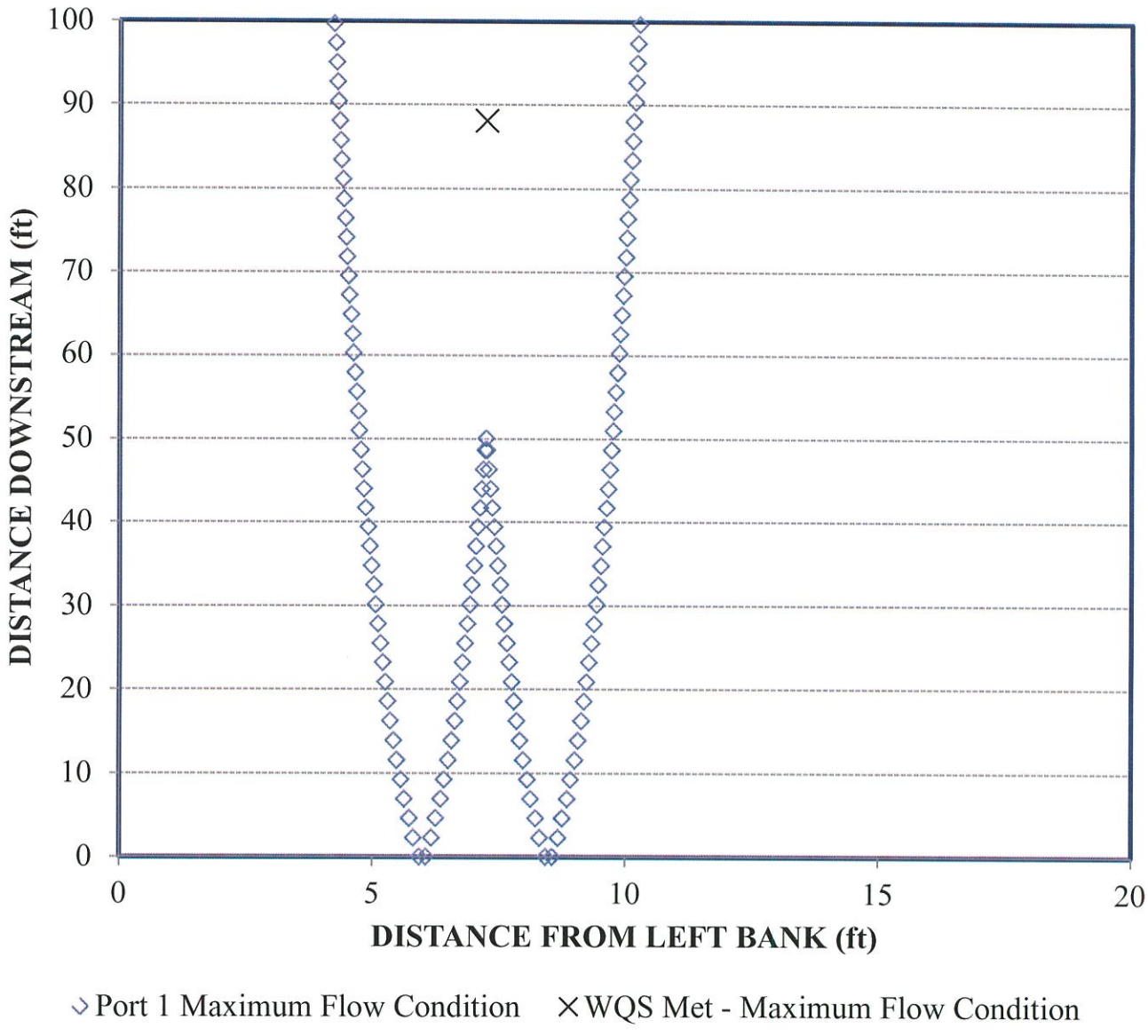
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 10
MODEL RESULTS FOR CASE 2 MINIMUM FLOW

R08423

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	396	**793**
2	396	
3	0	
4	0	
5	0	



AquAeTer

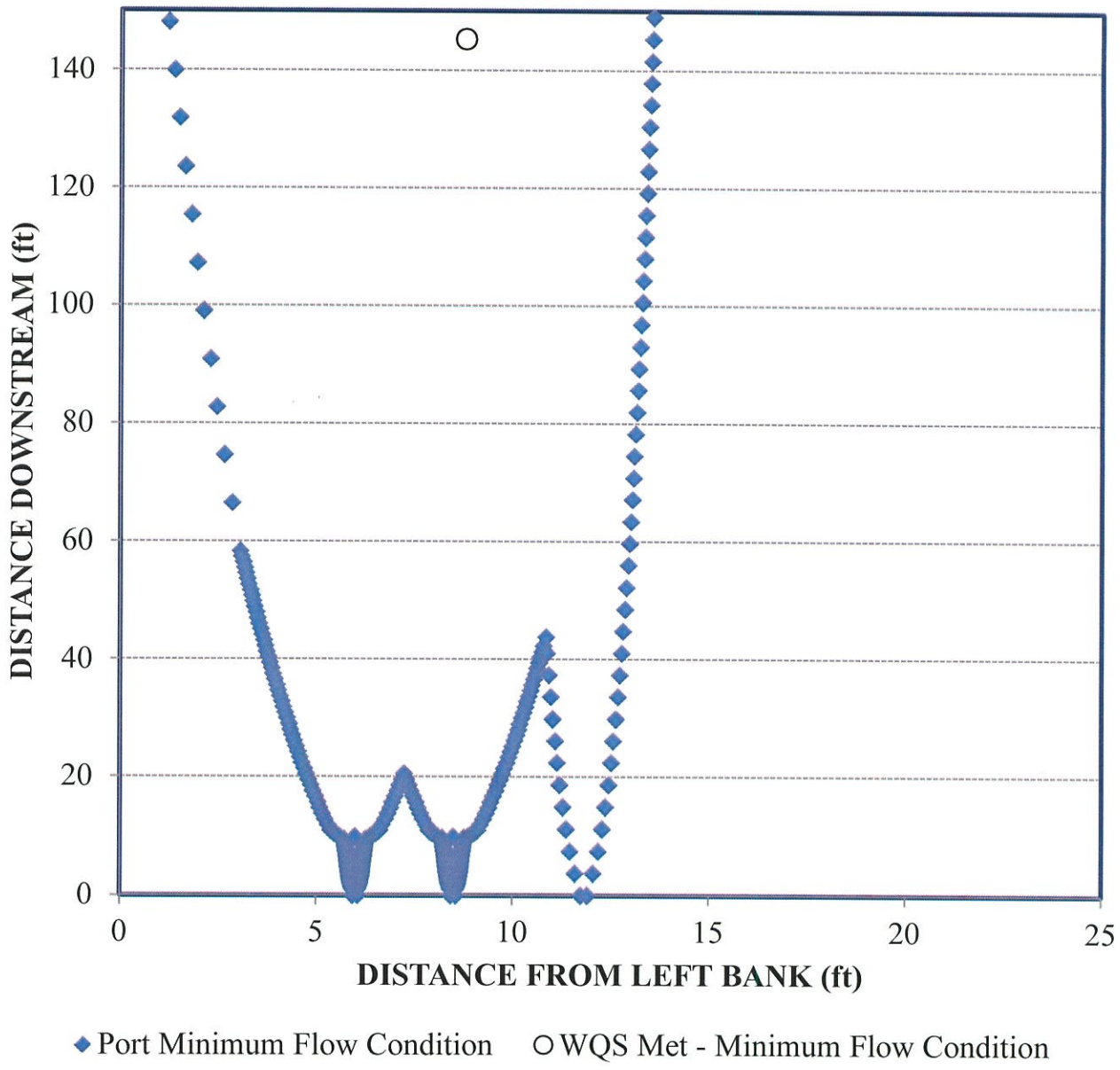
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 11
MODEL RESULTS FOR CASE 2 MAXIMUM FLOW

R08424

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	209	**793**
2	209	
3	373	
4	0	
5	0	



AquAeTer

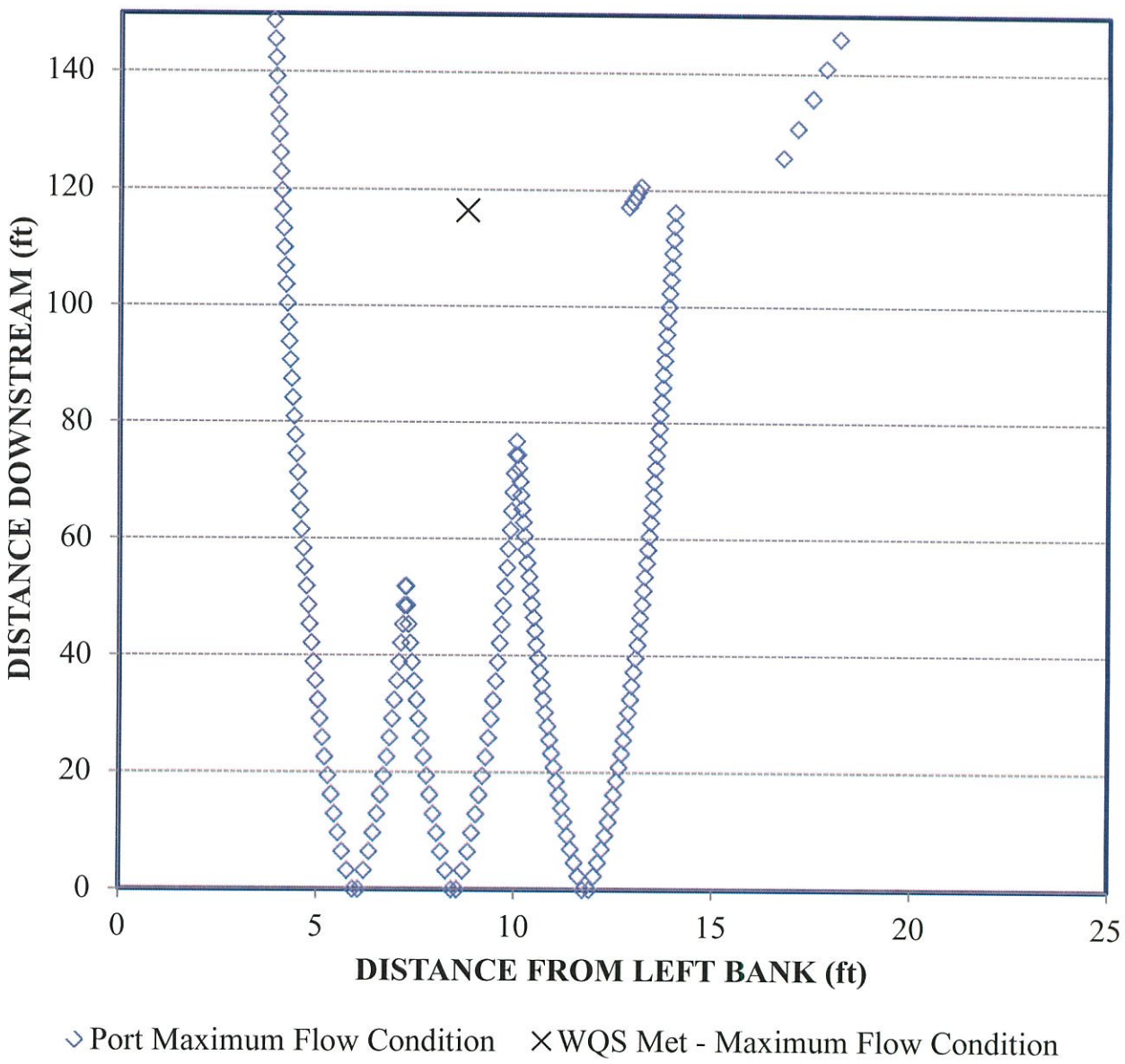
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 12
MODEL RESULTS FOR CASE 3 MINIMUM FLOW

R08425

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	396	**1,498**
2	396	
3	705	
4	0	
5	0	



AquAeTer

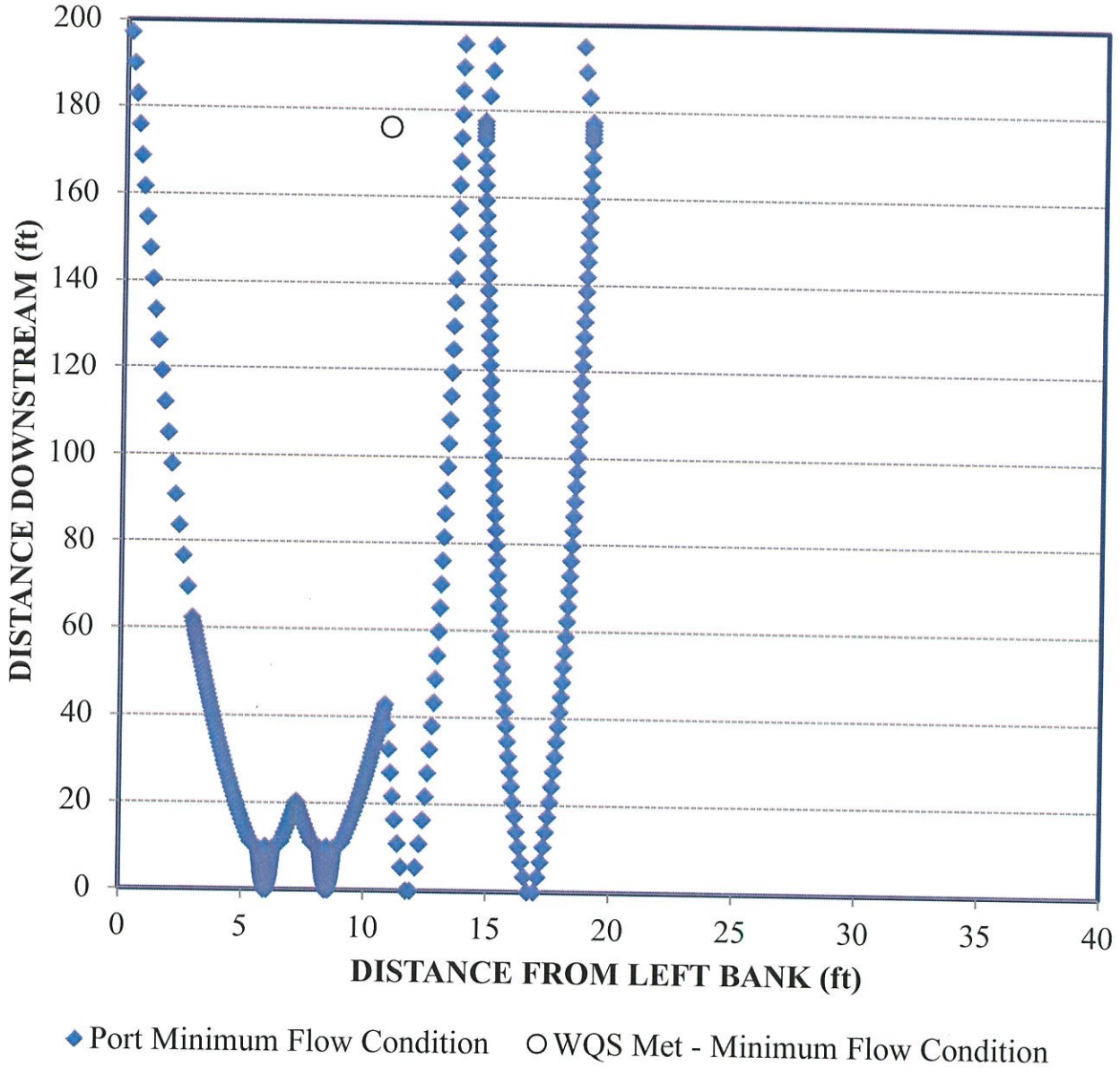
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 13
MODEL RESULTS FOR CASE 3 MAXIMUM FLOW

R08426

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	193	**1,498**
2	193	
3	342	
4	771	
5	0	



AquAeTer

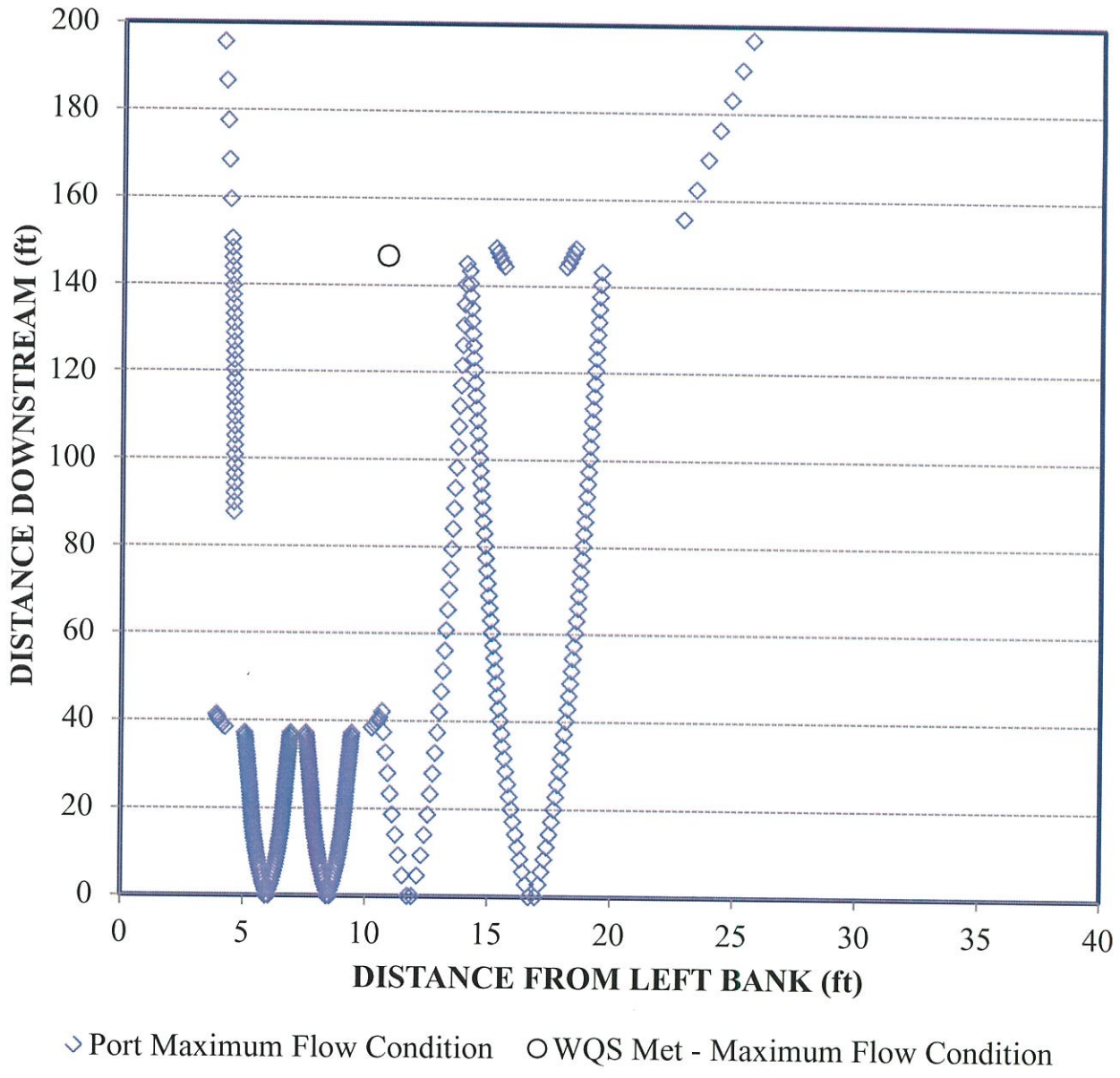
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 14
MODEL RESULTS FOR CASE 4 MINIMUM FLOW

R08427

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	396	**3,085**
2	396	
3	705	
4	1,587	
5	0	



AquAeTer

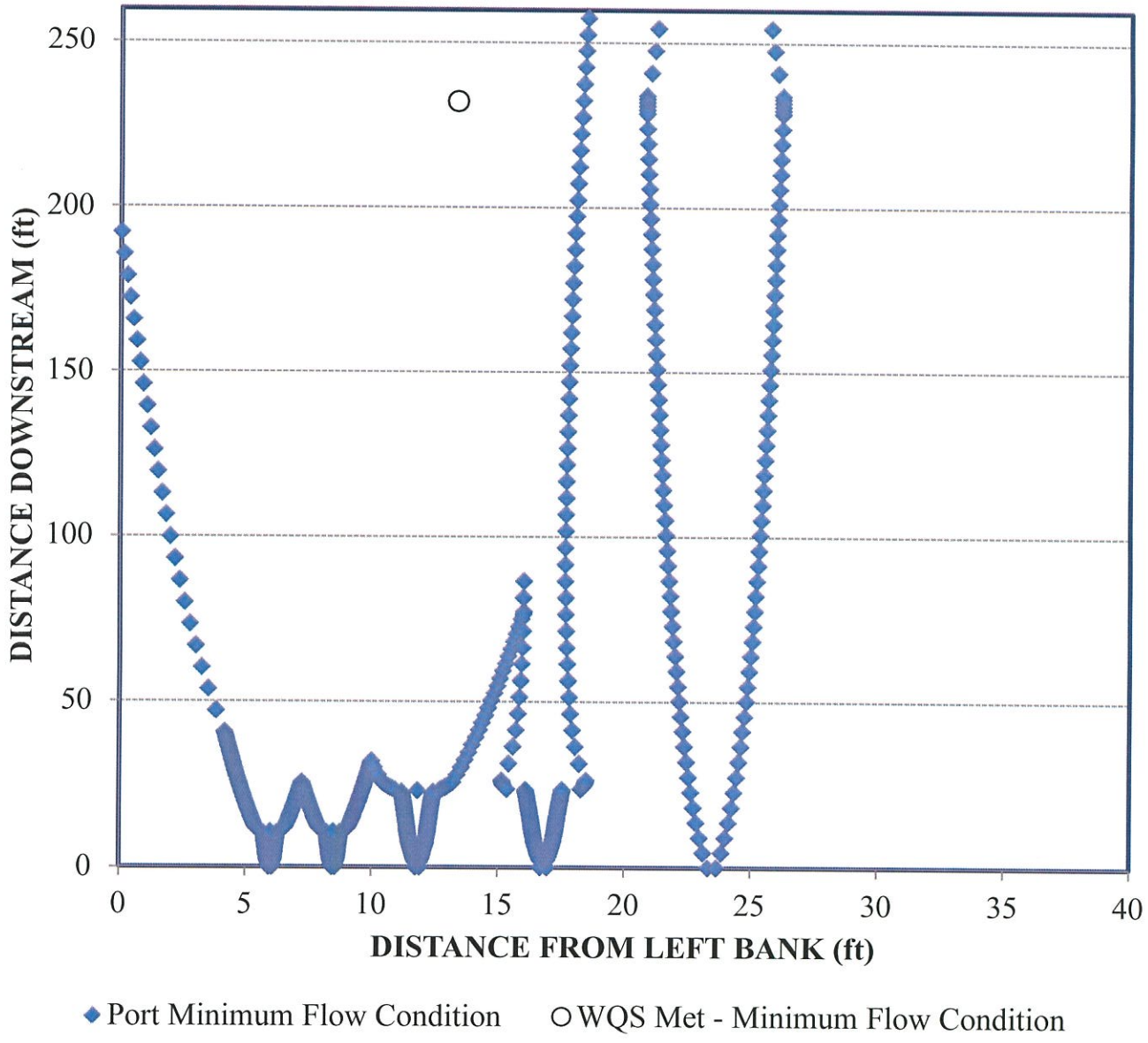
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 15
MODEL RESULTS FOR CASE 4 MAXIMUM FLOW

R08428

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	207	**3,085**
2	207	
3	368	
4	829	
5	1,473	



AquAeTer

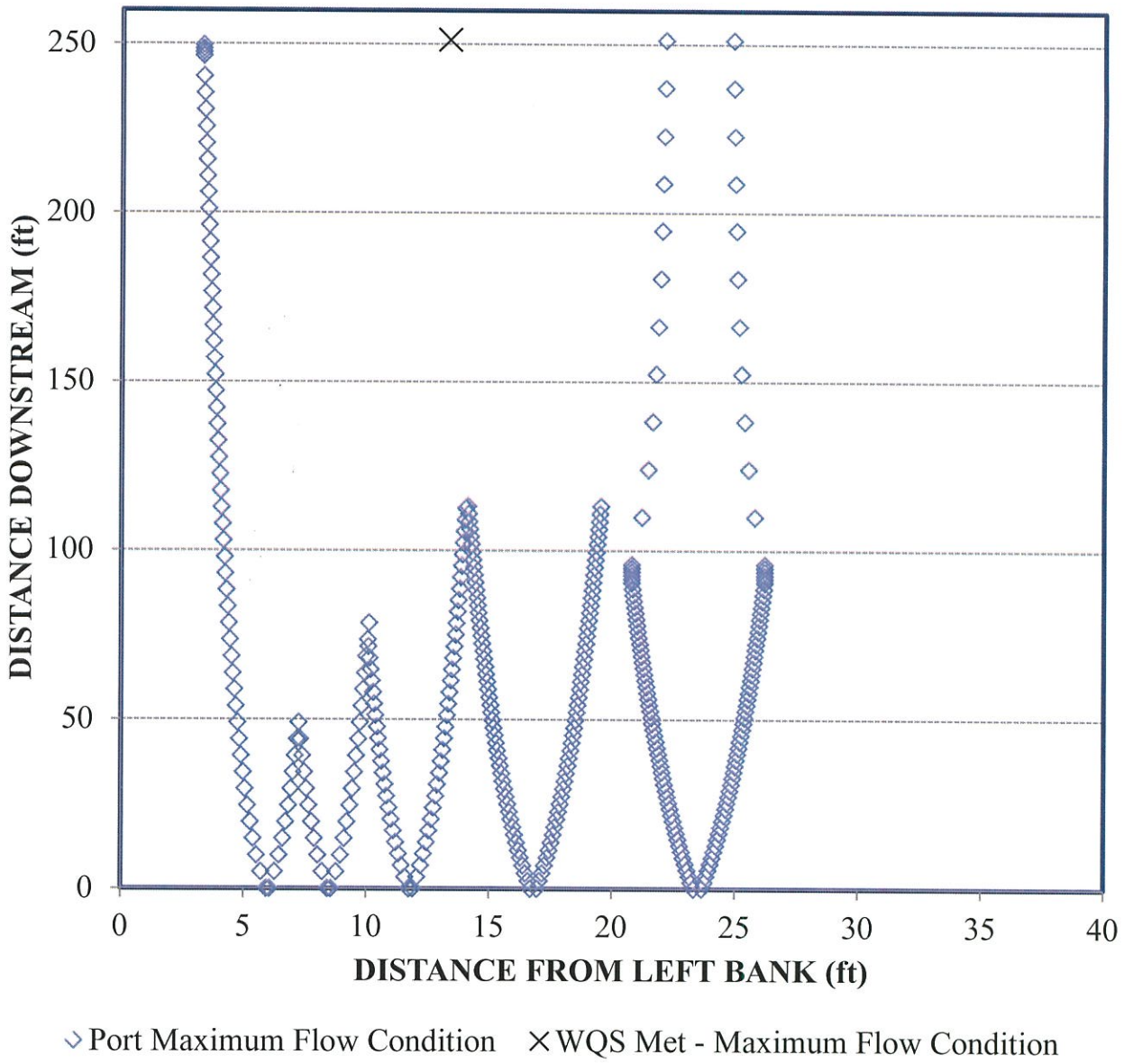
optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 16
MODEL RESULTS FOR CASE 5 MINIMUM FLOW

R08429

Port	Target Flow (gpm)	Total Discharge Flow (gpm)
1	396	**5,905**
2	396	
3	705	
4	1,587	
5	2,820	



AquAeTer

optimizing resources | water, air, earth

CLIENT: Mach Mine
LOCATION: Johnston City, Illinois
PROJECT/FILE: 152405

FIGURE 17
MODEL RESULTS FOR CASE 5 MAXIMUM FLOW

R08430

SECTION 6.0

SUMMARY

A conceptual diffuser has been designed for the proposed discharge to the Big Muddy River. The conceptual diffuser consists of 5 individual single-port diffusers. This design maximizes the mixing zone for each flow condition in the River while allowing Mach to discharge based on the flow in the River. Multiple river flow scenarios were modeled, with each port modeled as necessary.

MODEL RUNS

The maximum dispersion required for all water quality parameters is 34:1. The diffuser design meets this target dispersion in minimal distances downstream, reducing the overall size of the mixing zone.

Model predictions have been made for a maximum effluent total flow rate of 5,905 gpm or 13.2 cfs. At the maximum chloride concentration of 12,000 mg/L, this maximum discharge requires a River flow of 1,734 cfs to meet a dispersion of 34:1 in less than 25% of the River volume. The water quality standards were met for all scenarios within the regulatory limits for a mixing zone. The maximum distance to meet the water quality standard for all scenarios is 252 feet downstream.

The controlled low-flow periods have in the past extended for more than a year. The Mine cannot hold water for that long of a period. At the same time, the Mine cannot discharge the full amount of water that it needs to at the low flow condition. The solution is to discharge some water all of the time, increasing the discharge as conditions allow.

ATTACHMENT 2

POND CREEK MIXING ZONE REPORT

AquAeTer

optimizing
resources | water, air, earth

MEMORANDUM

TO: Simon Stepp, Williamson Energy, LLC
FROM: John Michael Corn, P.E. and Michael R. Corn, P.E., BCEES, **AquAeTer, Inc.**
DATE: November 18, 2016
JOB NO.: 142336
RE: **Williamson Energy Mine**
Proposed Pond Creek Discharge Mixing Zone Analysis

INTRODUCTION

The Williamson Energy Mine is proposing to construct a new outfall to discharge from Pond 009 to Pond Creek. Pond 009 will collect stormwater runoff from the outslope of the active Slurry Impoundment/RDA3, the underdrain from the impoundment, and the stormwater collected in Ponds 001-004, 006, and 007/008. Ponds 001-004 and Pond 006 collect stormwater runoff from undeveloped areas, access roads, the raw coal pile, and the mine yard. Ponds 007/008 collect stormwater from the outslope of and discharge from the inactive Slurry Impoundments (RDA 1 and RDA 2) underdrain. The proposed outfall will be located at approximately 37°51'19"N 88°49'36"W, and will discharge to Pond Creek Reach Il_NG-02, as shown in Figure 1 and as presented in Bulletin 57 (State Water Survey Division, 1973). The Illinois Environmental Protection Agency (IEPA) has specified that 25% of the stream flow can be used to determine the allowable discharge to Pond Creek, since it is not a 0 flow 7Q1.1 stream.

Possible maximum allowable discharges from Pond 009 into Pond Creek were calculated based on meeting water quality standards (WQS). The calculations were performed using volumetric flowrates in the stream, the background concentration of constituents of concern found in Pond Creek, and the concentration expected in the discharge (effluent from Pond 009).

WATER QUALITY STANDARDS

Discharge from Pond 009 will only be allowed when the water quality standards, as defined in IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards, will be met in Pond Creek. The potential constituents of concern are those compounds for which the Pond Creek reach is listed on the 2014 and 2016 303(d) Lists, there is a water quality standard and the compound is potentially found in the discharge, or the compound is on the current NPDES permit for monitoring or has a permit limit. The constituents of concern are:

- Sedimentation/siltation (cause of 2014 and 2016 303(d) listing, TSS and settleable solids are the parameters that monitor this parameter);

- Chloride (cause of 2014 and 2016 303(d) listing, water quality standard);
- Dissolved oxygen (cause of 2016 303(d) listing);
- Sulfates (water quality standard, listed in the NPDES permit);
- Settleable solids (parameter, along with TSS, to monitor sedimentation impairment),
- Iron (water quality standard, listed in the NPDES permit);
- Manganese (water quality standards, listed on the NPDES permit);
- Cadmium (water quality standards, possibly present in discharge);
- Nickel (water quality standards, possibly present in discharge); and
- Zinc (water quality standards, possibly present in discharge).
- Phenols (water quality standard and possibly present in discharge);
- Arsenic (water quality standard and possibly present in discharge);
- Chromium, (water quality standard and possibly present in discharge);
- Selenium, (water quality standard);
- Silver (water quality standard);
- Cyanide (water quality standard); and
- Copper (water quality standard and possibly present in discharge).

Compounds that were evaluated and not found to be a concern, either because of the nature of the discharge or have been found to be non-detect in samples collected from the Pond 009 representative sample, are cadmium, silver, zinc, and cyanide. Dissolved oxygen is not expected to be an issue for this stormwater pond. For phenols, chromium, arsenic, copper, nickel, and selenium, the results show that the effluent will meet the water quality standards at the end of pipe. Therefore, the proposed discharge will not further impair Pond Creek River for any of these constituents. These compounds are not discussed in detail below. TSS, chlorides, sulfate, and manganese have been determined to be constituents of concern and are discussed further below.

BACKGROUND STREAM FLOW DETERMINATION

A range in background flow measurements in Pond Creek and used in the mixing zone evaluation is presented in the attached tables. The flowrates include a maximum flow rate of 7,070 cfs as calculated using USGS StreamStats 4.0.

BACKGROUND WATER QUALITY

Background samples were collected from Pond Creek upstream of the proposed outfall as shown in Figure 2. The results are presented in Table 1.

EFFLUENT WATER QUALITY

The water stored in Pond 009 is representative of the effluent that will be discharged to Pond Creek. Results for samples collected from Pond 009 are presented in Table 2. The minimum, average, and maximum values are used in the calculations to provide a range of loadings to the creek.

DISPERSION

The following equation was used to calculate dispersion needed to meet the chloride water quality standard.

$$C_{standard}S = (S-1)C_{background} + 1 * C_{site\ water}$$

where: $C_{standard}$ = water quality standard, mg/L;
S = dispersion (__:1), unitless;
$C_{background}$ = background concentration, mg/L;
$C_{site\ water}$ = concentration from on-site source, mg/L

Rearranging the above equation to solve for the dispersion, S, yields:

$$S = \frac{C_{site\ water} - C_{background}}{C_{standard} - C_{background}}$$

Given the available data, the required chloride dispersion was calculated as 1.09 for the minimum, 1.63 for the average, and 3.26 for the maximum, as presented in Table 3.

Given the available data, the required iron dispersion was calculated as -0.712 for the minimum, 0.166 for the average, and 3.24 for the maximum, as presented in Table 4.

Therefore, this mixing zone evaluation required chloride for the minimum and average effluent concentrations and iron for the maximum effluent concentrations.

DISCHARGE FLOW EVALUATION

A comparison of the water quality standards and the expected effluent concentration shows that, at the end of pipe, the chloride and iron concentrations are expected to be greater than the standard. Manganese and sulfate concentrations, however, are expected to be less than the standards at the end of pipe. Therefore, the discharge from Pond 009 is expected to be controlled to ensure the chloride and iron WQS are met. Allowed flows are calculated for chloride for the minimum and average and iron for the maximum and, then, used to confirm that manganese and sulfate water quality standards will be met. Also, loadings are calculated for these compounds.

A range of allowable effluent flows from Pond 009 (Q eff) were calculated for a range of possible flows during rain events (Q bkg) in order to meet the water quality standards for chlorides at the minimum and average and iron at the maximum. The chloride and iron flows were then used for all constituents. For this calculation, 25% of the stream flow was used. As shown in the table, if there is no flow in the river, then there will be no effluent discharge from Pond 009.

Chloride Results

The calculation of the estimated allowable discharge from Pond 009 to Pond Creek is summarized in Table 7 for chlorides. Also, as an example, at the minimum concentration of 540 mg/L chloride and a background flow of 1,000 cfs, the effluent flow could be less than or equal to 2,900 cfs while meeting the water quality standard at the edge of a mixing zone.

In addition, the background, effluent, and total (downstream, outside the mixing zone) loads were calculated as shown in Table 7. For the example presented above, the background load would be 194,079 lbs/day, at the minimum effluent concentration the load would be 8,442,431 lbs/day, and at the maximum effluent concentration the load would be 933,990 lbs/day. At the minimum effluent concentration the total load would be 8,636,509 lbs/day and at the maximum effluent concentration the total load would be 1,128,069 lbs/day.

After it was determined that the water quality standard would be met, the downstream concentration was also evaluated to determine the overall impact to the stream. The concentration of chlorides predicted for outside the mixing zone was then calculated. As shown in Table 7, the concentration is predicted to range from 188 to 411 mg/L for range of effluent concentrations evaluated. Thus, it is confirmed that the predicted chloride concentration will be less than the water quality standard when the Mine discharges from Pond 009 under the described conditions.

Iron Results

The calculation of the estimated allowable discharge from Pond 009 to Pond Creek is summarized in Table 8 for iron. Also, as an example, at the minimum concentration of 0.132 mg/L iron and a background flow of 1,000 cfs, the effluent flow could be less than or equal to 2,900 cfs while meeting the water quality standard at the edge of a mixing zone.

In addition, the background, effluent, and total (downstream, outside the mixing zone) loads were calculated as shown in Table 8. For the example presented above, the background load would be 2,658 lbs/day, at the minimum effluent concentration the load would be 2,064 lbs/day, and at the maximum effluent concentration the load would be 1,286 lbs/day. At the minimum effluent concentration the total load would be 4,722 lbs/day and at the maximum effluent concentration the total load would be 3,944 lbs/day.

After it was determined that the water quality standard would be met, the downstream concentration was also evaluated to determine the overall impact to the stream. The concentration of iron predicted for outside the mixing zone was then calculated. As shown in Table 8, the concentration is predicted to range from 0.225 to 0.658 mg/L for range of effluent concentrations evaluated. Thus, it is confirmed that the predicted iron concentration will be less than the water quality standard when the Mine discharges from Pond 009 under the described conditions.

Manganese Results

As mentioned previously, the results from the current ponds on-site show that the manganese concentration in the effluent is less than the water quality standard.

The calculation of the resulting load and concentration using the effluent flows determined for manganese is presented in Table 9. As shown in the table, if there is no flow in the river, then there will be no effluent discharge from Pond 009. For the example presented above, the background load would be 1,170 lbs/day, at the minimum effluent concentration the load would be 406 lbs/day, and at the maximum effluent concentration the load would be 127 lbs/day. At the minimum effluent concentration the total load would be 1,576 lbs/day and at the maximum effluent concentration the total load would be 1,296 lbs/day. Thus, it is confirmed that the predicted manganese concentration will be less than the chronic water quality standard of 3.65 mg/L outside the mixing zone when the Mine discharges from Pond 009 under the described conditions.

Sulfate Results

As mentioned previously, the results from the current ponds on-site show that the sulfate concentration in the effluent is less than the water quality standard.

The calculation of the resulting load and concentration using the effluent flows determined for chlorides is presented in Table 10. As shown in the table, if there is no flow in the river, then there will be no effluent discharge from Pond 009. For the example presented above, the background load would be 1,148,300 lbs/day, at the minimum effluent concentration the load would be 8,755,113 lbs/day, and at the maximum effluent concentration the load would be 626,677 lbs/day. At the minimum effluent concentration the total load would be 9,903,413 lbs/day and at the maximum effluent concentration the total load would be 1,774,977 lbs/day. Thus, it is confirmed that the predicted sulfate concentration will be less than the water quality standard of 2,000 mg/L outside the mixing zone when the Mine discharges from Pond 009 under the described conditions.

Total Suspended Solids Results

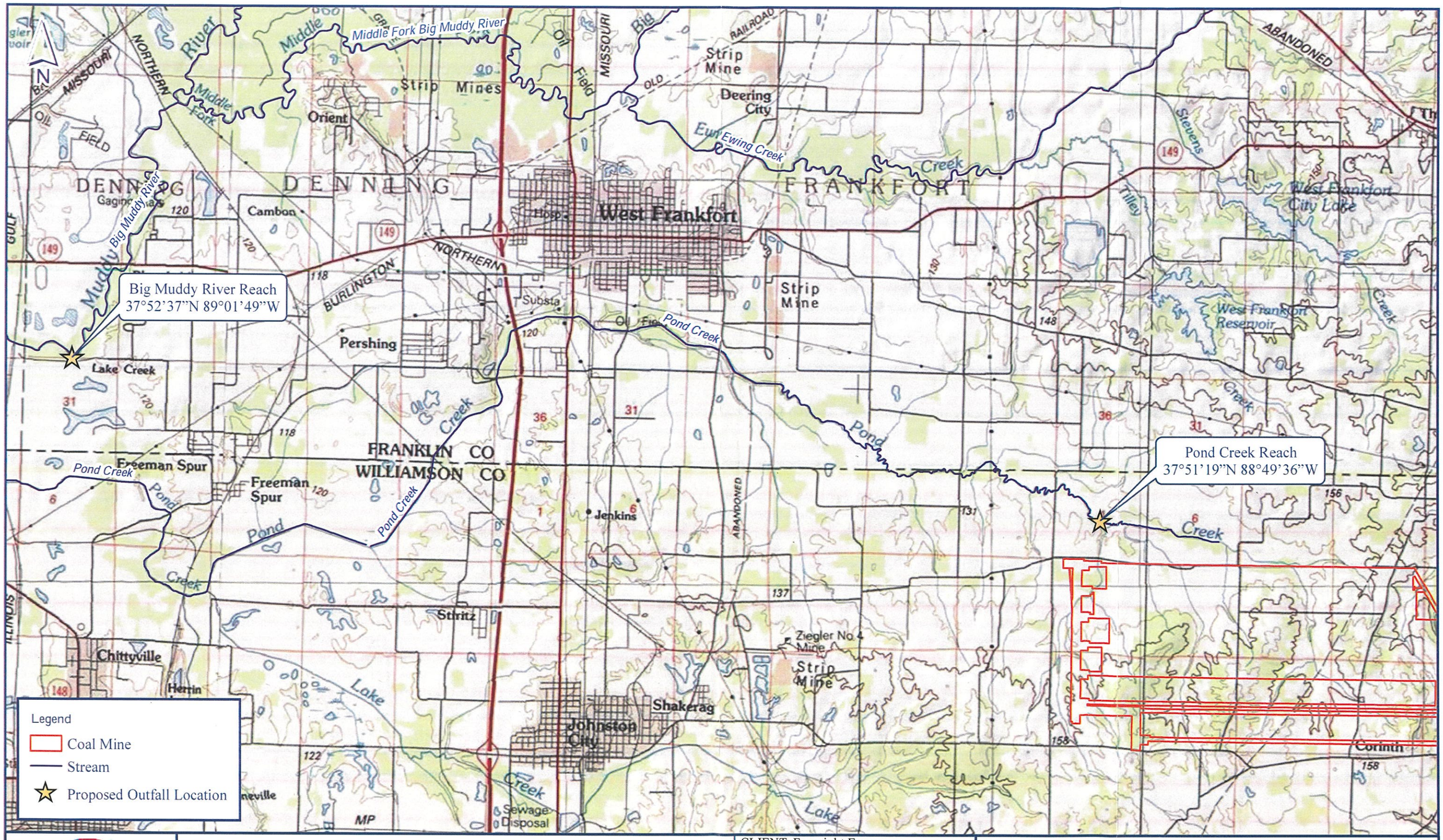
Pond Creek is listed as impaired for sedimentation and siltation. The total suspended solids measurement is used to monitor the potential impact on the stream. However, there are no numeric water quality standards for TSS. The calculation of the estimated load and resulting concentration from potential discharges from Pond 009 is summarized in Table 11. For the example presented above, the background load would be 296,509 lbs/day, at the minimum effluent concentration the load would be 78,171 lbs/day, and at the maximum effluent concentration the load would be 84,360 lbs/day. At the minimum effluent concentration the total load would be 374,680 lbs/day and at the maximum effluent concentration the total load would be 380,870 lbs/day. The resulting downstream concentration would range from 18 to 64 mg/L.

CLOSING REMARKS

If you should have questions or comments concerning our assessment, please do not hesitate to contact us by telephone at (615) 373-8532, by facsimile at (615) 373-8512, or by electronic mail at mcorn@aquaeter.com or jmcorn@aquaeter.com.

FIGURES

R08440



CLIENT: Foresight Energy
LOCATION: Benton, Illinois
PROJECT FILE: 142336

FIGURE 1.

Document Path: I:\DATA\GIS Projects\142336 - Sugar Camp\BigMuddy_PondCreek_ProposedOutfallLoc.mxd

Date Saved: 11/9/2016 12:09:02 PM

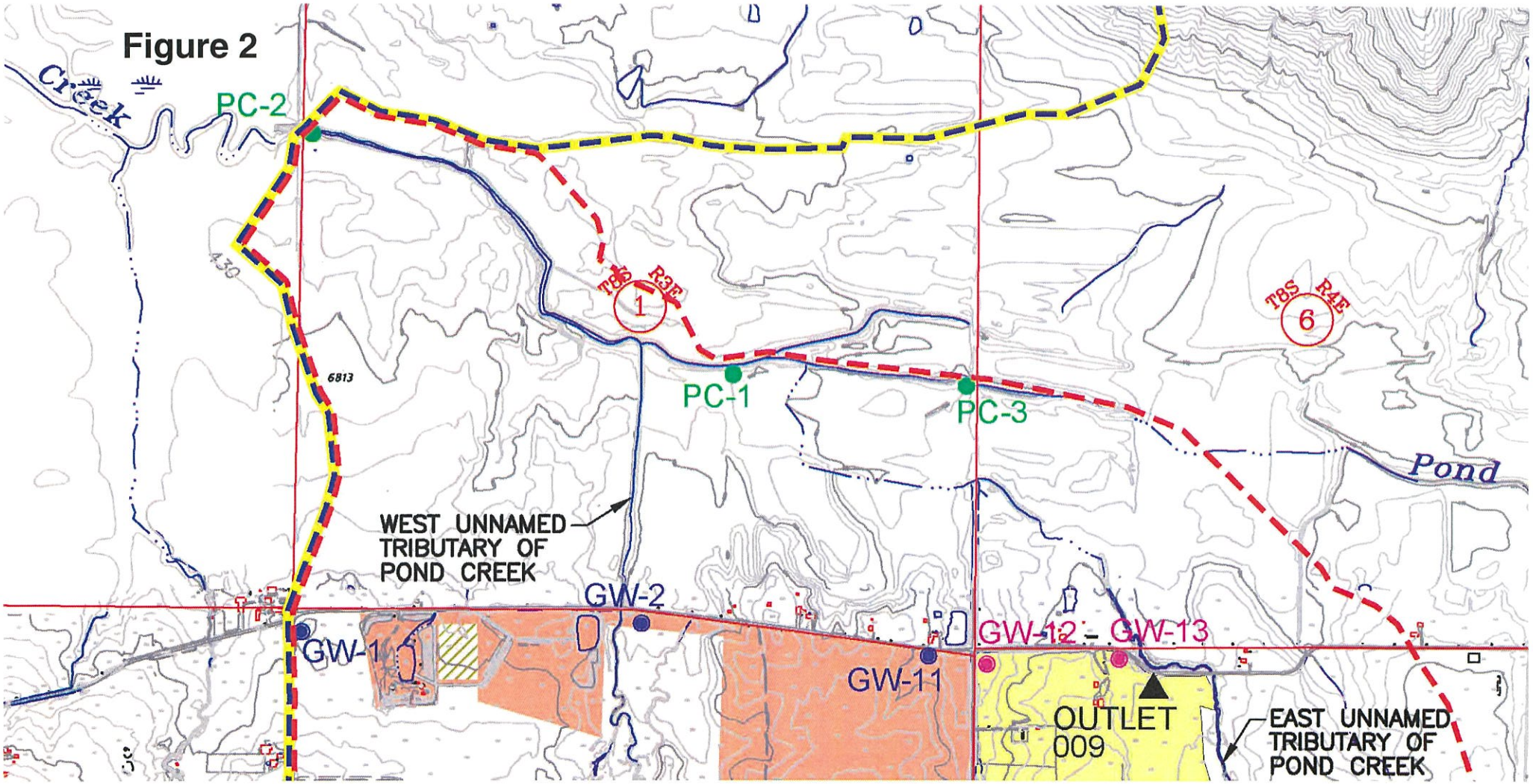


Figure 2
Creek
PC-2
T8S R3E
1
T8S R4E
6
PC-1
PC-3
Pond
WEST UNNAMED
TRIBUTARY OF
POND CREEK
GW-2
GW-1
GW-11
GW-12
GW-13
OUTLET
009
EAST UNNAMED
TRIBUTARY OF
POND CREEK

R08441

TABLES

TABLE 1. POND CREEK PC3
Representative Background Location

CONSTITUENT	SAMPLE COLLECTION DATE/LABORATORY REPORT NUMBER															AVERAGE (mg/L)	IL WQ STANDARD (1) CHRONIC (mg/L)	WQ STANDARD TMZ (mg/L)
	1-Mar-09 13738-3 (mg/L)	29-May-09 13850-15 (mg/L)	27-Aug-09 13981-14 (mg/L)	30-Nov-09 14094-15 (mg/L)	26-Feb-10 14185-14 (mg/L)	20-Aug-10 14408-14 (mg/L)	19-May-11 14738-14 (mg/L)	15-Aug-11 14840-14 (mg/L)	17-Nov-11 14967-14 (mg/L)	22-Feb-12 15077-14 (mg/L)	25-May-12 15173-14 (mg/L)	15-Aug-13 15716-15 (mg/L)	27-Feb-14 15923-15 (mg/L)	30-May-14 16038-15 (mg/L)	18-Aug-14 16172-17 (mg/L)			
pH	8.3	7.9	8	8.1	8.5	--	7.7	--	7.7	7.9	--	7.4	7.7	7.5	7.3	7.8	6.5-9.0	--
Acidity	<10	<10	<10	<10	<10	--	<10	--	<10	<10	--	<10	<10	10	10	10	--	--
Alkalinity	188	118	141	91	85	--	70	--	40	70	--	82	70	94	60	92	--	--
Chlorides	32	87.6	73	32	25	--	9	--	16	26	--	11	56	34	32	36	--	500
Sulfates	150	120	39	240	180	--	280	--	110	370	--	176	380	306	209	213	--	500
Settleable solids	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TDS	--	--	--	--	--	--	526	--	297	--	--	282	512	520	372	418	--	--
TSS	35	37	457	<1	5		13		19	7		6	5	6	19	55	--	--
Cyanide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.005-0.022	--
Phenols, TR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--
Antimony	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0021	--
Chromium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011-0.016	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.026	--
Iron, total	1.4	0.121	0.891	0.384	0.436	--	<0.006	--	<0.006	0.302	--	0.141	0.482	0.355	0.421	0.493	1	--
Iron, dissolved	1.06	0.121	0.267	0.235	0.252	--	<0.006	--	<0.006	<0.006	--	0.141	0.482	0.192	0.341	0.343	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese, total	0.178	0.003	<0.002	0.540	0.377	--	0.017	--	<0.002	0.234	--	0.034	0.373	0.311	0.098	0.217	3.65	--
Manganese, dissolved	0.053	<0.002	<0.002	0.456	0.186	--	0.011	--	<0.002	0.036	--	0.03	0.326	<0.002	0.023	0.140	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.000012	--
Nickel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011	--
Selenium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	I	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.005	--
Thallium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.071	--
PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness	656	180	228	272	208	--	291	--	149	260	--	180	264	260	200	262	--	--

NOTES:

1. 226 mg/L hardness value was used to calculate the IL Title 35
2. PC3 collected on 11/7/2013 (15812-15) was not included due to issues during sample collection and analysis.

R08443

TABLE 2. POND 009 DATA
Representative Sample for Discharge to Pond Creek

CONSTITUENT	SAMPLE COLLECTION DATE/LABORATORY REPORT NUMBER									AVERAGE (mg/L)	MAXIMUM (mg/L)	MINIMUM (mg/L)	IL WQ STANDARD (1) CHRONIC (mg/L)	WQ STANDARD TMZ (mg/L)
	30-Sep-16 18089-2 (mg/L)	6-Oct-16 18095-2 (mg/L)	10-Oct-16 18097-2 (mg/L)	13-Oct-16 18114-2 (mg/L)	17-Oct-16 18118-2 (mg/L)	19-Oct-16 18124-2 (mg/L)	27-Oct-16 18149-2 (mg/L)	31-Oct-16 18165-2 (mg/L)	2-Nov-16 18176-2 (mg/L)					
pH	6.9	7.6	7.8	7.2	7.2	7.9	8.7	7.1	6.7	7.5	8.7	6.7	6.5-9.0	--
Acidity	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND	ND	ND	--	--
Alkalinity	44	408	72	76	72	92	72	84	72	110	408	44	--	--
Hardness	460	460	200	570	460	410	650	540	710	496	710	200	--	--
Chlorides	700	750	750	850	575	850	1,550	580	540	794	1,550	540		500
Sulfates	680	840	1,040	1,040	680	1,000	560	600	1,000	827	1,040	560		500
Settleable solids	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TSS	12	8	140	8	5	17	5	28	11	26	140	5	--	--
Cyanide	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ND	ND	ND	0.005-0.022	--
Phenols, TR	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.03	0.03	0.1	--
Antimony	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001	--	--
Arsenic	0.002	0.001	0.002	<0.001	0.001	0.001	0.001	<0.001	<0.001	0.001	0.002	0.002	--	--
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	--	--
Cadmium, total	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	ND	ND	ND	0.002	--
Cadmium, dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	ND	ND	ND	--	--
Chromium	0.008	0.005	0.005	0.002	0.002	0.002	0.004	0.002	0.002	0.004	0.008	0.002	0.011-0.016	--
Copper	0.017	0.024	0.017	0.011	0.008	0.008	0.015	0.012	0.013	0.014	0.024	0.008	0.026	--
Iron, total	1.274	0.818	2.134	0.177	0.152	0.186	0.177	0.132	0.141	0.577	2.134	0.132	1	--
Iron, dissolved	0.419	0.043	0.199	0.119	0.089	0.09	0.117	0.023	< 0.020	0.137	0.419	0.023	--	--
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	--	--
Manganese, total	0.181	0.21	0.192	0.051	0.038	0.034	0.036	0.041	0.026	0.090	0.210	0.026	3.65	--
Manganese, dissolved	0.095	0.054	0.1	0.033	0.028	<0.020	0.03	0.024	<0.020	0.052	0.103	0.024	--	--
Mercury	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ND	ND	ND	0.000012	--
Nickel, total	0.009	0.007	0.006	0.002	0.003	0.003	0.004	0.003	0.003	0.004	0.009	0.002	0.011	--
Nickel, dissolved	0.004	0.001	0.005	0.002	0.003	0.003	0.004	0.003	0.003	0.003	0.005	0.001	--	--
Selenium	0.011	0.006	0.008	0.006	0.007	0.007	0.007	0.005	0.006	0.007	0.011	0.005	1	--
Silver	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	0.005	--
Thallium	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	ND	ND	ND	--	--
Zinc	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	ND	ND	ND	0.071	--
PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOTES:
1.226 mg/L hardness value was used to calculate the IL Title 35 Subtitle C

R08444

Table 3. Chloride Dispersion Model						
C Bkg (mg/L) (1)	36				mg/L	
C total (mg/L) (2)	500				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		540	794	1,550	mg/L	
Dispersion (S)=		1.09	1.63	3.26	No units	

Table 4. Iron Dispersion Model						
C Bkg (mg/L) (1)	0.493				mg/L	
C total (mg/L) (2)	1				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		0.132	0.577	2.134	mg/L	
Dispersion (S)=		-0.712	0.166	3.24	No units	

Table 5. Manganese Dispersion Model						
C Bkg (mg/L) (1)	0.217				mg/L	
C total (mg/L) (2)	3.65				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		0.026	0.090	0.210	mg/L	
Dispersion (S)=		-0.06	-0.04	0.00	No units	

Table 6. Sulfate Dispersion Model						
C Bkg (mg/L) (1)	213				mg/L	
C total (mg/L) (2)	2000				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		560	827	1040	mg/L	
Dispersion (S)=		0.19	0.34	0.46	No units	

TABLE 7. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
CHLORIDE

C Bkg (mg/L) (1) 36
C total (mg/L) (2) 500

C eff (mg/L) (3) 540 794 1,550

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS AT MIN Ceff (cfs)	Q EFF BASED ON MEETING WQS AT AVG Ceff (cfs)	Q EFF BASED ON MEETING WQS AT MAX Ceff (cfs)	BKG LOAD (lbs/day)	EFFLUENT LOAD AT MIN Ceff (lbs/day)	EFFLUENT LOAD AT AVG Ceff (lbs/day)	EFFLUENT LOAD AT MAX Ceff (lbs/day)	PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE AT MIN Ceff (lbs/day)	PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE AT AVG Ceff (lbs/day)	PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE AT MAX Ceff (lbs/day)	PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE AT MIN Ceff (mg/L)	PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE AT AVG Ceff (mg/L)	PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	5,822	253,273	50,667	28,020	259,095	56,490	33,842	411	250	188
500	125	1,450	197	56	97,039	4,221,215	844,456	466,995	4,318,255	941,495	564,035	411	250	188
1,000	250	2,900	395	112	194,079	8,442,431	1,688,912	933,990	8,636,509	1,882,990	1,128,069	411	250	188
5,000	1,250	14,500	1,973	559	970,394	42,212,153	8,444,558	4,669,951	43,182,547	9,414,952	5,640,346	411	250	188
7,070	1,768	20,503	2,790	790	1,372,138	59,687,984	11,940,604	6,603,311	61,060,121	13,312,742	7,975,449	411	250	188

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the chloride WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08449

TABLE 8. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
IRON

C Bkg (mg/L) (1) 0.493
C total (mg/L) (2) 1

C eff (mg/L) (3) 0.132 0.577 2.134

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS AT MIN Ceff (cfs)	Q EFF BASED ON MEETING WQS AT AVG Ceff (cfs)	Q EFF BASED ON MEETING WQS AT MAX Ceff (cfs)	BKG LOAD (lbs/day)	EFFLUENT LOAD AT MIN Ceff (lbs/day)	EFFLUENT LOAD AT AVG Ceff (lbs/day)	EFFLUENT LOAD AT MAX Ceff (lbs/day)	PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE AT MIN Ceff (lbs/day)	PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE AT AVG Ceff (lbs/day)	PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE AT MAX Ceff (lbs/day)	PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE AT MIN Ceff (mg/L)	PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE AT AVG Ceff (mg/L)	PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	80	62	37	39	142	117	118	0.225	0.517	0.658
500	125	1,450	197	56	1,329	1,032	614	643	2,361	1,943	1,972	0.225	0.517	0.658
1,000	250	2,900	395	112	2,658	2,064	1,227	1,286	4,722	3,885	3,944	0.225	0.517	0.658
5,000	1,250	14,500	1,973	559	13,289	10,319	6,137	6,429	23,608	19,426	19,718	0.225	0.517	0.658
7,070	1,768	20,503	2,790	790	18,791	14,590	8,677	9,091	33,381	27,468	27,882	0.225	0.517	0.658

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the iron WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08450

TABLE 9. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
MANGANESE

C Bkg (mg/L) (1) 0.217
C total (mg/L) (2) 3.65

C eff (mg/L) (3) 0.026 0.090 0.210

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	35	12	6	4	47	41	39	0.075	0.181	0.216
500	125	1,450	197	56	585	203	96	63	788	681	648	0.075	0.181	0.216
1,000	250	2,900	395	112	1,170	406	191	127	1,576	1,361	1,296	0.075	0.181	0.216
5,000	1,250	14,500	1,973	559	5,849	2,032	957	633	7,882	6,807	6,482	0.075	0.181	0.216
7,070	1,768	20,503	2,790	790	8,271	2,874	1,353	895	11,145	9,624	9,166	0.075	0.181	0.216

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the manganese WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08451

TABLE 10. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
SULFATE

C Bkg (mg/L) (1) 213
C total (mg/L) (2) 2,000

C eff (mg/L) (3) 560 827 1,040

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	34,449	262,653	52,773	18,800	297,102	87,222	53,249	471	387	296
500	125	1,450	197	56	574,150	4,377,557	879,553	313,339	4,951,707	1,453,703	887,489	471	387	296
1,000	250	2,900	395	112	1,148,300	8,755,113	1,759,106	626,677	9,903,413	2,907,406	1,774,977	471	387	296
5,000	1,250	14,500	1,973	559	5,741,500	43,775,566	8,795,528	3,133,387	49,517,065	14,537,028	8,874,886	471	387	296
7,070	1,768	20,503	2,790	790	8,118,481	61,898,650	12,436,876	4,430,609	70,017,130	20,555,357	12,549,089	471	387	296

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the sulfate WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08452

TABLE 11. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
TSS

C Bkg (mg/L) (1) 55
C total (mg/L) (2) NA

C eff (mg/L) (3) 5 26 140

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	8,895	2,345	1,659	2,531	11,240	10,554	11,426	18	47	64
500	125	1,450	197	56	148,255	39,085	27,652	42,180	187,340	175,907	190,435	18	47	64
1,000	250	2,900	395	112	296,509	78,171	55,304	84,360	374,680	351,814	380,870	18	47	64
5,000	1,250	14,500	1,973	559	1,482,547	390,853	276,522	421,802	1,873,400	1,759,069	1,904,349	18	47	64
7,070	1,768	20,503	2,790	790	2,096,321	552,667	391,002	596,428	2,648,988	2,487,323	2,692,749	18	47	64

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = No WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08453

DOCUMENT

43

AquAeTer

optimizing
resources | water, air, earth

MEMORANDUM

TO: Simon Stepp, Williamson Energy, LLC
FROM: John Michael Corn, P.E. and Michael R. Corn, P.E., BCEES, **AquAeTer, Inc.**
DATE: November 18, 2016
JOB NO.: 142336
RE: **Williamson Energy Mine**
Proposed Pond Creek Discharge Mixing Zone Analysis

INTRODUCTION

The Williamson Energy Mine is proposing to construct a new outfall to discharge from Pond 009 to Pond Creek. Pond 009 will collect stormwater runoff from the outslope of the active Slurry Impoundment/RDA3, the underdrain from the impoundment, and the stormwater collected in Ponds 001-004, 006, and 007/008. Ponds 001-004 and Pond 006 collect stormwater runoff from undeveloped areas, access roads, the raw coal pile, and the mine yard. Ponds 007/008 collect stormwater from the outslope of and discharge from the inactive Slurry Impoundments (RDA 1 and RDA 2) underdrain. The proposed outfall will be located at approximately 37°51'19"N 88°49'36"W, and will discharge to Pond Creek Reach Il_NG-02, as shown in Figure 1 and as presented in Bulletin 57 (State Water Survey Division, 1973). The Illinois Environmental Protection Agency (IEPA) has specified that 25% of the stream flow can be used to determine the allowable discharge to Pond Creek, since it is not a 0 flow 7Q1.1 stream.

Possible maximum allowable discharges from Pond 009 into Pond Creek were calculated based on meeting water quality standards (WQS). The calculations were performed using volumetric flowrates in the stream, the background concentration of constituents of concern found in Pond Creek, and the concentration expected in the discharge (effluent from Pond 009).

WATER QUALITY STANDARDS

Discharge from Pond 009 will only be allowed when the water quality standards, as defined in IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards, will be met in Pond Creek. The potential constituents of concern are those compounds for which the Pond Creek reach is listed on the 2014 and 2016 303(d) Lists, there is a water quality standard and the compound is potentially found in the discharge, or the compound is on the current NPDES permit for monitoring or has a permit limit. The constituents of concern are:

- Sedimentation/siltation (cause of 2014 and 2016 303(d) listing, TSS and settleable solids are the parameters that monitor this parameter);

- Chloride (cause of 2014 and 2016 303(d) listing, water quality standard);
- Dissolved oxygen (cause of 2016 303(d) listing);
- Sulfates (water quality standard, listed in the NPDES permit);
- Settleable solids (parameter, along with TSS, to monitor sedimentation impairment),
- Iron (water quality standard, listed in the NPDES permit);
- Manganese (water quality standards, listed on the NPDES permit);
- Cadmium (water quality standards, possibly present in discharge);
- Nickel (water quality standards, possibly present in discharge); and
- Zinc (water quality standards, possibly present in discharge).
- Phenols (water quality standard and possibly present in discharge);
- Arsenic (water quality standard and possibly present in discharge);
- Chromium, (water quality standard and possibly present in discharge);
- Selenium, (water quality standard);
- Silver (water quality standard);
- Cyanide (water quality standard); and
- Copper (water quality standard and possibly present in discharge).

Compounds that were evaluated and not found to be a concern, either because of the nature of the discharge or have been found to be non-detect in samples collected from the Pond 009 representative sample, are cadmium, silver, zinc, and cyanide. Dissolved oxygen is not expected to be an issue for this stormwater pond. For phenols, chromium, arsenic, copper, nickel, and selenium, the results show that the effluent will meet the water quality standards at the end of pipe. Therefore, the proposed discharge will not further impair Pond Creek River for any of these constituents. These compounds are not discussed in detail below. TSS, chlorides, sulfate, and manganese have been determined to be constituents of concern and are discussed further below.

BACKGROUND STREAM FLOW DETERMINATION

A range in background flow measurements in Pond Creek and used in the mixing zone evaluation is presented in the attached tables. The flowrates include a maximum flow rate of 7,070 cfs as calculated using USGS StreamStats 4.0.

BACKGROUND WATER QUALITY

Background samples were collected from Pond Creek upstream of the proposed outfall as shown in Figure 2. The results are presented in Table 1.

EFFLUENT WATER QUALITY

The water stored in Pond 009 is representative of the effluent that will be discharged to Pond Creek. Results for samples collected from Pond 009 are presented in Table 2. The minimum, average, and maximum values are used in the calculations to provide a range of loadings to the creek.

DISPERSION

The following equation was used to calculate dispersion needed to meet the chloride water quality standard.

$$C_{standard}S = (S-1)C_{background} + 1 * C_{site\ water}$$

where: $C_{standard}$ = water quality standard, mg/L;
S = dispersion (__:1), unitless;
$C_{background}$ = background concentration, mg/L;
$C_{site\ water}$ = concentration from on-site source, mg/L

Rearranging the above equation to solve for the dispersion, S, yields:

$$S = \frac{C_{site\ water} - C_{background}}{C_{standard} - C_{background}}$$

Given the available data, the required chloride dispersion was calculated as 1.09 for the minimum, 1.63 for the average, and 3.26 for the maximum, as presented in Table 3.

Given the available data, the required iron dispersion was calculated as -0.712 for the minimum, 0.166 for the average, and 3.24 for the maximum, as presented in Table 4.

Therefore, this mixing zone evaluation required chloride for the minimum and average effluent concentrations and iron for the maximum effluent concentrations.

DISCHARGE FLOW EVALUATION

A comparison of the water quality standards and the expected effluent concentration shows that, at the end of pipe, the chloride and iron concentrations are expected to be greater than the standard. Manganese and sulfate concentrations, however, are expected to be less than the standards at the end of pipe. Therefore, the discharge from Pond 009 is expected to be controlled to ensure the chloride and iron WQS are met. Allowed flows are calculated for chloride for the minimum and average and iron for the maximum and, then, used to confirm that manganese and sulfate water quality standards will be met. Also, loadings are calculated for these compounds.

A range of allowable effluent flows from Pond 009 (Q eff) were calculated for a range of possible flows during rain events (Q bkg) in order to meet the water quality standards for chlorides at the minimum and average and iron at the maximum. The chloride and iron flows were then used for all constituents. For this calculation, 25% of the stream flow was used. As shown in the table, if there is no flow in the river, then there will be no effluent discharge from Pond 009.

Chloride Results

The calculation of the estimated allowable discharge from Pond 009 to Pond Creek is summarized in Table 7 for chlorides. Also, as an example, at the minimum concentration of 540 mg/L chloride and a background flow of 1,000 cfs, the effluent flow could be less than or equal to 2,900 cfs while meeting the water quality standard at the edge of a mixing zone.

In addition, the background, effluent, and total (downstream, outside the mixing zone) loads were calculated as shown in Table 7. For the example presented above, the background load would be 194,079 lbs/day, at the minimum effluent concentration the load would be 8,442,431 lbs/day, and at the maximum effluent concentration the load would be 933,990 lbs/day. At the minimum effluent concentration the total load would be 8,636,509 lbs/day and at the maximum effluent concentration the total load would be 1,128,069 lbs/day.

After it was determined that the water quality standard would be met, the downstream concentration was also evaluated to determine the overall impact to the stream. The concentration of chlorides predicted for outside the mixing zone was then calculated. As shown in Table 7, the concentration is predicted to range from 188 to 411 mg/L for range of effluent concentrations evaluated. Thus, it is confirmed that the predicted chloride concentration will be less than the water quality standard when the Mine discharges from Pond 009 under the described conditions.

Iron Results

The calculation of the estimated allowable discharge from Pond 009 to Pond Creek is summarized in Table 8 for iron. Also, as an example, at the minimum concentration of 0.132 mg/L iron and a background flow of 1,000 cfs, the effluent flow could be less than or equal to 2,900 cfs while meeting the water quality standard at the edge of a mixing zone.

In addition, the background, effluent, and total (downstream, outside the mixing zone) loads were calculated as shown in Table 8. For the example presented above, the background load would be 2,658 lbs/day, at the minimum effluent concentration the load would be 2,064 lbs/day, and at the maximum effluent concentration the load would be 1,286 lbs/day. At the minimum effluent concentration the total load would be 4,722 lbs/day and at the maximum effluent concentration the total load would be 3,944 lbs/day.

After it was determined that the water quality standard would be met, the downstream concentration was also evaluated to determine the overall impact to the stream. The concentration of iron predicted for outside the mixing zone was then calculated. As shown in Table 8, the concentration is predicted to range from 0.225 to 0.658 mg/L for range of effluent concentrations evaluated. Thus, it is confirmed that the predicted iron concentration will be less than the water quality standard when the Mine discharges from Pond 009 under the described conditions.

Manganese Results

As mentioned previously, the results from the current ponds on-site show that the manganese concentration in the effluent is less than the water quality standard.

The calculation of the resulting load and concentration using the effluent flows determined for manganese is presented in Table 9. As shown in the table, if there is no flow in the river, then there will be no effluent discharge from Pond 009. For the example presented above, the background load would be 1,170 lbs/day, at the minimum effluent concentration the load would be 406 lbs/day, and at the maximum effluent concentration the load would be 127 lbs/day. At the minimum effluent concentration the total load would be 1,576 lbs/day and at the maximum effluent concentration the total load would be 1,296 lbs/day. Thus, it is confirmed that the predicted manganese concentration will be less than the chronic water quality standard of 3.65 mg/L outside the mixing zone when the Mine discharges from Pond 009 under the described conditions.

Sulfate Results

As mentioned previously, the results from the current ponds on-site show that the sulfate concentration in the effluent is less than the water quality standard.

The calculation of the resulting load and concentration using the effluent flows determined for chlorides is presented in Table 10. As shown in the table, if there is no flow in the river, then there will be no effluent discharge from Pond 009. For the example presented above, the background load would be 1,148,300 lbs/day, at the minimum effluent concentration the load would be 8,755,113 lbs/day, and at the maximum effluent concentration the load would be 626,677 lbs/day. At the minimum effluent concentration the total load would be 9,903,413 lbs/day and at the maximum effluent concentration the total load would be 1,774,977 lbs/day. Thus, it is confirmed that the predicted sulfate concentration will be less than the water quality standard of 2,000 mg/L outside the mixing zone when the Mine discharges from Pond 009 under the described conditions.

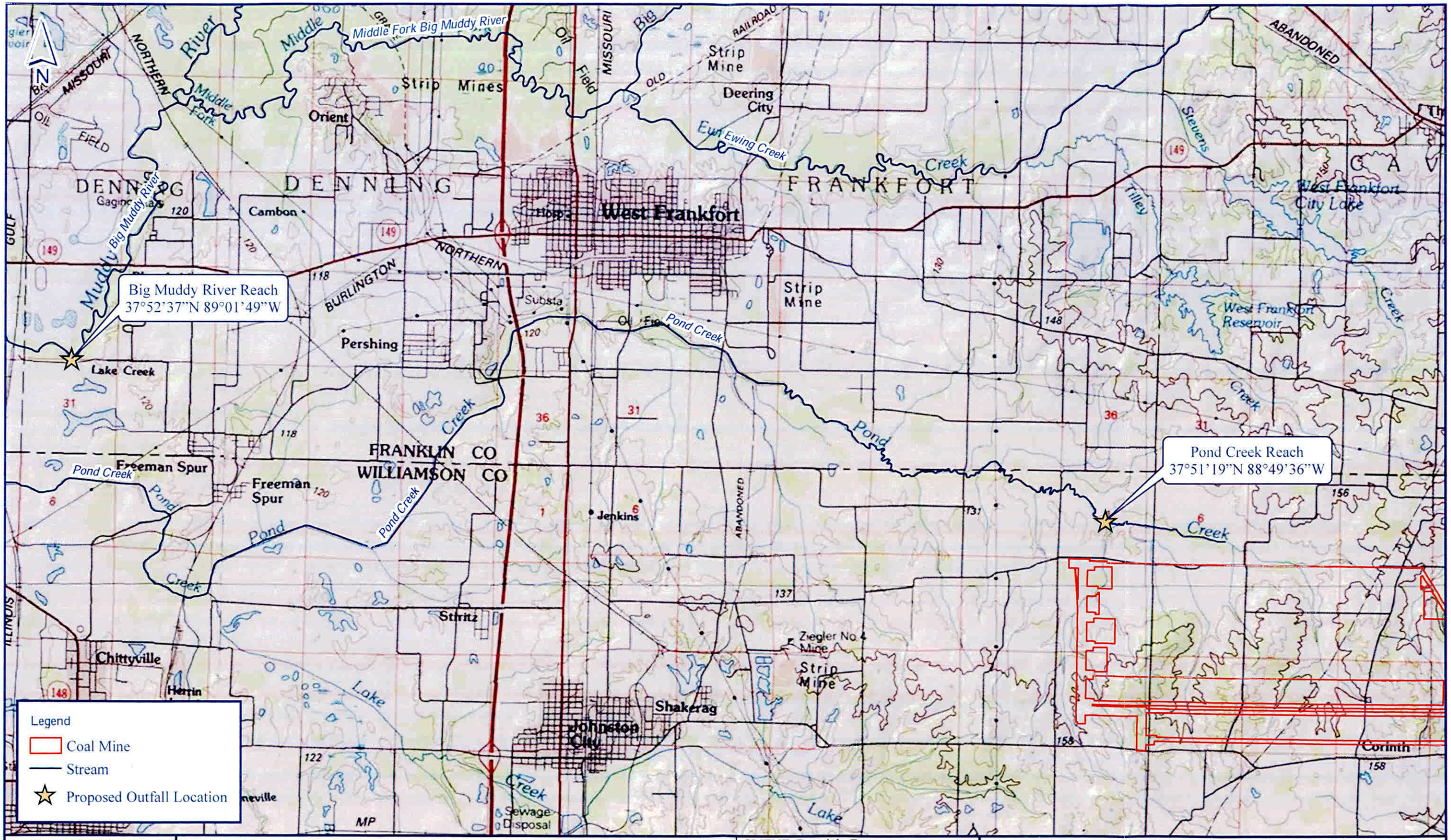
Total Suspended Solids Results

Pond Creek is listed as impaired for sedimentation and siltation. The total suspended solids measurement is used to monitor the potential impact on the stream. However, there are no numeric water quality standards for TSS. The calculation of the estimated load and resulting concentration from potential discharges from Pond 009 is summarized in Table 11. For the example presented above, the background load would be 296,509 lbs/day, at the minimum effluent concentration the load would be 78,171 lbs/day, and at the maximum effluent concentration the load would be 84,360 lbs/day. At the minimum effluent concentration the total load would be 374,680 lbs/day and at the maximum effluent concentration the total load would be 380,870 lbs/day. The resulting downstream concentration would range from 18 to 64 mg/L.

CLOSING REMARKS

If you should have questions or comments concerning our assessment, please do not hesitate to contact us by telephone at (615) 373-8532, by facsimile at (615) 373-8512, or by electronic mail at mcorn@aquaeter.com or jmcorn@aquaeter.com.

FIGURES



CLIENT:	Foresight Energy
LOCATION:	Benton, Illinois
PROJECT FILE:	142336

FIGURE 1.

Document Path: I:\DATA\GIS Projects\142336 - Sugar Camp\BigMuddy_PondCreek_ProposedOutfallLoc.mxd

Date Saved: 11/9/2018 12:09:02 PM

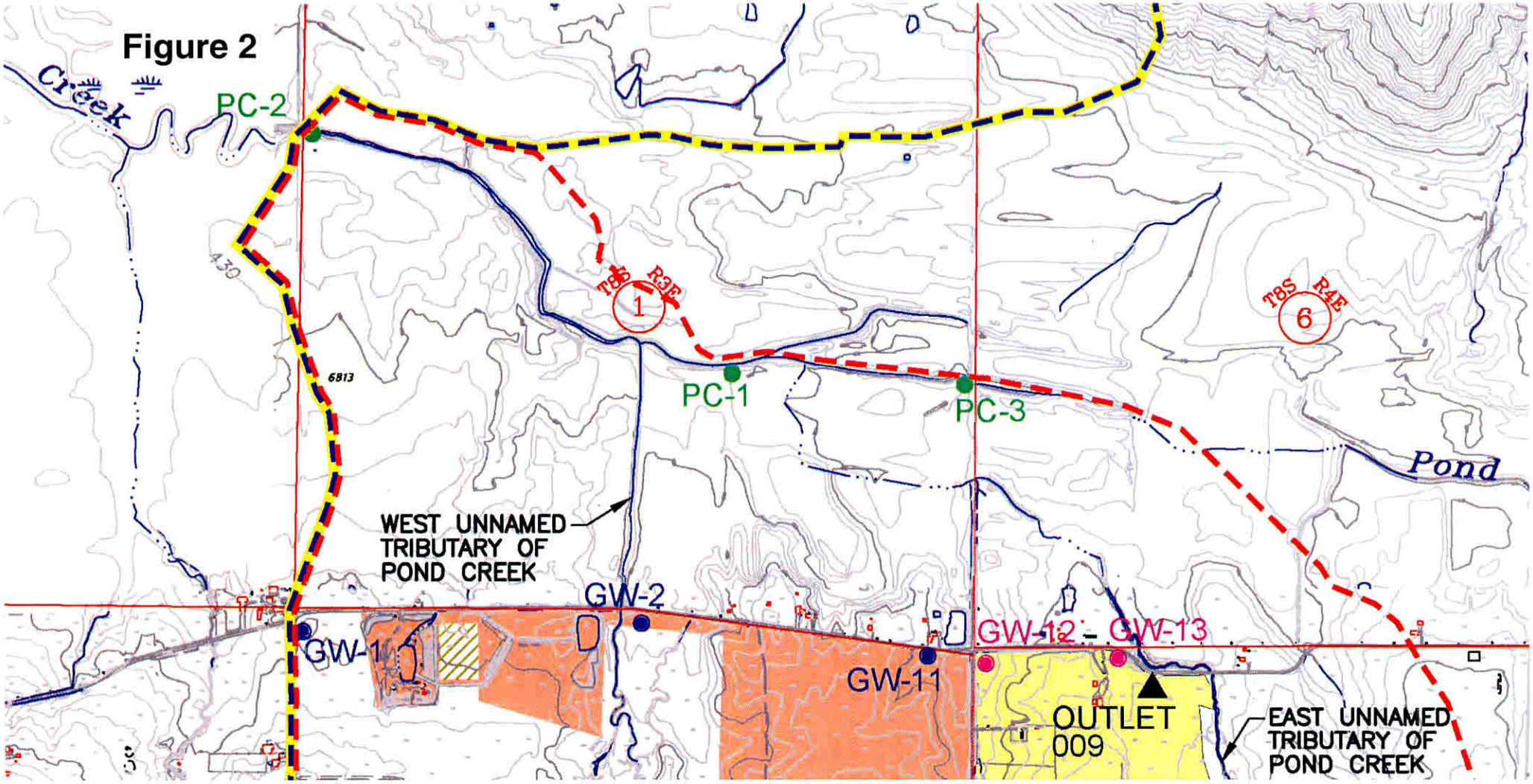


Figure 2
Creek
PC-2
T8S R3E
1
T8S R4E
6
6813
PC-1
PC-3
Pond
WEST UNNAMED
TRIBUTARY OF
POND CREEK
GW-2
GW-1
GW-11
GW-12
GW-13
OUTLET
009
EAST UNNAMED
TRIBUTARY OF
POND CREEK

R08463

TABLES

TABLE 1. POND CREEK PC3
Representative Background Location

CONSTITUENT	SAMPLE COLLECTION DATE/LABORATORY REPORT NUMBER															AVERAGE (mg/L)	IL WQ STANDARD (1) CHRONIC (mg/L)	WQ STANDARD TMZ (mg/L)
	1-Mar-09 13738-3 (mg/L)	29-May-09 13850-15 (mg/L)	27-Aug-09 13981-14 (mg/L)	30-Nov-09 14094-15 (mg/L)	26-Feb-10 14185-14 (mg/L)	20-Aug-10 14408-14 (mg/L)	19-May-11 14738-14 (mg/L)	15-Aug-11 14840-14 (mg/L)	17-Nov-11 14967-14 (mg/L)	22-Feb-12 15077-14 (mg/L)	25-May-12 15173-14 (mg/L)	15-Aug-13 15716-15 (mg/L)	27-Feb-14 15923-15 (mg/L)	30-May-14 16038-15 (mg/L)	18-Aug-14 16172-17 (mg/L)			
pH	8.3	7.9	8	8.1	8.5	--	7.7	--	7.7	7.9	--	7.4	7.7	7.5	7.3	7.8	6.5-9.0	--
Acidity	<10	<10	<10	<10	<10	--	<10	--	<10	<10	--	<10	<10	10	10	10	--	--
Alkalinity	188	118	141	91	85	--	70	--	40	70	--	82	70	94	60	92	--	--
Chlorides	32	87.6	73	32	25	--	9	--	16	26	--	11	56	34	32	36	--	500
Sulfates	150	120	39	240	180	--	280	--	110	370	--	176	380	306	209	213	--	500
Settleable solids	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TDS	--	--	--	--	--	--	526	--	297	--	--	282	512	520	372	418	--	--
TSS	35	37	457	<1	5		13		19	7		6	5	6	19	55	--	--
Cyanide	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.005-0.022	--
Phenols, TR	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.1	--
Antimony	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0021	--
Chromium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011-0.016	--
Copper	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.026	--
Iron, total	1.4	0.121	0.891	0.384	0.436	--	<0.006	--	<0.006	0.302	--	0.141	0.482	0.355	0.421	0.493	1	--
Iron, dissolved	1.06	0.121	0.267	0.235	0.252	--	<0.006	--	<0.006	<0.006	--	0.141	0.482	0.192	0.341	0.343	--	--
Lead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese, total	0.178	0.003	<0.002	0.540	0.377	--	0.017	--	<0.002	0.234	--	0.034	0.373	0.311	0.098	0.217	3.65	--
Manganese, dissolved	0.053	<0.002	<0.002	0.456	0.186	--	0.011	--	<0.002	0.036	--	0.03	0.326	<0.002	0.023	0.140	--	--
Mercury	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.000012	--
Nickel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.011	--
Selenium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--
Silver	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.005	--
Thallium	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.071	--
PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardness	656	180	228	272	208	--	291	--	149	260	--	180	264	260	200	262	--	--

NOTES:
1. 226 mg/L hardness value was used to calculate the IL Title 35
2. PC3 collected on 11/7/2013 (15812-15) was not included due to issues during sample collection and analysis.

R08465

TABLE 2. POND 009 DATA
Representative Sample for Discharge to Pond Creek

CONSTITUENT	SAMPLE COLLECTION DATE/LABORATORY REPORT NUMBER									AVERAGE (mg/L)	MAXIMUM (mg/L)	MINIMUM (mg/L)	IL WQ STANDARD (1) CHRONIC (mg/L)	WQ STANDARD TMZ (mg/L)
	30-Sep-16 18089-2 (mg/L)	6-Oct-16 18095-2 (mg/L)	10-Oct-16 18097-2 (mg/L)	13-Oct-16 18114-2 (mg/L)	17-Oct-16 18118-2 (mg/L)	19-Oct-16 18124-2 (mg/L)	27-Oct-16 18149-2 (mg/L)	31-Oct-16 18165-2 (mg/L)	2-Nov-16 18176-2 (mg/L)					
pH	6.9	7.6	7.8	7.2	7.2	7.9	8.7	7.1	6.7	7.5	8.7	6.7	6.5-9.0	--
Acidity	<10	<10	<10	<10	<10	<10	<10	<10	<10	ND	ND	ND	--	--
Alkalinity	44	408	72	76	72	92	72	84	72	110	408	44	--	--
Hardness	460	460	200	570	460	410	650	540	710	496	710	200	--	--
Chlorides	700	750	750	850	575	850	1,550	580	540	794	1,550	540		500
Sulfates	680	840	1,040	1,040	680	1,000	560	600	1,000	827	1,040	560		500
Settleable solids	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TSS	12	8	140	8	5	17	5	28	11	26	140	5	--	--
Cyanide	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ND	ND	ND	0.005-0.022	--
Phenols, TR	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.03	0.03	0.1	--
Antimony	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001	--	--
Arsenic	0.002	0.001	0.002	<0.001	0.001	0.001	0.001	<0.001	<0.001	0.001	0.002	0.002	--	--
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	--	--
Cadmium, total	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	ND	ND	ND	0.002	--
Cadmium, dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	ND	ND	ND	--	--
Chromium	0.008	0.005	0.005	0.002	0.002	0.002	0.004	0.002	0.002	0.004	0.008	0.002	0.011-0.016	--
Copper	0.017	0.024	0.017	0.011	0.008	0.008	0.015	0.012	0.013	0.014	0.024	0.008	0.026	--
Iron, total	1.274	0.818	2.134	0.177	0.152	0.186	0.177	0.132	0.141	0.577	2.134	0.132	1	--
Iron, dissolved	0.419	0.043	0.199	0.119	0.089	0.09	0.117	0.023	< 0.020	0.137	0.419	0.023	--	--
Lead	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	--	--
Manganese, total	0.181	0.21	0.192	0.051	0.038	0.034	0.036	0.041	0.026	0.090	0.210	0.026	3.65	--
Manganese, dissolved	0.095	0.054	0.1	0.033	0.028	<0.020	0.03	0.024	<0.020	0.052	0.103	0.024	--	--
Mercury	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	ND	ND	ND	0.000012	--
Nickel, total	0.009	0.007	0.006	0.002	0.003	0.003	0.004	0.003	0.003	0.004	0.009	0.002	0.011	--
Nickel, dissolved	0.004	0.001	0.005	0.002	0.003	0.003	0.004	0.003	0.003	0.003	0.005	0.001	--	--
Selenium	0.011	0.006	0.008	0.006	0.007	0.007	0.007	0.005	0.006	0.007	0.011	0.005	1	--
Silver	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	ND	ND	ND	0.005	--
Thallium	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	ND	ND	ND	--	--
Zinc	<0.02	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	ND	ND	ND	0.071	--
PCBs	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOTES:
1.226 mg/L hardness value was used to calculate the IL Title 35 Subtitle C

R08466

Table 3. Chloride Dispersion Model						
C Bkg (mg/L) (1)	36				mg/L	
C total (mg/L) (2)	500				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		540	794	1,550	mg/L	
Dispersion (S)=		1.09	1.63	3.26	No units	

Table 4. Iron Dispersion Model						
C Bkg (mg/L) (1)	0.493				mg/L	
C total (mg/L) (2)	1				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		0.132	0.577	2.134	mg/L	
Dispersion (S)=		-0.712	0.166	3.24	No units	

Table 5. Manganese Dispersion Model						
C Bkg (mg/L) (1)	0.217				mg/L	
C total (mg/L) (2)	3.65				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		0.026	0.090	0.210	mg/L	
Dispersion (S)=		-0.06	-0.04	0.00	No units	

Table 6. Sulfate Dispersion Model						
C Bkg (mg/L) (1)	213				mg/L	
C total (mg/L) (2)	2000				mg/L	WQS
		Minimum	Average	Maximum		
C eff (mg/L) (3)		560	827	1040	mg/L	
Dispersion (S)=		0.19	0.34	0.46	No units	

TABLE 7. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
CHLORIDE

C Bkg (mg/L) (1) 36
C total (mg/L) (2) 500

C eff (mg/L) (3) 540 794 1,550

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	5,822	253,273	50,667	28,020	259,095	56,490	33,842	411	250	188
500	125	1,450	197	56	97,039	4,221,215	844,456	466,995	4,318,255	941,495	564,035	411	250	188
1,000	250	2,900	395	112	194,079	8,442,431	1,688,912	933,990	8,636,509	1,882,990	1,128,069	411	250	188
5,000	1,250	14,500	1,973	559	970,394	42,212,153	8,444,558	4,669,951	43,182,547	9,414,952	5,640,346	411	250	188
7,070	1,768	20,503	2,790	790	1,372,138	59,687,984	11,940,604	6,603,311	61,060,121	13,312,742	7,975,449	411	250	188

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the chloride WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08471

TABLE 8. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
IRON

C Bkg (mg/L) (1) 0.493
C total (mg/L) (2) 1

C eff (mg/L) (3) 0.132 0.577 2.134

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	80	62	37	39	142	117	118	0.225	0.517	0.658
500	125	1,450	197	56	1,329	1,032	614	643	2,361	1,943	1,972	0.225	0.517	0.658
1,000	250	2,900	395	112	2,658	2,064	1,227	1,286	4,722	3,885	3,944	0.225	0.517	0.658
5,000	1,250	14,500	1,973	559	13,289	10,319	6,137	6,429	23,608	19,426	19,718	0.225	0.517	0.658
7,070	1,768	20,503	2,790	790	18,791	14,590	8,677	9,091	33,381	27,468	27,882	0.225	0.517	0.658

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the iron WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08472

TABLE 9. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
MANGANESE

C Bkg (mg/L) (1) 0.217
C total (mg/L) (2) 3.65

C eff (mg/L) (3) 0.026 0.090 0.210

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	35	12	6	4	47	41	39	0.075	0.181	0.216
500	125	1,450	197	56	585	203	96	63	788	681	648	0.075	0.181	0.216
1,000	250	2,900	395	112	1,170	406	191	127	1,576	1,361	1,296	0.075	0.181	0.216
5,000	1,250	14,500	1,973	559	5,849	2,032	957	633	7,882	6,807	6,482	0.075	0.181	0.216
7,070	1,768	20,503	2,790	790	8,271	2,874	1,353	895	11,145	9,624	9,166	0.075	0.181	0.216

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the manganese WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08473

TABLE 10. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
SULFATE

C Bkg (mg/L) (1) 213
C total (mg/L) (2) 2,000

C eff (mg/L) (3) 560 827 1,040

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	34,449	262,653	52,773	18,800	297,102	87,222	53,249	471	387	296
500	125	1,450	197	56	574,150	4,377,557	879,553	313,339	4,951,707	1,453,703	887,489	471	387	296
1,000	250	2,900	395	112	1,148,300	8,755,113	1,759,106	626,677	9,903,413	2,907,406	1,774,977	471	387	296
5,000	1,250	14,500	1,973	559	5,741,500	43,775,566	8,795,528	3,133,387	49,517,065	14,537,028	8,874,886	471	387	296
7,070	1,768	20,503	2,790	790	8,118,481	61,898,650	12,436,876	4,430,609	70,017,130	20,555,357	12,549,089	471	387	296

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = the sulfate WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08474

TABLE 11. CALCULATED ALLOWED EFFLUENT DISCHARGE AND TOTAL RIVER LOAD
POND CREEK
TSS

C Bkg (mg/L) (1) 55
C total (mg/L) (2) NA

C eff (mg/L) (3) 5 26 140

Q BKG (4) (cfs)	ALLOWABLE BKG Q FOR MIXING (5) (cfs)	Q EFF BASED ON MEETING WQS			BKG LOAD (lbs/day)	EFFLUENT LOAD			PREDICTED LOAD (TOTAL) OUTSIDE THE MIXING ZONE			PREDICTED CONCENTRATION OUTSIDE THE MIXING ZONE		
		AT MIN Ceff (cfs)	AT AVG Ceff (cfs)	AT MAX Ceff (cfs)		AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (lbs/day)	AT AVG Ceff (lbs/day)	AT MAX Ceff (lbs/day)	AT MIN Ceff (mg/L)	AT AVG Ceff (mg/L)	AT MAX Ceff (mg/L)
0	0	0	0	0	0	0	0	0	0	0	0	-	-	-
30	7.5	87	12	3.4	8,895	2,345	1,659	2,531	11,240	10,554	11,426	18	47	64
500	125	1,450	197	56	148,255	39,085	27,652	42,180	187,340	175,907	190,435	18	47	64
1,000	250	2,900	395	112	296,509	78,171	55,304	84,360	374,680	351,814	380,870	18	47	64
5,000	1,250	14,500	1,973	559	1,482,547	390,853	276,522	421,802	1,873,400	1,759,069	1,904,349	18	47	64
7,070	1,768	20,503	2,790	790	2,096,321	552,667	391,002	596,428	2,648,988	2,487,323	2,692,749	18	47	64

NOTES:
1. C Bkg = Pond Creek background samples, PC3 average
2. C total = No WQS
3. C eff = Pond 009 samples, minimum, maximum, and average
4. Q Bkg = range of potential flows with 500 year peak flood as maximum (StreamStats 4.0)
5. Allowable Q Bkg = 0.25 * background flow in Pond Creek

R08475

DOCUMENT

44

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
MINE RELATED WATER POLLUTION CONTROL PERMIT

PERMIT NO.: 2016-MA-2273

DATE ISSUED: August 26, 2016

FINAL PLANS, SPECIFICATIONS, APPLICATION AND SUPPORTING DOCUMENTS

EXPIRATION DATE: July 31, 2021

PREPARED BY: Mark Schuerger
Williamson Energy, LLC

LOG NUMBERS: 2273-16

SUBJECT: Williamson Energy, LLC
Pond Creek No. 1 Mine

Williamson Energy, LLC
P.O. Box 99
Johnston City, Illinois 62951

Permit is hereby granted to the above designated permittee to construct and operate the surface facilities to support the underground mine facility described as follows:

A permit area consisting of 6.5 acres, also identified as Incidental Boundary Revision (IBR) No. 65 to OMM Permit No. 375, located in Section 29, Township 8 South, Range 4 East, Williamson County, Illinois, as described and depicted in IEPA Log No. 2273-16 is to be utilized for the construction of a concrete lined South District Supply Shaft to provide supplies underground. The area will consist of topsoil and subsoil stockpiles, three (3) boreholes, a pole barn for dry storage area and an access road.

Runoff from the area approved herein will be controlled by silt fence, mulching, seeding, vegetation, rock check dams, erosion control blankets, etc.

The abandonment plan shall be executed and completed in accordance with 35 Ill. Adm. Code 405.109.

(Continued on Page 2)

This permit is issued in accordance with the Illinois Environmental Protection Act of 1970, the Title 35, Subtitle C: Water Pollution and Subtitle D: Mine Related Pollution Regulations adopted pursuant thereto by the Illinois Environmental Protection Act. THE STANDARD CONDITIONS OF ISSUANCE INDICATED ON THE ATTACHMENT TO THIS PERMIT (PAGE 1a) MUST BE COMPLIED WITH IN FULL. READ ALL CONDITIONS CAREFULLY.

Alan Keller, P.E.
Manager, Permit Section
Division of Water Pollution Control

cc: IDNR, Office of Mines and Minerals
IDNR, Division of Water Resources
BOW/MPCP/FOS/Marion

SAK:DM:cs/7282c/8-23-16

RECEIVED
SEP 06 2016
IL Environmental Protection Agency
MARION REGIONAL OFFICE

This Permit is issued subject to the following Special Condition. If such Special Condition requires additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval for issuance of a Supplemental Permit.

Special Condition No. 1: This permit is issued with the expressed understanding that there shall be no surface discharge from these facilities. If such discharge occurs, additional or alternate facilities shall be provided. The construction of such additional or alternate facilities may not be started until a Permit for the construction is issued by the Agency.

STATE OF ILLINOIS

ENVIRONMENTAL PROTECTION AGENCY

Subject: Williamson Energy, LLC – Pond Creek No. 1 Mine

Data: Log No. 2273-16

Reviewed by: D. Maschhoff **Date:** 8/18/16

Log No. 2273-16 ⇒ IBR No. 65 to OMM Permit No. 375

Log No. 2273-16

- A permit area consisting of 6.5 acres
- Facility is located in Section 29, Township 8 South, Range 4 East, Williamson County, Illinois.
- The purpose for this IBR is for the construction of a concrete lined supply shaft to provide supplies to the South District. The area will consist of topsoil and subsoil stockpiles, three (3) boreholes, a dry storage area and an access road.
- Runoff from the area approved herein will be controlled by silt fence, mulching, seeding, vegetation, rock check dams, erosion control blankets, etc.
- This permit will be issued with the expressed understanding that there shall be no surface discharge from these facilities. If such discharge occurs, additional or alternate facilities shall be provided. The construction of such additional or alternate facilities may not be started until a Permit for the construction is issued by the Agency.

* Action: Prepare Subtitle D Permit No. 2016-MA-2273.

2273 · / 16
Due date: 9/8/16
R084806

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois Department of Natural Resources

One Natural Resources Way Springfield, Illinois 62702-1271
www.dnr.illinois.gov

Bruce Rauner, Governor
Wayne A. Rosenthal, Director

July 26, 2016

Mr. Anthony Webb
Williamson Energy, LLC
P.O. Box 99
Johnson City, IL. 62951

Re: Permit No. 375
Incidental Boundary Revision No. 65

Dear Mr. Webb:

The appropriate Department technical staff have reviewed the proposed incidental boundary revision dated June 6, 2016 and supplemental information dated June 16, 2016 submitted by Williamson Energy for the Pond Creek mine. The request would add 6.5 acres to conduct surface coal mining activities. The additional acres would be used for the South District Supply Shaft as well as 3 sealed cased boreholes for power and supplies.

Section 1774.13: The Department finds the permittee has demonstrated in its request, and field inspections by the Department's field representative have confirmed that these areas meet the requirements for an incidental boundary change as outlined in 62 Ill. Adm. Code 1774.13(d). Section 1774.13(d)(6) publication requirements have been met.

Section 1761.11(d): The proposed permit area is perpendicular to Streetcar Road. The only proposed coal mining activities in the permit area within 100 feet of the public road is the construction of a mine access road. Thus, the provisions of Section 1761.14(b) do not apply.

Section 1761.11(e): The proposed permit area is within three hundred (300) feet measured horizontally of an occupied dwelling. The owner of the dwelling has provided a written waiver pursuant to Section 1761.15 consenting to surface coal mining operations closer than 300 feet.

Section 1773.15(c)(12): The effect of the proposed permitting action on properties listed on or eligible for listing on the National Register of Historic Places has been taken into account by the Department.

Sections 1784.14(e)(4) and 1784.14(f)(2), respectively: The Department has determined that neither a new or updated probable hydrologic consequences determination nor a new or updated assessment of the probable cumulative hydrologic impacts is required.

RECEIVED
JUL 28 2016
IL Environmental Protection Agency
MARION REGIONAL OFFICE

Permit Conditions: All conditions and provisions contained in the approved permit also apply to this revision. Approval from this agency does not relieve the permittee from obtaining approval from other agencies requiring such.

Should you have any questions, please contact Robert W. Schoeppel at our Benton office.

Sincerely,

Scott K. Fowler, Supervisor
Land Reclamation Division

SKF:RWS:gr

cc: R. Schoeppel
Mine Pollution Control Program, IEPA
M. Parrish

Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

NON Contiguous IBR To Permit No. 375

South District Supply Shaft

6.5 Acres

June 6, 2016

Williamson Energy, LLC
PO Box 300
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

R08483

June 6, 2016

Mr. Scot Fowler
ILLINOIS DEPARTMENT
OF NATURAL RESOURCES
Office of Mines and Minerals
Land Reclamation Division
One Natural Resources Way
Springfield, IL 62702-1271

Williamson Energy LLC - Permit No. 375
Pond Creek #1 Mine, Williamson County, Illinois
IBR for Permit 375: 6.5 acres IBR for South District Supply Shaft

Dear Mr. Fowler:

Williamson Energy, LLC is submitting copy of the 6.5 acres IBR for South District Supply Shaft for your review and comment. A Cultural Resources Survey has been completed for this project area and will be submitted to the Illinois Historical Preservation Agency. A copy of the submittal is included in the back of this package. One copy hand delivered to Mr. Robert Schoeppel at the IDNR office in Benton.

If you have any questions, or require additional information, please contact me.

Respectfully submitted,

WILLIAMSON ENERGY, LLC

James Plumley

James Plumley
Authorized Person

RECEIVED
JUL 29 2016
IL Environmental Protection Agency
MARION REGIONAL OFFICE

State of Illinois

Department of Natural Resources
Office of Mines and Minerals
Land Reclamation Division
One Natural Resources Way
Springfield, IL 62702-1271

APPLICATION FOR SURFACE COAL MINING AND RECLAMATION OPERATIONS INCIDENTAL BOUNDARY REVISION IBR-1

PART I

DATE: June 6 , 2016

NOTICE: This state agency is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Ill. Rev. Stat. 1987 Ch. 96 1/2, par. 7901.01 et seq. Disclosure of this information is voluntary, however failure to comply may result in this form not being processed. This form has been approved by the Forms Management Center.

1) A) General Information

~~(I)(We)~~(The) Williamson Energy, LLC
(Name of Company, Corporation, Partnership or Individual)

PO Box 99, Johnston City, IL. 62951
(Address)

618-983-3020
(Telephone Number)

hereby submit application for an Incidental Boundary Revision to Permit 375

Name of Mine Pond Creek No. 1 Mine

MSHA No. 11-03141

I, Mark Schuerger
(vice president or his duly authorized representative under the existing permit) under penalty of perjury declare that all information provided in this application is true and correct to the best of my knowledge.

Title: Authorized Person

ADDITIONAL ACRES REQUESTED 6.5 EXISTING PERMIT ACREAGE 690.9

B) Indicate the type of disturbance and associated acreage.

Type of Disturbance	Existing	Permit IBR	Total
Area Stripping	20.1	0	20.1
Mine Waste Areas	277.4	0	277.4
Processing Areas & Support Facilities	176.4	4.5	180.9
Access, Haul Roads & Transport Facilities	27.6	0.1	27.7
Soil Storage Areas	87.3	0.2	87.5
Diversions	32.8	0	32.8
Coal Recovery (Gob & Slurry)	0	0	0
Other (shaft site/fan pad, etc.)	32.1	0.1	32.2
Not to be Disturbed	37.2	1.6	38.8
Total	690.9	6.5	697.4

2) A) Provide name and address of every legal or equitable owner of record of the IBR area.

RESPONSE: The IBR surface area is owned by:

KATHY S. TROUT - 1301 MEADOWVIEW DR. OLNEY IL 62450

DONALD R. CRAIG - 3316 CAMP CREEK ROAD. LYNN CENTER IL. 61262.

RONALD D. CRAIG - 1005 LARK LANE SHOREWOOD IL. 60435.

TERRY L. CRAIG - 1007 HILLCREST DR. MARION IL - 62959.

B) Provide name and address of the owner of record for all surface and subsurface areas contiguous to any part of the proposed IBR area.

RESPONSE: Please see the Property Tract Map and the corresponding Property Rights Summary sheet at the end of this Part I of the application.

C) Show location of owners of record of those lands, surface and subsurface, included in or contiguous to the IBR area on pre-mining land use map or another map, if necessary.

RESPONSE: See Tract Map in map section and corresponding Property

Rights Summary sheet at the end of this Part I of the application.

3) Provide name and address of any holder of record of leasehold interest for the IBR area.

RESPONSE: Williamson Energy, LLC (applicant) has leasehold interest in the surface and coal.

4) Affidavits, Certifications

A) Complete affidavit regarding applicant's legal right to enter and begin surface coal mining and reclamation operations in the IBR area and whether that right is the subject of pending litigation. Identify the documents upon which affidavit is based by type and date of execution and identify specific lands to which each document pertains and explain the legal rights claimed by the applicant (1778.15(a)). If the private mineral estate to be mined has been severed from the private surface estate, provide copies of the documents required under Section 1778.15(B)(1)-(3). On the permit map or other designated map show the boundaries of land within the permit area upon which the applicant has the legal right to enter and begin surface mining activities.

RESPONSE: The Affidavit at the end of this Part.

B) Complete certification for engineering aspects of the application. In addition to the general certification, three specific certifications are included which are applicable only if the box in front of each is marked. The first two cover special permit requirements and should be marked only when they occur for the proposed permit. The third certification covers the Illinois Environmental Protection Agency permit requirements. In most cases, an Illinois registered engineer will be required to certify I.E.P.A. permit requirements. Except as otherwise provided all maps, plans and cross-sections included in the permit application shall be prepared by, or under the direction of, and sealed by a qualified registered professional engineer licensed under the Illinois Professional Engineering Act, a qualified registered structural engineer licensed under the Illinois Structural Engineering Act or if authorized by state law, a qualified registered professional land surveyor licensed under the Illinois Land Surveyors Act with assistance from experts in related fields.

RESPONSE: The Engineering Certificate is at the end of this Part.

5) Areas Designated Unsuitable for Mining

A) Does proposed IBR area include --

(1) Lands within boundaries of the National Park System, National Wildlife Refuge System, National Recreation Areas, etc. [Section 1761.11(a)]?

Yes ___ No **X**

(2) National forest land?

Yes ___ No **X**

(3) Any land which will adversely affect any publicly-owned park or places included in or eligible for listing in the National Register of Historic places, etc. [per Sections 1779.12(b)]?

Yes ___ No **X**

If yes, complete Part II, Section 10, (B) & (C) of the SCM-1 or the UCM-1

(4) Any public roads which are to be removed, relocated or temporarily closed?

Yes ___ No **X**.

Indicate on the pre-mining land use map or other designated map the location of the public roads and attach a copy of the written agreement from the appropriate authority authorizing the relocation, removal or temporary closure. Describe the measures to be used to insure that the interest of the public and land owners affected will be protected.

B) Will proposed IBR area be located --

(1) Within 100 feet of the right-of-way line of any public road?

Yes **X** No ___

If yes, explain proposed procedure for complying with regulation section 1761.12(c), including request for variance, if relevant. Provide location of public roads on pre-mining land use map or other designated map. Describe the measures to be used to insure that the interest of the public and land owners affected will be protected.

RESPONSE: **An access road will be constructed at a ~90 degree angle to the public road (Streetcar Road) and permit up to Fairchild Lane (No disturbance planned). Please see General Location Map.**

6/16/16

(2) Within 300 feet measured horizontally from any occupied dwelling?

Yes X No __.

If so, is waiver provided meeting requirements of Section 1761?

RESPONSE: **Waiver will be proved under separate cover.**

(3) Within 300 feet measured horizontally of any public building, school, church, community or institutional building or public park?
Yes ____ No **X**

(4) Within 100 feet measured horizontally of a cemetery?
Yes ____ No **X**

C) Are valid existing rights (per 1761.11) claimed for any part of the IBR area?

Yes ____ No **X**

If yes, provide documentation to substantiate claim.

D) Provide a draft copy of the proposed newspaper notice and name of local newspaper of general circulation in which advertisement of the application will be published, per 62 Ill. Adm. Code 1774.13(d)(6). Certification of publication is to be furnished to the Department and must be received prior to Department approval of the IBR.

RESPONSE: **A proposed copy of Public Notice is at the end of this Part I of the application. It will be published in the Daily Republican newspaper, located in Marion, IL.**

Attachment I.10.A

(I) (We) Mark Schuerger under penalties of perjury declare on behalf of the applicant,
(Individual or Individuals)

Williamson Energy, LLC that said applicant has valid documents which bestow upon the applicant a legal right to enter and commence surface coal mining and reclamation operations upon lands contained in the proposed permit area and the shadow area. A portion of the proposed permit area and shadow area is the subject of pending litigation in a lawsuit filed on November 26, 2014 in the Circuit Court of the First Judicial District, Williamson County, Illinois, entitled Mitchell/Roberts Partnership v. Williamson Energy, LLC, Case No. 14-MR-285. The applicant does not believe the claims in the lawsuit implicate its ownership of the deep coal at issue in this permit application.

Dated this 7th day of June, 20 16.

Signature

Authorized Person
Title

Sworn to and subscribed before me

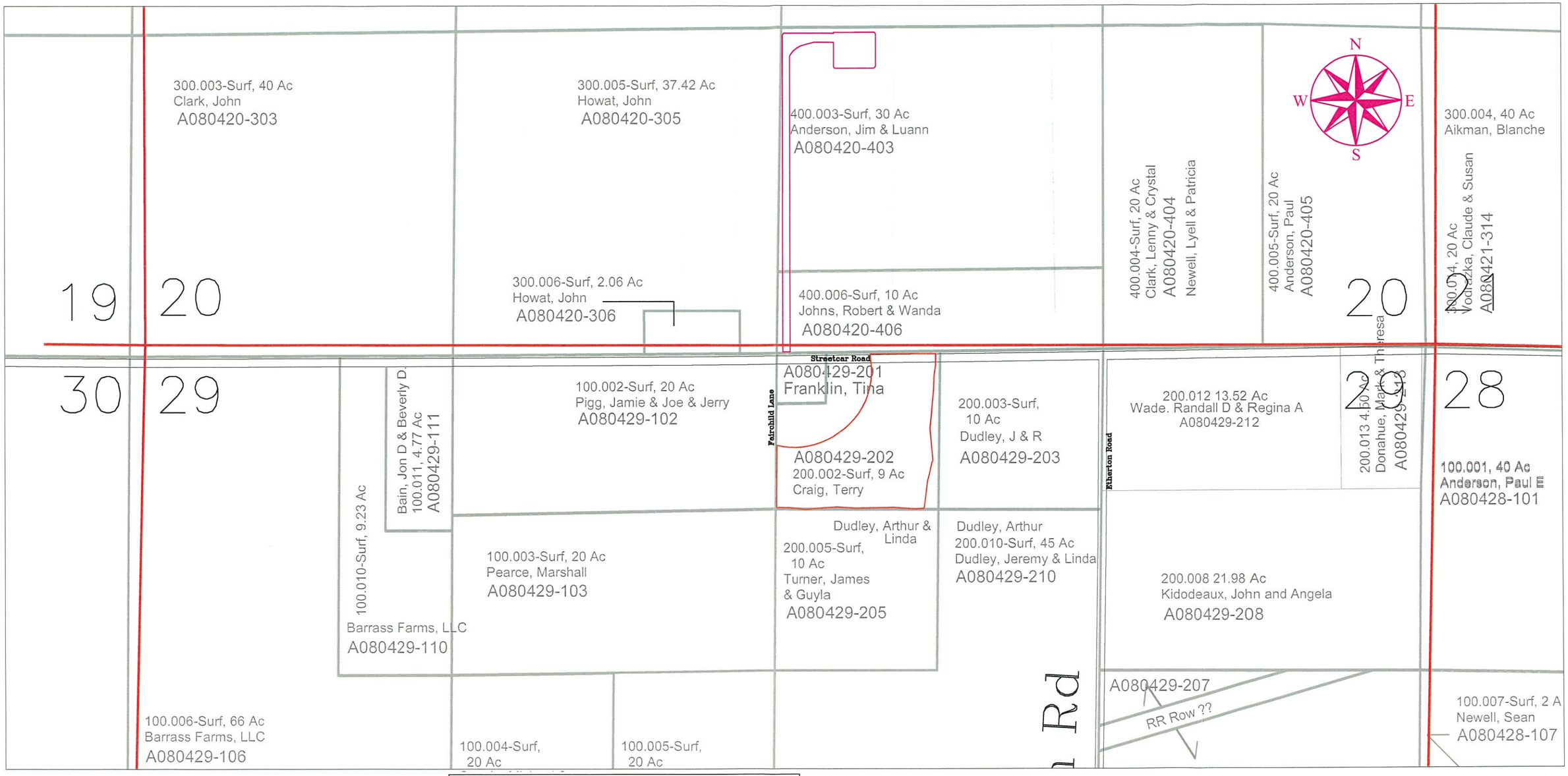
this 7th day of June, 20 16.

Notary Public

OFFICIAL SEAL
STACI R LOWRY
Notary Public - State of Illinois
My Commission Expires Jan 14, 2019

My Commission Expires: 1/14/2019

R08490



Description

The Proposed Permit Area is described as: 6.5 (+/-)-acre tract situated in part of the NW/4, NW/4, NW/4 of Section 29, T8S-R4E of the 3rd P.M., Williamson County, Illinois;

Proposed Surface Permit Area
Existing Surface Permit Area
Public Road

300.014, 18.5 Ac
& Brenda
Fleming. Charles

Tract Information Including PIN #, Acreage and Owner's Name

400’ 0’ 400’ 800’

SCALE 1” = 400’

Surface Ownership Map

South District Supply Shaft

Williamson Energy, LLC

Drawn By JLP	Date 5/11/16	ILLINOIS DEPARTMENT OF NATURAL RESOURCES PERMIT NO. 375
Approved By JLP	Date 5/11/16	Surface Ownership Map
Revised:		POND CREEK MINE NO. 1
		Prepared By WILLIAMSON ENERGY, LLC. P.O. BOX 99, JOHNSTON CITY, ILLINOIS 62951
Scale AS NOTED	Project No.	Rev. / Map # Map 2

PROPERTY RIGHTS SUMMARY

For: Williamson Energy–South District Supply Shaft

SURFACE OWNERSHIP OF PROPOSED PERMIT AREA

KATHY S. TROUT - 1301 MEADOWVIEW DR. OLNEY IL 62450

DONALD R. CRAIG - 3316 CAMP CREEK ROAD. LYNN CENTER IL. 61262.

RONALD D. CRAIG - 1005 LARK LANE SHOREWOOD IL. 60435.

TERRY L. CRAIG - 1007 HILLCREST DR. MARION IL - 62959.

CONTIGUOUS SURFACE OWNERSHIP / CONTROL

Williamson County Highway Department
1817 N. Court Street, Marion, IL 62959

FRANKLIN, TINA L
20139 STREETCAR RD, PITTSBURG IL 62974

DUDLEY, JEREMY & WENDY L
14039 ETHERTON ROAD, PITTSBURG, IL 62974

DUDLEY, JEREMY F
14039 ETHERTON ROAD, PITTSBURG, IL 62974

TURNER, JAMES A & GUYLA M
14276 FAIRCHILD LN, PITTSBURG IL 62974

PEARCE, MARSHALL W (JUNE)
518 BARRACUDA, CORPUS CHRISTI, TX 78411

PIGG, JAMIE & JOE & JERRY
19872 NEW OHIO COAL RD., PITTSBURG IL 62974

SUB-SURFACE OWNERSHIP WITHIN PROPOSED PERMIT AREA

COLT LLC, leased to Williamson Energy, LLC, with an address at 3801 PGA Blvd. Suite 903, Palm Beach Gardens, Florida 33410

NOTE: Applicant has leasehold interest to the coal under the proposed permit area.

SUB-SURFACE OWNERSHIP CONTIGUOUS TO PROPOSED PERMIT AREA

COLT LLC, leased to Williamson Energy, LLC, with an address at 3801 PGA Blvd. Suite 903, Palm Beach Gardens, Florida 33410

RIGHTS CLAIMED BY APPLICANT:

The right to conduct mining and reclamation operations within the approved and proposed areas of coal mining. See Mining Affidavit in PART I.

PUBLIC NOTICE

Pursuant to the Surface Coal Mining Land Conservation and Reclamation Act (PA-81-1015, as amended) and the Rules and Regulations of the Act, Williamson Energy, LLC, P. O. Box 99, Johnston City, IL 62951, hereby gives notice that a request for a 6.5-acre Incidental Boundary Revision (IBR) was submitted to the Illinois Department of Natural Resources, Office of Mines and Minerals, Land Reclamation Division under the provisions of Section 1774.13 (d) (2 to complete a supply shaft to transport supplies underground as required for the continued effective operation of the approved mine plan along with three (3) steel cased boreholes with a diameter < 10 $^{5}/_{8}$ inches for power and other supplies.

The proposed permit area is described:
6.5 acres in NW/4 NE/4 of Section 29
Township 8 South, Range 4 East,
Williamson County, Illinois.

The physical location is on Street Car Road and approximately 600 feet east of the Fairchild Lane intersection in Williamson County, Illinois.

The applicant will also be accessing the site from Streetcar Road.

Copies of the application are on file for inspection at the following office, and written comments may be addressed to: Illinois Department of Natural Resources, Office of Mines & Minerals, Land Reclamation Div., One Natural Resources Way, Springfield, IL 62702-1271.

The closing date of the comment period for this IBR is seven (7) days from the date of this Public Notice.

ENGINEERING CEERTIFICATION

I hereby certify the engineering design used in preparation of this application, attachments, and supplements was done by me or under my direct supervision.

I further certify to the best of my knowledge all such design is in accordance with all applicable local, state and federal laws, rules and regulations. I have placed an "X" in the box below if that item is relevant.

N/A — Whereas the Reclamation Plan calls for an alternative land use, I also certify the plans to conform to applicable accepted standards for adequate land stability, drainage, vegetative cover, and aesthetic design appropriate for the post-mining use of the site.

N/A — Whereas the operation proposes disposal of spoil or waste materials in areas other than mining workings or excavations, I also certify such fills are designed in accordance with recognized professional standards and all applicable laws.

N/A — Certification of Illinois Environmental Protection Agency-35 Ill. Adm. Code 405.104(a) Permit. In my professional judgment, the plans and specifications submitted as part of this application describe an operation which will meet all applicable effluent and water quality standards. I certify that I am familiar with all of the plans, specifications, reports, and maps submitted as part of this application and that said plans, etc. are accurate insofar as they represent existing conditions.

James Plumley
Name

067610
Illinois Registration Number (Seal)

Foresight Energy, LLC
Firm

618-983-3020
Phone Number

16824 Liberty School Road, Marion, IL 62959
Address

JAMES L. PLUMLEY
067610
LICENSED
PROFESSIONAL
ENGINEER
STATE OF ILLINOIS

James Plumley
Signature

June 16, 2016
Date

6/16/16

PART II

PREMINING INFORMATION

Pre-mining information is to be displayed on pre-mining land use map unless otherwise indicated.

1) Describe how the IBR area perimeter will be marked and discuss the method or system employed to locate permit area perimeter and set markers along it. Designate a reference point outside the IBR area if different than the original permit. Provide a description of the reference point and a sketch relating the reference point to the IBR area perimeter.

RESPONSE: **The permit boundary will be marked by PVC pipe set over steel fence post ("T"-Posts). From any single post, the posts on either side will be visible.**
For permit reference point: approx. 3,400-feet west of Paulton Road and approx. 4,700-feet south of Corinth Road in Williamson County, Illinois. This reference point is noted on the General Location Map.

2) Explain and locate areas where the IBR is contiguous to an existing permit.

RESPONSE: **Please see the General Location Map and the other maps included with this application.**

3) Give the acreages of each land use within the proposed IBR and existing permit area, employing land use categories of Section 1701.5 listed below, and delineate on pre-mining land use map existing land uses in the proposed permit area and adjacent to it. Include on the pre-mining land use map the location of all buildings and identify the current use of these buildings.

Pre-Mining Land Use	Existing Permit	IBR	Total
Cropland	535.8	6.3	542.1
Pasture land	7.2	0	7.2
Grazing Land	0	0	0
Forestry (incl. private road)	107.9	0	107.9
Residential	5.8	0	5.8
Industrial/Commercial	4.0	0	4.0
Recreation	0	0	0
Fish and Wildlife Habitat	28.8	0.2*	29.0
Developed Water Resources	1.4	0	1.4
Undeveloped land	0	0	0
Total	690.9	6.5	697.4

*-Fish and Wildlife (Wetland)

4) Soils Information Map

A) Does the submitted soils map represent a map developed by the National Resources Conservation Service (NRCS)?

Yes __X__ No ____. If no, explain.

B) Delineate on the soils map(s) the area which will incur actual mining (removal of overburden and/or deposition of overburden for the extraction of coal).

RESPONSE: **No mining will be conducted on this site.**

C) Are any of the identified map units correlated as prime farmland by NRCS criteria? Yes __X__ No ___.

If yes, explain and provide documentation to meet the requirements of Section 1785.17, if a determination for grandfathering and/or negative determination is sought. If prime farmlands exist which will not meet the exemption criteria described above, the approved prime farmlands restoration plan must be followed.

RESPONSE: **The majority of the land is currently being farmed. The site will be primarily reclaimed to Cropland. No exemption of prime farm land is requested .**

D) Submit, by completing soils information chart, acreage totals of each map unit (soil type and slope classification) and land use capability classes in the IBR area and the percent slope range of each lettered slope classification used on the soil map.

RESPONSE: **See Soils Information Chart at the end of this Part II.**

E) Provide, by completing soil information chart, acreage for each of the map units of high capability land (including grandfathered and negatively determined prime farmland) and non-cropland capability land with respect to areas which will be mined and areas which will incur other forms of disturbance (i.e., roads, ditches, etc.). Identify and provide map unit acreage values, if any, for areas which will not be disturbed.

RESPONSE: **See Soils Information Chart at the end of this Part along with Soils Map.**

F) Are selected overburden materials proposed to be used in lieu of or as a supplement to the A-horizon?
Yes _____ No __X__. If yes, provide the appropriate information required under 1780.18(b)(4)/1784.13(b)(4).

United States Department of Agriculture

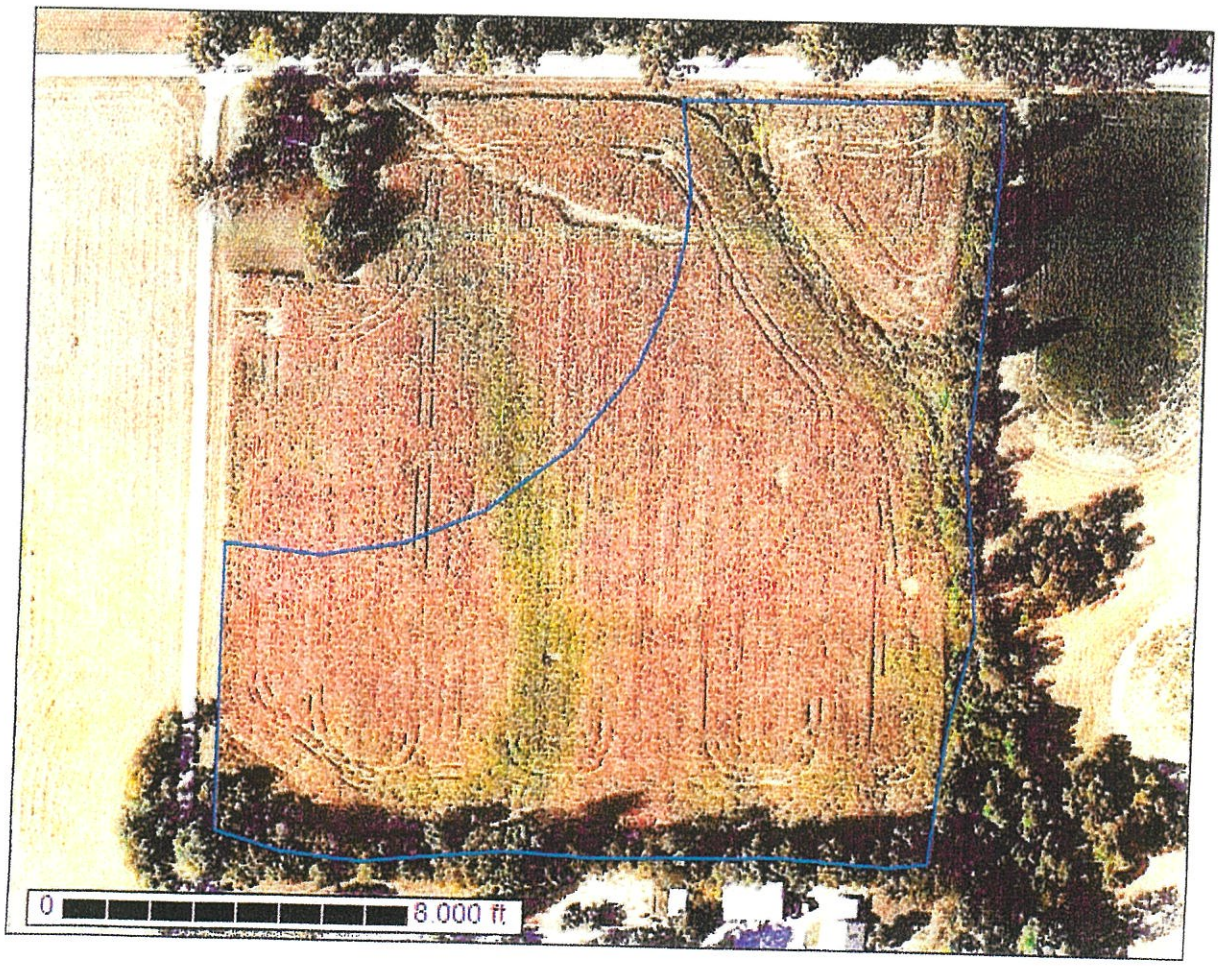
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Williamson County, Illinois

South District Supply Shaft



May 9, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http //www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http //offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http //www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface.....2
How Soil Surveys Are Made.....5
Soil Map.....7
Soil Map.....8
Legend.....9
Map Unit Legend.....10
Map Unit Descriptions.....10
Williamson County, Illinois.....10
5C3—Blair silty clay loam, 5 to 10 percent slopes, severely eroded.....12
13B2—Bluford silt loam, 2 to 5 percent slopes, eroded.....13
14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded.....14
References.....16
Glossary.....18

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


88° 47' 26" W
88° 47' 11" W
37° 48' 19" N
37° 48' 11" N
342360
342390
342420
342450
342480
342510
342540
342570
342600
342630
342660
342690
342720
4185710
4185680
4185650
4185620
4185590
4185560
4185530
4185500
Fairchild Ln
13B2
5C3
13B2
13B2
14C3
Map Scale: 1:1,670 if printed on A landscape (11" x 8.5") sheet.
N
0 20 40 80 120 Meters
0 50 100 200 300 Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

R08503

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Williamson County, Illinois
Survey Area Data: Version 10, Sep 25, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 13, 2011—Oct 21, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

R08504

Map Unit Legend

Williamson County, Illinois (IL199)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5C3	Blair silty clay loam, 5 to 10 percent slopes, severely eroded	2.1	32.3%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	2.5	39.0%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	1.9	28.7%
Totals for Area of Interest		6.5	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic

classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Williamson County, Illinois

5C3—Blair silty clay loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2t964
Elevation: 330 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Blair, severely eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blair, Severely Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty pedisediment over till

Typical profile

Ap - 0 to 5 inches: silty clay loam
Bt - 5 to 12 inches: silty clay loam
Btg - 12 to 47 inches: silt loam
BCg - 47 to 71 inches: silt loam
2Btgb - 71 to 79 inches: clay loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 3.0
Available water storage in profile: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D

Minor Components

Ava, eroded

Percent of map unit: 4 percent
Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear

Darmstadt, eroded

Percent of map unit: 3 percent
Landform: Ground moraines
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear

Belknap, frequently flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

13B2—Bluford silt loam, 2 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2t95f
Elevation: 360 to 840 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 175 to 195 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bluford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bluford

Setting

Landform: Ground moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over mixed loess and drift

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 9 inches: silt loam
Btg - 9 to 32 inches: silty clay
2Btgx - 32 to 47 inches: silty clay loam
2Btg - 47 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: 5 to 20 inches to abrupt textural change; 19 to 45 inches to fragipan
Natural drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 13.0
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D

Minor Components

Ava

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Wynoose

Percent of map unit: 5 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

14C3—Ava silty clay loam, 5 to 10 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 1lm1b
Elevation: 360 to 660 feet

Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ava, severely eroded, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ava, Severely Eroded

Setting

Landform: Till plains
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Peoria and roxana loess over glacial drift

Typical profile

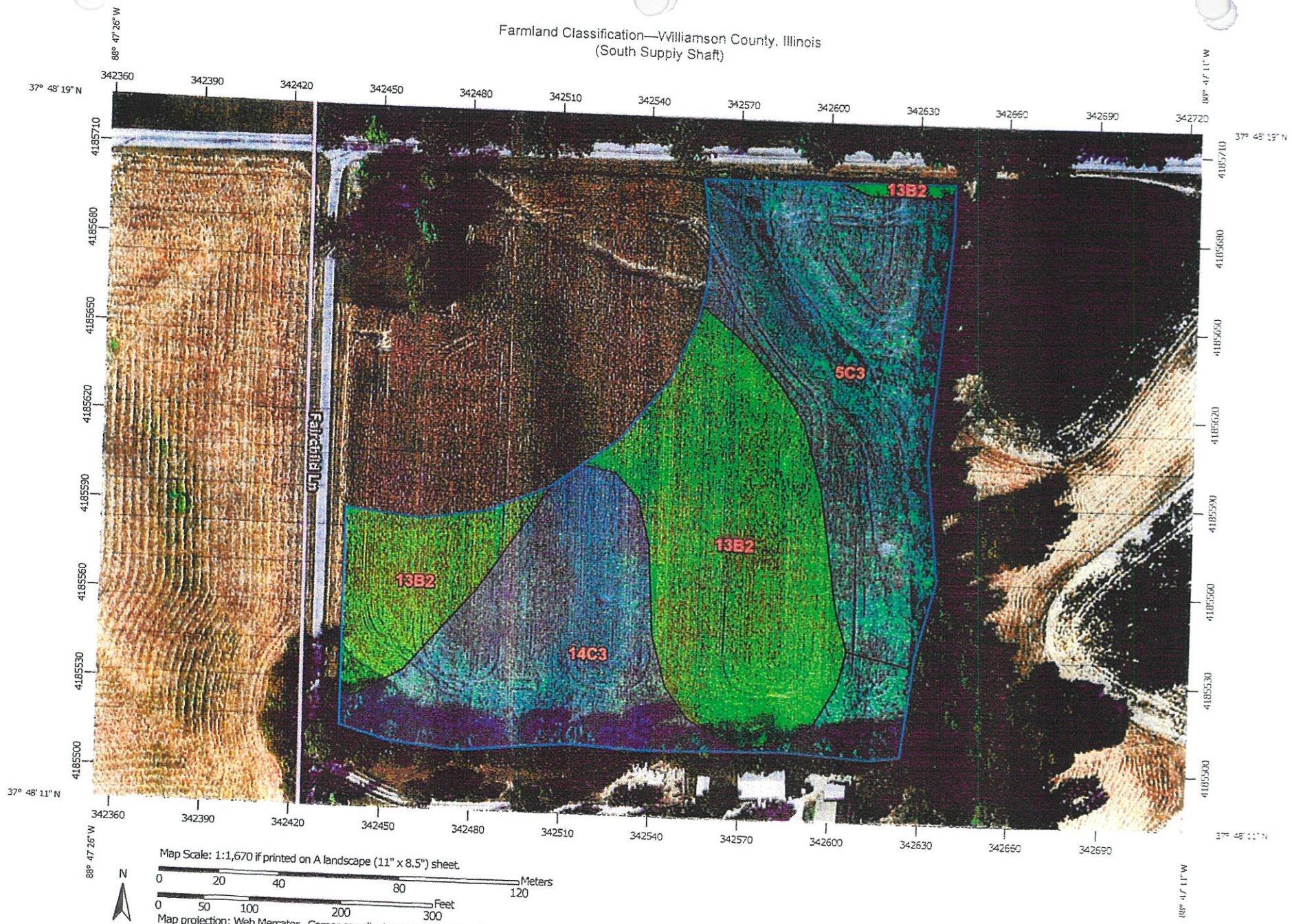
H1 - 0 to 9 inches: silty clay loam
H2 - 9 to 28 inches: silty clay loam
H3 - 28 to 64 inches: silt loam
H4 - 64 to 78 inches: silt loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: 25 to 40 inches to fragipan
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

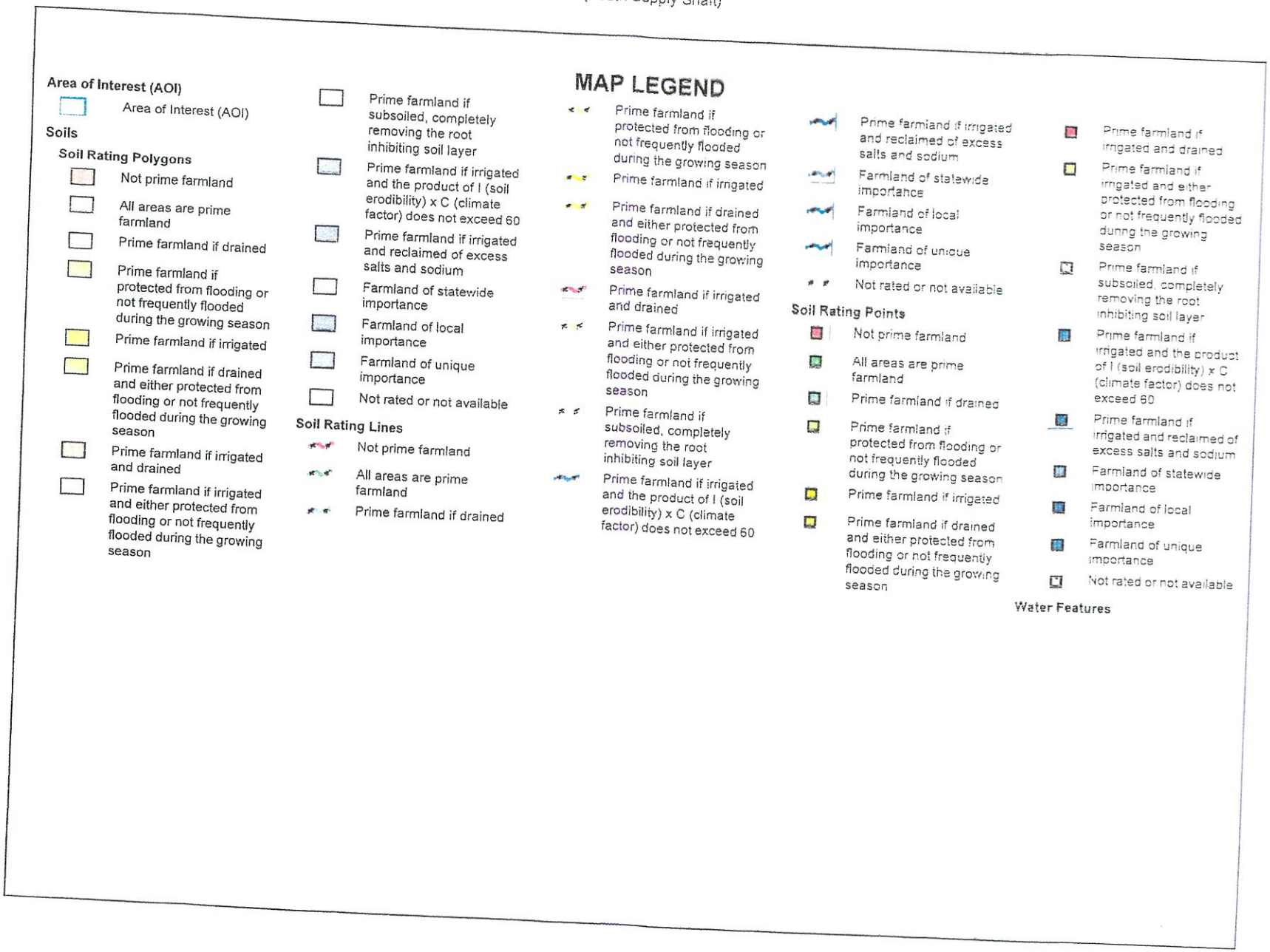
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C



USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

R08511


MAP LEGEND
Area of Interest (AOI)
Area of Interest (AOI)
Soils
Soil Rating Polygons
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of local importance
Farmland of unique importance
Not rated or not available
Soil Rating Lines
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of local importance
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of local importance
Farmland of unique importance
Not rated or not available
Water Features

R08512

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Williamson County, Illinois
Survey Area Data: Version 10, Sep 25, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 13, 2011—Oct 21, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Williamson County, Illinois (IL199)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
5C3	Blair silty clay loam, 5 to 10 percent slopes, severely eroded	Farmland of statewide importance	2.1	32.3%
13B2	Bluford silt loam, 2 to 5 percent slopes, eroded	All areas are prime farmland	2.5	39.0%
14C3	Ava silty clay loam, 5 to 10 percent slopes, severely eroded	Farmland of statewide importance	1.9	28.7%
Totals for Area of Interest			6.5	100.0%

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The majority of soil attributes are associated with a component of a map unit, and such an attribute has to be aggregated to the map unit level before a thematic map can be rendered. Map units, however, also have their own attributes. An attribute of a map unit does not have to be aggregated in order to render a corresponding thematic map. Therefore, the "aggregation method" for any attribute of a map unit is referred to as "No Aggregation Necessary".

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

PART III

OPERATIONS PLAN

1) Explain the proposed operation and why the IBR is needed. Locate on a mining operations map.

RESPONSE: **The proposed operation is the completion of a concrete-lined Supply Shaft of 16.5-foot inside diameter X 350-feet depth to provide the supplies underground. No fan is proposed at this location.**

A pad for the raise drilling platform will contain approximately 245 yd^3 of concrete.

Three (3) boreholes with casing no larger than 10 5/8" diameter and depth of 350 feet.

The site will be grade level and covered with limestone gravel (~1 ft thick) to approximately final elevation of 508 to allow operation of the mobile crane on site for dropping supplies down shaft.

A fifty feet by eighty feet three side pole barn will be constructed for dry storage. The pole barn will not have a concrete floor.

2) Surface Drainage Control

A) (1) Locate on the mining operations map or on a separate drainage map all proposed drainage control systems. Show drainage patterns of all affected mining areas.

RESPONSE: **The surface drainage pattern is indicated on the attached Pre- and Post-Mine Surface Topography Map and the Operations Map.**

(2) Will all surface drainage from the affected mining area be collected and treated prior to leaving the IBR area?

Yes ___ No **X**.

If yes, delineate how and where surface drainage will be collected and treated, and list permit numbers and type of permit that the drainage control systems are operated under. If above answer is no, explain how regulatory compliance will be achieved without treatment, i.e., address the requirements of 1816.46(e)/1817.46(e).

RESPONSE: **A sediment pond exemption is requested for this permit area due to its small area (6.5 acres). Silt fence and/or straw bales**

will be placed along the down-slope edge of the disturbed area to minimize sediment loss from the disturbed areas.

The topsoil and subsoil pile will be seeded and mulched to reduce runoff and promote cover establishment. The operations yard area will be rocked, and the rock will also reduce sediment loss.

Will all surface drainage from unaffected areas be intercepted and diverted around the affected mining area?

Yes ____ No __X__. ____If no, please discuss.

RESPONSE: Because the entire operations yard area and access road will be covered with limestone gravel, and the soil stockpiles will be protected with mulch, it will not be necessary to intercept or divert the small amount of surface runoff from the surrounding area. Consequently, a "small area drainage variance" is requested for this proposed IBR site.

C) Overland Flow Diversions and Sediment Ponds:

Are either overland flow diversions or sediment ponds to be constructed?

Yes ___ No __X__.

If yes, complete applicable parts of the SCM-1 or UCM-1 Part IV (surface drainage control).

D) Does a perennial or intermittent stream occur within the proposed IBR area?

Yes ___ No __X__.

If yes, is an exception to the 100 foot buffer zone being requested or is a stream diversion being proposed. For an exception to the 100 foot buffer zone, indicate how compliance with 1816.57/1817.57 will be assured. For a stream diversion, complete applicable parts of the SCM-1 or UCM-1.

3) Roads and other activities

A) Are roads to be constructed in the IBR area?

Yes __X__ No ____

If yes, complete the applicable part of the SCM-1or UCM-1 (transportation facilities).

RESPONSE: A new access road will be constructed to provide access to the proposed supply shaft site. Please see the transportation facilities

section is at the end of this Part.

B) If the operations involve other activities not specifically addressed above complete applicable parts of the SCM-1 or UCM-1.

4) Are any existing structures proposed for utilization in the IBR?
Yes No X. If yes, complete Part IV.4 of the SCM-1 or UCM-1.

TRANSPORTATION FACILITIES - (From UCM-1)

1) Provide a detailed description on mining operations map or other map and show location of the following:

a) Proposed road(s), conveyor system(s), or rail system.

b) Related sediment control facilities.

c) Earth borrow locations and/or locations for deposition of excess excavation.

RESPONSE: **1)a)b)c) The Surface Operation Map in the Map Section indicates the proposed access road location. It will be gravel surfaced on subsoil subgrade. A geotextile fabric will be placed on top of the subsoil subgrade, if it is determined to be necessary.**

2) Provide specifications and plan profiles of existing gradeline, proposed road centerline, ditch flow lines, road cut, fill embankment, culvert, bridge and drainage structures. Provide typical cross sections where appropriate.

RESPONSE: **A typical access road cross-section drawing and a road profile drawing follow this page. One (1) culvert will be installed within the proposed IBR area along the access road. This culvert will be installed at the intersection with Streetcar Road to allow the continuation of the normal drainage pattern. One (1) culvert will be installed in the topsoil storage pile to minimize any potential for water to backup north of the stockpile. Please see the culvert size calculations at the end of this Part III.**

3) For all transportation facilities to be constructed, provide construction details for all sediment control facilities to be constructed to prevent additional contributions of suspended solids to streamflow or to runoff outside the permit area.

RESPONSE: **For this relatively small area used for the access road, the limestone rocked surface will prevent contributions of soil suspended solids.**

6/16/16

Straw bales and/or silt fence will be staked on the down-slope of the proposed permit edge to capture surface runoff where erosion would likely occur due to soil disturbance.

4) Discuss the re-vegetation of ditch and borrow areas involved in construction.

RESPONSE: **See Part IV - Reclamation Plan.**

5) Discuss the estimated life of each facility and how materials will be removed when the facility becomes inactive.

RESPONSE: **The life of the facility is anticipated to be approximately (+/-) five years. See Part IV - Reclamation for facility closing plan.**

6/16/16

Culvert Selection: Access Road For Dist. 3 South Bleeder Shaft/Fan

Summary: Area 1 requires two 18 inch diameter corrugated steel culverts (or equivalent) for the access road to the surface site. Area 2 requires one 12 inch diameter corrugated steel culvert(or equivalent) to insure water will not back up north of the topsoil stock pile.

1----Specifically required per 62 Ill. ADM. Code, Ch. 1, Section 1817.43 e) 3), drainage flow must safely pass the peak runoff of a 2-year / 6-hour precipitation event. For this particular site, the event is approximately 2.6 inches of rainfall.

2----Use Talbot's Formula for round, steel corrugated culvert sizing (standard method for most Illinois County Highway Departments) to safely pass a 2.6-inch rainfall event.

The watershed runoff for the culvert selection was coefficient 0.5 "Rolling Land".

Please see attached calculations sheets for further details.

Using Talbot's Formula to Determine the Correct Culver Size To Carry Surface Drainage

The program that calculates the Talbot Formula (a=C*A3/4) allows the user to plug in the data fields and a square footage water flow area is computed. The computed value must then be correlated to the Pipe Area list of standard sized culverts. Where the flow area value is between the listed pipe sizes, standard practice is to select the next up or use multiple smaller diameter pipes.

The attached 2-yr. 6 hr. hydrograph was taken from the NRCS Compilation of Bullentin 71-Rainfall Frequency Atlas of the Midwest (Illinois State Water Survey) by Floyd Huff and James Angel. This hydrograph shows 2.6 inches of rain for the area near Williamson Energy's Mach Mine facilities for the 6-hour duration of a 2-year event. This equates to an average of 0.433 inches of rain per hour for this 2-hr.--6 year event. For comparison, the 100-yr/24-hr. event is 0.33-inches/hr.

Note: "Talbot's Formula" by Professor Arthur N. Talbot, Water Resources Engineering---University of Illinois at Champaign.

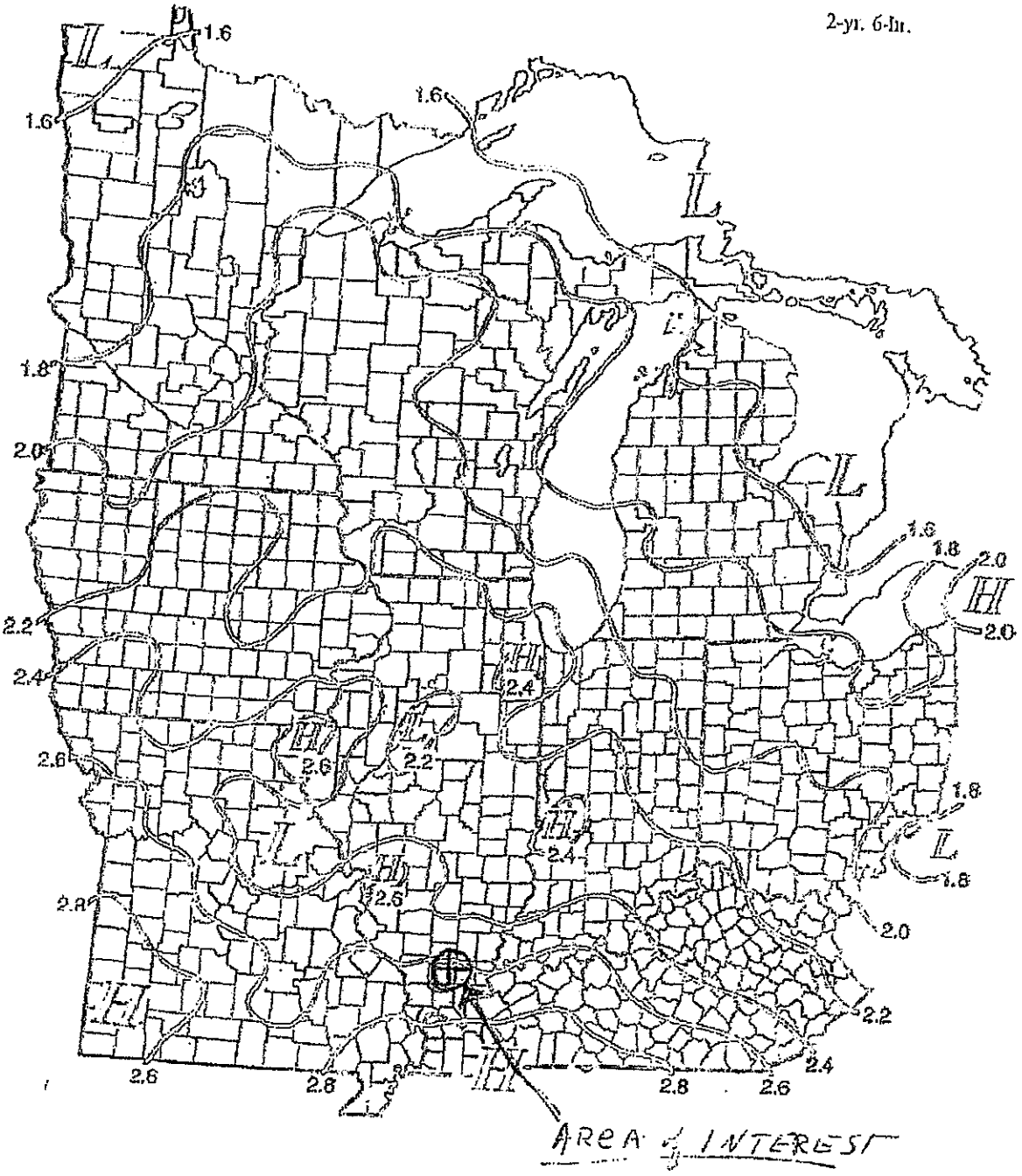


Figure 4. Spatial distribution of 6-hour rainfall (inches)

Talbot's Forumla

Area 1

$a=C*A^{3/4}$

a= Required Section of Waterway in Square feet
A= Drainage area in acres
C = Talbot's Coefficient

Talbolts Coefficient

	Mountainous	Hilly Land		Rolling Land		Flat Land	
C =	1	0.8	0.6	0.5	0.4	0.3	0.2

Label	Area (acres)	Talbot Coefficient	Waterway Area (ft^2)	Pipe Size (In.)	CMP Number
Area 1	0.07	0.5	0.07	12	1

Pipe Area

	Pipe Area (ft^2)				
Pipe Size	1 Culvert	2 Culverts	3 Culverts	4 Culverts	5 Culverts
12 Inch	0.79	1.57	2.36	3.14	3.93
18 Inch	1.77	3.53	5.30	7.07	8.84
24 Inch	3.14	6.28	9.42	12.57	15.71
30 Inch	4.91	9.82	14.73	19.63	24.54
36 Inch	7.07	14.14	21.21	28.27	35.34
42 Inch	9.62	19.24	28.86	38.48	48.11
48 Inch	12.57	25.13	37.70	50.27	62.83
54 Inch	15.90	31.81	47.71	63.62	79.52
60 Inch	19.63	39.27	58.90	78.54	98.17
66 Inch	23.76	47.52	71.27	95.03	118.79
72 Inch	28.27	56.55	84.82	113.10	141.37
84 Inch	38.48	76.97	115.45	153.94	192.42
96 Inch	50.27	100.53	150.80	201.06	251.33
108 Inch	63.62	127.23	190.85	254.47	318.09
120 Inch	78.54	157.08	235.62	314.16	392.70

6/16/16

Talbot's Forumla

Area 2

$a=C*A^{3/4}$

a= Required Section of Waterway in Square feet
A= Drainage area in acres
C = Talbot's Coefficient

Talbolts Coefficient

	Mountainous	Hilly Land		Rolling Land		Flat Land	
C =	1	0.8	0.6	0.5	0.4	0.3	0.2

Label	Area (acres)	Talbot Coefficient	Waterway Area (ft^2)	Pipe Size (In.)	CMP Number
Area 1	2.90	0.2	0.44	12	1

Pipe Area

	Pipe Area (ft^2)				
Pipe Size	1 Culvert	2 Culverts	3 Culverts	4 Culverts	5 Culverts
12 Inch	0.79	1.57	2.36	3.14	3.93
18 Inch	1.77	3.53	5.30	7.07	8.84
24 Inch	3.14	6.28	9.42	12.57	15.71
30 Inch	4.91	9.82	14.73	19.63	24.54
36 Inch	7.07	14.14	21.21	28.27	35.34
42 Inch	9.62	19.24	28.86	38.48	48.11
48 Inch	12.57	25.13	37.70	50.27	62.83
54 Inch	15.90	31.81	47.71	63.62	79.52
60 Inch	19.63	39.27	58.90	78.54	98.17
66 Inch	23.76	47.52	71.27	95.03	118.79
72 Inch	28.27	56.55	84.82	113.10	141.37
84 Inch	38.48	76.97	115.45	153.94	192.42
96 Inch	50.27	100.53	150.80	201.06	251.33
108 Inch	63.62	127.23	190.85	254.47	318.09
120 Inch	78.54	157.08	235.62	314.16	392.70

6/16/16

PART IV

RECLAMATION PLAN

1) Provide a reclamation plan map outlining proposed reclamation of the lands within the proposed IBR area and state how the IBR area will be reclaimed in conformity with the original plan.

RESPONSE: See the Pre and Post-Mine Land Use (Reclamation Map) in the Map Section of this application.

- **Any future buried utility lines (water, communications, etc.) will not be recovered. They will remain buried, and final site reclamation will be conducted "over" them.**
- **None of the 0.2 acres of the Fish and Wildlife (Wetland) will be impacted. The remaining acres will be returned to their previous land use of cropland.**
- **Topsoil from the access road and operations yard will be removed and stored as indicated on the Operations Map. The stockpiles will be mulched and seeded to protect from wind erosion and erosion which could be caused by heavy precipitation events.**
- **The shaft and any boreholes will be plugged from top to bottom according to all MSHA and IDNR regulatory standards after they are no longer needed. Any steel casings will be cut off six feet below natural soil level and the void filled with subsoil, and then covered with topsoil, mulched and seeded.**
- **Stockpiled material from the construction of the supply shaft will be returned to the open bleeder shaft. Stockpiled subsoil from this site will then be placed above the unconsolidated material followed by stockpiled topsoil. The final graded soil at the bleeder shaft site will be prepared and planted in accordance with the appropriate vegetation for the post mine land use (the same as the original land use).**
- **The applicant will remove the rocked yard and access road. The rock will be hauled for use at another permit area or used to back fill the shaft.**
- **Stockpiled subsoil removed from the drill pits will be returned to the drill pits, and moderately compacted immediately after drilling completion.**
- **The entire disturbed area will be graded for positive drainage.**

All topsoil removed and stored during initial site construction will be redistributed and graded over the exposed subsoil. The area will be ripped to relieve soil compaction, and the topsoil will be amended, if necessary, and fertilized and prepared for planting.

2) Post Mining Land Use

A) Provide a detailed description of proposed post-mining land uses and capabilities employing land use and capability categories listed below. Provide acreage figures for each post-mining land use proposed for the existing permit, the IBR area and total permit after inclusion of the IBR acreage and designate the post-mining land uses on

6/16/16

the Post Mining Land Use Map. Acreage figures for post-mining land use must differentiate between mined and surface disturbance areas based on the mining line used in the pre-mining section of the application.

RESPONSE: Please see the Land Use / Capability Chart on the following page.

6/16/16

Land Use / Capability Chart

Land Use	Capability								
	Existing Permit (ac)			IBR (ac)			Total (ac)		
	Prime	HCap	NonCrop	Prime	HCap	NonCrop	Prime	HCap	NonCrop
Cropland	10.7	3.5	2.5	2.3	4.0		13.0	7.5	2.5
Pasture Land		0.8	5.5				0	0.8	5.5
Grazing Land							0	0	0
Forestry			14.3				0	0	14.3
Residential			1.5				0	0	1.5
Industrial/Commercial	0.3						0.3	0	0
Recreation							0	0	0
Fish & Wildlife Habitat (Herbacious)	5.8	8.4	43				5.8	8.4	43
Fish & Wildlife Habitat (Woody)		0.8	574.5				0	0.8	574.5
Fish & Wildlife Habitat (Wetland)						0.2	0	0	0.2
Developed Water Resources			19.3				0	0	19.3
Undeveloped Land							0	0	0
Total	16.8	13.5	660.6	2.5	4.0	0.2	19.1	17.5	660.8

Prime: Prime farmland
HCap: High Capability - meeting productivity requirements of 62 Ill. Adm. Code 1825.
NonCrop: Non-Cropland - All soils which do not qualify as prime farmland or high capability
* = "Negative Determination" Acres

Updated 02/25/2011

3) Pursuant to Section 1784.21, the applicant shall provide a protection and enhancement plan for the Indiana bat meeting the specifications of the July 2009 Range-wide Indiana bat protection and enhancement plan guidelines developed by the Fish and Wildlife Service and the Office of Surface Mining, or justify why no protection and enhancement plan is required under those guidelines.

RESPONSE: **The proposed site is mostly Cropland. A 0.2 acres portion of the permit is Fish and Wildlife (Wetland) and will not be disturbed. The remaining acreage will be return to its pre-mining land used.**

6/16/16

DOCUMENT

45

R08528

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

RESPONSE TO IEPA COMMENTS DATED FEBRUARY 13, 2015

PERMIT NO. 417
COAL REFUSE DISPOSAL FACILITY NO. 3
POND CREEK MINE

IEPA - DIVISION OF RECORDS MANAGEMENT
RELEASABLE

AUG 02 2019

REVIEWER: JMR

Prepared for

WILLIAMSON ENERGY, LLC
JOHNSTON CITY, ILLINOIS

ALLIANCE PROJECT NO. B12-271-1413
OCTOBER 2015

Summersville, WV
848 Northside Drive
Summersville, WV 26651
Telephone: (304) 883-2360
Fax: (304) 883-2361

Beckley, WV
Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA
3 Four Coins Dr., Ste. 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

September 22, 2015

Project No. B12-271-1413

Mr. Joseph D. Stitely, P.E.
Acting Manager, Permit Section
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
Mine Pollution Control Program
Bureau of Water
1021 North Grand Avenue East
Springfield, IL 62794-9276

IEPA - DIVISION OF RECORDS MANAGEMENT
RELEASABLE

AUG 02 2019

REVIEWER: JMR

Response to Comments
Permit Application No. 417
Williamson Energy, LLC
Coal Refuse Disposal Facility No. 3
Williamson County, Illinois

RECEIVED
DEC 22 2015
IL Environmental Protection Agency
MARION REGIONAL OFFICE

Dear Mr. Stitely:

This letter describes our response to the comments contained in the Illinois Environmental Protection Agency, Mine Pollution Control Program, Bureau of Water letter dated February 13, 2015 (copy attached). The letter was written in reference to the document described above. Changes in the application in regards to the subject comments are in blue text. The responses to the IEPA's comments are as follows:

Response to Comment No. 1. – Part III(2)(D)(1)(a) has been revised to reference RDA No. 3 under the paragraph entitled "Existing Groundwater Quality".

Response to Comment No. 2. – The pH for Pond 009 has been revised on the Schedule A table. The pH entry is based on pH readings of seven ponds located on the adjacent Permit 375.

Response to Comment No. 3 – The latitude and longitude have been added to Schedule A in Part III.

Response to Comment No. 4 – The reference in Part IV(6)(A) of the application has been changed to see "Attachment III.2.A.2".

Response to Comment No. 5 – A detail narrative of the liner system has been added in Part IV(6)(H).

Response to Comment No. 6 – Additional information on the clay liner has been added to Part IV(6)(H).

We trust this letter and attachments are acceptable to the IEPA. If there are any questions, or if further clarification is required, please contact us.

Respectfully submitted,

ALLIANCE CONSULTING, INC.

Stephen M. Sutphin
Senior Project Manager

Claudio E. Yon, P. E.
Principal Engineer

SMS/CEY:kjs
File: \\Aci-zeus\projects\Projects\Williamson Energy (1413)\2012\B12-271-1413\12271-15.doc

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-2829
BRUCE RAUNER, GOVERNOR LISA BONNETT, DIRECTOR

February 13, 2015 618/993-7200

Williamson Energy, LLC
P.O. Box 300
Johnston City, IL 62951

Re: Williamson Energy, LLC
Pond Creek Mine No. 1
IDNR/OMM Permit No. 417 Application
NPDES Permit No. IL0077666 (Modification)
IEPA Log. No. 3001-15

Gentlemen:

We received the information concerning the above referenced project, dated November 17, 2014, on January 2, 2015. This information has been reviewed by the Permit Section Staff, and based upon that review, the following items are offered for your consideration and appropriate action:

1. The response to Part III(2)(D)(1)(a), Page 8, first (1st) paragraph under "Existing Groundwater Quality" references proposed RDA No. 3 as RDA No. 1 which appears to be an error and should be corrected and/or clarified.

2. The Schedule A provided in response to Part III(2)(D)(3)(c) includes an "estimate" for pH that reflects the allowable range in accordance with the Subtitle D regulations. Please revise the Schedule A based on nearby similar operations and/or onsite data to provide an actual estimate of the anticipated pH values rather than the extreme limits allowed in accordance with 35 Ill. Adm. Code 406.106. Information regarding the basis for such estimations should be provided.

3. As an accurate location of all outfalls is required for the NPDES Permit, please provide accurate coordinates (longitude and latitude) of Outfall 009. This information may be included on the required Schedule A if you elect to do so.

4. The reference in Part (IV)(6)(A) of the application to Attachment IV-6.A appears to be in error as the reference material seems to be located in Attachment III.A.2.A. Please correct and/or clarify this reference. III 2. A. 2.

5. Part (IV)(6)(D) of the application refers to Volume 2, "MSHA Submittal Plan" which contains a brief discussion of the proposed four (4) foot compacted clay liner. However, to ensure an adequate response please provide a more detailed description of the liner system in Part (IV)(6)(D).

6. Volume 2 "MSHA Submittal Plan", Part 6.1 Site Preparation of the application proposes a four (4) foot compacted clay liner under the Refuse Disposal Area No. 3, Sedimentation Pond No. 9 and sedimentation ditches. Please modify Volume 1 of the application, to reference the four (4) foot compacted clay liner with a hydraulic conductivity of 1×10^{-7} cm/s or a synthetic liner capable of providing an equivalent level of groundwater protection.

7. Please provide construction details and specifications as well as a Quality Assurance/Quality Control (QA/QC) Plan for the proposed four (4) foot compacted clay liners or equivalent synthetic liner. The QA/QC Plan should include at a minimum:

   a. The loose soil thickness of each lift;
   b. The methodology for replacing soft areas encountered during construction;
   c. Frequency of permeability testing; and
   d. Means of protecting the constructed liner from damage.

8. The final cover for the refuse disposal facility must be designed and constructed to limit the amount of water (rainfall) that can infiltrate to a quantity or volume that is not in excess of the amount of water which can infiltrate through the liner constructed for the base of the proposed disposal facility. It is noted that the low permeability final cover may consist of compacted clay, synthetic HDPE, or a composite liner comprised of both of these materials. Please provide detailed design information for a low permeability cap or cover for the refuse disposal facility demonstrating the ability of the cover to limit infiltration as described.

9. The response to Part (IV)(6)(J)(2) states that clarified water from the slurry disposal operation will be reused in the preparation plant located in the adjacent permitted area. Please provide a more detailed discussion including pumping rates and volume of the water balance for the coal preparation circuit as this is pertinent to this application.

10. Also, Part IV(6)(J)(2) of the Application indicates that clarified water from the proposed slurry cell will be pumped into the sediment ditches and will discharge into Sedimentation Structure No. 9 and/or to the approved water circuit system for OMM Permit No. 375. As this clarified water may contain elevated dissolved solids, please re-evaluate the proposal to possibly direct this water to the closed circuit water system for OMM Permit No. 375 Area.

11. Since discharges from a flooded sedimentation pond would likely not meet permit effluent limits, the pond and discharge should be located outside the limits of the flood plain area or otherwise protected from flood waters entering the basin to the extent possible. The 100 year flood plain should be plotted on an appropriate map and Part IV(7)(F)(1) of the application should be revised to provide a discussion of the affects a 100-year storm event may have on the sedimentation basin and outfall.

12. In Volume 2 "MSHA Submittal Plan" of the application, Figure No. 4 (Drawing No. B12-271-M5) and Figure No. 7 (Drawing No. B12-271-M13), appears to depict Pond No. 9 as Pond No.1. Please correct and/or clarify this discrepancy.

13. It appears the locations of existing wells GW-11, GW-12, GW-13 and GW-28 are acceptable in accordance with the requirements of the 620 Groundwater Quality Standards regulations. However, to ensure adequate groundwater monitoring of Refuse Disposal Area No. 3 in accordance with 62 Ill. Adm. Code 1784(h), an additional monitoring well should be installed near the center of the south side of Refuse Disposal Area No. 3 and screened in the first water bearing zone below the bottom of the disposal facility. Please delay installation of this additional well until such time that the location of the well is approved by both IDNR/OMM and the Illinois EPA.

14. An emissions permit from the Illinois EPA, Division of Air Pollution Control, may be needed for the proposed facilities. The Permit Section of this Division should be contacted concerning these requirements at the above indicated address; phone number 217/782-7326.

Should you have any questions or comments regarding the above, or need any additional information concerning Agency requirements, please contact Environmental Protection Engineer, Dora Maschhoff at 618/993-7200 or the Marion address listed below.

Sincerely,

Joseph D. Stitely, P.E.
Acting Manager, Permit Section
Mine Pollution Control Program
Bureau of Water

JDS:DM:cs/6991c/2-11-15

cc: IDNR/Office of Mines and Minerals
BOW/MPCP/FOS/Marion

RESPONSE TO COMMENT NO. 1

NPDES permit. Should a trend indicating declining pH values become apparent, a treatment plan will be developed which may include one or a combination of the following actions:

- Addition of alkalinity to coarse refuse by application and incorporation of agricultural or ground limestone or hydrated lime at an appropriate rate to neutralize the acidity.

- Addition of sodium hydroxide or hydrated lime to the sediment control structure at appropriate rates sufficient to neutralize the acidity.

During refuse disposal and reclamation activities, erosion and sediment control measures are to be utilized in disturbed areas in order to minimize potential contamination of surface water runoff. During refuse disposal operations, sediment loading could improve over pre-mining conditions as a result of utilizing best management practices such as establishing and maintaining vegetative cover in areas that are currently cropland, construction of sedimentation structures, and decreasing peak flows and velocities by retaining storm water runoff in the impoundment. As a result of the increased mineralization discussed above, which tends to cause fine suspended particles to coalesce and settle, suspended solids may be lowered as a result of the proposed activities. Flocculants or coagulants may be used if necessary. Runoff from within the permit area which has the potential to come into contact with coal refuse will pass through the approved sedimentation control structure prior to release from the permit area.

Surface Facility Impacts to Groundwater

Facility design includes the construction of maintaining a minimum of 4 feet of in situ clay in the coal refuse disposal area and the sedimentation control structure that receives runoff from the coal refuse disposal area. This clay will minimize vertical percolation of precipitation and surface water which comes into contact with coal refuse and consequently minimize impacts to groundwater. The thickness of the clay, proposed grades for construction of Refuse Area No. 3, and permeability of the in situ clays are shown on Drawing No. B12-271-M17 entitled, "Geologic Cross Section I-I'", Drawing No. B12-271-M18 entitled, "Geologic Cross Section J-J'", and Drawing No. B12-271-M19 entitled, "Geologic Cross Section K-K'". Although sandstone exists in the permit area, it is discontinuous and generally less than 10 feet in thickness in areas where it exists. The Sandstone Unit Isopach Map (Drawing No. B12-271-E14) and Sandstone Unit Thickness Cross Sections AA-AA' and BB-BB' (Drawing No. B12-271-E15) exhibits that unit's thickness. Groundwater in the permit area flows primarily to the north as shown on Drawing No. B12-271-E17 entitled, "Potentiometric Surface/Water Table Map for Groundwater Levels Recorded on February 27, 2014".

During final reclamation of the site, coal refuse is to be covered with clean soil which will minimize infiltration and consequently minimize impacts to groundwater resources (refer to Part V for details).

Existing Groundwater Quality

Groundwater quality sampling and laboratory analysis has been performed for seven (7) groundwater monitoring wells (GW-8R, GW-10, GW-11, GW-12, GW-13, GW-14 and GW-28) located at/near proposed RDA No. 3. The location of each of these wells is presented upon the Geologic Cross Sections Location Map (Drawing No. B12-271-E1). Submitted are laboratory analytical reports for these samples, which were collected on a quarterly basis spanning the third and fourth calendar quarters of 2013 and the first and

RESPONSE TO COMMENT NOS. 2 & 3

DISCHARGE LOCATION AND CHARACTERISTICS FOR NEW AND EXISTING MINES
SCHEDULE A *

Discharge # **	009		
Latitude	37° 50' 52.3"		
Longitude	88° 48' 43.7"		
Quarter Section	NW		
SECTION	7		
Township	T8S		
Range	R4E		
County	Williamson		
Average Flow (gpd) **if discharge does not result from precipitation.**	Precipitation		
Max Flow (gpd) **if discharge does not result from precipitation.**	Precipitation		
Source of Discharge **(e.g. pit pumpage, processing plant circuit, surface runoff, etc.)**	Surface Runoff		
Sampling Method **(24 hr. composite, grab, est., etc.)**	Grab		
Acidity (mg/l)	30-905		
Alkalinity (mg/l)	200		
Lead (mg/l)	0.5		
Iron (mg/l)	3 - 6		
Manganese (mg/l)	4		
pH (range)	7.7***		
Zinc (mg/l)	0.5 – 1.0		
Fluoride (mg/l)	1.0		
Total Suspended Solids (mg/l)	35 - 70		
Sulfate (mg/l)	2100		
Total Dissolved Solids (mg/l)	3500		
Chloride (mg/l)	1000		
Receiving Stream	Unnamed		
Tributary to	Pond Creek		
Tributary to	Big Muddy River		
Tributary to	Mississippi River		

* If application is for NPDES permit USEPA form 2C or 2D may also be required.
** Discharge # should correspond with NPDES discharge number and shall be shown on the mine operations map.
*** Note: pH is based on average of seven ponds located on the adjacent Permit 375 sampled on 01/05/2015.

RESPONSE TO COMMENT NO. 4

6) Waste Material

A) Identify the nature of all waste material including shaft excavation material and non-coal waste to be disposed of within the permit area. Give the net neutralization potential.

RESPONSE: Coarse and fine refuse generated from coal processing will be disposed of in the permit area. Sources of coal refuse are primarily roof and floor lithologies associated with the coal seam. Therefore, the refuse is expected to be primarily composed of gray to black shale and underclay or claystone. Acid base accounting is contained in Attachment III.2.A.2.

B) Coal processing waste bank dams shall be designed to comply with requirements of 62 Ill. Adm. Code 1817.81 through 1817.84. For coal processing waste dams and embankments each plan shall comply with the requirements of MSHA, 30 CFR 77.216-1 and 77.216-2, and shall contain the results of a geo-technical investigation as prescribed under 62 Ill. Adm. Code 1784.16(e).

RESPONSE: Refer to the Engineering Design and Report contained in Volume 2.

C) Indicate location of all areas in which such materials including shaft excavation material and non-coal waste (including those under Subtitle C of RCRA) are to be disposed of on the mining operations map. Indicate all streams, creeks, and surface water impoundments within such areas or which receive runoff from such areas. Provide acreage of disposal area and borrow areas. Indicate location of borrow area on mining operations map.

RESPONSE: The location of the area where coal refuse will be placed is shown on the "Operation Plan Map", Drawing No. B12-271-M24.

D) Provide construction details for all impoundments and structures to contain such waste material. Provide typical cross-sections of all proposed levees, dams and excavations.

RESPONSE: Refer to the Engineering Design and Report contained in Volume 2 for construction details.

E) Indicate location and provide details for diversions as necessary to divert surface water around such areas on the mining operations map.

RESPONSE: Refer to Refer to Map 6 S.F. Operations Plan Map.

RESPONSE TO COMMENT NOS. 5 & 6

F) Provide details of diversions or other devices designed to collect surface runoff from waste disposal sites and transport same to appropriate treatment facility.

RESPONSE: Refer to Refer to Map 6 S.F. Operations Plan Map.

G) Provide details of such treatment facilities and identify points of discharge.

RESPONSE: Refer to Refer to Map 6 S.F. Operations Plan Map and Volume 2.

H) For disposal areas explain measures to be taken to avoid pollution of surface or groundwater due to leaching through levees or dams and through underlying soil.

RESPONSE: During mining and reclamation activities, erosion and sediment control measures will be applied to disturbed areas to minimize contamination of surface runoff.

A four foot clay liner with a permeability of $1x10^{-7}$ will be placed in all areas onto which coal refuse will come into contact, and the sedimentation pond, below the elevation of the spillway, which receives runoff from coal refuse. The clay will be thoroughly compacted to achieve the permeability specification. A quality assurance quality control plan has been included as Attachment No. IV(6)(D).

Coal processing wastes will be placed in the refuse disposal areas and covered with soil materials to minimize contact with surface runoff. Runoff from disposal areas will pass through approved sediment control structures for treatment before release and will meet appropriate NPDES effluent criteria. Should runoff from the refuse disposal area develop acidic characteristics, the runoff will be collected and neutralized to meet water quality standards.

The fine-grained soil materials of the refuse disposal area exhibit very low permeability that will inhibit infiltration and percolation of leachate from the refuse material into the ground water system.

Covering the refuse material with four feet of soil will protect the material from the effects of oxidation and erosion as well as minimize the potential for impacts to ground water resources by minimizing leachate production. Earthen materials used in the construction of dams and levees will be compacted to reduce permeability and minimize the potential for flow through the structures. Therefore, it is unlikely the proposed disposal operations will adversely impact

RESPONSE TO COMMENT NO. 7

ATTACHMENT IV.6.D

QUALITY ASSURANCE QUALITY CONTROL PLAN

SECTION I
GENERAL

SECTION I
(CONTINUED)

1.0 INTRODUCTION

This Construction Quality Assurance and Quality Control (CQA/QC) Plan has been prepared to provide the Owner, Engineer, Contractor and Subcontractor the means to govern the construction quality and to satisfy the environmental protection requirements. More specifically, this CQA/QC Plan addresses the installation of the clay liner at the proposed Coal Refuse Disposal Facility No. 3 at Williamson Energy LLC's Pond Creek Mine.

The CQA/QC Plan is divided into the following sections:

- Section I, General;
- Section II, Site Preparation; Quality Assurance/Quality Control;
- Section III, Documentation, Quality Assurance

2.0 DEFINITIONS RELATING TO CONSTRUCTION QUALITY ASSURANCE

2.1 Construction Quality Assurance and Construction Quality Control

This CQA/QC Plan is devoted to construction quality assurance/quality control for the construction quality assurance only of the liner system to be installed at Coal Refuse Disposal Facility No. 3 at the Pond Creek Mine. In the context of this plan, construction quality assurance and construction quality control are defined as follows:

Construction Quality Assurance (CQA) - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service. Construction Quality Control (CQC) - Those actions which provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements

2.2 Use of Terms in This Plan

In the context of this document:

- Construction Quality Assurance refers to means and actions employed by the Owner to assure conformity of the clay liner preparation and construction with this CQA/QC Plan, Contract Drawings, and the Specifications.

- Construction Quality Control refers to those actions taken by Contractors or Subcontractors to ensure that the materials and the workmanship meet the requirements of this CQA/QC Plan and the Specifications.

SECTION I
(CONTINUED)

3.0 PARTIES TO CONSTRUCTION QUALITY ASSURANCE

3.1 Descriptions of the Parties

The parties to Construction Quality Assurance include the Owner, Project Manager, Engineer, Contractor and Subcontractors.

3.1.1 Engineer

The Engineer is responsible for the engineering design, drawings, plans, and specifications for the Coal Refuse Disposal Facility. The engineer is also responsible for certifying construction of the segments necessary for state and federal regulatory agencies. There may be multiple engineers employed by the owner or the contactor.

3.1.2 Contractor and Subcontractors

The Contractor and Subcontractors are responsible for the site preparation and construction of the clay liner system. The owner may elect to perform work designated herein to be performed by the contactor. The Contractor and Subcontractor may be employees of the owner.

3.1.3 Owner

The Owner is Williamson Energy, LLC, who is responsible for the facility.

3.1.4 Project Manager

The Project Manager is the official representative of the Owner and may also be an employee of the owner. In this CQA Plan, the term "Project Manager" will apply equally to "Construction Coordinator" or "Owner's Representative", i.e., the individual or company in charge of coordinating construction activities.

3.2 Qualifications of the Parties

The following qualifications are required of all parties involved with the design and constructionof the Coal Refuse Disposal Facility. These qualifications must be submitted to the Project Manager for review and approval.

3.2.1 Engineer

The Engineer should be a qualified engineer, registered as required by regulation. The Engineer should have a history which demonstrates familiarity with Coal Refuse Disposal Facility, as appropriate, including detailed design methods and procedures.

SECTION I
(CONTINUED)

3.2.2 Contractor and Subcontractors

Qualifications of the Contractor and Subcontractors are specific to the construction contract and independent of this CQA/QC Plan. It is the Contractor's responsibility to ensure that the equipment, materials and construction techniques meet the Specifications of the project. The Contractor and Subcontractor may be employed by the owner.

4.0 SCOPE OF CONSTRUCTION QUALITY ASSURANCE

The scope of this CQA/QC Plan includes the CQA of construction of the clay liner system at the Coal Refuse Disposal Facility proposed for the Pond Creek Mine. The CQA of the selection, evaluation is included in the scope.

5.0 REFERENCES

The CQA/QC Plan includes references to the test procedures of the American Society for Testing and Materials (ASTM). It is the responsibility of the entity performing the work to assure the most recent version of the testing procedures is being used.

6.0 SITE AND PROJECT CONTROL

To guarantee a high degree of quality during construction, clear, open channels of communication are essential. To that end, meetings are critical.

6.1 Pre-Construction Meeting

A Pre-Construction Meeting will be held at the site. At a minimum, the meeting will be attended by the Owner, Engineer, the Contractor, and the Project Manager.

Specific topics considered for this meeting include:

- Communicate to all parties any relevant documents;
- Review critical design details of the project;
- Review the site-specific CQA/QC Plan;
- Make any appropriate modifications to the CQA/QC Plan;
- Review the responsibilities of each party;
- Review lines of authority and communication;
- Review methods for documenting and reporting, and for distributing documents and reports;

- Establish protocols for testing;
- Establish protocols for handling deficiencies, repairs, and retesting;
- Review the time schedule for all operations;
- Outline procedures for packaging and storing archive samples;
- Review repair procedures; and,
- Establish soil stockpiling locations (if any).

6.2 Progress Meetings

Progress meetings will be held between the Superintendent, the Contractor, the Project Manager, and any other concerned parties as necessary. These meetings will discuss current progress, planned activities which lie ahead, and any new business or revisions to the work. The CQA Manager will log any problems, decisions, or questions arising at this meeting. Any matter requiring action which is raised in this meeting will be reported to the appropriate parties.

6.3 Problem or Work Deficiency Meeting

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by all interested parties, the Project Manager, and the Contractor. If the problem requires a design modification, the Engineer should also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and,
- Implement an action plan to resolve the problem or deficiency.

The meeting will be documented by a person designated at the meeting and minutes will be transmitted to affected parties.

SECTION II
SITE PREPARATION QUALITY ASSURANCE

SECTION II
(CONTINUED)

1.0 INTRODUCTION

This section of the CQA/QC Plan addresses the site preparation and outlines the CQA/QC program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

Construction Specifications

1. Soil to be used for soil liner construction shall be classified as CL, ML, CL-ML or CH (ASTM Unified Classification). Soil shall be free of grass, vines, vegetation, and rock or stones greater than 4 inches.

2. Soil liner construction shall be completed in general accordance with the following procedures. Soil shall be delivered to the construction area with construction trucks, wheel tractor scrapers, tractor and pull behind scraper combinations, or dozers. The soil is to be spread to appropriate thickness using a bulldozer or soil compactor. If deemed necessary, a tractor/disk combination is to be used to process the soil (e.g., break down clods, dry soil, or mix in water). Each processed lift is then to be compacted with a soil compactor (e.g., CAT 815 or similar), pull behind sheepsfoot roller and or rubber tired or track equipment.

3. Each soil lift shall be placed to a 12 to 24 inch loose thickness depending on compaction results of the material being placed.

4. If soft areas are encountered, they shall be removed, as well as dry material, within 2 feet in any direction of the soft material. Suitable material will be placed in the excavation and replaced in accordance with these specifications.

5. Each lift shall be compacted to the minimum standard Proctor density (ASTM D698) identified by Item 19 below, at a moisture content 0% to 5% above the optimum moisture content of the soil.

6. Soil liner construction shall proceed to ensure consistent achievement of density, moisture content, and hydraulic conductivity for each successive lift.

7. The placement of frozen material or the placement of material on frozen ground shall be prohibited.

8. If drying or freezing occur the surface will be scarified.

9. Construction shall proceed only during favorable climatic conditions.

10. Soil liner construction shall be completed in a manner which reduces void spaces within the soil and liner.

SECTION II
(CONTINUED)

11. All construction stakes shall be removed during construction, and all test holes (e.g., Shelby tube samples) are to be backfilled with bentonite.

12. The soil liner shall be constructed in a manner to achieve a uniform barrier with a hydraulic conductivity of $1x10^{-7}$ cm/sec.

13. If acceptable compaction results are not achieved, the soil lift shall be reprocessed, or removed and replaced. If the moisture content is less than optimum, or greater than 5% above optimum, the failing material shall be wetted or dried to a moisture content within specification and then recompacted. If the dry density is below specification, the failing material shall be recompacted until a passing test is achieved.

14. In the event of a failing conductivity test, the soil may be removed or recompacted and retested until a passing result is obtained; or the soil immediately above and below the test specimen from the same Shelby tube may be tested. If both tests pass, the original test shall be nullified. If either test fails, that portion of the liner shall be rejected and shall be reconstructed and retested until passing results are obtained. The limits of necessary reconstruction shall be determined by additional sampling and testing within the failed region, thereby isolating the failing area of work.

15. Construction additives are not permitted for soil liner construction unless testing is completed to ensure that hydraulic conductivity requirements can be met after incorporation of the products and unless written approval is provided by the IDNR.

Testing Specifications

16. Prior to initiating soil liner construction, borrow soils shall be identified, qualified, and verified. At a minimum, a representative sample of each soil type identified within the borrow area is to be collected and analyzed for gradation, compaction, and hydraulic conductivity characteristics.

17. Samples collected from the borrow area shall be evaluated in accordance with ASTM D422, D4318, and D2487 to ensure classification criteria are met.

18. Samples collected from the borrow area shall be tested in accordance with ASTM D698 to determine maximum dry density and optimum moisture content of the soil.

19. Samples collected from the borrow area shall be compacted to 90% and 95% standard Proctor density at or near optimum moisture content. The hydraulic conductivity of the recompacted samples shall be determined in accordance with ASTM D5084 procedures. The results of this testing shall be used to establish the

minimum dry density for soil liner compaction necessary to achieve a hydraulic conductivity of $1x10^{-7}$ cm/sec or less.

20. Moisture and density testing by nuclear methods (ASTM D2922 and D3017) shall be conducted at a rate of at least one test per 2,000 cy placed. Testing locations shall be random, and shall not be known to the earthwork contractor prior to lift placement.

21. To insure the accuracy and reproducibility of the nuclear testing, all nuclear density gauges shall be certified to calibration and shall be recertified and calibrated every 1.5 years. Soil compaction tests shall also be double-checked with independent test methods.–A drive cylinder test and laboratory moisture content determination shall be conducted and compared to gauge readings. These independent checks shall be made at the outset of construction and on a bi-weekly basis (e.g., every ten working days) thereafter.

22. Samples for hydraulic conductivity verification shall be retrieved from the compacted soil liner and tested in accordance with ASTM D5084 procedures. Samples shall be retrieved using three-inch Shelby tubes. Samples shall be completed at a frequency of one sample/test per 20,000 cy placed. The vertical location of the recovered samples shall be varied so that representative portions or lifts of the constructed liner are tested. Testing locations shall be random, and shall not be known to the earthwork contractor prior to soil liner construction.

23. Liner thickness will be verified upon installation by the use of onboard equipment GPS and/or ground survey checks. To verify liner thickness the ground elevation will be checked before and after liner construction.

24. The soil liner will be protected in areas where it could be vulnerable to being excavated (into ponds, stockpiles, etc.) by surveying the completed liner. If any excavating is to be done in these areas, surveying will be performed to assure the liner is not penetrated. The liner to be covered beneath the coal refuse facility will be visually inspected and repairs made if necessary before the placement of refuse.

2.0 SOILS CONSTRUCTION QUALITY ASSURANCE

Soils CQA will be performed on all components of the construction. Construction evaluation testing will consist of: 1) monitoring the work; and 2) laboratory and field tests. Laboratory tests will be conducted on samples taken at the borrow source and stockpile(s) prior to construction, and also during the course of the work. Field tests will be conducted during the course of the work.

2.1 Monitoring

The Project Manager shall monitor and document the construction of all components. Monitoring the construction work for the subgrade layer includes the following:

SECTION II
(CONTINUED)

- Monitoring the action of the compaction and/or heavy hauling equipment on the construction surface (i.e., penetration, pumping, cracking, etc.).

2.2 Construction Quality Control Testing Frequency

All Construction Quality Control testing will be conducted in conjunction with the CQC testing by the qualified personnel in accordance with the project Specifications or as directed by the Owner or the Project Manager. Documentation and reporting of test results will be in accordance with the regulatory requirements.

Pre-construction testing will be conducted on material samples obtained from the borrow source and/or stockpile(s). Pre-construction testing will consist of material evaluation tests as described in Subsection 3 of this section of the CQA/QC Plan. Construction Quality Control testing will be conducted on samples taken from the material during the course of the work.

Sampling locations will be selected by the Project Manager.

2.3 Deficiencies

If a defect is discovered in the site preparation, the Project Manager will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Project Manager will determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Project Manager deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Project Manager will define the limits and nature of the defect.

2.3.1 Notification

After determining the extent and nature of a defect, the Project Manager will notify the Owner and Contractor and schedule appropriate retests when the work deficiency is corrected.

2.3.2 Repairs and Retesting

The Contractor will correct the deficiency to the satisfaction of the Project Manager. If a project Specification criterion cannot be met, or unusual weather conditions hinder work, then the Project Manager will develop and present to the Owner suggested solutions for his approval.

All retests recommended by the Project Manager must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The Project Manager will also verify that all installation requirements are met and that all submittals are provided.

SECTION III
CONSTRUCTION QUALITY ASSURANCE DOCUMENTATION

SECTION III
(CONTINUED)

1.0 DOCUMENTATION

An effective CQA plan depends largely on recognition of all construction activities that should be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The Project Manager will document that all quality assurance requirements have been addressed and satisfied.

The Contractor or Superintendent will provide the Project Manager and Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The Project Manager will also maintain at the job site a complete file of plans and Specifications, a CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

1.1 Recordkeeping

Standard reporting procedures will include preparation of a report which, at a minimum, will consist of: (a) field notes, including memoranda of meetings and/or discussions with the Contractor or Superintendent; (b) observation logs, and testing data sheets; and (c) construction problem and solution data sheets. This information will be regularly submitted to and reviewed by the Project Manager and/or the Engineer.

1.1.1 Memorandum of Discussion with Earthwork Contractor or Subcontractors

A memorandum will be prepared periodically, summarizing discussions between the Project Manager and Contractor or Superintendent. At a minimum, the memorandum will include the following information:

- date, project name, location, and other identification;
- name of parties to discussion;
- relevant subject matter or issues;
- activities planned and schedule; and,
- signature of the Contractor or Superintendent and/or Project Manager.

1.1.2 Observation Logs and Testing Data Sheets

Observation logs and testing data sheets will be prepared periodically. At a minimum, these logs and data sheets will include the following information:

- an identifying sheet number for cross referencing and document control;

SECTION III
(CONTINUED)

- date, project name, location, and other identification;
- data on weather conditions;
- a reduced-scale Site Plan showing all proposed work areas and test locations;
- descriptions and locations of ongoing construction;
- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- locations where tests and samples were taken;
- a summary of test results;
- calibrations or recalibrations of test equipment, and actions taken as a result of recalibration;
- off site materials received, including quality verification documentation;
- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and,
- the Project Manager's signature.

RESPONSE TO COMMENT NO. 8

ATTACHMENT III.2.D.1.a

"HELP MODEL" ANALYSIS

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

BY: BCS DATE: 08/18/15 CHKD BY: RPC DATE: 08/19/15

PROJECT NAME: Pond Creek #1 Mine – Facility #2 Expansion Plan

PROJECT NO. B12-271-1413 SHEET ____ OF ____

DESCRIPTION HELP Model Analysis – Abandonment Conditions

OBJECTIVE:

Develop the weather, soil, and design data to be used in the Hydrologic Evaluation of Landfill Performance (HELP) Model, to evaluate the abandonment conditions at the Pond Creek No. 1 Mine, Refuse Disposal Facility No. 2. The results of the HELP Model can be used to determine the effectiveness of the proposed final soil cover and the base liner system.

METHODOLOGY:

Utilize the United States Environmental Protection Agency (USEPA), HELP Model Version 3.07, computer program to estimate anticipated seepage volumes during final cover conditions at the site.

REFERENCES:

1. Schroeder, P. R., Dozier, T. S., Zappi, P. A., McEnroe, B. M., Sjostrom, J. W., and Peyton, R. L. (1994). "The Hydrologic Evaluation of Landfill Performance (HELP) Model: Engineering Documentation for Version 3, "EPA/600/r-94/168b, September 1994, U. S. Environmental Protection Agency Office of Research and Development, Washington, D. C.

ANALYSIS:

A. Weather Data

The facility is located approximately 90 miles Southeast of East St. Louis, Illinois. Therefore, default data for evapotranspiration, precipitation, temperature, and solar radiation for East St. Louis were used for the analysis. The default data included information for a 5-year period; therefore, the model was simulated over a 5-year period.

B. Soil Data

The coal refuse disposal facility is comprised of the following major components from top to bottom (decreasing in elevation):

1. Four (4) feet (48 in.) of Final Cover Soil;
   a. One-half (1/2) foot (6 in.) of SiCL
   b. Three and one-half (3-1/2) feet (42 in.) of CL
2. One hundred eighty-five (185) feet (2220 in.) of Coal Refuse
3. Three (3) feet (36 in.) Lateral Internal Drain; and
4. Four (4) feet of Compacted Clay Base Liner.

The default soil properties provided in the HELP model were used for all components of the coal refuse disposal facility. The default soil values are presented in the following table:

TABLE 2-1
DEFAULT SOIL, WASTE, AND GEOSYNTHETIC CHARACTERISTICS

Classification			Total Porosity	Field Capacity	Wilting Point	Saturated Hydraulic Conductivity
HELP	USDA	USCS	vol/vol	vol/vol	vol/vol	cm/sec
1	CoS	SP	0.417	0.045	0.018	1.0×10^{-2}
2	S	SW	0.437	0.062	0.024	5.8×10^{-3}
3	FS	SW	0.457	0.083	0.033	3.1×10^{-3}
4	LS	SM	0.437	0.105	0.047	1.7×10^{-3}
5	LFS	SM	0.457	0.131	0.058	1.0×10^{-3}
6	SL	SM	0.453	0.190	0.085	7.2×10^{-4}
7	FSL	SM	0.473	0.222	0.104	5.2×10^{-4}
8	L	ML	0.463	0.232	0.116	3.7×10^{-4}
9	SiL	ML	0.501	0.284	0.135	1.9×10^{-4}

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

BY: BCS DATE: 08/18/15 CHKD BY: RPC DATE: 08/19/15

PROJECT NAME: Pond Creek #1 Mine – Facility #2 Expansion Plan

PROJECT NO. B12-271-1413 SHEET ____ OF ____

DESCRIPTION HELP Model Analysis – Abandonment Conditions

TABLE 2-1
(Continued)

Classification			Total Porosity	Field Capacity	Wilting Point	Saturated Hydraulic Conductivity
HELP	USDA	USCS	vol/vol	vol/vol	vol/vol	cm/sec
10	SCL	SC	0.398	0.244	0.136	1.2x10-4
11	CL	CL	0.464	0.310	0.187	6.4x10-5
12	SiCL	CL	0.471	0.342	0.210	$4.2x10^{-5}$
13	SC	SC	0.430	0.321	0.221	$3.3x10^{-5}$
14	SiC	CH	0.479	0.371	0.251	$2.5x10^{-5}$
15	C	CH	0.475	0.378	0.265	$1.7x10^{-5}$
16	Barrier Soil		0.427	0.418	0.367	$1.0x10^{-7}$
17	Bentonite Mat (0.6 cm)		0.750	0.747	0.400	$3.0x10^{-9}$
18	Municipal Waste (900 lb/yd^3 or 312 kg/m^3)		0.671	0.292	0.077	$1.0x10^{-3}$
19	Municipal Waste (channeling and dead zones)		0.168	0.073	0.019	$1.0x10^{-3}$
20	Drainage Net (0.5 cm)		0.850	0.010	0.005	$1.0x10^{+1}$
21	Gravel		0.397	0.032	0.013	3.0x10-1
22	L*	ML	0.419	0.307	0.180	$1.9x10^{-5}$
23	SiL*	ML	0.461	0.360	0.203	$9.0x10^{-6}$
24	SCL*	SC	0.365	0.305	0.202	$2.7x10^{-6}$
25	CL*	CL	0.437	0.373	0.266	$3.6x10^{-6}$
26	SiCL*	CL	0.445	0.393	0.277	$1.9x10^{-6}$
27	SC*	CH	0.400	0.366	0.288	$7.8x10^{-7}$
28	SiC*	CH	0.452	0.411	0.311	$1.2x10^{-6}$
29	C*	CH	0.451	0.419	0.332	$6.8x10^{-7}$

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

BY: BCS DATE: 08/18/15 CHKD BY: RPC DATE: 08/19/15
PROJECT NAME: Pond Creek #1 Mine – Facility #2 Expansion Plan
PROJECT NO. B12-271-1413 SHEET ____ OF ____
DESCRIPTION HELP Model Analysis – Abandonment Conditions

TABLE 2-1
(Continued)

Classification			Total Porosity	Field Capacity	Wilting Point	Saturated Hydraulic Conductivity
HELP	USDA	USCS	vol/vol	vol/vol	vol/vol	cm/sec
30	Coal-Burning Electric Plant Fly Ash*		0.541	0.187	0.047	$5.0x10^{-5}$
31	Coal-Burning Electric Plant Bottom Ash*		0.578	0.076	0.025	$4.1x10^{-3}$
32	Municipal Incinerator Fly Ash*		0.450	0.116	0.049	$1.0x10^{-2}$
33	Fine Copper Slag*		0.375	0.055	0.020	$4.1x10^{-2}$
34	Drainage Net (0.6 cm)		0.850	0.010	0.005	$3.3x10^{+1}$
35	High Density Polyethylene (HDPE)					$2.0x10^{-13}$
36	Low Density Polyethylene (LDPE)					$4.0x10^{-13}$
37	Polyvinyl Chloride (PVC)					$2.0x10^{-11}$
38	Butyl Rubber					$1.0x10^{-12}$
39	Chlorinated Polyethylene (CPE)					$4.0x10^{-12}$
40	Hypalon or Chlorosulfonated Polyethylene (CSPE)					$3.0x10^{-12}$
41	Ethylene-Propylene Diene Monomer (EPDM)					$2.0x10^{-12}$
42	Neoprene					$3.0x10^{-12}$

*Denotes soils that are moderately compacted

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

BY: BCS DATE: 08/18/15 CHKD BY: RPC DATE: 08/19/15

PROJECT NAME: Pond Creek #1 Mine – Facility #2 Expansion Plan

PROJECT NO. B12-271-1413 SHEET ____ OF ____

DESCRIPTION HELP Model Analysis – Abandonment Conditions

C. Design Data

The design data used in the HELP model consists of the total modeled area, the percentage of the modeled area allowing stormwater runoff, and the runoff curve number of the uppermost surface modeled in the HELP simulation.

For this HELP model simulation, the following design parameters were used:

1. For all simulations, a unit area of 1 acre was modeled. This unit area can be used to allow the results of the HELP model simulations to be applied to any development area by multiplying the area in question by the unit of area HELP results.

2. 100 percent of the modeled area was allowed to have stormwater runoff.

3. A HELP-defined runoff curve number was used to model the uppermost exposed surface.

RESULTS:

Results from the HELP model simulation for the Abandonment Conditions at the Pond Creek No. 1 Mine, Refuse Disposal Facility No. 2 are attached as Exhibit 1 of this calculation brief. Referring to the output file, the following were determined for the Pond Creek No. 1 Mine, Refuse Disposal Facility No. 2:

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

BY: BCS DATE: 08/18/15 CHKD BY: RPC DATE: 08/19/15

PROJECT NAME: Pond Creek #1 Mine – Facility #2 Expansion Plan

PROJECT NO. B12-271-1413 SHEET ____ OF ____

DESCRIPTION HELP Model Analysis – Abandonment Conditions

ABANDONMENT CONDITIONS SIMULATION	AVERAGE ANNUAL TOTALS FOR YEARS 1-30 (FROM AVERAGE ANNUAL OUTPUT)		
	INCHES	PERCENT OF WATER BUDGET	CU. FEET/ ACRE/ YEAR
Precipitation	34.08 inches	100%	123,718 ft^3
Runoff	1.91 inches	5.60%	6,926 ft^3
Evapotranspiration	28.54 inches	83.75%	103,612 ft^3
Water Stored in Soil Profile	2.20 inches	6.44%	7,972 ft^3
Water Collected in Lateral Underdrain above Compacted Clay Base Liner	0.51 inches	1.51%	1,864 ft3
Percolation/Leakage through Compacted Clay Base Liner	0.92 inches	2.70%	3,344 ft^3

Given these results, the four feet of final soil cover, coupled with the compacted clay base liner, is expected to provide adequate protection of the shallow groundwater at the Pond Creek No. 1 Mine, Refuse Disposal Facility No. 2.

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

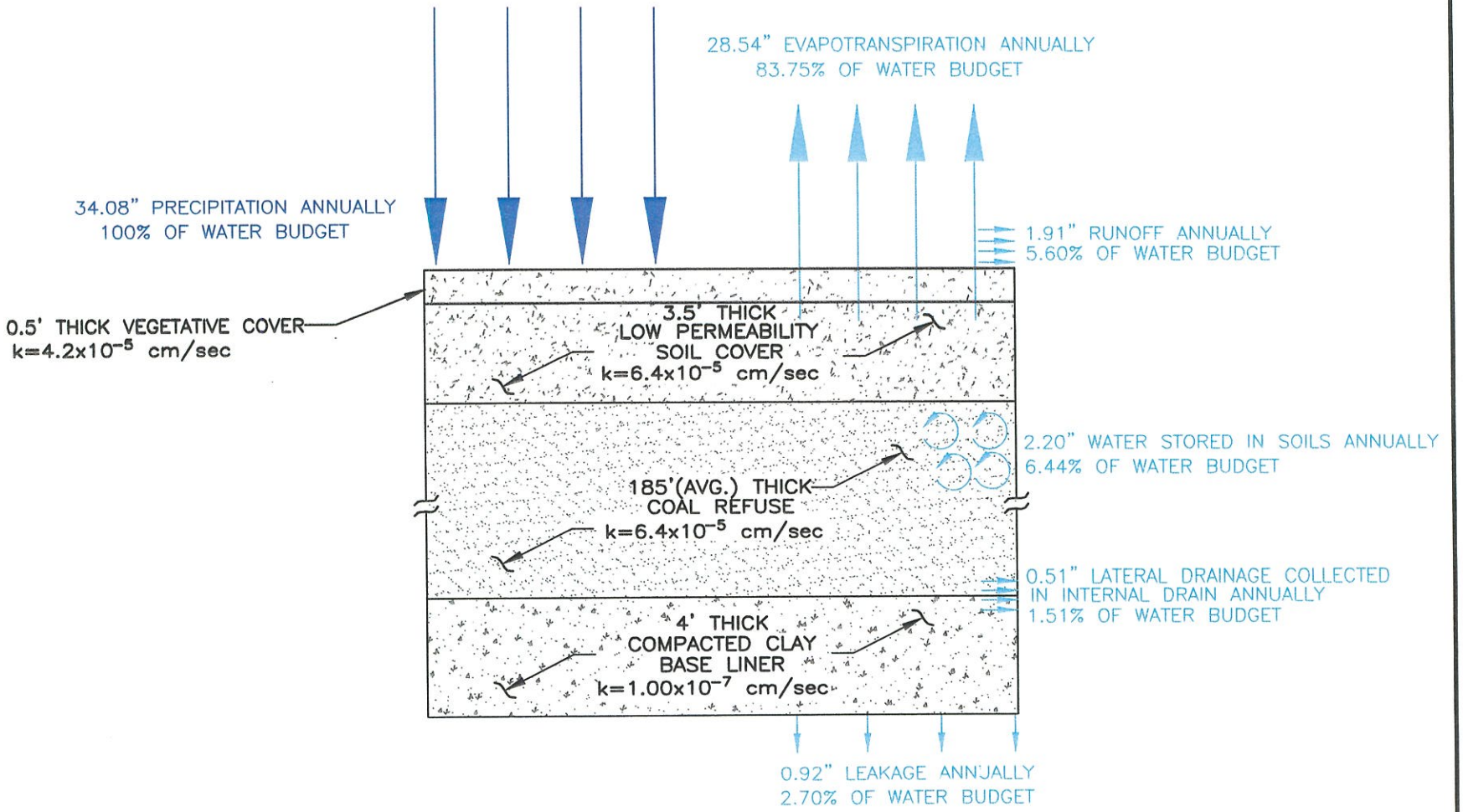
BY: BCS DATE: 08/18/15 CHKD BY: RPC DATE: 08/19/15

PROJECT NAME: Pond Creek #1 Mine – Facility #2 Expansion Plan

PROJECT NO. B12-271-1413 SHEET ____ OF ____

DESCRIPTION HELP Model Analysis – Abandonment Conditions

EXHIBIT 1



Alliance Consulting, Inc.
Engineers
Constructors
Scientists
BECKLEY, WV (304) 255-0491
CANONSBURG, PA (724) 745-3630
SUMMERSVILLE, WV (304) 883-2360

RESULTS OF HELP MODEL ANALYSIS UNDER FINAL COVER CONDITIONS

POND CREEK NO. 1 MINE
FACILITY NO. 2 EXPANSION PLAN
PREPARED FOR
WILLIAMSON ENERGY, LLC
P.O. BOX 300, JOHNSTON CITY, ILLINOIS 62951

DRAWN BY	JWD	08/19/15
CHECKED BY	RPC	08/19/15
APPROVED BY	CEY	08/19/15
DRAWING NUMBER		
B12-271-A14		

R08566

```
*******************************************************************************
*****

*******************************************************************************
*****
 **
**
 **
**
 **              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**
 **                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)
**
 **                  DEVELOPED BY ENVIRONMENTAL LABORATORY
**
 **                   USAE WATERWAYS EXPERIMENT STATION
**
 **             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
**
 **
**
 **
**

*******************************************************************************
*****

*******************************************************************************
*****


 PRECIPITATION DATA FILE:     E:\INSTALLE\ILLINOI2.D4
 TEMPERATURE DATA FILE:       E:\INSTALLE\ILLINOI2.D7
 SOLAR RADIATION DATA FILE:   E:\INSTALLE\ILLINOI2.D13
 EVAPOTRANSPIRATION DATA:     E:\INSTALLE\ILLINOI2.D11
 SOIL AND DESIGN DATA FILE:   E:\INSTALLE\EST_DWNA.D10
 OUTPUT DATA FILE:            E:\INSTALLE\EST_DWNA.OUT


 TIME:  11:17     DATE:   8/19/2015


*******************************************************************************
*****

      TITLE:  EAST OF DWINA REFUSE AREA
```

****
*****

NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 12

THICKNESS	=	6.00	INCHES
POROSITY	=	0.4710	VOL/VOL
FIELD CAPACITY	=	0.3420	VOL/VOL
WILTING POINT	=	0.2100	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3603	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.419999997000E-04	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 4.63 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	42.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2984	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 11

THICKNESS	=	2220.00	INCHES
POROSITY	=	0.4640	VOL/VOL
FIELD CAPACITY	=	0.3100	VOL/VOL
WILTING POINT	=	0.1870	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3105	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.639999998000E-04	CM/SEC

LAYER 4

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 21

THICKNESS	=	36.00	INCHES
POROSITY	=	0.3970	VOL/VOL
FIELD CAPACITY	=	0.0320	VOL/VOL
WILTING POINT	=	0.0130	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0413	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000012000	CM/SEC
SLOPE	=	1.00	PERCENT
DRAINAGE LENGTH	=	1000.0	FEET

LAYER 5

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 16

THICKNESS	=	48.00	INCHES
POROSITY	=	0.0000	VOL/VOL
FIELD CAPACITY	=	0.0000	VOL/VOL
WILTING POINT	=	0.0000	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000001000E-06	CM/SEC
FML PINHOLE DENSITY	=	0.00	HOLES/ACRE
FML INSTALLATION DEFECTS	=	0.00	HOLES/ACRE
FML PLACEMENT QUALITY	=	4 - POOR	

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #12 WITH A GOOD STAND OF GRASS, A SURFACE SLOPE OF 1.% AND A SLOPE LENGTH OF 1000. FEET.

SCS RUNOFF CURVE NUMBER	=	81.60	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	36.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	10.974	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	16.746	INCHES

LOWER LIMIT OF EVAPORATIVE STORAGE	=	6.870	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	705.554	INCHES
TOTAL INITIAL WATER	=	705.554	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
EAST ST. LOUIS ILLINOIS

STATION LATITUDE	=	38.80	DEGREES
MAXIMUM LEAF AREA INDEX	=	3.50	
START OF GROWING SEASON (JULIAN DATE)	=	97	
END OF GROWING SEASON (JULIAN DATE)	=	300	
EVAPORATIVE ZONE DEPTH	=	36.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	10.40	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	73.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	71.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	74.00	%

NOTE: PRECIPITATION DATA FOR CHICAGO ILLINOIS
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EAST ST. LOUIS ILLINOIS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
29.80	34.60	43.80	56.20	65.20	74.10
77.70	75.70	69.00	57.60	44.90	35.00

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR EAST ST. LOUIS ILLINOIS
AND STATION LATITUDE = 38.80 DEGREES

WARNING: TEMPERATURE FOR YEAR 1 USED WITH PRECIPITATION FOR YEAR 1974

WARNING: SOLAR RADIATION FOR YEAR 1 USED WITH PRECIPITATION FOR YEAR 1974

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1974

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.29	2.11	2.40	4.27	5.09	4.69
	2.96	2.60	1.47	1.88	2.47	2.12
RUNOFF	0.049	0.019	0.001	0.017	0.000	0.000
	0.025	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.772	1.112	2.059	3.497	6.442	7.335
	3.547	2.630	0.965	1.016	0.968	0.581
LATERAL DRAINAGE COLLECTED	0.0447	0.0405	0.0750	0.0171	0.0001	0.0001
FROM LAYER 4	0.0000	0.0000	0.0000	0.0043	0.0317	0.0507
PERCOLATION/LEAKAGE THROUGH	0.1054	0.0952	0.1054	0.0798	0.0296	0.0220
LAYER 5	0.0154	0.0029	0.0008	0.0883	0.1020	0.1054

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.085	0.085	0.142	0.034	0.000
0.000					
TOP OF LAYER 5	0.000	0.000	0.000	0.008	0.062
0.096					
STD. DEVIATION OF DAILY	0.001	0.012	0.013	0.036	0.000
0.000					
HEAD ON TOP OF LAYER 5	0.000	0.000	0.000	0.010	0.015
0.005					

****
******

****
******

ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
PRECIPITATION	35.35	128320.523	100.00
RUNOFF	0.111	404.602	0.32
EVAPOTRANSPIRATION	30.924	112254.437	87.48
DRAINAGE COLLECTED FROM LAYER 4	0.2641	958.838	0.75
PERC./LEAKAGE THROUGH LAYER 5	0.752467	2731.457	2.13
AVG. HEAD ON TOP OF LAYER 5	0.0427		
CHANGE IN WATER STORAGE	3.298	11971.201	9.33
SOIL WATER AT START OF YEAR	706.322	2563949.750	
SOIL WATER AT END OF YEAR	709.620	2575921.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00

SNOW WATER AT END OF YEAR	0.000	0.000
0.00		
ANNUAL WATER BUDGET BALANCE	0.0000	-0.013
0.00		

****
******

WARNING: TEMPERATURE FOR YEAR 2 USED WITH PRECIPITATION FOR YEAR 1975

WARNING: SOLAR RADIATION FOR YEAR 2 USED WITH PRECIPITATION FOR YEAR 1975

****
******

MONTHLY TOTALS (IN INCHES) FOR YEAR 1975

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	3.69	2.48	2.02	5.50	3.02	5.07
	2.19	7.37	0.80	1.90	2.53	3.05
RUNOFF	0.000	2.295	1.564	0.299	0.000	0.003
	0.000	0.773	0.000	0.000	0.000	0.282
EVAPOTRANSPIRATION	0.607	0.516	1.246	2.873	4.989	7.543
	2.802	3.048	3.660	1.024	0.926	0.537
LATERAL DRAINAGE COLLECTED	0.0562	0.0518	0.0570	0.0588	0.0800	0.0134

FROM LAYER 4	0.0001	0.0000	0.0000	0.0012	0.0275
0.0555					
PERCOLATION/LEAKAGE THROUGH	0.1054	0.0952	0.1054	0.1020	0.1054
0.0749					
LAYER 5	0.0287	0.0127	0.0000	0.0578	0.1020
0.1054					

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.107	0.109	0.108	0.115	0.152
0.026					
TOP OF LAYER 5	0.000	0.000	0.000	0.002	0.054
0.105					
STD. DEVIATION OF DAILY	0.001	0.000	0.002	0.013	0.020
0.032					
HEAD ON TOP OF LAYER 5	0.000	0.000	0.000	0.004	0.022
0.009					

****

****

ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.62	143820.594	100.00
RUNOFF	5.216	18935.109	13.17
EVAPOTRANSPIRATION	29.772	108071.156	75.14
DRAINAGE COLLECTED FROM LAYER 4	0.4015	1457.325	1.01

PERC./LEAKAGE THROUGH LAYER 5	0.895206	3249.597	2.26
AVG. HEAD ON TOP OF LAYER 5	0.0649		
CHANGE IN WATER STORAGE	3.335	12107.216	8.42
SOIL WATER AT START OF YEAR	709.620	2575921.000	
SOIL WATER AT END OF YEAR	712.196	2585273.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.759	2755.048	1.92
ANNUAL WATER BUDGET BALANCE	0.0001	0.188	0.00

****

WARNING: TEMPERATURE FOR YEAR 3 USED WITH PRECIPITATION FOR YEAR 1976

WARNING: SOLAR RADIATION FOR YEAR 3 USED WITH PRECIPITATION FOR YEAR 1976

****

MONTHLY TOTALS (IN INCHES) FOR YEAR 1976

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.85	1.87	5.91	4.05	4.03	2.93

	1.44	1.29	1.49	1.41	0.65
0.64					
RUNOFF	0.629	0.000	0.593	0.334	0.059
0.000					
	0.000	0.000	0.000	0.000	0.000
0.000					
EVAPOTRANSPIRATION	0.515	1.009	1.665	3.559	6.620
3.546					
	1.965	1.373	0.983	1.437	0.559
0.450					
LATERAL DRAINAGE COLLECTED	0.0648	0.0627	0.0796	0.0771	0.0040
0.0001					
FROM LAYER 4	0.0000	0.0000	0.0000	0.0030	0.0437
0.0772					
PERCOLATION/LEAKAGE THROUGH	0.1054	0.0986	0.1054	0.1020	0.0595
0.0305					
LAYER 5	0.0205	0.0094	0.0000	0.0611	0.1020
0.1054					

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.123	0.127	0.151	0.151	0.008
0.000					
TOP OF LAYER 5	0.000	0.000	0.000	0.006	0.086
0.146					
STD. DEVIATION OF DAILY	0.002	0.001	0.030	0.053	0.014
0.000					
HEAD ON TOP OF LAYER 5	0.000	0.000	0.000	0.009	0.028
0.010					

****

****

ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
PRECIPITATION	26.56	96412.812	100.00
RUNOFF	1.616	5864.440	6.08
EVAPOTRANSPIRATION	23.681	85960.617	89.16
DRAINAGE COLLECTED FROM LAYER 4	0.4122	1496.197	1.55
PERC./LEAKAGE THROUGH LAYER 5	0.800109	2904.396	3.01
AVG. HEAD ON TOP OF LAYER 5	0.0665		
CHANGE IN WATER STORAGE	0.052	187.235	0.19
SOIL WATER AT START OF YEAR	712.196	2585273.250	
SOIL WATER AT END OF YEAR	713.004	2588205.250	
SNOW WATER AT START OF YEAR	0.759	2755.048	2.86
SNOW WATER AT END OF YEAR	0.003	10.189	0.01
ANNUAL WATER BUDGET BALANCE	0.0000	-0.074	0.00

****

WARNING: TEMPERATURE FOR YEAR 4 USED WITH PRECIPITATION FOR YEAR 1977

WARNING: SOLAR RADIATION FOR YEAR 4 USED WITH PRECIPITATION FOR YEAR 1977

****
******

MONTHLY TOTALS (IN INCHES) FOR YEAR 1977

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	0.55	0.71	3.66	2.63	1.30	3.78
	3.06	5.09	5.50	2.17	1.87	2.18
RUNOFF	0.000	0.000	0.043	0.000	0.000	0.030
	0.082	0.005	0.027	0.003	0.000	0.588
EVAPOTRANSPIRATION	0.430	0.461	1.314	2.755	4.639	3.749
	2.974	4.122	3.411	1.192	0.756	0.541
LATERAL DRAINAGE COLLECTED	0.0867	0.0800	0.0885	0.0849	0.0861	0.0853
FROM LAYER 4	0.0767	0.0796	0.0789	0.0810	0.0782	0.0805
PERCOLATION/LEAKAGE THROUGH	0.1054	0.0952	0.1054	0.1020	0.1054	0.1020
LAYER 5	0.1054	0.1054	0.1020	0.1054	0.1020	0.1054

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.165	0.168	0.168	0.166	0.163	0.167
TOP OF LAYER 5	0.146	0.151	0.155	0.154	0.153	0.153
STD. DEVIATION OF DAILY	0.002	0.000	0.000	0.000	0.004	0.011

HEAD ON TOP OF LAYER 5	0.001	0.003	0.001	0.000	0.000
0.001					

****

****

ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
PRECIPITATION	32.50	117975.016	100.00
RUNOFF	0.778	2823.944	2.39
EVAPOTRANSPIRATION	26.346	95635.016	81.06
DRAINAGE COLLECTED FROM LAYER 4	0.9864	3580.677	3.04
PERC./LEAKAGE THROUGH LAYER 5	1.241584	4506.951	3.82
AVG. HEAD ON TOP OF LAYER 5	0.1590		
CHANGE IN WATER STORAGE	3.148	11428.388	9.69
SOIL WATER AT START OF YEAR	713.004	2588205.250	
SOIL WATER AT END OF YEAR	716.155	2599643.750	
SNOW WATER AT START OF YEAR	0.003	10.189	0.01
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.042	0.00

****
******

WARNING: TEMPERATURE FOR YEAR 5 USED WITH PRECIPITATION FOR YEAR 1978

WARNING: SOLAR RADIATION FOR YEAR 5 USED WITH PRECIPITATION FOR YEAR 1978

****
******

MONTHLY TOTALS (IN INCHES) FOR YEAR 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION	1.54	0.43	1.16	3.94	2.80	5.34
	5.61	1.98	6.63	1.33	2.24	3.38
RUNOFF	0.550	0.042	0.000	0.000	0.000	0.116
	0.081	0.000	1.029	0.000	0.000	0.000
EVAPOTRANSPIRATION	0.459	0.394	2.361	3.657	4.686	5.954
	6.540	1.976	2.065	1.572	1.272	1.059
LATERAL DRAINAGE COLLECTED	0.0904	0.0438	0.0756	0.0457	0.0002	0.0000
FROM LAYER 4	0.0000	0.0001	0.0240	0.0646	0.0765	0.0827
PERCOLATION/LEAKAGE THROUGH	0.1054	0.0952	0.1054	0.1020	0.0401	0.0172
LAYER 5	0.0054	0.0309	0.1020	0.1054	0.1020	0.1054

MONTHLY SUMMARIES FOR DAILY HEADS (INCHES)

AVERAGE DAILY HEAD ON	0.171	0.092	0.143	0.090	0.001	0.000
TOP OF LAYER 5	0.000	0.000	0.047	0.122	0.150	0.157
STD. DEVIATION OF DAILY	0.027	0.017	0.023	0.048	0.001	0.000
HEAD ON TOP OF LAYER 5	0.000	0.000	0.029	0.014	0.004	0.001

****

****

ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	36.38	132059.391	100.00
RUNOFF	1.818	6599.150	5.00
EVAPOTRANSPIRATION	31.995	116140.414	87.95
DRAINAGE COLLECTED FROM LAYER 4	0.5035	1827.793	1.38
PERC./LEAKAGE THROUGH LAYER 5	0.916725	3327.713	2.52
AVG. HEAD ON TOP OF LAYER 5	0.0811		

CHANGE IN WATER STORAGE	1.147	4164.397
3.15		
SOIL WATER AT START OF YEAR	716.155	2599643.750
SOIL WATER AT END OF YEAR	717.303	2603808.250
SNOW WATER AT START OF YEAR	0.000	0.000
0.00		
SNOW WATER AT END OF YEAR	0.000	0.000
0.00		
ANNUAL WATER BUDGET BALANCE	0.0000	-0.075
0.00		

****
******

****
******

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	1.98	1.52	3.03	4.08	3.25	4.36
	3.05	3.67	3.18	1.74	1.95	2.27
STD. DEVIATIONS	1.43	0.90	1.84	1.02	1.42	0.99
	1.57	2.52	2.68	0.36	0.77	1.06
RUNOFF						
TOTALS	0.246	0.471	0.440	0.130	0.012	0.030

	0.038	0.155	0.211	0.001	0.000
0.174					
STD. DEVIATIONS	0.316	1.020	0.676	0.171	0.026
0.050					
	0.041	0.345	0.457	0.001	0.000
0.262					

EVAPOTRANSPIRATION

TOTALS	0.557	0.698	1.729	3.268	5.475
5.625					
	3.566	2.630	2.217	1.248	0.896
0.634					
STD. DEVIATIONS	0.138	0.335	0.479	0.421	0.975
1.907					
	1.756	1.050	1.287	0.249	0.265
0.242					

LATERAL DRAINAGE COLLECTED FROM LAYER 4

TOTALS	0.0686	0.0558	0.0751	0.0567	0.0341
0.0198					
	0.0154	0.0160	0.0206	0.0308	0.0515
0.0693					
STD. DEVIATIONS	0.0196	0.0160	0.0115	0.0269	0.0448
0.0371					
	0.0343	0.0356	0.0342	0.0388	0.0243
0.0150					

PERCOLATION/LEAKAGE THROUGH LAYER 5

TOTALS	0.1054	0.0959	0.1054	0.0976	0.0680
0.0493					
	0.0351	0.0323	0.0410	0.0836	0.1020
0.1054					
STD. DEVIATIONS	0.0000	0.0015	0.0000	0.0099	0.0358
0.0373					
	0.0402	0.0422	0.0557	0.0232	0.0000
0.0000					

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 5

AVERAGES	0.1301	0.1162	0.1425	0.1112	0.0647
0.0389					
	0.0293	0.0303	0.0403	0.0584	0.1010
0.1314					
STD. DEVIATIONS	0.0372	0.0333	0.0218	0.0528	0.0849
0.0727					
	0.0650	0.0675	0.0670	0.0735	0.0477
0.0285					

****
******

****
******

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
PRECIPITATION	34.08	(4.915)	123717.7	100.00
RUNOFF	1.908	(1.9712)	6925.45	5.598
EVAPOTRANSPIRATION	28.543	(3.4483)	103612.33	83.749
LATERAL DRAINAGE COLLECTED FROM LAYER 4	0.51354	(0.27782)	1864.166	1.50679
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.92122	(0.19136)	3344.022	2.70295
AVERAGE HEAD ON TOP OF LAYER 5	0.083	(0.045)		
CHANGE IN WATER STORAGE	2.196	(1.5098)	7971.69	6.443

****
******

****
*****

PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	3.48	12632.400
RUNOFF	1.212	4398.9380
DRAINAGE COLLECTED FROM LAYER 4	0.00365	13.23919
PERCOLATION/LEAKAGE THROUGH LAYER 5	0.003402	12.34781
AVERAGE HEAD ON TOP OF LAYER 5	0.214	
MAXIMUM HEAD ON TOP OF LAYER 5	0.422	
LOCATION OF MAXIMUM HEAD IN LAYER 4 (DISTANCE FROM DRAIN)	16.4 FEET	
SNOW WATER	2.90	10510.0811

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4079
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1908

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

****
*****

****
*****

FINAL WATER STORAGE AT END OF YEAR 1978

--

LAYER	(INCHES)	(VOL/VOL)
1	2.2227	0.3705
2	14.9525	0.3560
3	697.8251	0.3143
4	1.5342	0.0426
5	0.0000	0.0000
SNOW WATER	0.000	

****
*****

****
*****

RESPONSE TO COMMENT NOS. 9 & 10

the quantity or quality of surface and ground water in the permit or adjacent area.

I) Describe estimated life of each area.

RESPONSE: Refer to Volume 2.

J) Coal preparation:

1) Give a general description of the coal processing operation at this facility.

RESPONSE: N/A

2) Describe the fresh water (makeup) and slurry circuits for this operation and indicate if a discharge occurs. If a discharge does occur, it should be included on Schedule A. If a discharge does not occur, a detailed description of how this will be accomplished must be submitted.

RESPONSE: Considering the continuous need for water in numerous mining activities and in coal processing, water management is of the utmost importance to the success of the Pond Creek Mine's need to have adequate water for operations, especially during dry periods. The water management system includes a water circulation system for the preparation plant process water that incorporates mine pumpage to satisfy the incoming water requirement for the operation of the plant thickeners. Fresh water (purchased from Johnston City, IL) is pumped to the property and stored in Pond 005. The water in Pond 005 functions as the source for the underground mine water usage.

The majority of water used at the mine site is required for separating raw coal from rock in the preparation plant. The larger rocks are screened off from the incoming feed to the plant where they are deposited onto the refuse belt. This material is used to construct the refuse impoundment. The fine material ultimately ends at the thickener units. The thickener units attached to the preparation plant require approximately 2,000 gpm of incoming water while in operation. The makeup water required for the thickener units is pumped to the plant from the Fresh Water Lake. The underflow from the thickeners is then pumped to the impoundment. Over time, the fine solid particles settle to the bottom of the impoundment leaving clarified water on the surface. At this point, the clarified water is able to be recycled by pumping it from the impoundment back to the Fresh Water Lake where it can be pumped into the preparation plant and reused in the process. Since the fines do not all settle

immediately, this clarified water is not of sufficient volume to provide the preparation plant with all of its water usage requirements. This water is supplemented with mine infiltration water and/or stormwater collected in the system to provide the entire 2,000 gpm required for the preparation plant operation.

Mine infiltration water is required to be pumped from the underground coal mine to protect the health and safety of the workforce, as well as the overall operation. The current daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2.7 million gallons per day. This water is pumped from the mine to the Fresh Water Lake where it can then be pumped to the preparation plant or to the impoundment where it can be stored. Due to the large consumption of make-up water required for the preparation plant (approximately 2.8 million gallons per day), much of the mine water is consumed in the coal processing operations. Surplus mine water that cannot be utilized in the preparation plant will be stored, either in Refuse Disposal Facility No. 3 or in another approved location, or discharged through an NPDES outlet in accordance with all applicable permits. A more detailed discussion of the mine water infiltration is included in the response to Part III.2.D.

A direct discharge of the process water is not proposed to occur. Both clarified process water and mine infiltration water will be pumped to the Fresh Water Lake. The Fresh Water Lake has an emergency overflow structure that discharges into Pond 006. The clarified process water will be pumped with a manually controlled pump in which water can be sent to the Fresh Water Lake as needed for plant makeup water or the water can be temporarily stored in the impoundment. Since the mine infiltration water is pumped out of the mine with turbine pumps that cycle automatically based on the dewatering need at their respective underground locations, an automatic control system will be installed to ensure a direct discharge of this water does not occur. A float system will be installed in the Fresh Water Lake that will indicate the water elevation in the Fresh Water Lake with respect to the emergency spillway elevation that flows into Pond 006. Once the pool elevation gets within one foot of the spillway elevation, the float will activate and send a signal to automatically shut off the mine infiltration water flow. Once this automatic valve is shut, head pressure in the pipeline will send the mine infiltration water to the impoundment to be temporarily stored. In order to prevent unintended discharges from the Fresh Water Lake into Pond 006, an audible alarm will be installed on the system that will notify personnel if the valve actuator malfunctions and remains in the open position during an intended cycle. The alarm will sound in the preparation

plant control room. If the alarm is sounded, the system will be immediately checked for proper functionality. A manual shutoff valve in the line will be used to turn the mine infiltration water flow into the Fresh Water Lake off until the system can be restored. While a discharge of the preparation plant process water is not proposed, the mine infiltration water may eventually be discharged through an NPDES outlet as long as it is in accordance with all applicable permits.

3) What safeguards are provided to prevent the discharge of slurry fines and untreated slurry water during emergency situations (e.g. power outages, mechanical equipment breakdown, plant shutdowns, etc.)? Also indicate where the slurry would go by gravity flow in the event of an emergency discharge, and the environmental impact this would have.

RESPONSE: If a power outage or mechanical equipment breakdown occurs, the fine coal refuse would be contained inside the adjacent preparation plant pipelines and equipment or emptied into the thickener. Fine coal refuse could be temporarily placed in sediment control structures where it could potentially flow by gravity. If so, Williamson Energy maintains pumps, which are powered by diesel generators. These pumps can be used to pump the fine coal refuse into the impoundment.

7) Surface Drainage Control

A) 1) Locate on the mining operations map or on a separate drainage map all proposed drainage control systems. Show drainage patterns of all affected mining areas.

RESPONSE: Refer to Map 6 S.F. Operations Plan Map.

2) Will all surface drainage from the affected mining area be collected and treated prior to leaving the permit area?

Yes _____ No ___X____

If yes, delineate how and where surface drainage will be collected and treated, and list permit numbers and type of permit that the drainage control systems are operated under. If above answer is no, explain how regulatory compliance will be achieved without treatment, i.e., address the requirements of Section 1817.46(e).

second quarters of 2014. Excepting only GW-8R which was dry during the third and fourth quarter 2013 sampling events, all other wells were recorded as having water present for sampling during the year.

Based upon this suite of groundwater analyses, the pH of these wells was characteristically circum-neutral, with the highest pH in the data set measuring 7.5 and the lowest 6.6. As would be expected from that pH range, the groundwater has considerably higher alkalinity in comparison to acidity. Alkalinity ranged from a high of 800 to a low of 190 mg/L; and, acidity spanned from <10 up to 150 mg/L. Hardness is very high in all samples, with a low of 292 and high of 3800 mg/L. Total dissolved solids (TDS) and sulfates were also characteristically high to very high, with TDS spanning between a low of 638 and high of 5736 mg/L and sulfates between a low of 284 and high of 3730 mg/L. Total iron was variable even on an intrawell basis, with same-well concentration ranging from below the method detection limit to a high of 3.072 mg/L in GW-14 during the year. Other wells too exhibited notable iron concentration fluctuations. Total manganese likewise exhibited variable intrawell concentration, along with considerable variability between wells. Both the sampling events where water was present in well GW-8R exhibited high total manganese, with reporting of 7.107 and 9.124 mg/L. In the other wells, total manganese values spanned from below the method detection limit up to 8.630 mg/L. In collective consideration of the aforementioned parameters and concentrations, the existing shallow groundwater quality on/near proposed RDA No. 3 is regarded to be poor.

A groundwater monitoring program will be in place during facility operations and following closure of the facility. This system of monitoring wells is intended to detect facility impacts on the uppermost aquifer. Detection and confirmation of potential facility impact will promulgate an investigation and assessment of the impact. If facility operations are confirmed to be the cause of the impact, operations are to be modified and/or remediation is to occur, if warranted.

As part of the underground mining operation, native groundwater is produced from overlying sandstone units, allowing this water to infiltrate into the mine (mine infiltration water). The majority of the mine infiltration water is believed to be coming from the Anvil Rock or Gimlet Sandstone units. The vertical stratigraphic interval between the Herrin No. 6 Coal Seam roof and the base of the Anvil Rock Sandstone varies between approximately 10 feet and 60 feet. The unit is normally discontinuous and is commonly thin with thicknesses within the mining area ranging between 0 feet thick to a very rare excursion thickness of 48 feet. As would be expected, the smallest vertical intervals between the seam roof and base of that sandstone characteristically occur at those few locations where the Anvil Rock Sandstone attains its greater thickness. During longwall panel extraction the caved zone above the mined panels most likely extend into the Anvil Rock Sandstone horizon. The Anvil Rock Sandstone is normally discontinuous, and it does not have a significant potential to be a hydrostratigraphic unit that provides water sufficient for consideration as an aquifer. As even further evidence of this assertion, the inventory of groundwater users within the area has identified no water supply well penetrating down into or anywhere in close proximity above the Anvil Rock Sandstone horizon.

The vertical stratigraphic interval between the Herrin No. 6 seam roof and the base of the Gimlet Sandstone varies between approximately 78 and 131½ feet, and averages 103 feet. This sandstone characteristically appears shortly above the top of the Piasa Limestone. However, in a few locations it seems that this sandstone truncates the Piasa Limestone and

may extend to depths approaching 15 feet below the base of the Piasa horizon. The locations at which these very infrequent and localized occurrences are evident are where the Gimlet Sandstone attains its greatest thickness. Potentially, these localized thicknesses may be indicative of relict sandstone channel deposits.

The typically thin sandstone deposition, the occurrence of multiple sandstone/shale interbeds, the lack of lateral continuity of sandstone bedding across the focus area, and the very localized presence of any areas of appreciable sandstone thickening are not conducive for portraying the Gimlet Sandstone as having potential to be a hydrostratigraphic unit that may provide water sufficient for consideration as an aquifer. The inventory of groundwater users within the general area has identified only one well as potentially penetrating down near the Gimlet Sandstone horizon. That well, reported to be 350 feet deep, is envisioned to have only been drilled to such a depth in order to provide additional reservoir storage either because the well yield was low or else the owner wanted to attempt further measures toward increasing general storage capacity. The water well use for this well is "Gardening", and the primary water supply for the residents is denoted as being from a public water source.

It is necessary to remove the water from the mine to protect the health and safety of the workforce, as well as the overall mining operation. The mine infiltration water is from a saline zone and the chloride and sulfate content of this water typically exceeds the water quality standard allowed to be discharged into receiving waters. The chloride concentration values of the mine water range between 2,149 mg/L and 5,198 mg/L depending on location. The average chloride concentration of the samples taken is 3,678 mg/L. The sulfate values range between 1,260 mg/L and 3,850 mg/L. The average sulfate concentration of the samples taken is 2,516 mg/L. The mine has recently experienced a total surplus of water due to the infiltration water. This is most likely due to the fact that the active mining district is currently in the area in which the Anvil Rock Sandstone and/or the Gimlet Sandstone has the greatest thickness and closest proximity to the coal seam. Therefore, this water must be properly managed onsite through a water management system. The current daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2.7 million gallons per day. Due to the large consumption of make-up water required for the preparation plant (2.8 million gallons per day), much of this water is consumed in coal processing operations. This water is pumped from the mine to the surface where it is then pumped to the preparation plant. Surplus mine water that cannot be utilized in the preparation plant will be stored, either in Refuse Disposal Facility No. 3 or in another approved location, or discharged through an NPDES outlet in accordance with all applicable permits. Given all of the above, the operation is adequately designed to minimize material damage to the hydrologic balance within the permit and adjacent areas, and to prevent material damage to the hydrologic balance outside the permit area.

<u>Cumulative Hydrogeologic Impact Area</u> – The cumulative impact area (CIA) is defined as the area, including the proposed permit area, within which impacts resulting from the proposed mining operation may interact with the impact of all anticipated mining on surface and groundwater systems. The Cumulative Impact Area (existing and proposed) is broken down into two areas as shown on Drawing No. B12-271-E16 entitled "Cumulative Impact Areas – Permits 375 and 417".

- **Area No. 1 is the area permitted for Permit 417 and is 229.78 acres.**

RESPONSE TO COMMENT NO. 11

E) Sediment pond Design:
NPDES
MSHA#
Total Drainage Area (Acres)
Total Disturbed Drainage Area (Acres)
Total Calculated Inflow From Design Storm (AC-FT)
Sediment Storage Volume (AC- FT)
Total Volume Below Primary Spillway Elevation (AC-FT)
Total Volume Below Emerg. Spillway Elevation (AC-FT)

NPDES	MSHA #	Total Drainage Area (ac.)	Total Disturbed Area (ac.)	Total Calculated Inflow from Design Storm (ac-ft)	Sediment Storage Volume (ac-ft)	Total Volume Below Primary Spillway (ac-ft)	Total Volume Below Emergency Spillway (ac-ft)	Embankment Height from Upstream Toe to Emergency Spillway (ft)
009	N/A	274.48	273.09	69.82	27.31	59.04	59.04 *	1.0 **

*** - Basin has single, open-channel spillway.**
**** - Embankment height is from U/S toe to open-channel spillway.**

F) 1) Discuss the design basis for the sediment pond(s) calculations.

Submit calculations used in spillway designs and determination of inflow volume and pond volume.

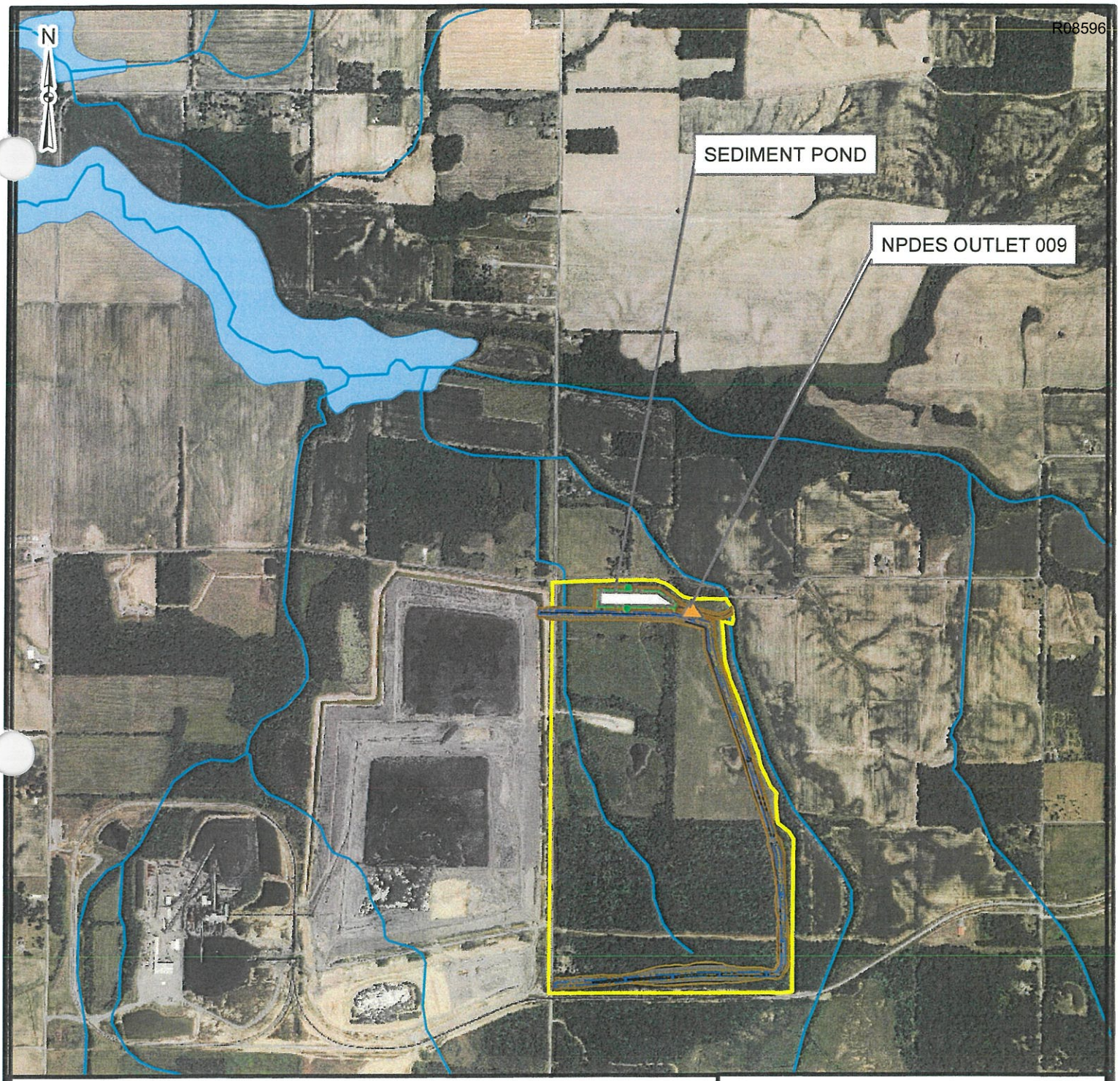
RESPONSE: Refer to the calculations contained in Appendix B of Volume 2 and Attachment IV.5.C.2. Refer to Drawing No. B12-271-M2 entitled, "Surface Drainage Map". The sediment control structure is not in the 100 year flood plain. The permit area and the 100 year flood plain are shown on Drawing No. B08-467-A24 entitled, "Floodplain and Outlet Map".

2) Submit a typical section of the embankment(s), details of the principal and emergency spillways and a plan view of each pond at a scale of 1 inch = 200 ft. or larger showing pond bottom contours and points of inflow.

RESPONSE: Refer to the Plan View and Details for Sediment Pond No. 9 (Drawing No. B12-271-E2) in Volume 2.

3) For all sedimentation ponds provide design information showing compliance with the requirements of 62 Ill. Adm. Code 1817.46. Each plan shall, at

R08596



REFERENCE:
2012 AERIAL IMAGE FROM THE NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) ADMINISTERED BY THE USDA
DATA AVAILIBLE AT: http://datagateway.nrcs.usda.gov/GDGOrder.aspx

SCALE
0 1,000 2,000 4,000 6,000 Feet

Legend

- PERMIT 417 BOUNDARY
- 100 YEAR FEMA FLOODPLAIN

Alliance Consulting, Inc.
Engineers · Constructors · Scientists
124 PHILPOTT LANE
BEAVER, WV 25813
(304) 255-0491

FLOODPLAIN AND OUTLET LOCATION MAP

POND CREEK MINE NO. 1
COAL REFUSE DISPOSAL FACILITY NO. 3
PREPARED FOR
WILLIAMSON ENERGY, LLC.
JOHNSTON CITY, ILLINOIS

DRAWN BY	TJS	03/02/15
CHECKED BY	BAH	03/02/15
APPROVED BY		
DRAWING NUMBER		REVISION NUMBER
B08-467-A24		1

RESPONSE TO COMMENT NO. 12

Response to Comment No. 7 – A four foot clay liner with a permeability of 1x10-7 will be placed in all areas onto which coal refuse will come into contact. These areas include the refuse disposal area, the sedimentation pond and the sediment ditches. The clay will be thoroughly compacted to achieve the permeability specification. A quality assurance quality control plan has been included as Attachment No. IV(6)(D).

Response to Comment No. 8 – A detailed design of a low permeability cover has been provided on Drawing No B12-271-A14. The HELP Model has been used to demonstrate the ability of the cover to limit infiltration.

Response to Comment No. 9 – Additional pumping rates and volume of water information has been added to Part IV(6)(J)(2) and Part III.2.D.

Response to Comment No. 10 – Water Handling Plan information has been added to Part IV(6)(J)(2) and Part III.2.D.

Response to Comment No. 11 – The sediment pond is not in the 100-year flood plain. The permit area and 100 year flood plain are shown on Drawing No. B08-467-A24 entitled "Floodplain and Outlet Location Map".

Response to Comment No. 12 – In Volume II "MSHA Submittal Plan", Figure No. 4 (Drawing No. B12-271-M5) and Figure No. 7 (Drawing No. B12-271-M13) Pond No. 1 text has been changed to Pond No. 9.

Response to Comment No. 13 – An additional well installed near the center of the south side of Refuse Disposal Area No. 3 will not likely provide any groundwater water information. The railroad and the associated ditches located south of the proposed refuse area were constructed into bedrock to maintain the required railroad grade. Pond No. 9/Sediment Ditch adjacent to the proposed refuse area is proposed to be constructed into bedrock to maintain positive drainage of the ditch. As required to protect the groundwater hydrology, a clay liner will be installed beneath the ditch. It would appear that any groundwater movement from the south to the north along the soil/bedrock interface would be intercepted by the railroad ditches and the proposed clay liner would prevent groundwater movement to a well in the suggested location. Therefore, an additional groundwater well has not been incorporated into the permit application.



DOCUMENT

46

Twait, Scott

From: Twait, Scott
Sent: Wednesday, December 09, 2015 4:39 PM
To: Stitely, Joe; Ward, Iwona
Cc: Mosher, Bob (Bob.Mosher@Illinois.gov)
Subject: Williamson Energy - Pond Creek Mine

Joe,

I am sorry that it took so long to review the request that you sent September 30th. I thought it was an antidegradation review, but it was a Subtitle D permit application. They are not proposing to discharge from the Refuse Disposal Facility at this time. My understanding is that they will be applying for an NPDES permit before it starts to discharge. In the transmittal letter you asked "Is this submittal acceptable to what was agreed upon in your previous meeting?" The Subtitle D application has lots of stuff that we did not talk about, such as thickness of clay liners, QA/QC, etc. However, this application is in line with what we discussed at the previous meeting; the site location was adjacent to the existing RDA, the facility would construct a basin for water storage that would allow the facility to operate in such a manner that there was no discharge, and that the new RDA would be designed such that it would be able to be permitted under the Subtitle D permit.

If you have any questions, please let me know.

Scott

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM

DATE: September 30, 2015

TO: Bob Mosher

FROM: Joe Stitely

SUBJECT: Williamson Energy, LLC – Pond Creek Mine No. 1
NPDES Permit No. IL0077666
IEPA Log No. 3403-15
Permit Application for Refuse Placement at Refuse Disposal Facility No. 3

Attached please find a copy of information from the application for Refuse Placement Disposal Facility No. 3. This project was previously discussed in Springfield by the Applicant in a power point presentation title "Pond Creek Mine Management Challenges and Solutions." Is this submittal acceptable to what was agreed upon in your previous meeting? The Applicant has also indicated that they would like to meet with you again to discuss the proposed project for approval of a Subtitle D permit. If additional information is needed you may obtain such information directly from the Applicant. The Applicant's name and address is included in the attached documentation.

Thank you.

RECEIVED
OCT - 1 2015
shed Management Section

Let Thad know when it gets closer

Big Muddy Mining Zone

Table 1. Summary of Potential Discharges to Middle Fork Big Muddy River

		Middle Fork Big Muddy River Flows Predicted in Drainage Basin (cfs)		Maximum Allowable Discharge at Peak Flow in Stream		Discharge Allowed based on 24-Hour Average Stream Flow
	Rainfall Amount	Peak Drainage Basin Flow	Average Discharge 24 hours	(cfs)	(gpm)	(gpm)
6-hr Storm	0.5"	4,165	1,494	262	117,382	42,104
	1.0"	4,915	1,848	309	138,498	52,067
	1.5"	5,459	2,217	343	153,829	62,484
	2.0"	5,869	2,666	369	165,398	75,137
	2-yr (2.4")	6,134	3,043	385	172,863	85,762
	2.5"	6,198	3,149	389	174,681	88,742
	5-yr (2.98")	6,437	3,603	404	181,416	101,551
	3.0"	6,451	3,633	405	181,799	102,379
	10-yr (3.45")	6,912	4,067	434	194,777	114,623
	25-yr (4.11")	9,528	4,731	598	268,520	133,320
	50-yr (4.66")	11,765	5,293	739	331,548	149,153
	100-yr (5.22")	14,204	5,882	892	400,300	165,760
24-hr Storm	0.5"	0	0	0	0	-
	1.0"	119	42	7	3,354	1,191
	1.5"	691	238	43	19,462	6,701
	2.0"	1,507	515	95	42,467	14,510
	2.5"	2,413	826	152	67,997	23,275
	3.0"	3,426	1,215	215	96,556	34,234
	2-yr (3.37")	4,186	1,504	263	117,957	42,387
	5-yr (4.18")	5,976	2,178	375	168,413	61,385
	10-yr (4.84")	7,582	2,798	476	213,681	78,855
	25-yr (5.76")	9,809	3,650	616	276,425	102,860
	50-yr (6.51")	11,693	4,385	734	329,538	123,581
	100-yr (7.29")	13,653	5,161	857	384,757	145,436

Note: The Maximum Discharge allowable is based on the more stringent standard. In this case, it is the chloride standard.

Based on 100% mixing.

Should only get 25% of receiving stream.

R08603

Twait, Scott

From: Mosher, Bob
Sent: Monday, April 27, 2015 9:10 AM
To: Twait, Scott
Subject: FW: Segments IL_N-06 and IL_NG-02

Bob Mosher
Manager, Water Quality Standards Section
Division of Water Pollution Control
Illinois Environmental Protection Agency
1021 North Grand Ave. East
P.O. Box 19276
Springfield, IL 62794-9276
217/558-2012

From: Muir, David
Sent: Thursday, April 23, 2015 12:01 PM
To: Mosher, Bob
Cc: Johnson, Kent A.
Subject: Segments IL_N-06 and IL_NG-02

The current aquatic life assessment for IL_N-06 was made in 2010 based on data collected at station N-06 in 2008 from the INTB and AWQMN programs. The fish IBI score was 36, the Bug IBI score was 17.7. The listing of sedimentation/siltation as a cause of impairment was based on field observations on 8/20/08 of 66% bottom coverage of silt and an average depth of silt of 12 inches.

The current aquatic life assessment for IL_NG-02 was made in 2010 based on INTB data collected at NG-05 in 2008 and from AWQMN data collected at NG-02 from 2006-2008. The fish IBI score was 30, the Bug IBI score was 25. Chloride was listed as a cause of impairment based on a single exceedance of the chloride standard (1420 mg/L) collected at NG-05 on 7/24/2008.

If you have any other questions regarding these two assessments let me know.

David Muir
Illinois EPA
Marion Regional Office
618-993-7200

R08605

Illinois
Department of
Natural Resources

http://dnr.state.il.us

One Natural Resources Way, Springfield, IL 62702-1271

CONSULTATION AGENCY ACTION REPORT

(Illinois Administrative Code Title 17 Part 1075)
Division of Resource Review and Coordination

Date submitted: 5-9-05
If this is a resubmittal, include previous IDNR response if available.

FOR DEPARTMENT USE ONLY
PROJCODE: 0504253
Date Due: 6-8-05

Applicant Name: IEPA
Contact Person: Scott Twait
Applicant Address: 1021 N. Grand East
Springfield, Illinois 62702
Phone:
Fax:
E-mail:

LOCATION OF PROPOSED ACTION
A MAP SHOWING LOCATION OF PROPOSED ACTION IS REQUIRED
Project Name: Pond Creek Mine #1 County: Williamson
Project Address (if available):
City, State, Zip:
Township/Range/Section (e.g. T45N,R9E,S2): 08S 03E Sec 12
Brief Description of Proposed Action: New Coal Mine with eight new outfalls
Projected Start Date and End Date of Proposed Action:

Will state funds or technical assistance support this action? [Yes | (No)] If Yes, the Interagency Wetlands Policy Act will apply. Contact the funding agency or this Division for details.

Local/State Agency with Project Jurisdiction: Same as above
Contact:
Address:
Phone:
Fax:
E-mail:

FOR DEPARTMENT USE ONLY
Are endangered/threatened species or Natural Areas present in the vicinity of the action? [YES (NO)]
Could the proposed action affect the threatened/endangered species or Natural Area? [YES (NO)]
Is consultation terminated? [(YES) NO]
Comments:

Evaluated by:
Michael R. Brandt
Division of Resource Review and Coordination (217) 785-5500
Date: 6-8-05

Visit our website at http://dnr.state.il.us/orep/nrrc/aar.htm

********** -COMM. JOURNAL- ********** DATE JUN-23-2005 ****** TIME 10:32 **********

MODE = MEMORY TRANSMISSION START=JUN-23 10:32 END=JUN-23 10:32

FILE NO.=613

STN NO.	COMM.	ONE-TOUCH/ ABBR NO.	STATION NAME/TEL NO.	PAGES	DURATION
001	OK		916189971281	002/002	00:00:22

-IEPA BOW -

********** - ****** - 217 785 1225- **********

PLEASE DELIVER THIS FAX TO:

Larry Crislip

Fax #: 618-997-1281

From: Scott Twait

Date: 23 June 2005

Number of Pages (Including Cover Sheet): 2

Message:

Larry,

Attached is the consultation report sent by IDNR. Normally, I would indicate in my assessment that IDNR terminated the consultation, but, since this is on public notice, I am faxing it to you to put in the file.

If you have any questions or comments, please let me know.

Scott

Illinois EPA - Bureau of Water
1021 North Grand Avenue East
Springfield, Illinois 62702

Water Quality Standards Unit
Phone # 217/558-2012
FAX # 217/782-5549

PLEASE DELIVER THIS FAX TO:

Larry Crislip

Fax #: 618-997-1281

From: Scott Twait

Date: 23 June 2005

Number of Pages (Including Cover Sheet): 2

Message:

Larry,

Attached is the consultation report sent by IDNR. Normally, I would indicate in my assessment that IDNR terminated the consultation, but, since this is on public notice, I am faxing it to you to put in the file.

If you have any questions or comments, please let me know.

Scott

Illinois EPA - Bureau of Water
1021 North Grand Avenue East
Springfield, Illinois 62702

Water Quality Standards Unit
Phone # 217/558-2012
FAX # 217/782-5549

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276, 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601, 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

Memorandum

Date: 20 May 2005

To: Larry Crislip

From: Scott Twait ST

Subject: Steelhead Development Co. L.L.C. - Pond Creek Mine No. 1
Antidegradation Assessment
NPDES Permit No. IL0077666 (Williamson County)

The subject facility has applied for an NPDES permit for a new underground coal mine. The facility will contain a processing plant, coal stockpiles, refuse disposal areas, railroad loop, and support areas. The new discharges are South of Pond Creek. An unnamed tributary will receive all eight (8) of the proposed effluents. Outfalls 001, 002, 003, 004, and 005 will be classified as alkaline mine drainage. Outfalls 006, 007, and 008 will be classified as acid mine drainage. Pond 006 (outfall 006) will also receive underground pumpage.

Identification and Characterization of the Affected Water Body.

The subject facility discharges to an unnamed tributary of Pond Creek at a point where 0 cfs of flow exists upstream of the outfall during critical 7Q10 low-flow conditions. The outfalls are located between two miles and seven miles from the confluence of the tributary and Pond Creek. The unnamed tributary of Pond Creek is classified as a General Use Water. Neither the unnamed tributary of Pond Creek or Pond Creek itself are rated under the Agency's Biological Stream Characterization (BSC) program. The unnamed tributary of Pond Creek, tributary to Waterbody Segment, NG-02, is not found on the 2004 Illinois 303(d) List. However, Pond Creek itself, Waterbody Segment, NG-02, is found on the 2004 Illinois 303(d) List. The uses impaired for this segment were aquatic life and primary contact (swimming). The potential causes of impairment given for the segment were copper, manganese, pH, sedimentation/siltation, dissolved oxygen, physical habitat alterations (streams), total fecal coliform bacteria, and total suspended solids (TSS). The potential sources associated with the impairment are agriculture, crop related sources, non-irrigated crop production, resource extraction, surface mining, petroleum activities, hydrologic/habitat modification, channelization, and source unknown.

The Illinois Natural History Survey does not list the unnamed tributary of Pond Creek or Pond Creek itself as biologically significant streams according to the 1992 publication *Biologically Significant Illinois Streams*. The IDNR WIRT system indicates that no threatened or endangered species of aquatic life are present.

Identification of Proposed Pollutant Load Increases or Potential Impacts on Uses.

The parameters of concern for alkaline discharges are total suspended solids, iron (total), pH, alkalinity, acidity, sulfates, chlorides, and settleable solids. In addition, the acid mine discharges will have manganese added. The applicant has estimated that effluent water quality will meet water quality standards for all parameters. Suspended solids should settle in the sedimentation pond to a substantial degree before the storm water is released to the receiving stream. The concentration of suspended solids in the effluent should be no greater than runoff from the existing land use of the property. Some iron should settle with the solids. The pH related parameters should not be a problem, however, neutralization of the effluent is available if necessary.

Fate and Effect of Parameters Proposed for Increased Loading.

Whatever suspended solids remain in the effluent after settling in the treatment pond would be expected to behave in a manner similar to the existing soil particles in runoff from the site. The other substances in the discharge will tend to persist in stream water except when taken up by living organisms. Since water quality standards are predicted to be met in the effluent, and will be regulated at the water quality standards in the permit, no adverse impact is expected in the receiving waters.

Manganese is listed in the Illinois 2004 303(d) List as a potential cause of the impairment noted for segment NG-02 of Pond Creek. As no other potential sources of manganese are listed other than surface mining and petroleum activities, it is believed that pre-law mining operations are responsible for occasional violations of the 1 mg/L water quality standard for manganese. Recent manganese data from the NG-02 monitoring station was compared to total suspended solids (TSS) data taken at the same date and time. TSS is an indicator of stream flow, i.e., when flow is high, TSS is generally higher than when the stream flow is lower. It was found that samples exceeding the water quality standard were collected when TSS, and therefore stream flow, was lower than were flows when manganese did not exceed the standard. This corroborates the theory that abandoned mines are the sources of the manganese problem since these unregulated mine discharges occur even during dry periods. The discharge from the new mine will not contain manganese at concentrations above the water quality standard, moreover, the applicant will manage the water level in Pond 006 so that a discharge will only occur during wet weather events when the stream does not have a history of exceeding the standard. The new discharges should not exacerbate the manganese impairment of Pond Creek, as no net loading of manganese will occur during low stream flow conditions.

Purpose and Anticipated Benefits of the Proposed Activity.

The purpose of this project is to allow a new mine to be opened. The benefits of this project are employment in the local community and provision of an energy supply for the state and region.

Assessments of Alternatives for Less Increase in Loading or Minimal Environmental Degradation.

The use of sedimentation ponds is the generally accepted practice to control suspended solids and associated pollutants in runoff.

Very little pumpage is expected in the development of the underground works. The water level in Pond 006 will be managed to prevent a discharge in dry weather.

Summary Comments of the Illinois Department of Natural Resources, Regional Planning Commissions, Zoning Boards or Other Entities

IDNR has received a copy of the application and will also have the opportunity to review the public notice and fact sheet containing this assessment. Any comments by IDNR or other entities received prior to the end of the public notice period will be reviewed after the public notice period and appropriate responses will be made at that time.

Agency Conclusion.

This assessment was conducted pursuant to the Illinois Pollution Control Board regulation for Antidegradation found at 35 Ill. Adm. Code 302.105 (antidegradation standard). We find that the proposed activity will result in the attainment of water quality standards. All existing uses will be fully protected. All technically and economically reasonable measures to avoid or minimize the extent of the proposed increase in pollutant loading have been incorporated into the proposed activity. This activity will benefit the community at large by providing jobs for the community and providing energy for the state and region. The proposed activity is therefore compliant with the Antidegradation standard.

CC: Bob Mosher
Byron Marks
Ron Morse
Chron

R08611

Ave. TSS when Mn < 1000
= 61.6 / 3 = 20.5 exclude 2 highest

Ave. TSS when Mn > 1000
= 200/11 = 18.2

key	MANGANESE	MANGANESE	SOLIDS, F	PctDiff
B00137800	1500	1700	9	12
B00341000	550	570	12	4
B00532300	520	540	13	4
B00758100	1600	1600	21	0
B00848600	NG	02 6,	25	
B00886900	NG	02 6,	22	
B00945000	NG	02 6,	18	
B00990800	NG	02 6,	51	
B00992300	480	550	36	13
B01038100	NG	02 6,	346	
B01064900	NG	02 7,	2	
B01148300	NG	02 7,	9	
B01195400	NG	02 7,	9	
B01215000	NG	02 7,	11	
B01243100	570	600	16	5
B01277900	NG	02 7,	9	
B01486800	820	870	15	6
B01579300	NG	02 9,	28	
B01649200	NG	02 9,	15	
B01649300	NG	02 9,	13	
B01692300	NG	02 9,	35	
B01736400	NG	02 9,	9	
B01829300	640	640	6	0
B02191500	350	370	11	5
B10163200	280	300	17	7
B10345800	240	290	65	17
B10570700	15	100	19	85
B10692500	1100	1100	10	0
B11317200	750	800	22	6
B11649400	850	910	35	7
B11970100	780	800	14	2
B12160800	490	520	4	6
B12338100	240	270	27	11
B20255100	400	420	20	5
B20462200	110	380	293	71
B20791600	350	450	25	22
B21006300	990	1000	14	1
B21462800	1100	1100	17	0
B21808100	2900	3000	17	3
B22055600	500	520	30	4
B22240200	4300	4700	17	9
B30055600	370	360	10	-3
B30310900	200	200	11	0
B30636700	590	620	19	5
B30845100	560	630	37	11
B30938400	93	670	1230	86
B31202700	510	540	18	6
B31884200	3900	4000	33	2
B32027300	94	110	6	15
B40141200	350	380	12	8
B90021200	650	710	21	8
B90165200	300	350	20	14
B90522400	450	520	12	13
B90633200	490	530	26	8
B90978700	1600	1600	24	0
B91412900	700	810	37	14

B91706000	3000	3200 [redacted]	16	6
B91941400	1000	1100 [redacted]	22	9

R08613

Scott Twait - Re: NG-02 Manganese impairment

From: David Muir
To: Shasteen, Scott; Smogor, Roy; Twait, Scott
Date: 5/19/2005 3:16 PM
Subject: Re: NG-02 Manganese impairment

There is not surface mining (old or new) in the watershed of Pond Creek that I'm aware of. There could be some small older underground mines that had some discharges in the wateshed. There is a lot of oil wells in the watershed, but I doubt that this provides much manganese to the creek. Mostly, I think soils in the area are naturally high in manganese, but I can't say what is the source of manganese in the water.

>>> Roy Smogor 05/19/05 2:27 PM >>>
Dave or Scott,

Might you have any insights for Scott T. ? Thanks.

For segment NG-02 in our 2004 305(b) report, Aquatic Life Use is impaired due to manganese and copper (among other causes). Sources listed for these two parameters are: Surface Mining and Petroleum Activities.

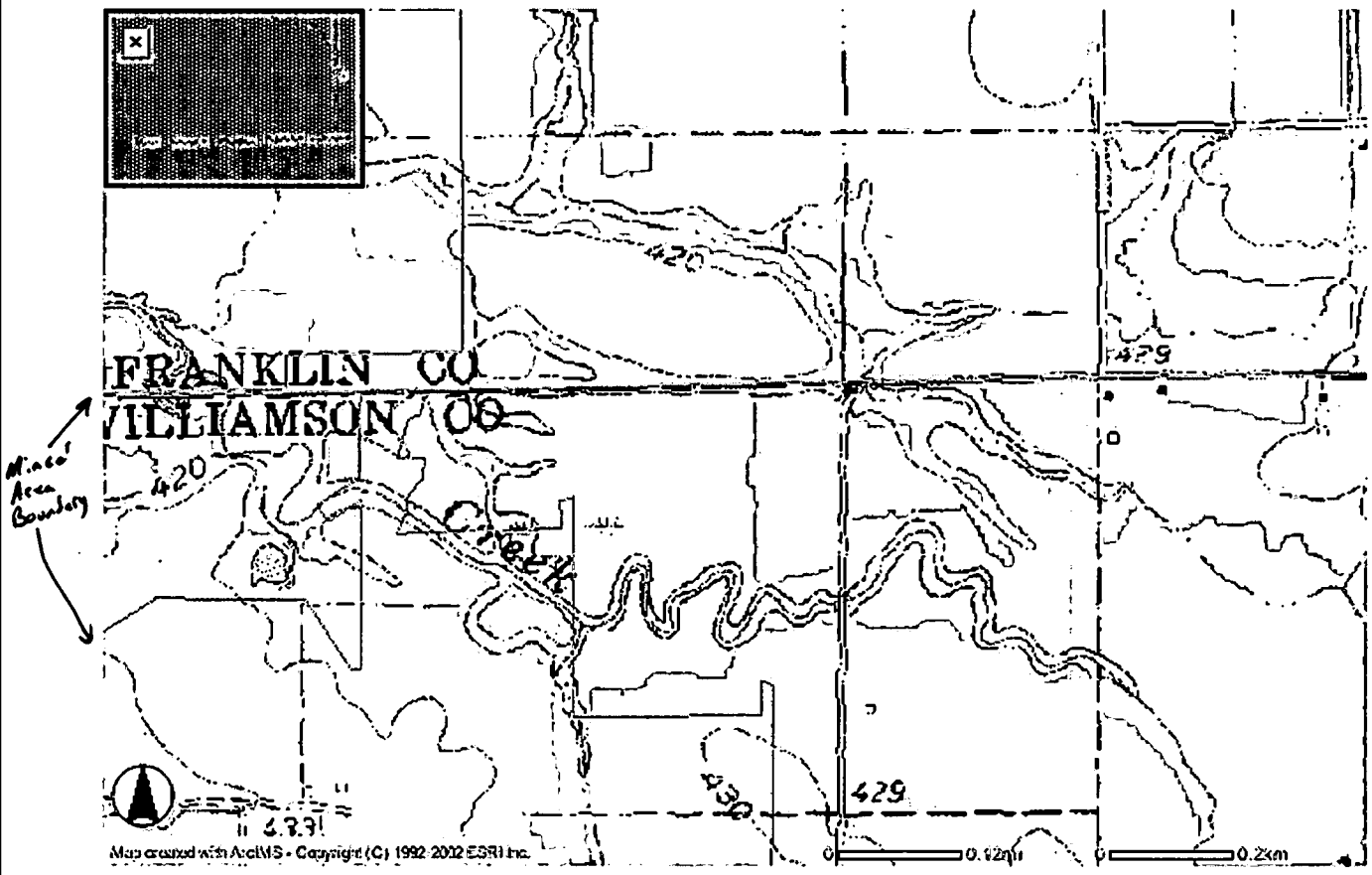
Roy

>>> Scott Twait 05/19/05 2:07 PM >>>
Roy,

Who would I talk to in order to find out the source of the Manganese impairment of Pond Creek (NG-02)? I would like to find out if it is from prior mining (pre-law) or an existing facility.

Thanks,
Scott

I investigated the IDNR mining areas and determined that most of Pond Creek is not influenced by mining. However the [redacted] most downstream areas, including, AWQMN station NG-02 is within [redacted] mining boundaries.



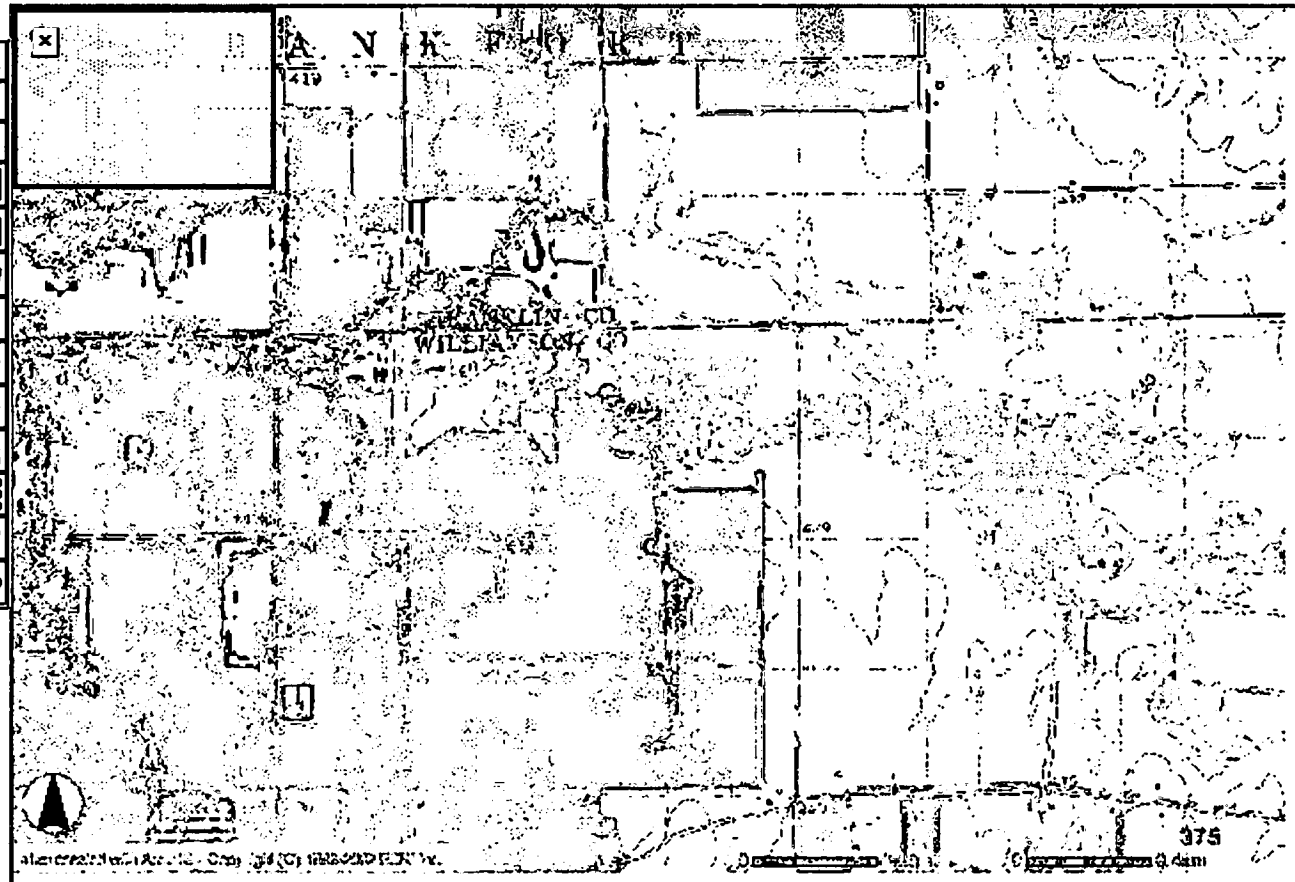
Mined Area Boundary

R086144

Illinois Department of Natural Resources
Office of Mines & Minerals
Land Reclamation Division

ArcIMS Illinois Coal Mine Permit Viewer

Select Permit Number | HELP ? | Zoom Out



Refresh Map

Layers

Visible Active

- [x] (•) Coal Mine Permit Boundaries for the Permanent Program
- [ ] ( ) Ground Water Monitoring Wells
- [x] ( ) SGS Surface Mined Areas - Incomplete
- [x] ( ) SGS Underground Mined Areas circa 2004
- [ ] ( ) Affected Acres
- [ ] ( ) Bond Release Phase 1
- [ ] ( ) Bond Release Phase 2
- [ ] ( ) Bond Release Phase 3
- [ ] ( ) Incremental Bonding
- [ ] ( ) Soil Capability
- [ ] ( ) Post-Mining Land Use
- [ ] ( ) PLSS - Twp, Range, Section
- [x] ( ) County Boundaries
- [ ] ( ) 100 + 500 yr Floodzones for Unincorporated Areas
- [ ] ( ) NWI Wetlands
- RMP Digital Plat

R08615

RECEIVED
APR - 2 2005
Watershed Management Section
BUREAU OF WATER

Memorandum

To: Bob Mosher, Standards Development Unit

From: Larry D. Crislip, Manager, Permit Section, MPCP LDC

Date: April 29, 2005

Re: Anti-Degradation Analysis for New Outfalls
Steelhead Development Company, L.L.C. – Pond Creek Mine No. 1

Analysis Needed:

☐ Ammonia Current Limits (avg./max.): summer: _____ mg/L
winter: _____ mg/L

☐ Reasonable Potential Analysis

☐ Toxicity Recommendations

☒ Anti-degradation Current DAF/DMF: _____ MGD
Proposed DAF/DMF: _____ MGD

☒ 303(d) Listing for Receiving Water ☒ BCS Rating for Receiving Water

NPDES Permit No. IL0077666 County: Williamson

Facility Name: Pond Creek Mine No. 1

NPDES Permit Expiration Date: New NPDES Permit Application

Receiving Water: Unnamed tributaries to Pond Creek

Comments: A new underground mine is proposed where there has been no previous mining. The facility will contain a processing plant, coal stockpiles, refuse disposal areas, railroad loop, and support areas. The effluent from all eight outfalls is estimated to meet water quality standards at all times.

Pond Creek
Nos. 02
listed

A draft NPDES permit is being written for the above mentioned facility. Please evaluate the receiving stream with regards to the biological stream characterization and 303(d) list by completing the following:

Type of Discharge: Sedimentation pond discharge. Discharge Nos. 001, 002, 003, 004 and 005 will be classified alkaline mine drainage. Discharge Nos. 006, 007 and 008 will be classified acid mine drainage. Pond (Outfall) 006 will also receive underground pumpage.

Design Flow: See table.

Outfall No.	**25 yr, 6 hr Discharge cfs**	**10 yr, 24 hr Discharge cfs**
001	54.01	113.01
002	13.46	25.80
003	5.91	8.52
004	8.12	13.95
005	96.73	178.98
006	25.18	35.35
007	109.62	106.68
008	44.51	66.38

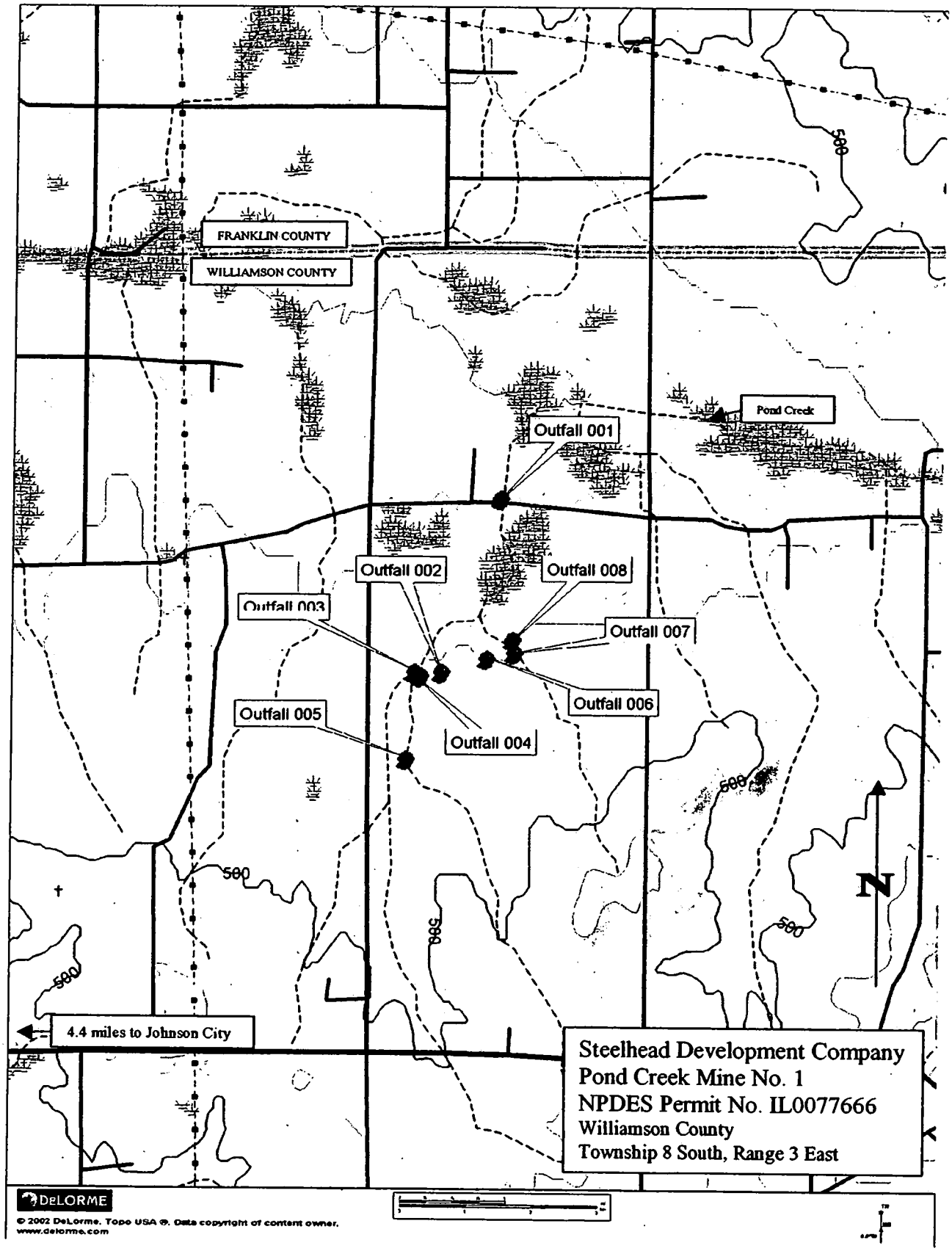
Effluent Parameters: For alkaline discharges: Total Suspended Solids, Iron (total), pH, Alkalinity, Acidity, Sulfates, Chlorides and Settleable Solids. For acid mine discharges, Manganese will be added.

Outfall	Receiving Stream	Latitude	Longitude	Stream Classification	Biological Stream Characterization
001	Unnamed tributaries to Pond Creek	37°50'59.2"	88°49'37.5"		
002	Unnamed tributaries to Pond Creek	37°50'26.0"	88°49'51.5"		
003	Unnamed tributaries to Pond Creek	37°50'26.0"	88°49'58.0"		
004	Unnamed tributaries to Pond Creek	37°50'25.0"	88°49'56.6"		
005	Unnamed tributaries to Pond Creek	37°50'9.1"	88°50'00"		

006	Unnamed tributaries to Pond Creek	37°50'28.4"	88°49'40.6"		
007	Unnamed tributaries to Pond Creek	37°50'29.5"	88°49'34.0"		
008	Unnamed tributaries to Pond Creek	37°50'31.4"	88°49'33.9"		

The stream segment receiving the discharge from outfall(s) _____ is on the 303(d) list of impaired waters.
The stream segment receiving the discharge from outfall(s) _____ is not on the 303(d) list of impaired waters. The following parameters have been identified as the pollutants causing impairment:

POLLUTANT	POTENTIAL CONTRIBUTORS
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____


FRANKLIN COUNTY
WILLIAMSON COUNTY
Pond Creek
Outfall 001
Outfall 002
Outfall 003
Outfall 004
Outfall 005
Outfall 006
Outfall 007
Outfall 008
500
N
4.4 miles to Johnson City
Steelhead Development Company
Pond Creek Mine No. 1
NPDES Permit No. IL0077666
Williamson County
Township 8 South, Range 3 East
DeLORME
© 2002 DeLorme. Topo USA ®. Data copyright of content owner.
www.delorme.com

From: Bob Kerr
To: Twait, Scott
Date: 5/12/2005 9:44:43 AM
Subject: Re: Crislip's Phone

Talked to Tim Myers (Steelhead Engineer) this morning concerning 006. Fresh water from West Frankfort Lake will be pumped through a 12" pipe to the Freshwater Lake which is tributary to Pond 006. The water level in 006 will be managed to prevent a discharge in dry weather. The water accumulating in this series of ponds should be of good quality. We (MPCP) have to include manganese in the effluent sampling list, because of the definition of the discharge- acid mine drainage. He thought he could live with 1.0 mg/l manganese without problems. The manganese impairment in Pond Creek is very likely due to previous mining. Manganese is a routine parameter, except when acid water treatment is be conducted, which is not planned here. Most ground water pumpage will be through a discharge yet to be proposed or approved through a facility approximately 3 miles away. This facility will be located where the coal is the lowest for gravity drainage. Very little pumpage is expected in the development of the underground works, but he wanted to be able to pump to 006 just in case.

Need anything else?

>>> Scott Twait 05/12/05 9:10 AM >>>
I am working on Pond Creek Mine No. 1, which will have 8 discharge locations that will discharge to an unnamed tributary to Pond Creek. Pond Creek is on the 303(d) list for Manganese (plus other contaminants). I will have to talk to my boss before we allow more Manganese to Pond Creek. I was wondering if you knew the reason that the stream is listed for Manganese. Is it from old mines? Also, is Manganese expected or is it just a routine parameter?

Finally, they have underground pumpage to outfall 006. Will this outfall discharge continuously or only when it rains? If it will discharge during non-stormwater events, what will be the flowrate?

Scott

>>> Bob Kerr 05/12/05 8:57 AM >>>
You left a message on Crislips's phone on Tuesday. He won't be in much today or tomorrow and asked me to find out what you needed.

CC: epa1409

R08621

US Army Corps of Engineers ®

Information Systems and Technology
a Strategic Research Initiative funded by the Illinois Council on Food and Agricultural Research

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Wetland Impact Review Tool Report: Preliminary Checks on NWP Conditions

Critical Resource	Inside Parcel	Buffer	Buffer to account for GIS inaccuracy
100 year Floodplain	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
ADID Wetlands	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Aquatic Life Movements	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Critical Resource Waters	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Downstate Regional Condition #2	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
High Value Subwatersheds	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
National Wetlands Inventory (NWI)	Conflict found	Conflict found within 100 feet	Conflict found within 100 feet
Navigation	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Nature Preserve LWR & NAI	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Public Water Supply Intakes	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Spawning Areas	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Threatened and Endangered Species	NO CONFLICT FOUND	NO CONFLICT FOUND	NO CONFLICT FOUND
Wild and Scenic Rivers			



County: WILLIAMSON. Section (PLSS): 3 8S 3E12.
Watershed (IEPA 818): ILNG02.

Area: 0.29 square miles = 187.192 acres

Mon May 9 11:58:30 CDT 2005

RECEIVED
MAY - 2 2005
Watershed Management Section
BUREAU OF WATER

Memorandum

To: Bob Mosher, Standards Development Unit

From: Larry D. Crislip, Manager, Permit Section, MPCP

Date: April 29, 2005

Re: Anti-Degradation Analysis for New Outfalls
Steelhead Development Company, L.L.C. – Pond Creek Mine No. 1

Analysis Needed:

☐ Ammonia Current Limits (avg./max.): summer: _____ mg/L
winter: _____ mg/L

☐ Reasonable Potential Analysis

☐ Toxicity Recommendations

☒ Anti-degradation Current DAF/DMF: _____ MGD
Proposed DAF/DMF: _____ MGD

☒ 303(d) Listing for Receiving Water ☒ BCS Rating for Receiving Water

NPDES Permit No. IL0077666 County: Williamson

Facility Name: Pond Creek Mine No. 1

NPDES Permit Expiration Date: New NPDES Permit Application

Receiving Water: Unnamed tributaries to Pond Creek

Comments: A new underground mine is proposed where there has been no previous mining. The facility will contain a processing plant, coal stockpiles, refuse disposal areas, railroad loop, and support areas. The effluent from all eight outfalls is estimated to meet water quality standards at all times.

Pond Creek
Non-listed

A draft NPDES permit is being written for the above mentioned facility. Please evaluate the receiving stream with regards to the biological stream characterization and 303(d) list by completing the following:

Type of Discharge: Sedimentation pond discharge. Discharge Nos. 001, 002, 003, 004 and 005 will be classified alkaline mine drainage. Discharge Nos. 006, 007 and 008 will be classified acid mine drainage. Pond (Outfall) 006 will also receive underground pumpage.

Design Flow: See table.

Outfall No.	**25 yr, 6 hr Discharge cfs**	**10 yr, 24 hr Discharge cfs**
001	54.01	113.01
002	13.46	25.80
003	5.91	8.52
004	8.12	13.95
005	96.73	178.98
006	25.18	35.35
007	109.62	106.68
008	44.51	66.38

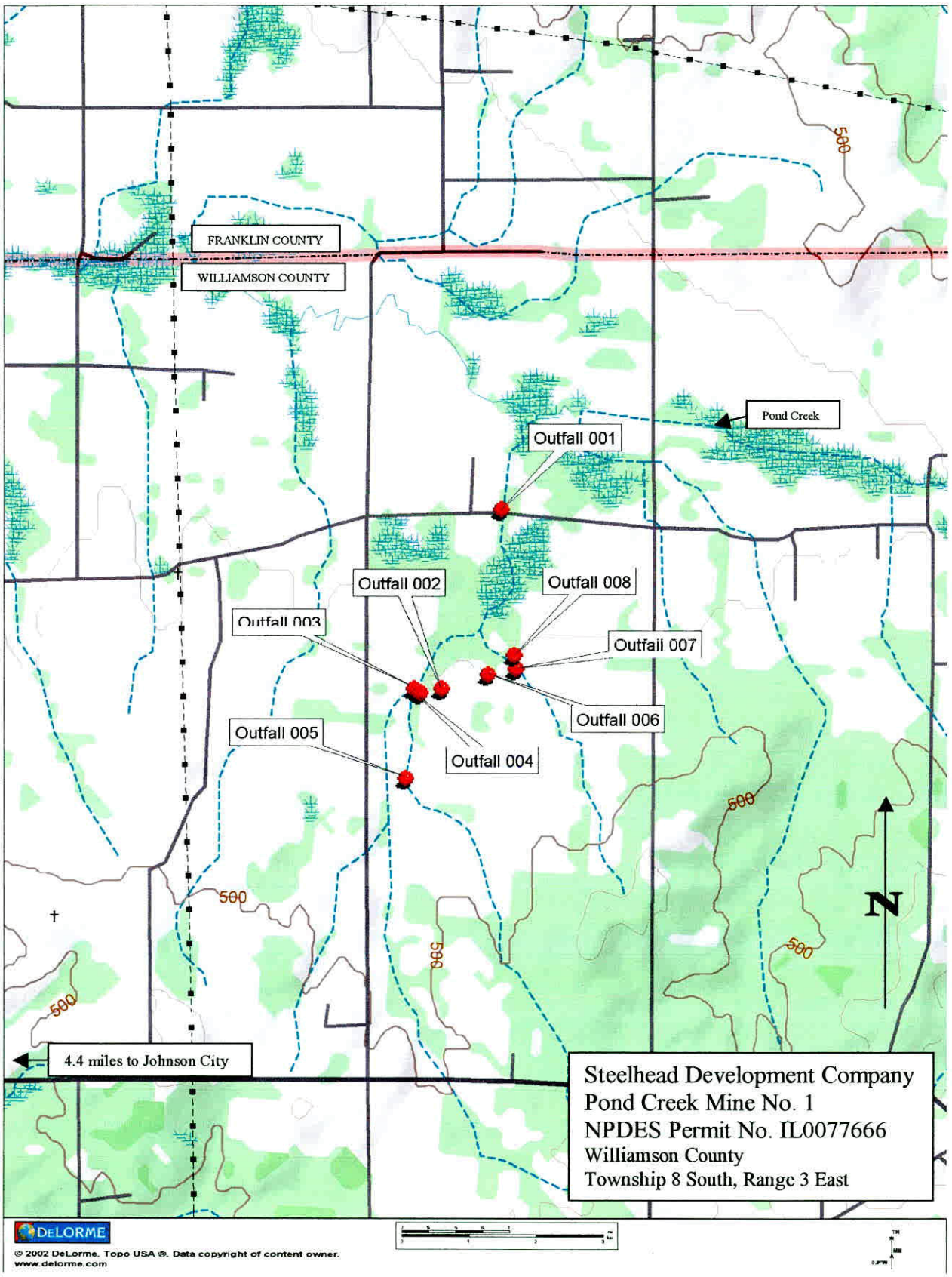
Effluent Parameters: For alkaline discharges: Total Suspended Solids, Iron (total), pH, Alkalinity, Acidity, Sulfates, Chlorides and Settleable Solids. For acid mine discharges, Manganese will be added.

Outfall	Receiving Stream	Latitude	Longitude	Stream Classification	Biological Stream Characterization
001	Unnamed tributaries to Pond Creek	37°50'59.2"	88°49'37.5"		
002	Unnamed tributaries to Pond Creek	37°50'26.0"	88°49'51.5"		
003	Unnamed tributaries to Pond Creek	37°50'26.0"	88°49'58.0"		
004	Unnamed tributaries to Pond Creek	37°50'25.0"	88°49'56.6"		
005	Unnamed tributaries to Pond Creek	37°50'9.1"	88°50'00"		

006	Unnamed tributaries to Pond Creek	37°50'28.4"	88°49'40.6"		
007	Unnamed tributaries to Pond Creek	37°50'29.5"	88°49'34.0"		
008	Unnamed tributaries to Pond Creek	37°50'31.4"	88°49'33.9"		

The stream segment receiving the discharge from outfall(s) _____ is on the 303(d) list of impaired waters.
The stream segment receiving the discharge from outfall(s) _____ is not on the 303(d) list of impaired waters. The following parameters have been identified as the pollutants causing impairment:

POLLUTANT	POTENTIAL CONTRIBUTORS
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____


FRANKLIN COUNTY
WILLIAMSON COUNTY
Pond Creek
Outfall 001
Outfall 002
Outfall 003
Outfall 004
Outfall 005
Outfall 006
Outfall 007
Outfall 008
500
N
4.4 miles to Johnson City
Steelhead Development Company
Pond Creek Mine No. 1
NPDES Permit No. IL0077666
Williamson County
Township 8 South, Range 3 East
DeLORME
© 2002 DeLorme. Topo USA ®. Data copyright of content owner.
www.delorme.com

********** -COMM. JOURNAL- ********** DATE MAY-09-2005 ***** TIME 14:52 **********

MODE = MEMORY TRANSMISSION START=MAY-09 14:50 END=MAY-09 14:52

FILE NO.=133

STN NO.	COMM.	ONE-TOUCH/ ABBR NO.	STATION NAME/TEL NO.	PAGES	DURATION
001	OK	8	95244177	005/005	00:01:19

-IEPA BOW -

********** - ***** - 217 785 1225- **********

PLEASE DELIVER THIS FAX TO:

Mike Branham

Fax #: 524-4177

From: Scott Twait

Date: 9 May 2005

Number of Pages (Including Cover Sheet): 6

Message:

Mike,

Attached is a consultation request for Pond Creek Mine No. 1. This is a new underground coal mine that will have 8 new outfalls. Please see attached. I am also sending you something from WIRT to help you locate the site.

Thanks,
Scott

Illinois EPA - Bureau of Water
1021 North Grand Avenue East
Springfield, Illinois 62702

Water Quality Standards Unit
Phone # 217/558-2012
FAX# 217/782-5549

PLEASE DELIVER THIS FAX TO:

Mike Branham

Fax #: 524-4177

From: Scott Twait

Date: 9 May 2005

Number of Pages (Including Cover Sheet): 6

Message:

Mike,

Attached is a consultation request for Pond Creek Mine No. 1. This is a new underground coal mine that will have 8 new outfalls. Please see attached. I am also sending you something from WIRT to help you locate the site.

Thanks,
Scott

Illinois EPA - Bureau of Water
1021 North Grand Avenue East
Springfield, Illinois 62702

Water Quality Standards Unit
Phone # 217/558-2012
FAX# 217/782-5549

DOCUMENT

47

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
MINE RELATED WATER POLLUTION CONTROL PERMIT

PERMIT NO.: 2015-MA-3432

DATE ISSUED: November 5, 2015

FINAL PLANS, SPECIFICATIONS, APPLICATION AND SUPPORTING DOCUMENTS

EXPIRATION DATE: October 31, 2020

PREPARED BY: Simon Stepp, P.E.
Williamson Energy, LLC

LOG NUMBERS: 3432-15

SUBJECT: Williamson Energy, LLC – Pond Creek Mine No. 1
Refuse Disposal Facility No. 3 – Refuse Placement
Log No. 3432-15

Williamson Energy, LLC
P.O. Box 99
Johnston City, Illinois 62951

Permit is hereby granted to the above designated permittee to construct and operate the mine and mine refuse area referred to in the above subject heading, and described as follows:

Construction and development of the Refuse Disposal Facility No. 3 includes topsoil removal, grading, foundation preparation refuse area, water holding cell and installation of four (4) foot compacted clay liner.

Operation of Refuse Disposal Facility No. 3 and water holding cell including coarse refuse disposal approved herein for Refuse Disposal Facility No. 3 of the Pond Creek Mine No. 1 shall be performed in accordance with the procedures discussed and outlined in IEPA Log No. 3432-15 and shall be subject to all Special Conditions of this Permit.

As described in IEPA Log No. 3432-15, all stormwater runoff from the deposited coarse refuse within the Refuse Disposal Facility No. 3 shall be collected and maintained within the Refuse Disposal Facility No. 3 and/or pumped into the slurry impounding structure of the existing Refuse Disposal Area, which is an integral part of the Pond Creek Mine No. 1 coal preparation plant closed circuit wastewater handling system. Surplus mine water that is not utilized in the preparation plant closed circuit will be temporarily stored in Refuse Disposal Facility No. 3 or the Water Holding Cell. No refuse affected area stormwater runoff from the Refuse Disposal Facility No. 3 shall be directed or discharged to any waters of the state.

(Continued on Page 2)

This permit is issued in accordance with the Illinois Environmental Protection Act of 1970, the Title 35, Subtitle C: Water Pollution and Subtitle D: Mine Related Pollution Regulations adopted pursuant thereto by the Illinois Environmental Protection Act. THE STANDARD CONDITIONS OF ISSUANCE INDICATED ON THE ATTACHMENT TO THIS PERMIT (PAGE 1a) MUST BE COMPLIED WITH IN FULL. READ ALL CONDITIONS CAREFULLY.

Joseph D. Stitely, P.E.
Acting Manager, Permit Section
Mine Pollution Control Program
Bureau of Water

cc: IDNR, Office of Mines and Minerals
IDNR, Division of Water Resources
BOW/MPCP/FOS/Marion

JDS:DM:cs/7178c/10-14-15

The abandonment plan shall be executed and completed in accordance with 35 Ill. Adm. Code 405.109.

This Permit shall expire on the expiration date noted above or at such time that the facilities and/or activities approved herein are incorporated into a Construction Authorization of the NPDES Permit.

This Permit is issued subject to the following Special Conditions. If such Special Conditions require additional or revised facilities, satisfactory engineering plan documents must be submitted to this Agency for review and approval for issuance of a Supplemental Permit.

Special Condition No. 1: Coarse refuse may only be placed in the areas where four (4) foot compacted clay liner has been installed in accordance with the Construction Quality Assurance/Quality Control Plan contained in IEPA Log No. 3432-15.

Special Condition No. 2: The Fresh Water Lake has an emergency overflow structure that discharges into Pond 006. A float system shall ensure that once the water elevation in the Fresh Water Lake gets within the one (1) foot of the emergency spillway, it send a signal to automatically shut off the mine infiltration water. This will then send the mine infiltration water to the impoundment to prevent unintended discharges.

Special Condition No. 3: This permit does not authorize a discharge into the waters of the state from this facility. Discharge into waters of the United States must be authorized under an NPDES permit.

Special Condition No. 4: Any proposed changes or modifications to the conditions or operating procedures will require notification and approval by the Agency prior to such changes or modifications being implemented.

3432 - / 15
R08631
Due date: 11-16-15

Williamson Energy, LLC
PO Box 99
Johnston City, IL 62951
Office: 618-983-3020 Fax: 618-983-3017

October 03, 2015

Mr. Joe Stitely
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
Mine Pollution Control Program
2309 W. Main St., Suite 116
Marion, IL 62959

Re: Williamson Energy, LLC – Permit Application for Refuse Placement at Refuse Disposal Facility No. 3

Dear Mr. Stitely:

Please find attached two (2) copies of a permit application to allow for the placement of coal refuse at the Refuse Disposal Facility No. 3 at Williamson Energy, LLC's Pond Creek Mine. Pursuant to the Construction Authorization being applied for and submitted to the Agency on September 10, 2015, discharge effluent from mining activities is excluded from this application. No discharge from the facility is permitted under this application and is addressed in the pending NPDES application for the facility. This is the second submittal of this application, please withdraw the previous submittal dated September 14, 2015.

If you have any questions, or require additional information, please contact me at (217) 710-7713.

Respectfully submitted,

WILLIAMSON ENERGY, LLC

Simon Stepp, P.E.

RECEIVED
OCT 09 2015
IL Environmental Protection Agency
MARION REGIONAL OFFICE

POND CREEK MINE REFUSE DISPOSAL AREA NO. 3 – PERMIT FOR COAL REFUSE DISPOSAL

The purpose of this application is to facilitate the construction of a portion of Refuse Disposal Area No. 3 at Williamson Energy, LLC's Pond Creek Mine. The current refuse disposal facility, permitted under IEPA NPDES Permit No. IL0077666, is currently nearing completion. Upon completion of the current facility, the mine will be required to dispose of refuse in Refuse Disposal Facility No. 3 in order to maintain mining and processing operations. A drawing depicting the area to be constructed is attached. Construction of the new facility will begin immediately upon issuance of the required IDNR-OMM Permit No. 417 and will be covered under an IEPA Construction Authorization permit which has been previously applied for. Once a portion of the site is constructed to allow for refuse disposal, refuse will be placed according to applicable approved state and federal permits within the boundary outlined on the attached map.

All stormwater runoff from the deposited coal refuse within the facility shall be collected and maintained within the facility and/or pumped into the slurry impounding structure of the existing Refuse Disposal Area. Stormwater that comes into contact with coal refuse may be utilized in the Pond Creek Mine's coal preparation closed circuit wastewater handling system as described below. No refuse affected stormwater runoff from the facility shall be directed or discharged to any Waters of the State.

Closed Circuit Wastewater Handling System

Considering the continuous need for water in numerous mining activities and in coal processing, water management is of the utmost importance to the success of the Pond Creek Mine's need to have adequate water for operations, especially during dry periods. The water management system includes a water circulation system for the preparation plant process water that incorporates mine pumpage to satisfy the incoming water requirement for the operation of the plant thickeners. Fresh water (purchased from Johnston City, IL) is pumped to the property and stored in Pond 005. The water in Pond 005 functions as the source for the underground mine water usage.

The majority of water used at the mine site is required for separating raw coal from rock in the preparation plant. The larger rocks are screened off from the incoming feed to the plant where they are deposited onto the refuse belt. This material is used to construct the refuse impoundment. The fine material ultimately ends at the thickener units. The thickener units attached to the preparation plant require approximately 2,000 gpm of incoming water while in operation. The makeup water required for the thickener units is pumped to the plant from the Fresh Water Lake. The underflow from the thickeners is then pumped to the impoundment. Over time, the fine solid particles settle to the bottom of the impoundment leaving clarified water on the surface. At this point, the clarified water is able to be recycled by pumping it from the

impoundment back to the Fresh Water Lake where it can be pumped into the preparation plant and reused in the process. Since the fines do not all settle immediately, this clarified water is not of sufficient volume to provide the preparation plant with all of its water usage requirements. This water is supplemented with mine infiltration water and/or stormwater collected in the system to provide the entire 2,000 gpm required for the preparation plant operation.

Mine infiltration water is required to be pumped from the underground coal mine to protect the health and safety of the workforce, as well as the overall operation. The current daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2.7 million gallons per day. This water is pumped from the mine to the Fresh Water Lake where it can then be pumped to the preparation plant or to the impoundment where it can be stored. Due to the large consumption of make-up water required for the preparation plant (approximately 2.8 million gallons per day), much of the mine water is consumed in the coal processing operations. Surplus mine water that cannot be utilized in the preparation plant will temporarily be stored in Refuse Disposal Facility No. 3, the adjacent Water Holding Cell, or in another approved location.

A direct discharge of the process water is not proposed to occur. Both clarified process water and mine infiltration water will be pumped to the Fresh Water Lake. The Fresh Water Lake has an emergency overflow structure that discharges into Pond 006. The clarified process water will be pumped with a manually controlled pump in which water can be sent to the Fresh Water Lake as needed for plant makeup water or the water can be temporarily stored in the impoundment. Since the mine infiltration water is pumped out of the mine with turbine pumps that cycle automatically based on the dewatering need at their respective underground locations, an automatic control system will be installed to ensure a direct discharge of this water does not occur. A float system will be installed in the Fresh Water Lake that will indicate the water elevation in the Fresh Water Lake with respect to the emergency spillway elevation that flows into Pond 006. Once the pool elevation gets within one foot of the spillway elevation, the float will activate and send a signal to automatically shut off the mine infiltration water flow. Once this automatic valve is shut, head pressure in the pipeline will send the mine infiltration water to the impoundment to be temporarily stored. In order to prevent unintended discharges from the Fresh Water Lake into Pond 006, an audible alarm will be installed on the system that will notify personnel if the valve actuator malfunctions and remains in the open position during an intended cycle. The alarm will sound in the preparation plant control room. If the alarm is sounded, the system will be immediately checked for proper functionality. A manual shutoff valve in the line will be used to turn the mine infiltration water flow into the Fresh Water Lake off until the system can be restored.

Groundwater Protection

A four-foot thick compacted clay liner will be installed in all areas which coal refuse is placed and in ponds which receive drainage from areas in which coal refuse is placed. A four-foot thick compacted clay liner will also be installed in the proposed water holding cell. The clay liner will be installed in accordance with the following Quality Assurance/Quality Control Plan.

CLAY LINER INSTALLATION
CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
SECTION I - INTRODUCTION

1.0 INTRODUCTION

This Construction Quality Assurance and Quality Control (CQA/QC) Plan has been prepared to provide the Owner, Engineer, Contractor and Subcontractor the means to govern the construction quality and to satisfy the environmental protection requirements. More specifically, this CQA/QC Plan addresses the installation of the clay liner at the proposed Coal Refuse Disposal Facility No. 3 at Williamson Energy LLC's Pond Creek Mine.

The CQA/QC Plan is divided into the following sections:

- Section I, General;
- Section II, Site Preparation; Quality Assurance/Quality Control;
- Section III, Documentation, Quality Assurance

2.0 DEFINITIONS RELATING TO CONSTRUCTION QUALITY ASSURANCE

2.1 Construction Quality Assurance and Construction Quality Control

This CQA/QC Plan is devoted to construction quality assurance/quality control for the construction quality assurance only of the liner system to be installed at Coal Refuse Disposal Facility No. 3 at the Pond Creek Mine. In the context of this plan, construction quality assurance and construction quality control are defined as follows:

Construction Quality Assurance (CQA) - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service. Construction Quality Control (CQC) - Those actions which provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements

2.2 Use of Terms in This Plan

In the context of this document:

- Construction Quality Assurance refers to means and actions employed by the Owner to assure conformity of the clay liner preparation and construction with this CQA/QC Plan, Contract Drawings, and the Specifications.

- Construction Quality Control refers to those actions taken by Contractors or Subcontractors to ensure that the materials and the workmanship meet the requirements of this CQA/QC Plan and the Specifications.

3.0 PARTIES TO CONSTRUCTION QUALITY ASSURANCE

3.1 Descriptions of the Parties

The parties to Construction Quality Assurance include the Owner, Project Manager, Engineer, Contractor and Subcontractors.

3.1.1 Engineer

The Engineer is responsible for the engineering design, drawings, plans, and specifications for the Coal Refuse Disposal Facility. The engineer is also responsible for certifying construction of the segments necessary for state and federal regulatory agencies. There may be multiple engineers employed by the owner or the contactor.

3.1.2 Contractor and Subcontractors

The Contractor and Subcontractors are responsible for the site preparation and construction of the clay liner system. The owner may elect to perform work designated herein to be performed by the contactor. The Contractor and Subcontractor may be employees of the owner.

3.1.3 Owner

The Owner is Williamson Energy, LLC, who is responsible for the facility.

3.1.4 Project Manager

The Project Manager is the official representative of the Owner and may also be an employee of the owner. In this CQA Plan, the term "Project Manager" will apply equally to "Construction Coordinator" or "Owner's Representative", i.e., the individual or company in charge of coordinating construction activities.

3.2 Qualifications of the Parties

The following qualifications are required of all parties involved with the design and constructionof the Coal Refuse Disposal Facility. These qualifications must be submitted to the Project Manager for review and approval.

3.2.1 Engineer

The Engineer should be a qualified engineer, registered as required by regulation. The Engineer should have a history which demonstrates familiarity with Coal Refuse Disposal Facility, as appropriate, including detailed design methods and procedures.

3.2.2 Contractor and Subcontractors

Qualifications of the Contractor and Subcontractors are specific to the construction contract and independent of this CQA/QC Plan. It is the Contractor's responsibility to ensure that the equipment, materials and construction techniques meet the Specifications of the project. The Contractor and Subcontractor may be employed by the owner.

4.0 SCOPE OF CONSTRUCTION QUALITY ASSURANCE

The scope of this CQA/QC Plan includes the CQA of construction of the clay liner system at the Coal Refuse Disposal Facility proposed for the Pond Creek Mine. The CQA of the selection, evaluation is included in the scope.

5.0 REFERENCES

The CQA/QC Plan includes references to the test procedures of the American Society for Testing and Materials (ASTM). It is the responsibility of the entity performing the work to assure the most recent version of the testing procedures is being used.

6.0 SITE AND PROJECT CONTROL

To guarantee a high degree of quality during construction, clear, open channels of communication are essential. To that end, meetings are critical.

6.1 Pre-Construction Meeting

A Pre-Construction Meeting will be held at the site. At a minimum, the meeting will be attended by the Owner, Engineer, the Contractor, and the Project Manager.

Specific topics considered for this meeting include:

- Communicate to all parties any relevant documents;
- Review critical design details of the project;
- Review the site-specific CQA/QC Plan;
- Make any appropriate modifications to the CQA/QC Plan;
- Review the responsibilities of each party;
- Review lines of authority and communication;
- Review methods for documenting and reporting, and for distributing documents and reports;

- Establish protocols for testing;
- Establish protocols for handling deficiencies, repairs, and retesting;
- Review the time schedule for all operations;
- Outline procedures for packaging and storing archive samples;
- Review repair procedures; and,
- Establish soil stockpiling locations (if any).

6.3 Progress Meetings

Progress meetings will be held between the Superintendent, the Contractor, the Project Manager, and any other concerned parties as necessary. These meetings will discuss current progress, planned activities which lie ahead, and any new business or revisions to the work. The CQA Manager will log any problems, decisions, or questions arising at this meeting. Any matter requiring action which is raised in this meeting will be reported to the appropriate parties.

6.4 Problem or Work Deficiency Meeting

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by all interested parties, the Project Manager, and the Contractor. If the problem requires a design modification, the Engineer should also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and,
- Implement an action plan to resolve the problem or deficiency.

The meeting will be documented by a person designated at the meeting and minutes will be transmitted to affected parties.

CLAY LINER INSTALLATION
CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
SECTION II – SITE PREPARATION QUALITY ASSURANCE

1.0 INTRODUCTION

This section of the CQA/QC Plan addresses the site preparation and outlines the CQA/QC program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

Construction Specifications

1. Soil to be used for soil liner construction shall be classified as CL, ML, CL-ML or CH (ASTM Unified Classification). Soil shall be free of grass, vines, vegetation, and rock or stones greater than 4 inches.

2. Soil liner construction shall be completed in general accordance with the following procedures. Soil shall be delivered to the construction area with construction trucks, wheel tractor scrapers, tractor and pull behind scraper combinations, or dozers. The soil is to be spread to appropriate thickness using a bulldozer or soil compactor. If deemed necessary, a tractor/disk combination is to be used to process the soil (e.g., break down clods, dry soil, or mix in water). Each processed lift is then to be compacted with a soil compactor (e.g., CAT 815 or similar), pull behind sheepsfoot roller and or rubber tired or track equipment.

3. Each soil lift shall be placed to a 12 to 24 inch loose thickness depending on compaction results of the material being placed.

4. If soft areas are encountered, they shall be removed, as well as dry material, within 2 feet in any direction of the soft material. Suitable material will be placed in the excavation and replaced in accordance with these specifications.

5. Each lift shall be compacted to the minimum standard Proctor density (ASTM D698) identified by Item 19 below, at a moisture content 0% to 5% above the optimum moisture content of the soil.

6. Soil liner construction shall proceed to ensure consistent achievement of density, moisture content, and hydraulic conductivity for each successive lift.

7. The placement of frozen material or the placement of material on frozen ground shall be prohibited.

8. If drying or freezing occur the surface will be scarified.

9. Construction shall proceed only during favorable climatic conditions.

10. Soil liner construction shall be completed in a manner which reduces void spaces within the soil and liner.

11. All construction stakes shall be removed during construction, and all test holes (e.g., Shelby tube samples) are to be backfilled with bentonite.

12. The soil liner shall be constructed in a manner to achieve a uniform barrier with a hydraulic conductivity of $1x10^{-7}$ cm/sec.

13. If acceptable compaction results are not achieved, the soil lift shall be reprocessed, or removed and replaced. If the moisture content is less than optimum, or greater than 5% above optimum, the failing material shall be wetted or dried to a moisture content within specification and then recompacted. If the dry density is below specification, the failing material shall be recompacted until a passing test is achieved.

14. In the event of a failing conductivity test, the soil may be removed or recompacted and retested until a passing result is obtained; or the soil immediately above and below the test specimen from the same Shelby tube may be tested. If both tests pass, the original test shall be nullified. If either test fails, that portion of the liner shall be rejected and shall be reconstructed and retested until passing results are obtained. The limits of necessary reconstruction shall be determined by additional sampling and testing within the failed region, thereby isolating the failing area of work.
15. Construction additives are not permitted for soil liner construction unless testing is completed to ensure that hydraulic conductivity requirements can be met after incorporation of the products and unless written approval is provided by the IDNR.

Testing Specifications

16. Prior to initiating soil liner construction, borrow soils shall be identified, qualified, and verified. At a minimum, a representative sample of each soil type identified within the borrow area is to be collected and analyzed for gradation, compaction, and hydraulic conductivity characteristics.

17. Samples collected from the borrow area shall be evaluated in accordance with ASTM D422, D4318, and D2487 to ensure classification criteria are met.

18. Samples collected from the borrow area shall be tested in accordance with ASTM D698 to determine maximum dry density and optimum moisture content of the soil.

19. Samples collected from the borrow area shall be compacted to 90% and 95% standard Proctor density at or near optimum moisture content. The hydraulic conductivity of the recompacted samples shall be determined in accordance with ASTM D5084 procedures. The results of this testing shall be used to establish the

minimum dry density for soil liner compaction necessary to achieve a hydraulic conductivity of $1x10^{-7}$ cm/sec or less.

20. Moisture and density testing by nuclear methods (ASTM D2922 and D3017) shall be conducted at a rate of at least one test per 2,000 cy placed. Testing locations shall be random, and shall not be known to the earthwork contractor prior to lift placement.

21. To insure the accuracy and reproducibility of the nuclear testing, all nuclear density gauges shall be certified to calibration and shall be recertified and calibrated every 1.5 years. Soil compaction tests shall also be double-checked with independent test methods.–A drive cylinder test and laboratory moisture content determination shall be conducted and compared to gauge readings. These independent checks shall be made at the outset of construction and on a bi-weekly basis (e.g., every ten working days) thereafter.

22. Samples for hydraulic conductivity verification shall be retrieved from the compacted soil liner and tested in accordance with ASTM D5084 procedures. Samples shall be retrieved using three-inch Shelby tubes. Samples shall be completed at a frequency of one sample/test per 20,000 cy placed. The vertical location of the recovered samples shall be varied so that representative portions or lifts of the constructed liner are tested. Testing locations shall be random, and shall not be known to the earthwork contractor prior to soil liner construction.

23. Liner thickness will be verified upon installation by the use of onboard equipment GPS and/or ground survey checks. To verify liner thickness the ground elevation will be checked before and after liner construction.
24. The soil liner will be protected in areas where it could be vulnerable to being excavated (into ponds, stockpiles, etc.) by surveying the completed liner. If any excavating is to be done in these areas, surveying will be performed to assure the liner is not penetrated. The liner to be covered beneath the coal refuse facility will be visually inspected and repairs made if necessary before the placement of refuse.

4.0 SOILS CONSTRUCTION QUALITY ASSURANCE

Soils CQA will be performed on all components of the construction. Construction evaluation testing will consist of: 1) monitoring the work; and 2) laboratory and field tests. Laboratory tests will be conducted on samples taken at the borrow source and stockpile(s) prior to construction, and also during the course of the work. Field tests will be conducted during the course of the work.

4.1 Monitoring

The Project Manager shall monitor and document the construction of all components. Monitoring the construction work for the subgrade layer includes the following:

- Monitoring the action of the compaction and/or heavy hauling equipment on the construction surface (i.e., penetration, pumping, cracking, etc.).

4.2 Construction Quality Control Testing Frequency

All Construction Quality Control testing will be conducted in conjunction with the CQC testing by the qualified personnel in accordance with the project Specifications or as directed by the Owner or the Project Manager. Documentation and reporting of test results will be in accordance with the regulatory requirements.

Pre-construction testing will be conducted on material samples obtained from the borrow source and/or stockpile(s). Pre-construction testing will consist of material evaluation tests as described in Subsection 3 of this section of the CQA/QC Plan. Construction Quality Control testing will be conducted on samples taken from the material during the course of the work.

Sampling locations will be selected by the Project Manager.

4.3 Deficiencies

If a defect is discovered in the site preparation, the Project Manager will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Project Manager will determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Project Manager deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Project Manager will define the limits and nature of the defect.

4.3.1 Notification

After determining the extent and nature of a defect, the Project Manager will notify the Owner and Contractor and schedule appropriate retests when the work deficiency is corrected.

4.3.2 Repairs and Retesting

The Contractor will correct the deficiency to the satisfaction of the Project Manager. If a project Specification criterion cannot be met, or unusual weather conditions hinder work, then the Project Manager will develop and present to the Owner suggested solutions for his approval.

All retests recommended by the Project Manager must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The Project Manager will also verify that all installation requirements are met and that all submittals are provided.

CLAY LINER INSTALLATION
CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
SECTION III – CONSTRUCTION QUALITY ASSURANCE DOCUMENTATION

1.0 DOCUMENTATION

An effective CQA plan depends largely on recognition of all construction activities that should be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The Project Manager will document that all quality assurance requirements have been addressed and satisfied.

The Contractor or Superintendent will provide the Project Manager and Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The Project Manager will also maintain at the job site a complete file of plans and Specifications, a CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

1.1 Recordkeeping

Standard reporting procedures will include preparation of a report which, at a minimum, will consist of: (a) field notes, including memoranda of meetings and/or discussions with the Contractor or Superintendent; (b) observation logs, and testing data sheets; and (c) construction problem and solution data sheets. This information will be regularly submitted to and reviewed by the Project Manager and/or the Engineer.

1.1.1 Memorandum of Discussion with Earthwork Contractor or Subcontractors

A memorandum will be prepared periodically, summarizing discussions between the Project Manager and Contractor or Superintendent. At a minimum, the memorandum will include the following information:

- date, project name, location, and other identification;
- name of parties to discussion;
- relevant subject matter or issues;
- activities planned and schedule; and,
- signature of the Contractor or Superintendent and/or Project Manager.

1.1.2 Observation Logs and Testing Data Sheets

Observation logs and testing data sheets will be prepared periodically. At a minimum, these logs and data sheets will include the following information:

- an identifying sheet number for cross referencing and document control;
- date, project name, location, and other identification;
- data on weather conditions;

- a reduced-scale Site Plan showing all proposed work areas and test locations;
- descriptions and locations of ongoing construction;
- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- locations where tests and samples were taken;
- a summary of test results;
- calibrations or recalibrations of test equipment, and actions taken as a result of recalibration;
- off site materials received, including quality verification documentation;
- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and,
- the Project Manager's signature.

STATE OF ILLINOIS
ENVIRONMENTAL PROTECTION AGENCY

Subject: Williamson Energy, LLC – Pond Creek Mine No. 1

Data: Log No. 3432-15

Reviewed by: D. Maschhoff **Date:** 10/14/15

Log No. 3432-15 ⇒ Construction and Development of Refuse Disposal Area No. 3

Log No. 3432-15

- This submittal is requesting a Subtitle D Permit to construct a portion of the Refuse Disposal Area No. 3 referred to as Refuse Disposal Facility No. 3. Disposal of refuse in this area is in order to maintain mining and processing operations.
- All stormwater runoff from the deposited coarse refuse within the Refuse Disposal Area No. 3 shall be collected and maintained within the Refuse Disposal Area No. 3 and/or pumped into the slurry impounding structure of the existing Refuse Disposal Area.
- The water management system at the mine includes a water circulation system for the preparation plant processes water that incorporates mine pumpage to satisfy the incoming water requirement for the operation of the plant thickeners. Fresh water is purchased from Johnston City, IL is pumped to the property and stored in Pond 005, which functions as the source for the underground mine water usage.
- The thickener units attached to the preparation plant require approximately 2,000 gpm of incoming water while in operation. Makeup water required for the thickener units is pumped to the plant from the Fresh Water Lake. Underflow from the thickeners is pumped to the impoundment; clarified water from the impoundment is recycled by pumping it back to the Fresh Water Lake.
- The current daily quantity of mine infiltration water required to be pumped out of the mine is approximately 2.7 million gallons per day. This water is pumped to the Fresh Water Lake where it is used to in the preparation plant or pumped to the impoundment.
- The Fresh Water Lake has an emergency overflow structure that discharges into Pond 006. A float system will insure that once the water elevation in the Fresh Water Lake gets within the one (1) foot of the emergency spillway then it send a signal to automatically shut off the mine infiltration water. This will then send the mine infiltration water to the impoundment to prevent unintended discharges

STATE OF ILLINOIS

ENVIRONMENTAL PROTECTION AGENCY

Subject: Williamson Energy, LLC – Pond Creek Mine No. 1

Data: Log No. 3432-15

Reviewed by: D. Maschhoff **Date:** 10/14/15

- No refuse affected area stormwater runoff from the Refuse Disposal Area No. 3 shall be directed or discharged to any waters of the United States.
- Four (4) foot compacted clay liner will be installed in all areas which coal refuse is placed and in ponds (water holding cell) which receive drainage from coal refuse areas. The liner will be installed in accordance with the Quality Assurance/Quality Control Plan contained in IEPA Log No. 3432-15.

* Action: Prepare Subtitle D Permit No. 2015-MA-3432.

Maschhoff, Dora

From: Ward, Iwona
Sent: Tuesday, October 13, 2015 4:30 PM
To: Maschhoff, Dora
Subject: pond Creek

Just want to let you know that Simon called and he was checking on the submittal that we received today for the Subtitle D permit. He met with Bob Sanjay and Diane and they have been ok with his proposal. He would like this Subtitle D Permit before Thanksgiving.
Also he told me that OMM will have 417 responses ready by the end of this month.

Iwona K. Ward
Environmental Protection Engineer
Mine Pollution Control Program
2309 W. Main St., Suite 116
Marion, IL 62959

Phone: 618/993-7200
Fax: 618/997-1281
e-mail: Iwona.Ward@illinois.gov

DOCUMENT

48

3403-/15
R08653

Sugar Camp Energy, LLC
PO Box 357
Johnston City, IL 62951
Office: 618-438-8340 Fax: 618-438-8420

September 14, 2015

Mr. Joe Stitely
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
Mine Pollution Control Program
2309 W. Main St., Suite 116
Marion, IL 62959

Re: Williamson Energy, LLC – Permit Application for Refuse Placement at Refuse Disposal Facility No. 3

Dear Mr. Stitely:

Please find attached two (2) copies of a permit application to allow for the placement of coal refuse at the Refuse Disposal Facility No. 3 at Williamson Energy, LLC's Pond Creek Mine. Pursuant to the Construction Authorization being applied for and submitted to the Agency on September 10, 2015, discharge effluent from mining activities is excluded from this application. No discharge from the facility is permitted under this application and is addressed in the pending NPDES application for the facility.

If you have any questions, or require additional information, please contact me at (217) 710-7713.

Respectfully submitted,

SUGAR CAMP ENERGY, LLC

Simon Stepp, P.E.

RECEIVED
SEP 18 2015
IL Environmental Protection Agency
MARION REGIONAL OFFICE

POND CREEK MINE REFUSE DISPOSAL AREA NO. 3 – PERMIT FOR COAL REFUSE DISPOSAL

The purpose of this application is to facilitate the construction of a portion of Refuse Disposal Area No. 3 at Williamson Energy, LLC's Pond Creek Mine. The current refuse disposal facility, permitted under IEPA NPDES Permit No. IL0077666, is currently nearing completion. Upon completion of the current facility, the mine will be required to dispose of refuse in Refuse Disposal Facility No. 3 in order to maintain mining and processing operations. A drawing depicting the area to be constructed is attached. Construction of the new facility will begin immediately upon issuance of the required IDNR-OMM Permit No. 417 and will be covered under an IEPA Construction Authorization permit which has been previously applied for. Once a portion of the site is constructed to allow for refuse disposal, refuse will be placed according to applicable approved state and federal permits within the boundary outlined on the attached map.

All stormwater runoff from the deposited coal refuse within the facility shall be collected and maintained within the facility and/or pumped into the slurry impounding structure of the existing Refuse Disposal Area. Stormwater that comes into contact with coal refuse may be utilized in the Pond Creek Mine's coal preparation closed circuit wastewater handling system as described below. No refuse affected stormwater runoff from the facility shall be directed or discharged to any Waters of the State.

Closed Circuit Wastewater Handling System

Considering the continuous need for water in numerous mining activities and in coal processing, water management is of the utmost importance to the success of the Pond Creek Mine's need to have adequate water for operations, especially during dry periods. The water management system includes a water circulation system for the preparation plant process water that incorporates mine pumpage to satisfy the incoming water requirement for the operation of the plant thickeners. Fresh water (purchased from Johnston City, IL) is pumped to the property and stored in Pond 005. The water in Pond 005 functions as the source for the underground mine water usage.

The majority of water used at the mine site is required for separating raw coal from rock in the preparation plant. The larger rocks are screened off from the incoming feed to the plant where they are deposited onto the refuse belt. This material is used to construct the refuse impoundment. The fine material ultimately ends at the thickener units. The static thickener units attached to the preparation plant require approximately 2,000 gpm of incoming water while in operation. The underflow from the static thickeners can either be pumped to the impoundment or to the paste thickener. The purpose of the paste thickener is to take the underflow from the static thickeners and allow for greater retention time and settlement of solids. The paste thickener reduces the moisture content of the fine coal refuse, thus reducing the amount of water

that is sent to the impoundment. The overflow water from the paste thickener is directed back into the static thickener to be reused. The underflow of the paste thickener is then piped to the impoundment in the form of slurry (a mixture of fine solid particles and water). Under the typical operating cycle at the preparation plant, the paste thickener underflow is being pumped to the impoundment at an average rate of approximately 1,000 gpm. This results in a net benefit of an average 1,000 gpm of water that is not required to be pumped to the impoundment when utilizing the paste thickener during a normal production shift.

Over time, the fine solid particles settle to the bottom of the impoundment leaving clean water on the surface. At this point, the clarified water is able to be recycled by pumping it back into the preparation plant and reused in the process. Since the fines do not all settle immediately, this clarified water is not of sufficient volume to provide the preparation plant with all of its water usage requirements. This water is supplemented with mine infiltration water and/or stormwater collected in the system to provide the entire 1,000 gpm required for the preparation plant operation. Mine infiltration water is required to be pumped from the underground coal mine to protect the health and safety of the workforce, as well as the overall operation. This water will be pumped to the impoundment or adjacent water holding cell where it will be stored and utilized in the preparation plant process. Surplus mine water that cannot be utilized in the preparation plant will be stored, either in the impoundment, water holding cell, or in another approved location. This water may be discharged through an NPDES outlet as long as it is in accordance with all applicable permits.

Groundwater Protection

A four-foot thick compacted clay liner will be installed in all areas which coal refuse is placed and in ponds which receive drainage from areas in which coal refuse is placed. A four-foot thick compacted clay liner will also be installed in the proposed water holding cell. The clay liner will be installed in accordance with the following Quality Assurance/Quality Control Plan.

CLAY LINER INSTALLATION
CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
SECTION I - INTRODUCTION

1.0 INTRODUCTION

This Construction Quality Assurance and Quality Control (CQA/QC) Plan has been prepared to provide the Owner, Engineer, Contractor and Subcontractor the means to govern the construction quality and to satisfy the environmental protection requirements. More specifically, this CQA/QC Plan addresses the installation of the clay liner at the proposed Coal Refuse Disposal Facility No. 3 at Williamson Energy LLC's Pond Creek Mine.

The CQA/QC Plan is divided into the following sections:

- Section I, General;
- Section II, Site Preparation; Quality Assurance/Quality Control;
- Section III, Documentation, Quality Assurance

2.0 DEFINITIONS RELATING TO CONSTRUCTION QUALITY ASSURANCE

2.1 Construction Quality Assurance and Construction Quality Control

This CQA/QC Plan is devoted to construction quality assurance/quality control for the construction quality assurance only of the liner system to be installed at Coal Refuse Disposal Facility No. 3 at the Pond Creek Mine. In the context of this plan, construction quality assurance and construction quality control are defined as follows:

Construction Quality Assurance (CQA) - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service. Construction Quality Control (CQC) - Those actions which provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements

2.2 Use of Terms in This Plan

In the context of this document:

- Construction Quality Assurance refers to means and actions employed by the Owner to assure conformity of the clay liner preparation and construction with this CQA/QC Plan, Contract Drawings, and the Specifications.

- Construction Quality Control refers to those actions taken by Contractors or Subcontractors to ensure that the materials and the workmanship meet the requirements of this CQA/QC Plan and the Specifications.

3.0 PARTIES TO CONSTRUCTION QUALITY ASSURANCE

3.1 Descriptions of the Parties

The parties to Construction Quality Assurance include the Owner, Project Manager, Engineer, Contractor and Subcontractors.

3.1.1 Engineer

The Engineer is responsible for the engineering design, drawings, plans, and specifications for the Coal Refuse Disposal Facility. The engineer is also responsible for certifying construction of the segments necessary for state and federal regulatory agencies. There may be multiple engineers employed by the owner or the contactor.

3.1.2 Contractor and Subcontractors

The Contractor and Subcontractors are responsible for the site preparation and construction of the clay liner system. The owner may elect to perform work designated herein to be performed by the contactor. The Contractor and Subcontractor may be employees of the owner.

3.1.3 Owner

The Owner is Williamson Energy, LLC, who is responsible for the facility.

3.1.4 Project Manager

The Project Manager is the official representative of the Owner and may also be an employee of the owner. In this CQA Plan, the term "Project Manager" will apply equally to "Construction Coordinator" or "Owner's Representative", i.e., the individual or company in charge of coordinating construction activities.

3.2 Qualifications of the Parties

The following qualifications are required of all parties involved with the design and constructionof the Coal Refuse Disposal Facility. These qualifications must be submitted to the Project Manager for review and approval.

3.2.1 Engineer

The Engineer should be a qualified engineer, registered as required by regulation. The Engineer should have a history which demonstrates familiarity with Coal Refuse Disposal Facility, as appropriate, including detailed design methods and procedures.

3.2.2 Contractor and Subcontractors

Qualifications of the Contractor and Subcontractors are specific to the construction contract and independent of this CQA/QC Plan. It is the Contractor's responsibility to ensure that the equipment, materials and construction techniques meet the Specifications of the project. The Contractor and Subcontractor may be employed by the owner.

4.0 SCOPE OF CONSTRUCTION QUALITY ASSURANCE

The scope of this CQA/QC Plan includes the CQA of construction of the clay liner system at the Coal Refuse Disposal Facility proposed for the Pond Creek Mine. The CQA of the selection, evaluation is included in the scope.

5.0 REFERENCES

The CQA/QC Plan includes references to the test procedures of the American Society for Testing and Materials (ASTM). It is the responsibility of the entity performing the work to assure the most recent version of the testing procedures is being used.

6.0 SITE AND PROJECT CONTROL

To guarantee a high degree of quality during construction, clear, open channels of communication are essential. To that end, meetings are critical.

6.1 Pre-Construction Meeting

A Pre-Construction Meeting will be held at the site. At a minimum, the meeting will be attended by the Owner, Engineer, the Contractor, and the Project Manager.

Specific topics considered for this meeting include:

- Communicate to all parties any relevant documents;
- Review critical design details of the project;
- Review the site-specific CQA/QC Plan;
- Make any appropriate modifications to the CQA/QC Plan;
- Review the responsibilities of each party;
- Review lines of authority and communication;
- Review methods for documenting and reporting, and for distributing documents and reports;

- Establish protocols for testing;
- Establish protocols for handling deficiencies, repairs, and retesting;
- Review the time schedule for all operations;
- Outline procedures for packaging and storing archive samples;
- Review repair procedures; and,
- Establish soil stockpiling locations (if any).

6.3 Progress Meetings

Progress meetings will be held between the Superintendent, the Contractor, the Project Manager, and any other concerned parties as necessary. These meetings will discuss current progress, planned activities which lie ahead, and any new business or revisions to the work. The CQA Manager will log any problems, decisions, or questions arising at this meeting. Any matter requiring action which is raised in this meeting will be reported to the appropriate parties.

6.4 Problem or Work Deficiency Meeting

A special meeting will be held when and if a problem or deficiency is present or likely to occur. At a minimum, the meeting will be attended by all interested parties, the Project Manager, and the Contractor. If the problem requires a design modification, the Engineer should also be present. The purpose of the meeting is to define and resolve the problem or work deficiency as follows:

- Define and discuss the problem or deficiency;
- Review alternative solutions; and,
- Implement an action plan to resolve the problem or deficiency.

The meeting will be documented by a person designated at the meeting and minutes will be transmitted to affected parties.

CLAY LINER INSTALLATION
CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
SECTION II – SITE PREPARATION QUALITY ASSURANCE

1.0 INTRODUCTION

This section of the CQA/QC Plan addresses the site preparation and outlines the CQA/QC program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

Construction Specifications

1. Soil to be used for soil liner construction shall be classified as CL, ML, CL-ML or CH (ASTM Unified Classification). Soil shall be free of grass, vines, vegetation, and rock or stones greater than 4 inches.

2. Soil liner construction shall be completed in general accordance with the following procedures. Soil shall be delivered to the construction area with construction trucks, wheel tractor scrapers, tractor and pull behind scraper combinations, or dozers. The soil is to be spread to appropriate thickness using a bulldozer or soil compactor. If deemed necessary, a tractor/disk combination is to be used to process the soil (e.g., break down clods, dry soil, or mix in water). Each processed lift is then to be compacted with a soil compactor (e.g., CAT 815 or similar), pull behind sheepsfoot roller and or rubber tired or track equipment.

3. Each soil lift shall be placed to a 12 to 24 inch loose thickness depending on compaction results of the material being placed.

4. If soft areas are encountered, they shall be removed, as well as dry material, within 2 feet in any direction of the soft material. Suitable material will be placed in the excavation and replaced in accordance with these specifications.

5. Each lift shall be compacted to the minimum standard Proctor density (ASTM D698) identified by Item 19 below, at a moisture content 0% to 5% above the optimum moisture content of the soil.

6. Soil liner construction shall proceed to ensure consistent achievement of density, moisture content, and hydraulic conductivity for each successive lift.

7. The placement of frozen material or the placement of material on frozen ground shall be prohibited.

8. If drying or freezing occur the surface will be scarified.

9. Construction shall proceed only during favorable climatic conditions.

10. Soil liner construction shall be completed in a manner which reduces void spaces within the soil and liner.

11. All construction stakes shall be removed during construction, and all test holes (e.g., Shelby tube samples) are to be backfilled with bentonite.

12. The soil liner shall be constructed in a manner to achieve a uniform barrier with a hydraulic conductivity of $1x10^{-7}$ cm/sec.

13. If acceptable compaction results are not achieved, the soil lift shall be reprocessed, or removed and replaced. If the moisture content is less than optimum, or greater than 5% above optimum, the failing material shall be wetted or dried to a moisture content within specification and then recompacted. If the dry density is below specification, the failing material shall be recompacted until a passing test is achieved.

14. In the event of a failing conductivity test, the soil may be removed or recompacted and retested until a passing result is obtained; or the soil immediately above and below the test specimen from the same Shelby tube may be tested. If both tests pass, the original test shall be nullified. If either test fails, that portion of the liner shall be rejected and shall be reconstructed and retested until passing results are obtained. The limits of necessary reconstruction shall be determined by additional sampling and testing within the failed region, thereby isolating the failing area of work.
15. Construction additives are not permitted for soil liner construction unless testing is completed to ensure that hydraulic conductivity requirements can be met after incorporation of the products and unless written approval is provided by the IDNR.

Testing Specifications

16. Prior to initiating soil liner construction, borrow soils shall be identified, qualified, and verified. At a minimum, a representative sample of each soil type identified within the borrow area is to be collected and analyzed for gradation, compaction, and hydraulic conductivity characteristics.

17. Samples collected from the borrow area shall be evaluated in accordance with ASTM D422, D4318, and D2487 to ensure classification criteria are met.

18. Samples collected from the borrow area shall be tested in accordance with ASTM D698 to determine maximum dry density and optimum moisture content of the soil.

19. Samples collected from the borrow area shall be compacted to 90% and 95% standard Proctor density at or near optimum moisture content. The hydraulic conductivity of the recompacted samples shall be determined in accordance with ASTM D5084 procedures. The results of this testing shall be used to establish the

minimum dry density for soil liner compaction necessary to achieve a hydraulic conductivity of $1x10^{-7}$ cm/sec or less.

20. Moisture and density testing by nuclear methods (ASTM D2922 and D3017) shall be conducted at a rate of at least one test per 2,000 cy placed. Testing locations shall be random, and shall not be known to the earthwork contractor prior to lift placement.

21. To insure the accuracy and reproducibility of the nuclear testing, all nuclear density gauges shall be certified to calibration and shall be recertified and calibrated every 1.5 years. Soil compaction tests shall also be double-checked with independent test methods.–A drive cylinder test and laboratory moisture content determination shall be conducted and compared to gauge readings. These independent checks shall be made at the outset of construction and on a bi-weekly basis (e.g., every ten working days) thereafter.

22. Samples for hydraulic conductivity verification shall be retrieved from the compacted soil liner and tested in accordance with ASTM D5084 procedures. Samples shall be retrieved using three-inch Shelby tubes. Samples shall be completed at a frequency of one sample/test per 20,000 cy placed. The vertical location of the recovered samples shall be varied so that representative portions or lifts of the constructed liner are tested. Testing locations shall be random, and shall not be known to the earthwork contractor prior to soil liner construction.

23. Liner thickness will be verified upon installation by the use of onboard equipment GPS and/or ground survey checks. To verify liner thickness the ground elevation will be checked before and after liner construction.
24. The soil liner will be protected in areas where it could be vulnerable to being excavated (into ponds, stockpiles, etc.) by surveying the completed liner. If any excavating is to be done in these areas, surveying will be performed to assure the liner is not penetrated. The liner to be covered beneath the coal refuse facility will be visually inspected and repairs made if necessary before the placement of refuse.

4.0 SOILS CONSTRUCTION QUALITY ASSURANCE

Soils CQA will be performed on all components of the construction. Construction evaluation testing will consist of: 1) monitoring the work; and 2) laboratory and field tests. Laboratory tests will be conducted on samples taken at the borrow source and stockpile(s) prior to construction, and also during the course of the work. Field tests will be conducted during the course of the work.

4.1 Monitoring

The Project Manager shall monitor and document the construction of all components. Monitoring the construction work for the subgrade layer includes the following:

- Monitoring the action of the compaction and/or heavy hauling equipment on the construction surface (i.e., penetration, pumping, cracking, etc.).

4.2 Construction Quality Control Testing Frequency

All Construction Quality Control testing will be conducted in conjunction with the CQC testing by the qualified personnel in accordance with the project Specifications or as directed by the Owner or the Project Manager. Documentation and reporting of test results will be in accordance with the regulatory requirements.

Pre-construction testing will be conducted on material samples obtained from the borrow source and/or stockpile(s). Pre-construction testing will consist of material evaluation tests as described in Subsection 3 of this section of the CQA/QC Plan. Construction Quality Control testing will be conducted on samples taken from the material during the course of the work.

Sampling locations will be selected by the Project Manager.

4.3 Deficiencies

If a defect is discovered in the site preparation, the Project Manager will immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the Project Manager will determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Project Manager deems appropriate. If the defect is related to adverse site conditions, such as overly wet soils or surface desiccation, the Project Manager will define the limits and nature of the defect.

4.3.1 Notification

After determining the extent and nature of a defect, the Project Manager will notify the Owner and Contractor and schedule appropriate retests when the work deficiency is corrected.

4.3.2 Repairs and Retesting

The Contractor will correct the deficiency to the satisfaction of the Project Manager. If a project Specification criterion cannot be met, or unusual weather conditions hinder work, then the Project Manager will develop and present to the Owner suggested solutions for his approval.

All retests recommended by the Project Manager must verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency. The Project Manager will also verify that all installation requirements are met and that all submittals are provided.

CLAY LINER INSTALLATION
CONSTRUCTION QUALITY ASSURANCE & QUALITY CONTROL PLAN
SECTION III – CONSTRUCTION QUALITY ASSURANCE DOCUMENTATION

1.0 DOCUMENTATION

An effective CQA plan depends largely on recognition of all construction activities that should be monitored, and on assigning responsibilities for the monitoring of each activity. This is most effectively accomplished and verified by the documentation of quality assurance activities. The Project Manager will document that all quality assurance requirements have been addressed and satisfied.

The Contractor or Superintendent will provide the Project Manager and Engineer with signed descriptive remarks, data sheets, and logs to verify that all monitoring activities have been carried out. The Project Manager will also maintain at the job site a complete file of plans and Specifications, a CQA Plan, checklists, test procedures, daily logs, and other pertinent documents.

1.1 Recordkeeping

Standard reporting procedures will include preparation of a report which, at a minimum, will consist of: (a) field notes, including memoranda of meetings and/or discussions with the Contractor or Superintendent; (b) observation logs, and testing data sheets; and (c) construction problem and solution data sheets. This information will be regularly submitted to and reviewed by the Project Manager and/or the Engineer.

1.1.1 Memorandum of Discussion with Earthwork Contractor or Subcontractors

A memorandum will be prepared periodically, summarizing discussions between the Project Manager and Contractor or Superintendent. At a minimum, the memorandum will include the following information:

- date, project name, location, and other identification;
- name of parties to discussion;
- relevant subject matter or issues;
- activities planned and schedule; and,
- signature of the Contractor or Superintendent and/or Project Manager.

1.1.2 Observation Logs and Testing Data Sheets

Observation logs and testing data sheets will be prepared periodically. At a minimum, these logs and data sheets will include the following information:

- an identifying sheet number for cross referencing and document control;
- date, project name, location, and other identification;
- data on weather conditions;

- a reduced-scale Site Plan showing all proposed work areas and test locations;
- descriptions and locations of ongoing construction;
- descriptions and specific locations of areas, or units, of work being tested and/or observed and documented;
- locations where tests and samples were taken;
- a summary of test results;
- calibrations or recalibrations of test equipment, and actions taken as a result of recalibration;
- off site materials received, including quality verification documentation;
- decisions made regarding acceptance of units of work, and/or corrective actions to be taken in instances of substandard quality; and,
- the Project Manager's signature.

ATTACHMENT 1
NORTH RDA RUNOFF ANALYSIS

AquAeTer

optimizing
resources | water, air, earth

MEMORANDUM

TO: Simon Stepp, Sugar Camp Energy, LLC
FROM: John Michael Corn, P.E. and Michael R. Corn, P.E., BCEES, **AquAeTer, Inc.**
DATE: April 2, 2015
JOB NO.: 142336
RE: **Sugar Camp Mine – North RDA Runoff Analysis**

INTRODUCTION

The Sugar Camp Mine ("Mine") is proposing to construct a new refuse disposal area. Runoff from the RDA will be directed to Sedimentation Pond 013 which will discharge through Outfall 013 to an unnamed Tributary to the Middle Fork of the Big Muddy River. The discharge will be to reach IL_NH-07 which is a 0 7Q10 low flow stream, as presented in Bulletin 57 (State Water Survey Division, 1973). The Illinois Environmental Protection Agency allows the full use of the stream during a storm event for these streams.

The maximum allowable discharge from the new refuse area into the Middle Fork was analyzed. The maximum allowable discharges were calculated based on meeting the WQS based on the volumetric flowrates in the stream and the concentration of constituents of concern found the Middle Fork and expected in the discharge.

WATER QUALITY STANDARDS

The Illinois Water Quality standards are found in IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards. The water quality standard for chloride is 500 mg/L. The sulfate concentration is based on hardness of the receiving stream.

Background hardness data was gathered on the Middle Fork on November 12, 2014. The average hardness was 577 mg/L, resulting in a standard for sulfate of 2,000 mg/L.

METHODOLOGY

Peak Flow Determination

The USEPA HEC-HMS predictive model was used to estimate flow in the Middle Fork during different storm events. Publically available data about the watershed was used to develop the model. The drainage basin was delineated from a point on the Middle Fork (Latitude: 38° 2'

15"N, Longitude: 88° 46' 13"W). The program produced peak flow values for 6-hour and 24-hour 2-yr-, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr storm events.

The HEC-HMS program utilizes the SCS Curve Number loss method to estimate flows. A curve number of 77 was used based on land use; the drainage area is open space in good condition with a combination of C and D soil types. The drainage area was determined using GIS software with a 10-meter digital elevation model. For the discharge location into the Middle Fork, the drainage area was 27,020 acres. The SCS Unit Hydrograph transform method was used to model the flow in the stream from the watershed at the discharge location.

Rainfall data was also input into the HEC-HMS model to calculate flow for the drainage area of the Middle Fork. Historic rainfall amounts at the new refuse area were obtained from the National Oceanic and Atmospheric Administration (NOAA) Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS). These amounts are listed in Table 3. The distribution of the rainfall over the 24-hour period was taken from the Huff and Angel report "Rainfall Frequency Atlas of the Midwest." For the 24-hour storm, the third-quartile distribution was used.

Table 3. Rainfall Amounts for Storm Events at New Refuse Area

Storm Duration	Recurrence Interval (Years)					
	2	5	10	25	50	100
6-hr	2.39"	2.97"	3.44"	4.1"	4.65"	5.21"
24-hr	3.36"	4.18"	4.84"	5.75"	6.5"	7.29"

In addition to the storm events, peak flows for more frequent storm events for 6-hour and 24-hour storm durations were also modeled using the HEC-HMS program. The rainfall amounts for each storm event can be found in Table 1. The peak flows for each storm event can be found in Table 1.

Water Quality

Discharge from Pond 013 will only be allowed when the water quality standards as defined in IL Title 35 Subtitle C Chapter I Part 302: Water Quality Standards will be met in the Middle Fork of the Big Muddy River. The constituents of concern are chloride and sulfates. For the calculation, the allowable discharge was based on meeting the chloride water quality standard, as it was more stringent than the sulfate water quality standard. As shown below, the sulfate concentration in the discharge is expected to be less than the sulfate water quality standard.

To calculate the dispersion from the new refuse area into the Middle Fork, sulfate and chloride concentrations from the Pond 3 effluent were selected as representative concentrations

since samples from the proposed refuse area are not available. Pond 3 was sampled for sulfate and chloride on November 12, 2014. The Pond 3 sulfate concentration was 1,770 mg/L, which is less than the sulfate standard of 2,000 mg/L; therefore, the water quality standard is met at the end of pipe for sulfate. The Pond 3 chloride concentration was 5,190 mg/L. The following equation was used to calculate dispersion needed to meet the chloride water quality standard.

$$C_{standard}S = (S-1)C_{background} + 1 * C_{site\ water}$$

where: $C_{standard}$ = water quality standard, mg/L;
S = dispersion (__:1), unitless;
$C_{background}$ = background concentration, mg/L;
$C_{site\ water}$ = concentration from on-site source, mg/L

Rearranging the above equation to solve for the dispersion, S, yields:

$$S = \frac{C_{site\ water} - C_{background}}{C_{standard} - C_{background}}$$

RESULTS

The maximum allowable discharges for each storm event, which are based on Illinois Water Quality Standards of chloride and sulfate, were determined using the dispersion values previously calculated. As previously mentioned, the effluent sulfate concentration was below the water quality standard, so calculating the dispersion was not needed. The chloride dispersion was 16.93 for the discharge from the new refuse area into the Middle Fork. The flowrates for the maximum allowable discharges based on the dispersion and the 24-hour average flow are presented in Table 1.

CLOSING REMARKS

If you should have questions or comments concerning our assessment, please call us at (615) 373-8532 or by facsimile at (615) 373-8512, or by electronic mail at jmcorn@aquaeter.com.

DOCUMENT

49

3117-115
Due date 4/3/15
R08675

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

Transmittal Letter

Project No. B14-626-1413

To: Illinois Environmental Protection Agency
Mine Pollution Control Program
2309 West Main Street
Marion, IL 62959

Date: February 17, 2015

Attention: Mr. Joe Stitely

If enclosures are not as noted, please inform us immediately

We Transmit:

☒ Herewith ☐ Under Separate Cover

For Your:

☐ Approval ☐ Record

☐ Review & Comment

☒ Use

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASABLE
AUG 02 2019
REVIEWER: SAB

The Following:

☐ Drawings ☐ Laboratory Data ☒ Other

☐ Specifications ☐ Field Data

Copies	Dat	No.	Description
2			Copies of the Pond Creek NPDES Renewal

Remarks:

If you have any questions, please call me at 1-800-355-0491 ext. 113

By: Steve Sutphin

Copies To: File

RECEIVED
FEB 19 2015
IL Environmental Protection Agency
MARION REGIONAL OFFICE

124 Philpott Lane, Beaver, WV 25813 Telephone: 304 / 255-0491 Fax: 304 / 255-4232

Alliance Consulting, Inc.
Engineers • Constructors • Scientists

NPDES RENEWAL #2
FOR
PERMIT NO. IL0077666

(IDNR PERMIT 375 & 417)

POND CREEK MINE NO. 1 &
REFUSE DISPOSAL AREA NO. 3
WILLIAMSON COUNTY, IL

Prepared for

WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B14-626-1413
DECEMBER 2014

Summersville, WV

848 Northside Drive
Summersville, WV 26651
Telephone: (304) 883-2360
Fax: (304) 883-2361

Beckley, WV

Raleigh County Airport Industrial Park
124 Philpott Lane
Beaver, WV 25813-9502
Telephone: (304) 255-0491
Fax: (304) 255-4232

Canonsburg, PA

3 Four Coins Drive
Suite 100
Canonsburg, PA 15317
Telephone: (724) 745-3630
Fax: (724) 745-3631

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

February 13, 2015

Project No. B14-626-1413

IEPA-DIVISION OF RECORDS MANAGEMENT
RELEASABLE
AUG 02 2019
REVIEWER: SAB

Mr. Joe Stitely
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
2309 West Main Street, Suite 116
Marion, IL 62959

Williamson Energy LLC - NPDES No. 0077666
Renewal No. 1
Pond Creek Mine
Williamson County, Illinois

Dear Mr. Stitely:

Attached, please find the Permit Renewal application for Williamson Energy LLC; Pond Creek Mine located in Williamson County, Illinois. This renewal package includes:

- EPA Form 1
- EPA Form 2C
- Water analysis from each sediment pond. Ponds were not discharging, therefore grab samples were taken.
- Receiving stream samples - Un-named tributary of Pond Creek
- Schedule A identifying each outfall.
- Water Flow Diagram
- 1" = 1000' Operation Map showing the current permit boundary with acreages, NPDES outfall locations and stream monitoring point.
- 1" = 400' Supplemental Operations Map with a orthophotographs background
- Proposed Pond 9 – Plan View and Sections
- Proposed Pond 9 – Sediment Ditch Profile and Sections
- Proposed Pond 9 – SedCAD Report (10 yr. / 24 hr.)
- Proposed Pond 9 – SedCAD Report (100 yr. / 6 hr.)

Should you have any questions, or require additional information, please contact us.

Respectfully submitted for Williamson Energy LLC,

Stephen M. Sutphin
Senior Project Manager
ALLIANCE CONSULTING, INC.

SMS:sms
Enclosures

RECEIVED
FEB 19 2015
IL Environmental Protection Agency
MARION REGIONAL OFFICE

FILE: 14626-01

Alliance Consulting, Inc.
Engineers · Constructors · Scientists

February 13, 2015

Project No. B14-626-1413

Mr. Bob Mosher
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
Water Quality Standards Unit
Division of Water Pollution Control
1021 North Grand Av. E.
Springfield, IL 62794-9276

IEPA-DIVISION OF RECORDS MANAGEMENT
AT BUREAU
AUG 02 2019
REVIEWER: SAB

Williamson Energy LLC - NPDES No. 0077666
Renewal No. 1
Pond Creek Mine
Williamson County, Illinois

Dear Mr. Mosher:

Attached, please find the Permit Renewal application for Williamson Energy LLC; Pond Creek Mine located in Williamson County, Illinois. This renewal package includes:

- EPA Form 1
- EPA Form 2C
- Water analysis from each sediment pond. Ponds were not discharging, therefore grab samples were taken.
- Receiving stream samples - Un-named tributary of Pond Creek
- Schedule A identifying each outfall.
- Water Flow Diagram
- 1" = 1000' Operation Map showing the current permit boundary with acreages, NPDES outfall locations and stream monitoring point.
- 1" = 400' Supplemental Operations Map with a orthophotographs background
- Proposed Pond 9 – Plan View and Sections
- Proposed Pond 9 – Sediment Ditch Profile and Sections
- Proposed Pond 9 – SedCAD Report (10 yr. / 24 hr.)
- Proposed Pond 9 – SedCAD Report (100 yr. / 6 hr.)

Should you have any questions, or require additional information, please contact us.

Respectfully submitted for Williamson Energy LLC,

Stephen M. Sutphin
Senior Project Manager
ALLIANCE CONSULTING, INC.

SMS:sms
Enclosures

FILE: 14626-02

IEPA-DIVISION OF RECORDS MANAGEMENT
RECEIVED/FILED
AUG 02 2019
REVIEWER: SAB

NPDES RENEWAL #2
FOR
PERMIT NO. IL0077666
(IDNR PERMIT 375 & 417)

POND CREEK MINE NO. 1 &
REFUSE DISPOSAL AREA NO. 3
WILLIAMSON COUNTY, IL

Prepared for

WILLIAMSON ENERGY, LLC
JOHNSTON CITY, IL

ALLIANCE PROJECT NO. B14-626-1413
DECEMBER 2014

EPA FORM 1

Please print or type in the unshaded areas only.

Form Approved. OMB No. 2040-0086.

FORM 1 GENERAL

U.S. ENVIRONMENTAL PROTECTION AGENCY
GENERAL INFORMATION
Consolidated Permits Program
(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER: S F | IL 0077666 | T/A | C D

LABEL ITEMS	PLEASE PLACE LABEL IN THIS SPACE
I. EPA I.D. NUMBER	
III. FACILITY NAME	
V. FACILITY MAILING ADDRESS	
VI. FACILITY LOCATION	

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of **bold-faced terms**.

SPECIFIC QUESTIONS	Mark "X" YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a **discharge** to **waters of the U.S.**? (FORM 2A)		X	
B. Does or will this facility *(either existing or proposed)* include a **concentrated animal feeding operation** or **aquatic animal production facility** which results in a **discharge** to **waters of the U.S.**? (FORM 2B)		X	
C. Is this a facility which currently results in **discharges** to **waters of the U.S.** other than those described in A or B above? (FORM 2C)	X		
D. Is this a proposed facility *(other than those described in A or B above)* which will result in a **discharge** to **waters of the U.S.**? (FORM 2D)		X	
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)		X	
F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X	
H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X	
J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment area**? (FORM 5)		X	

III. NAME OF FACILITY

SKIP: POND CREEK 1 MINE

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*: ALLAMAN, MARK - CHIEF MINING ENGINEER

B. PHONE *(area code & no.)*: (618) 683-3020

V. FACILTY MAILING ADDRESS

A. STREET OR P.O. BOX: 16468 LIBERTY SCHOOL ROAD

B. CITY OR TOWN: MARION | C. STATE: IL | D. ZIP CODE: 62959

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER: 16468 LIBERTY SCHOOL ROAD

B. COUNTY NAME: WILLIAMSON

C. CITY OR TOWN: MARION | D. STATE: IL | E. ZIP CODE: 62959 | F. COUNTY CODE *(if known)*:

CONTINUED FROM THE FRONT

VII. SIC CODES *(4-digit, in order of priority)*

A. FIRST		B. SECOND	
1222	*(specify)* COAL MINING - UNDERGROUND		*(specify)* N/A
C. THIRD		**D. FOURTH**	
	(specify) N/A		*(specify)* N/A

VIII. OPERATOR INFORMATION

A. NAME	B. Is the name listed in Item VIII-A also the owner?
WILLIAMSON ENERGY LLC	☒ YES ☐ NO

C. STATUS OF OPERATOR *(Enter the appropriate letter into the answer box; if "Other," specify.)*

F = FEDERAL; M = PUBLIC (other than federal or state); S = STATE; O = OTHER (specify); P = PRIVATE

P — *(specify)* -

D. PHONE *(area code & no.)*: 618 983 3020

E. STREET OR PO BOX: 16468 LIBERTY SCHOOL ROAD

F. CITY OR TOWN	G. STATE	H. ZIP CODE
MARION	IL	62959

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☒ NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES *(Discharges to Surface Water)*: IL0077666	D. PSD *(Air Emissions from Proposed Sources)*: 05040012	
B. UIC (Underground Injection of Fluids): N/A	E. OTHER *(specify)*: 375	*(Specify)* IDNR
C. RCRA (Hazardous Wastes): N/A	E. OTHER *(specify)*: 417	*(Specify)* IDNR-PENDING

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS *(provide a brief description)*

UNDERGROUND BITUMINOUS COAL MINE WITH COAL PREPARATION PLANT, REFUSE DISPOSAL FACILITIES AND COAL HANDLING FACILITIES.

XIII. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. SIGNATURE	C. DATE SIGNED
DWAYNE FRANCISCO	Dwayne Fra	12/29/14

COMMENTS FOR OFFICIAL USE ONLY

EPA FORM 3510-1(8-90)

***Any person who knowingly makes a false, fictitous, or fraudulent statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h)).**

EPA FORM 2C

R08684

Please print or type in the unshaded areas only.

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)
IL0077666

Form Approved.
OMB No. 2040-0086.
Approval expires 3-31-98.

FORM 2C NPDES

U.S. ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
EXISTING MANUFACTURING, COMMERCIAL, MINING AND SILVICULTURE OPERATIONS
Consolidated Permits Program

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER (*list*)	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER (*name*)
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
001	37	50	59.2	88	49	37.5	Unnamed tributary of Pond Creek
002	37	50	26	88	49	51.5	Unnamed tributary of Pond Creek
003	37	50	26	88	49	58	Unnamed tributary of Pond Creek
004	37	50	25	88	49	56.6	Unnamed tributary of Pond Creek
005	37	50	9.1	88	50	0.0	Unnamed tributary of Pond Creek
006	37	50	28.4	88	50	40.6	Unnamed tributary of Pond Creek
007	37	50	29.5	88	49	34	Unnamed tributary of Pond Creek
008	37	50	31.4	88	49	33.9	Unnamed tributary of Pond Creek
009	37	50	52.3	88	48	43.7	Unnamed tributary of Pond Creek

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (*e.g., for certain mining activities*), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUTFALL NO. (*list*)	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION (*list*)	b. AVERAGE FLOW (*include units*)	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
001	Alkaline Mine Drainage	2 gpm	Sedimentation	1-U	4-A
	Storm Water Runoff			1-U	4-A
002	Alkaline Mine Drainage	1 gpm	Sedimentation	1-U	4-A
	Storm Water Runoff			1-U	4-A
003	Alkaline Mine Drainage	1 gpm	Sedimentation	1-U	4-A
	Storm Water Runoff			1-U	4-A
004	Alkaline Mine Drainage	2 gpm	Sedimentation	1-U	4-A
	Storm Water Runoff			1-U	4-A
005	Alkaline Mine Drainage	5 gpm	Sedimentation	1-U	4-A
	Storm Water Runoff			1-U	4-A
006	Acid Mine Drainage		Sedimentation	1-U	4-A
	Storm Water Runoff	2 gpm		1-U	4-A
	Process Wastewater	3 gpm			
	Deep Mine Drainage	10 gpm			

R08685

007	Acid Mine Drainage		Sedimentation	1-U	4-A
	Storm Water Runoff	1 gpm		1-U	4-A
	Process Wastewater	3 gpm			
	Deep Mine Drainage	10 gpm			
008	Acid Mine Drainage		Sedimentation	1-U	4-A
	Storm Water Runoff	1 gpm		1-U	4-A
	Process Wastewater	3 gpm			
	Deep Mine Drainage	10 gpm			
009	Acid Mine Drainage		Sedimentation	1-U	4-A
	Storm Water Runoff	1 gpm		1-U	4-A

OFFICIAL USE ONLY *(effluent guidelines sub-categories)*

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ YES (*complete the following table*) ☒ NO (*go to Section*

1. OUTFALL NUMBER (*list*)	2. OPERATION(s) CONTRIBUTING FLOW (*list*)	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK (*specify average*)	b. MONTHS PER YEAR (*specify average*)	a. FLOW RATE (*in mgd*)		B. TOTAL VOLUME (*specify with units*)		C. DURATION (*in days*)
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES (*complete Item III-B*) ☒ NO (*go to Section*

B. Are the limitations in the applicable effluent guideline expressed in terms of production (*or other measure of operation*)?

☐ YES (*complete Item III-C*) ☒ NO (*go to Section*

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS (*list outfall numbers*)
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. (*specify*)	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operations of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES (*complete the following table*) ☒ NO (*go to Item IV-B*)

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs (*or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction.

☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)
IL0077666

V. INTAKE AND EFFLUENT CHARACTERISTICS

B, & C: See instructions before proceeding – Complete one set of tables for each outfall – Annotate the outfall number in the space provided.
NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-9.

D. Use the space below to list any of the pollutants listed in Table 2c-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE
N/A			

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES (*list all such pollutants below*) ☒ NO (*go to Item VI-B*)

CONTINUED FROM THE FRONT

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES *(identify the test(s) and describe their purpose below)* ☒ NO *(go to Section VIII)*

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☒ YES *(list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below)* ☐ NO *(go to Section IX)*

A. NAME	B. ADDRESS	C. TELEPHONE *(area code & no.)*	D. POLLUTANTS ANALYZED *(list)*
Summit Environmental Services, Inc	17650 Route 37, West Frankfort, IL 62896	(618) 983-8280	1M - 15M
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	
		( )	

IX. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. NAME & OFFICIAL TITLE *(type or print)*	B. PHONE NO. *(area code & no.)*
Dwanye Francisco, AUTHORIZED AGENT	( )
C. SIGNATURE	D. DATE SIGNED 12/29/14

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
IL 0077666

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 001

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	2. EFFLUENT a. MAXIMUM DAILY VALUE (2) MASS	2. EFFLUENT b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	2. EFFLUENT b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	2. EFFLUENT c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	2. EFFLUENT c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	2. EFFLUENT d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS *(specify if blank)* b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE *(optional)* b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	***46***	***mg/L***					***1***					
e. Ammonia *(as N)*												
f. Flow	Value ***0***		Value		Value		***1***			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum ***-***	Maximum ***7.2***	Minimum	Maximum			***1***	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	2. EFFLUENT a. MAXIMUM DAILY VALUE (2) MASS	2. EFFLUENT b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	2. EFFLUENT b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	2. EFFLUENT c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	2. EFFLUENT c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	2. EFFLUENT d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS *(specify if blank)* b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE *(optional)* b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

R08689

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	***5,150***	***mg/L***					***1***					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	***17.81***	***mg/L***					***1***					
t. Magnesium, Total (7439-95-4)	☐	☒												
u Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

R08690

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*001*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.040*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.018*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*<0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*0.067*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*0.025*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764--01-6)	☐	☐	☒	DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	☐	☐	☒												
2V Acrylonitrile (107-13-1)	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

CONTINUED FROM PAGE V-4

EPA I.D. NUMBER *(copy from item 1 of Form 1)*: Error! Reference source not found.

OUTFALL NUMBER: *001*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS		a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

R08694

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

R08696

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*001*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSES	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08697

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
IL 0077666

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 002

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	***36***	***mg/L***					***1***					
e. Ammonia *(as N)*												
f. Flow	Value ***0***		Value		Value		***1***			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum ***-***	Maximum ***7.8***	Minimum	Maximum			***1***	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

R08698

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	***92***	***mg/L***					***1***					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	***1.982***	***mg/L***					***1***					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

R08699

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy fr... ...em 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*002*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.040*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.031*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*<0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764--01-6)	☐	☐	☒	DESCRIBE RESULTS											

CONTINUED . . .OM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	☐	☐	☒												
2V Acrylonitrile (107-13-1)	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

CONTINUED FROM PAGE V-4

EPA I.D. NUMBER *(copy from item 1 of Form 1)*: *Error! Reference source not found.*

OUTFALL NUMBER: *002*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Ntro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

CONTINUE ON PAGE V-7

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B DI-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

R08704

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

R08705

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*002*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08706

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
Error! Reference source not found.

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 003

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	*66*	*mg/L*					*1*					
e. Ammonia *(as N)*												
f. Flow	Value *0*		Value		Value		*1*			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum *-*	Maximum *8.0*	Minimum	Maximum			*1*	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	***88***	***mg/L***					***1***					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	***2.910***	***mg/L***					***1***					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

CONTINUE ON PAGE V-3

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy fro. ..em 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*003*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*0.069*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.024*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*<0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764-01-6)	☐	☐	☒	DESCRIBE RESULTS											

R08709

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*					a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. *Acrolein (107-02-8)*	☐	☐	☒												
2V *Acrylonitrile (107-13-1)*	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

CONTINUE ON PAGE V-5

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*					a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

CONTINUE ON PAGE V-7

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*					a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

CONTINUE ON PAGE V-9

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*003*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
Error! Reference source not found.

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 004

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	*58*	*mg/L*					*1*					
e. Ammonia *(as N)*												
f. Flow	Value *0*		Value		Value		*1*			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum -	Maximum *7.9*	Minimum	Maximum			*1*	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

R08716

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	***210***	***mg/L***					***1***					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	***0.463***	***mg/L***					***1***					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

R08717

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy fro... ...em 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*004*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.040*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.024*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*<0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764–01-6)	☐	☐	☒	DESCRIBE RESULTS											

R08718

CONTINUED . . .OM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	☐	☐	☒												
2V Acrylonitrile (107-13-1)	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

R08719

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS		a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzofluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloroethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethylhexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromophenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloronaphthalene (91-68-7)	☐	☐	☒												
17B 4-Chlorophenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichlorobenzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichlorobenzene (541-73-1)	☐	☐	☒												

R08721

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

CONTINUE ON PAGE V-9

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*004*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08724

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
Error! Reference source not found.

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 005

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	***65***	***mg/L***					***1***					
e. Ammonia *(as N)*												
f. Flow	Value ***0***		Value		Value		***1***			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum ***-***	Maximum ***8.1***	Minimum	Maximum			***1***	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	a. LONG TERM AVERAGE VALUE (2) MASS	b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

R08725

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* (14808-79-8)	☒	☐	*390*	*mg/L*					*1*					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)*(14265-45-3)	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	*1.408*	*mg/L*					*1*					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy fr... ...tem 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*005*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.040*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.043*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764-01-6)	☐	☐	☒	DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. *Acrolein (107-02-8)*	☐	☐	☒												
2V *Acrylonitrile (107-13-1)*	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

CONTINUED FROM PAGE V-4

EPA I.D. NUMBER *(copy from item 1 of Form 1)*: *Error! Reference source not found.*

OUTFALL NUMBER: *005*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS		a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

R08729

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-80-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

CONTINUE ON PAGE V-7

R08730

EPA I.D. NUMBER *(copy ... Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*005*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

R08731

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

R08732

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*005*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08733

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
Error! Reference source not found.

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 006

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	*24*	*mg/L*					*1*					
e. Ammonia *(as N)*												
f. Flow	Value *0*		Value		Value		*1*			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum *-*	Maximum *7.6*	Minimum	Maximum			*1*	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

ITEM V-C CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	***3800***	***mg/L***					***1***					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	***1.595***	***mg/L***					***1***					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

R08735

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy fr... ...tem 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*006*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.040*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.030*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*<0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*0.014*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764--01-6)	☐	☐	☒	DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	☐	☐	☒												
2V Acrylonitrille (107-13-1)	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

R08737

1. POLLUTANT AND CAS NO. (if available)	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS (specify if blank)		4. INTAKE (optional)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (if available)		c. LONG TERM AVRG. VALUE (if available)			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

CONTINUE ON PAGE V-7

R08739

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy fr... ...em 1 of Form 1)*
Error! Reference source not found.

OUTFALL NUMBER
006

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

R08740

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*					a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*006*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08742

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
Error! Reference source not found.

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 007

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	*15*	*mg/L*					*1*					
e. Ammonia *(as N)*												
f. Flow	Value *0*		Value		Value		*1*			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum -	Maximum *7.8*	Minimum	Maximum			*1*	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

R08743

ITEM V-E CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	***3450***	***mg/L***					***1***					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	***1.454***	***mg/L***					***1***					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☐	☒												
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

R08744

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy from item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*007*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.040*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.044*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*<0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*0.028*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*<0.01*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764--01-6)	☐	☐	☒	DESCRIBE RESULTS											

R08745

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	☐	☐	☒												
2V Acrylonitrile (107-13-1)	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

R08746

EPA I.D. NUMBER *(copy from item 1 of Form 1)*: *Error! Reference source not found.*

OUTFALL NUMBER: *007*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*					a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS		a. CONCENTRATION	b. MASS	(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

R08747

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

R08748

EPA I.D. NUMBER *(copy fr... ...tem 1 of Form 1)*: *Error! Reference source not found.*

OUTFALL NUMBER: *007*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

R08749

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

R08750

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*007*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSIS
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08751

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets *(use the same format)* instead of completing these pages. SEE INSTRUCTIONS.

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*
Error! Reference source not found.

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)* 008

PART A - You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE b. NO. OF ANALYSES
a. Biochemical Oxygen Demand *(BOD)*												
b. Chemical Oxygen Demand *(COD)*												
c. Total Organic Carbon *(TOC)*												
d. Total Suspended Solids *(TSS)*	***19***	***mg/L***					***1***					
e. Ammonia *(as N)*												
f. Flow	Value ***0***		Value		Value		***1***			Value		
g. Temperature *(winter)*	Value		Value		Value			°C		Value		
h. Temperature *(summer)*	Value		Value		Value			°C		Value		
i. pH	Minimum ***-***	Maximum ***8.7***	Minimum	Maximum			***1***	STANDARD UNTIS				

PART B - Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitation guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X' a. BELIEVED PRESENT	2. MARK 'X' b. BELIEVED ABSENT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	a. MAXIMUM DAILY VALUE (2) MASS	b. MAXIMUM 30 DAY VALUE *(if available)* (1) CONCENTRATION	b. MAXIMUM 30 DAY VALUE *(if available)* (2) MASS	c. LONG TERM AVRG. VALUE *(if available)* (1) CONCENTRATION	c. LONG TERM AVRG. VALUE *(if available)* (2) MASS	d. NO. OF ANALYSIS	3. UNITS *(specify if blank)* a. CONCENTRATION	3. UNITS b. MASS	4. INTAKE *(optional)* a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	4. INTAKE a. LONG TERM AVERAGE VALUE (2) MASS	4. INTAKE b. NO. OF ANALYSES
a. Bromide (24959-67-9)	☐	☒												
b. Chlorine, Total Residual	☐	☒												
c. Color	☐	☒												
d. Fecal Coliform	☐	☒												
e. Fluoride (16984-48-8)	☐	☒												
f. Nitrate-Nitrite *(as N)*	☐	☒												

R08752

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'		2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic *(as N)*	☐	☒												
h. Oil and Grease	☐	☒												
i. Phosphorus *(as P)*, Total (7723-14-0)	☐	☐												
j. Radioactivity														
(1) Alpha, Total	☐	☒												
(2) Bets, Total	☐	☒												
(3) Radium, Total	☐	☒												
(4) Radium 226, Total	☐	☒												
k. Sulfate *(as SO_4)* *(14808-79-8)*	☒	☐	*1100*	*mg/L*					*1*					
l. Sulfide (as S)	☐	☒												
m. Sulfite *(as SO_3)(14265-45-3)*	☐	☒												
n. Surfactants	☐	☒												
o. Aluminum, Total (7429-90-5)	☐	☒												
p. Barium, Total (7440-39-3)	☐	☒												
q. Boron, Total (7440-42-8)	☐	☒												
r. Cobalt, Total (7440-48-4)	☐	☒												
s. Iron, Total (7439-89-4)	☒	☐	*<0.006*	*mg/L*					*1*					
t. Magnesium, Total (7439-95-4)	☐	☒												
u. Molybdenum, Total (7439-98-7)	☐	☒												
v. Manganese, Total (7439-96-5)	☒	☐	*0.011*	*mg/L*					*1*					
w. Tin, Total (7440-31-5)	☐	☒												
x. Titanium, Total (7440-32-6)	☐	☒												

R08753

CONTINUED FROM PAGE 3 OF FORM 2-C

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	*008*

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a *(secondary industries, nonprocess wastewater outfalls, and non-required GC/MS fractions)*, mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant. If you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table *(all 7 pages)* for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSES	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1m. Antimony, Total (7440-36-0)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
2M. Arsenic, Total (7440-38-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
3M. Beryllium, Total (7440-41-7)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
4M. Cadmium, Total (7440-43-9)	☐	☒	☐	*0.008*	*mg/L*					*1*					
5M Chromium, Total (7440-47-3)	☐	☒	☐	*<0.006*	*mg/L*					*1*					
6M Copper, Total (7440-50-8)	☐	☒	☐	*0.003*	*mg/L*					*1*					
7M lead, Total (7439-92-1)	☐	☒	☐	*<0.0075*	*mg/L*					*1*					
8M Mercury, Total (7439-97-6)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
9M Nickel, Total (7440-02-0)	☐	☒	☐	*<0.010*	*mg/L*					*1*					
10M Selenium, Total (7782-49-2)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
11M Silver, Total (7440-22-4)	☐	☒	☐	*<0.002*	*mg/L*					*1*					
12M Thallium, Total (7440-28-0)	☐	☒	☐	*<0.020*	*mg/L*					*1*					
13M Zinc, Total (7440-66-6)	☐	☒	☐	*<0.001*	*mg/L*					*1*					
14M Cyanide, Total (57-12-5)	☐	☒	☐	*<0.007*	*mg/L*					*1*					
15M Phenols, Total	☐	☒	☐	*0.005*	*mg/L*					*1*					
DIOXIN															
2,3,7,8-Tetrachlorodibenzo-P-Dioxin (1764--01-6)	☐	☐	☒	DESCRIBE RESULTS											

R08754

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS															
1V. Acrolein (107-02-8)	☐	☐	☒												
2V Acrylonitrile (107-13-1)	☐	☐	☒												
3V Benzene (71-43-2)	☐	☐	☒												
4V Bis *(Chloromethyl)* Ether (542-88-1)	☐	☐	☒												
5V Bromoform (75-25-2)	☐	☐	☒												
6V Carbon Tetrachloride (56-23-5)	☐	☐	☒												
7V Chlorobenzene (108-90-7)	☐	☐	☒												
8V Chlorodibromomethane (124-48-1)	☐	☐	☒												
9V Chloroethane (75-00-3)	☐	☐	☒												
10V 2-Chloroethylvinyl Ether (110-75-8)	☐	☐	☒												
11V Chloroform (67-66-3)	☐	☐	☒												
12V Dichlorobromoethane (75-71-8)	☐	☐	☒												
13V Dichlorodifluoromethane (75-71-8)	☐	☐	☒												
14V 1,1-Dichloroethane (75-34-3)	☐	☐	☒												
15V 1,2-Dichloroethane (107-06-2)	☐	☐	☒												
16V 1,1-Dichloroethylene (75335-4)	☐	☐	☒												
17V 1,2-Dichloropropane (78-87-5)	☐	☐	☒												
18V 1,3-Dichloropropylene (542-76-6)	☐	☐	☒												
19V Ethylbenzene (100-41-4)	☐	☐	☒												
20V Methyl Bromide (74-83-9)	☐	☐	☒												
21V Methyl Chloride (74-87-3)	☐	☐	☒												

R08755

EPA I.D. NUMBER *(copy from Item 1 of Form 1)*: *Error! Reference source not found.*

OUTFALL NUMBER: *008*

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSIS	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - VOLATILE COMPOUNDS *(continued)*															
22 V Methylene Chloride (75-09-2)	☐	☐	☒												
23V 1,1,2,2-Tetra-Chloroethane (79-34-5)	☐	☐	☒												
24V Tetrachloro-ethylene (127-18-4)	☐	☐	☒												
25V Toluene (108-88-3)	☐	☐	☒												
26V 1,2-Trans-Dichloroethylene (156-60-5)	☐	☐	☒												
27V 1,1,1-Tri-chloroethane (71-55-6)	☐	☐	☒												
28V 1,1,2-Tri-chloroethane (79-00-5)	☐	☐	☒												
29V Trichloro-ethylene (79-01-6)	☐	☐	☒												
30V Trichloro-fluoromethane (75-69-4)	☐	☐	☒												
31V Vinyl Chloride (75-01-4)	☐	☐	☒												
GC/MS FRACTION - ACID COMPOUNDS															
1A 2-Chlorophenol (95-57-8)	☐	☐	☒												
2A 2,4-Dichloro-phenol (120-83-2)	☐	☐	☒												
3A 2,4-Dimethyl-phenol (105-67-9)	☐	☐	☒												
4A 4,6-Dinitro-O-cresol (534-52-1)	☐	☐	☒												
5A 2,4-Dinitro-phenol (51-28-5)	☐	☐	☒												
6A 2-Nitro-phenol (88-75-5)	☐	☐	☒												
7A 4-Nitro-phenol (100-02-7)	☐	☐	☒												
8A P-Chloro-M-Cresol (59-50-7)	☐	☐	☒												
9A Penta-chlorophenol (87-86-5)	☐	☐	☒												
10A Phenol (10/-95-2)	☐	☐	☒												
11A 2,4,6-Tri-chlorophenol (88-06-2)	☐	☐	☒												

R08756

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS															
1B Acenphthene (83-32-9)	☐	☐	☒												
2B Acenaphtylene (208-96-8)	☐	☐	☒												
3B Anthracene (120-12-7)	☐	☐	☒												
4B Benzidine (92-87-5)	☐	☐	☒												
5B Benzo (a) Anthracene (56-55-3)	☐	☐	☒												
6B Benzo (a) Pyrene (50-32-8)	☐	☐	☒												
7B 3,4-Benzo-fluoranthene (205-99-2)	☐	☐	☒												
8B Benzo *(ghi)* Perylene (191-24-2)	☐	☐	☒												
9B Benzo *(k)* Fluoranthene (207-08-9)	☐	☐	☒												
10B Bis *(2-Chloroethoxy)* Methane (111-91-1)	☐	☐	☒												
11B Bis *(2-Chloro-ethyl)* Ether (111-44-4)	☐	☐	☒												
12B Bis *(2-Chloroisepropyl)* Ether (102-60-1	☐	☐	☒												
13B Bis*(2-Ethyl-hexyl)* Phthalate (117-81-7)	☐	☐	☒												
14 B 4-Bromo-phenyl Phenyl Ether (101-55-3)	☐	☐	☒												
15B Butyl Benzyl Phthalate (85-68-7)	☐	☐	☒												
16B 2-Chloro-naphthalene (91-68-7)	☐	☐	☒												
17B 4-Chloro-phenyl Phenyl Ether (7005-72-3)	☐	☐	☒												
18B Chrysene (218-01-9)	☐	☐	☒												
19B Dibenzo *(a,h)* Anthracene (53-70-3)	☐	☐	☒												
20B 1,2-Dichloro-benzene (95-50-1)	☐	☐	☒												
21B 1,3-Dichloro-benzene (541-73-1)	☐	☐	☒												

R08757

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT							3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - BASE/NEUTRAL COMPOUNDS *(continued)*															
22B 1,4-Dichlorobenzene (106-46-7)	☐	☐	☒												
23B 3,3'-Dichlorobenzidine (91-94-1)	☐	☐	☒												
24B Diethyl Phthalate (84-66-2)	☐	☐	☒												
25B Dimethyl Phthalate (131-11-3)	☐	☐	☒												
26B Di-N-Butyl Phthalate (131-11-3)	☐	☐	☒												
27B 2,4-Dinitrotoluene (121-14-2)	☐	☐	☒												
28B 2,6-Dinitrotoluene (606-20-2)	☐	☐	☒												
29B Di-N-Octyl Phthalate (117-84-0)	☐	☐	☒												
30B 1,2-Diphenylhydrazine *(as Azo-benzene)* (122-66-7)	☐	☐	☒												
31B Fluoranthene (206-44-0)	☐	☐	☒												
32B Fluorene (86-73-7)	☐	☐	☒												
33B Hexachlorobenzene (118-74-1)	☐	☐	☒												
34B Hexachlorobutadiene (87-68-3)	☐	☐	☒												
35B Hexachlorocyclopentadiene (77-47-4)	☐	☐	☒												
36B Hexachloroethane (67-72-1)	☐	☐	☒												
37B Indeno *(1,2,3-cd)* Pyrene (193-39-5)	☐	☐	☒												
38B Isophorone (78-59-1)	☐	☐	☒												
39B Napthalene (91-20-3)	☐	☐	☒												
40B Nitrobenzene (98-95-3)	☐	☐	☒												
41B N-Nitrosodimethylamine (62-75-9)	☐	☐	☒												
42B N-Nitrosdi-N-Propylamine (621-64-7)	☐	☐	☒												

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						d. NO. OF ANALYSES	3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*			a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION - BASE/NEUTRAL COMPOUNDS *(continued)*															
43B N-Nitrosodiphenylamine (86-30-6)	☐	☐	☒												
44B Phenanthrene (85-01-/	☐	☐	☒												
45B Pyrene (129-00-0)	☐	☐	☒												
46B 1,2,4-Trichlorobenzene (120-82-1)	☐	☐	☒												
GC/MS FRACTION - PESTICIDES															
1P Aldrin (309-00-2)	☐	☐	☒												
2P β-Bhc (319-85-7)	☐	☐	☒												
4P γ-BHC (58-89-9)	☐	☐	☒												
5P δ-BHC (319-86-8)	☐	☐	☒												
6P Chlordane (57-74-9)	☐	☐	☒												
7P 4,4'-DDT (50-29-3)	☐	☐	☒												
8P 4,4'-DDE (72-55-9)	☐	☐	☒												
9P 4,4'-DDD (72-54-8)	☐	☐	☒												
10P Dieldrin (60-57-1)	☐	☐	☒												
11P α-Endosulfan (115-29-7)	☐	☐	☒												
12P β-Endosulfan (115-29-7	☐	☐	☒												
13P Endosulfan Sulfate (1031-07-8)	☐	☐	☒												
14P Endrin (72-20-8)	☐	☐	☒												
15P Endrin Aldehyde (7421-93-4)	☐	☐	☒												
16P Heptachlor (76-44-8)	☐	☐	☒												

R08759

CONTINUED FROM PAGE V-6

EPA I.D. NUMBER *(copy fro... ..em 1 of Form 1)*	OUTFALL NUMBER
Error! Reference source not found.	***008***

1. POLLUTANT AND CAS NO. *(if available)*	2. MARK 'X'			2. EFFLUENT						3. UNITS *(specify if blank)*		4. INTAKE *(optional)*		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE *(if available)*		c. LONG TERM AVRG. VALUE *(if available)*		d. NO. OF ANALYSIS	a. CONCENTRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS - PESTICIDES *(continued)*															
17P Heptachlor Expxide (1024-57-3)	☐	☐	☒												
18P PCB-1242 (53469-21-9)	☐	☐	☒												
19P PCB-1254 (11097-69-1)	☐	☐	☒												
20P PCB-1221 (11104-28-2)	☐	☐	☒												
21P PCB-1232 (11141-16-5)	☐	☐	☒												
22P PCB-1248 (12672-29-6)	☐	☐	☒												
23P PCB-1260 (11096-82-5)	☐	☐	☒												
24P PCB-1016 (12674-11-2)	☐	☐	☒												
25P Toxaphene (8001-35-2)	☐	☐	☒												

R08760

GRAB SAMPLES
FROM SEDIMENT PONDS

3117-15
Part 2 of 2

LAB ANALYSIS SHEETS
POND SAMPLES

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Mach Mining
PDL: 16455-1
SAMPLE ID: Pond #1
DATE SAMPLED: 12/16/14

REPORT DATE: 1/5/15
COMMENT:
SAMPLED BY: Client - CS
DATE RECEIVED: 12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit	1 - 14	150.1	12/16/14 AK
Acidity	52	mg/L	10	305.1	12/29/14 KE
Alkalinity	488	mg/L	10	310.1	12/29/14 KE
Chlorides	4,434	mg/L	5	325.3	12/22/14 KE
Sulfates	5,150	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	46	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	< 0.040	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.018	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	17.81	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	0.067	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	0.025	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

SUMMIT
ENVIRONMENTAL
SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Mach Mining
PDL: 16455-2
SAMPLE ID: Pond #2
DATE SAMPLED: 12/16/14

REPORT DATE: 1/5/15
COMMENT:
SAMPLED BY: Client - CS
DATE RECEIVED: 12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.8	Unit	1 - 14	150.1	12/16/14 AK
Acidity	< 10	mg/L	10	305.1	12/29/14 KE
Alkalinity	60	mg/L	10	310.1	12/29/14 KE
Chlorides	60	mg/L	5	325.3	12/22/14 KE
Sulfates	92	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	36	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	< 0.040	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.031	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	1.982	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	< 0.010	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	< 0.001	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Mach Mining
PDL: 16455-3
SAMPLE ID: Pond #3
DATE SAMPLED: 12/16/14

REPORT DATE: 1/5/15
COMMENT:
SAMPLED BY: Client - CS
DATE RECEIVED: 12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	8.0	Unit	1 - 14	150.1	12/16/14 AK
Acidity	< 10	mg/L	10	305.1	12/29/14 KE
Alkalinity	64	mg/L	10	310.1	12/29/14 KE
Chlorides	28	mg/L	5	325.3	12/22/14 KE
Sulfates	88	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	66	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	0.069	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.024	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	2.910	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	< 0.010	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	< 0.001	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Mach Mining	**REPORT DATE:**	1/5/15
PDL:	16455-4	**COMMENT:**	
SAMPLE ID:	Pond #4	**SAMPLED BY:**	Client - CS
DATE SAMPLED:	12/16/14	**DATE RECEIVED:**	12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.9	Unit	1 - 14	150.1	12/16/14 AK
Acidity	< 10	mg/L	10	305.1	12/29/14 KE
Alkalinity	88	mg/L	10	310.1	12/29/14 KE
Chlorides	38	mg/L	5	325.3	12/22/14 KE
Sulfates	210	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	58	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	< 0.040	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.024	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	0.463	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	< 0.010	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	< 0.001	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Mach Mining
PDL: 16455-5
SAMPLE ID: Pond #5
DATE SAMPLED: 12/16/14

REPORT DATE: 1/5/15
COMMENT:
SAMPLED BY: Client - CS
DATE RECEIVED: 12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	8.1	Unit	1 - 14	150.1	12/16/14 AK
Acidity	10	mg/L	10	305.1	12/29/14 KE
Alkalinity	72	mg/L	10	310.1	12/29/14 KE
Chlorides	88	mg/L	5	325.3	12/22/14 KE
Sulfates	390	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	65	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	< 0.040	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.043	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	1.408	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	< 0.010	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	< 0.001	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Mach Mining
PDL: 16455-6
SAMPLE ID: Pond #6
DATE SAMPLED: 12/16/14

REPORT DATE: 1/5/15
COMMENT:
SAMPLED BY: Client - CS
DATE RECEIVED: 12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.6	Unit	1 - 14	150.1	12/16/14 AK
Acidity	< 10	mg/L	10	305.1	12/29/14 KE
Alkalinity	520	mg/L	10	310.1	12/29/14 KE
Chlorides	3,209	mg/L	5	325.3	12/22/14 KE
Sulfates	3,800	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	24	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	< 0.040	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.030	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	1.595	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	< 0.010	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	0.014	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT: Mach Mining
PDL: 16455-7
SAMPLE ID: Pond #7
DATE SAMPLED: 12/16/14

REPORT DATE: 1/5/15
COMMENT:
SAMPLED BY: Client - CS
DATE RECEIVED: 12/16/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.8	Unit	1 - 14	150.1	12/16/14 AK
Acidity	10	mg/L	10	305.1	12/29/14 KE
Alkalinity	384	mg/L	10	310.1	12/29/14 KE
Chlorides	3,149	mg/L	5	325.3	12/22/14 KE
Sulfates	3,450	mg/L	5	375.4	12/22/14 KE
Total Suspended Solids	15	mg/L	5	160.2	12/22/14 KE
Cyanide	< 0.002	mg/L	0.002	335.4	12/30/14 KE
Phenols, Total Recoverable	< 0.01	mg/L	0.01	420.4	1/2/15 KE
Antimony	< 0.040	mg/L	0.040	204.1	12/30/14 AK
Arsenic	< 0.002	mg/L	0.002	206.4	12/30/14 AK
Beryllium	< 0.001	mg/L	0.001	210.1	12/30/14 AK
Cadmium	0.044	mg/L	0.002	213.1	12/30/14 AK
Chromium	< 0.006	mg/L	0.006	218.1	12/30/14 AK
Copper	< 0.003	mg/L	0.003	220.1	12/30/14 AK
Iron, Total	1.454	mg/L	0.006	236.1	12/30/14 AK
Lead	< 0.0075	mg/L	0.0075	239.1	12/30/14 AK
Mercury	< 0.002	mg/L	0.002	245.1	12/30/14 AK
Nickel	< 0.010	mg/L	0.010	249.1	12/30/14 AK
Selenium	< 0.002	mg/L	0.002	270.2	12/30/14 AK
Silver	< 0.002	mg/L	0.002	272.1	12/30/14 AK
Thallium	< 0.020	mg/L	0.020	279.1	12/30/14 AK
Zinc	0.028	mg/L	0.001	289.1	12/30/14 AK

Reviewed By: Jeff Gough

UN-NAMED TRIBUTARY OF POND CREEK STREAM SAMPLES

LAB ANALYSIS SHEETS
STREAM SAMPLES

SUMMIT
ENVIRONMENTAL
SERVICES, INC.

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208

CHEMICAL ANALYSTS & CONSULTANTS

Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	6/20/14
PDL:	16038-13	**COMMENT:**	1.2 cfs
SAMPLE ID:	PC 1	**SAMPLED BY:**	Client-TG
DATE SAMPLED:	5/30/14	**DATE RECEIVED:**	5/30/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.6	Unit		150.1	5/30/14 TG
Acidity	< 10	mg/L	10	305.1	6/12/14 KE
Alkalinity	120	mg/L	10	310.1	6/12/14 KE
Chlorides	43	mg/L	5	325.3	6/9/14 AK
Sulfates	333	mg/L	5	375.4	6/12/14 AK
Hardness	260	mg/L	10	130.2	6/12/14 KE
Total Dissolved Solids	564	mg/L	50	160.1	6/19/14 KE
Total Suspended Solids	10	mg/L	5	160.2	6/19/14 KE
Iron, Total	0.258	mg/L	0.006	236.1	6/12/14 JB
Iron , Dissolved	0.160	mg/L	0.006	236.1	6/12/14 JB
Manganese, Total	0.357	mg/L	0.002	243.1	6/12/14 JB
Manganese, Dissolved	0.045	mg/L	0.002	243.1	6/12/14 JB

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208

CHEMICAL ANALYSTS & CONSULTANTS

Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	6/20/14
PDL:	16038-14	**COMMENT:**	3.0 cfs
SAMPLE ID:	PC 2	**SAMPLED BY:**	Client-TG
DATE SAMPLED:	5/30/14	**DATE RECEIVED:**	5/30/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.6	Unit		150.1	5/30/14 TG
Acidity	< 10	mg/L	10	305.1	6/12/14 KE
Alkalinity	110	mg/L	10	310.1	6/12/14 KE
Chlorides	470	mg/L	5	325.3	6/9/14 AK
Sulfates	750	mg/L	5	375.4	6/12/14 AK
Hardness	260	mg/L	10	130.2	6/12/14 KE
Total Dissolved Solids	1,844	mg/L	50	160.1	6/19/14 KE
Total Suspended Solids	5	mg/L	5	160.2	6/19/14 KE
Iron, Total	0.279	mg/L	0.006	236.1	6/12/14 JB
Iron , Dissolved	0.132	mg/L	0.006	236.1	6/12/14 JB
Manganese, Total	0.138	mg/L	0.002	243.1	6/12/14 JB
Manganese, Dissolved	< 0.002	mg/L	0.002	243.1	6/12/14 JB

Reviewed By: Jeff Gough

SUMMIT
ENVIRONMENTAL
SERVICES, INC.

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208

CHEMICAL ANALYSTS & CONSULTANTS

Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	6/20/14
PDL:	16038-15	**COMMENT:**	0.5 cfs
SAMPLE ID:	PC 3	**SAMPLED BY:**	Client-TG
DATE SAMPLED:	5/30/14	**DATE RECEIVED:**	5/30/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.5	Unit		150.1	5/30/14 TG
Acidity	10	mg/L	10	305.1	6/12/14 KE
Alkalinity	94	mg/L	10	310.1	6/12/14 KE
Chlorides	34	mg/L	5	325.3	6/9/14 AK
Sulfates	306	mg/L	5	375.4	6/12/14 AK
Hardness	260	mg/L	10	130.2	6/12/14 KE
Total Dissolved Solids	520	mg/L	50	160.1	6/19/14 KE
Total Suspended Solids	6	mg/L	5	160.2	6/19/14 KE
Iron, Total	0.355	mg/L	0.006	236.1	6/12/14 JB
Iron , Dissolved	0.192	mg/L	0.006	236.1	6/12/14 JB
Manganese, Total	0.311	mg/L	0.002	243.1	6/12/14 JB
Manganese, Dissolved	< 0.002	mg/L	0.002	243.1	6/12/14 JB

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

CHEMICAL ANALYSTS & CONSULTANTS

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208
Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	6/20/14
PDL:	16038-16	**COMMENT:**	100 GPM
SAMPLE ID:	PC 4	**SAMPLED BY:**	Client-TG
DATE SAMPLED:	5/30/14	**DATE RECEIVED:**	5/30/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.2	Unit		150.1	5/30/14 TG
Acidity	< 10	mg/L	10	305.1	6/12/14 KE
Alkalinity	94	mg/L	10	310.1	6/12/14 KE
Chlorides	9	mg/L	5	325.3	6/9/14 AK
Sulfates	370	mg/L	5	375.4	6/12/14 AK
Hardness	340	mg/L	10	130.2	6/12/14 KE
Total Dissolved Solids	536	mg/L	50	160.1	6/19/14 KE
Total Suspended Solids	15	mg/L	5	160.2	6/19/14 KE
Iron, Total	0.381	mg/L	0.006	236.1	6/12/14 JB
Iron , Dissolved	0.150	mg/L	0.006	236.1	6/12/14 JB
Manganese, Total	5.214	mg/L	0.002	243.1	6/12/14 JB
Manganese, Dissolved	2.028	mg/L	0.002	243.1	6/12/14 JB

Reviewed By: Jeff Gough

SUMMIT ENVIRONMENTAL SERVICES, INC.

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208

CHEMICAL ANALYSTS & CONSULTANTS

Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	6/20/14
PDL:	16038-17	**COMMENT:**	20 GPM
SAMPLE ID:	C 1	**SAMPLED BY:**	Client-TG
DATE SAMPLED:	5/30/14	**DATE RECEIVED:**	5/30/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.4	Unit		150.1	5/30/14 TG
Acidity	< 10	mg/L	10	305.1	6/12/14 KE
Alkalinity	172	mg/L	10	310.1	6/12/14 KE
Chlorides	22	mg/L	5	325.3	6/9/14 AK
Sulfates	110	mg/L	5	375.4	6/12/14 AK
Hardness	170	mg/L	10	130.2	6/12/14 KE
Total Dissolved Solids	304	mg/L	50	160.1	6/19/14 KE
Total Suspended Solids	147	mg/L	5	160.2	6/19/14 KE
Iron, Total	1.312	mg/L	0.006	236.1	6/12/14 JB
Iron , Dissolved	0.337	mg/L	0.006	236.1	6/12/14 JB
Manganese, Total	0.729	mg/L	0.002	243.1	6/12/14 JB
Manganese, Dissolved	0.021	mg/L	0.002	243.1	6/12/14 JB

Reviewed By: Jeff Gough

SUMMIT
ENVIRONMENTAL
SERVICES, INC.

17650 Route 37
West Frankfort, Illinois 62896
Phone (618) 983-8280
Fax (618) 983-8208

CHEMICAL ANALYSTS & CONSULTANTS

Website: www.summitenviro.com

CLIENT:	Pond Creek	**REPORT DATE:**	6/20/14
PDL:	16038-18	**COMMENT:**	20 GPM
SAMPLE ID:	C 2	**SAMPLED BY:**	Client-TG
DATE SAMPLED:	5/30/14	**DATE RECEIVED:**	5/30/14

TEST DESCRIPTION	RESULT	UNITS	DETECTION LIMIT	METHOD	DATE/ ANALYST
pH	7.5	Unit		150.1	5/30/14 TG
Acidity	< 10	mg/L	10	305.1	6/12/14 KE
Alkalinity	62	mg/L	10	310.1	6/12/14 KE
Chlorides	11	mg/L	5	325.3	6/9/14 AK
Sulfates	80	mg/L	5	375.4	6/12/14 AK
Hardness	100	mg/L	10	130.2	6/12/14 KE
Total Dissolved Solids	160	mg/L	50	160.1	6/19/14 KE
Total Suspended Solids	260	mg/L	5	160.2	6/19/14 KE
Iron, Total	1.735	mg/L	0.006	236.1	6/12/14 JB
Iron , Dissolved	0.585	mg/L	0.006	236.1	6/12/14 JB
Manganese, Total	0.310	mg/L	0.002	243.1	6/12/14 JB
Manganese, Dissolved	< 0.002	mg/L	0.002	243.1	6/12/14 JB

Reviewed By: Jeff Gough

SCHEDULE A INFORMATION

Modifications to the Existing Permit

Proposed Outlet 009

Williamson Energy LLC currently has a pending IDNR-OMM permit application (Permit 417) in review and proposes a new NPDES Outlet, 009. The applicant is requesting that Outlet 009 be added to the IEPA Permit IL0077666. Permit 417 is the proposed Refuse Disposal Area No. 3 for Williamson Energy, LLC. This proposed disposal area will tie into the existing Refuse Disposal Area Nos. 1 & 2 and will eliminate a portion of the sediment control structure currently in-place. Refer to the enclosed Surface Facilities Map for additional details.

Drainage Modification – Outlet 005

Williamson Energy has converted the originally permitted soil storage area to a geotextile bag farm and is utilizing pumps to prevent a discharge from the sediment ditches. The water collected in the ditches is being pumped to the Refuse Disposal Area Nos. 1 & 2 impoundments. The pumps will operate by a float system that automatically starts and stops the pumps based on the water elevation in the pond. A minimum freeboard level of 2 feet and the pumping capacity will be maintained at all times to keep the pond from discharging. The pumps and attached discharge lines will have the capacity to evacuate 3,600 gpm from the pond.

In addition to adding Outlet 009 to IEPA Permit IL0077666, Williamson Energy, LLC is also requesting a minor drainage modification to Outlet 005. IEPA Permit No. 2014-MW-4275 was issued to Williamson Energy, LLC on October 2, 2014. The permit allowed the development and operation of an area in which fine refuse was pumped into geotextile tubes. In accordance with the permit, surface runoff and dewatering of the geotextile tubes is collected in a "no-discharge" perimeter containment basin. All water pumped from the containment basin is directed to the existing refuse disposal area or the coal preparation plant for use in the coal processing circuit. The pumps operate by a float system that automatically starts and stops the pumps based on the water elevation in the pond. A minimum freeboard level of 2 feet and the pumping capacity are being maintained to keep the pond from discharging. Upon the issuance of this permit and the construction of the new refuse facility, the geotextile tube area is no longer necessary. Williamson Energy, LLC is requesting to modify the drainage control plan to allow stormwater runoff from the area to discharge through sediment ditches and spillway, into existing Ditch D-5C and through Pond 005. This drainage pattern is not a deviation from the originally approved drainage plan. This change is being requested to eliminate stormwater being pumped into the impoundment and thus limiting the available operation life of the facility. Furthermore, due to the nature of the geotextile tubes, surface water quality is not anticipated to be affected once they are out of service and no longer being utilized. All groundwater protections and the reclamation plan for the area will remain as approved in the permit.

Mixing Zone

Williamson Energy LLC's Pond Creek Mine is proposing to use a stormwater mixing zone for the discharge of Pond 007/008 during certain precipitation events and corresponding flows in Pond Creek. Regulatory mixing zones, as contained in the general policies of the Illinois WQS (Title 35; Subtitle C; Chapter I; Part 302.102), are allowed at the discretion of the state. A physical mixing zone can be

calculated and, if approved, implemented on a site specific basis through the Pond Creek Mine's NPDES permit.

Refer to the report included within this document titled Pond Creek Mine Stormwater Analysis preliminary study for storm event sizes and corresponding allowable discharge.

SCHEDULE A

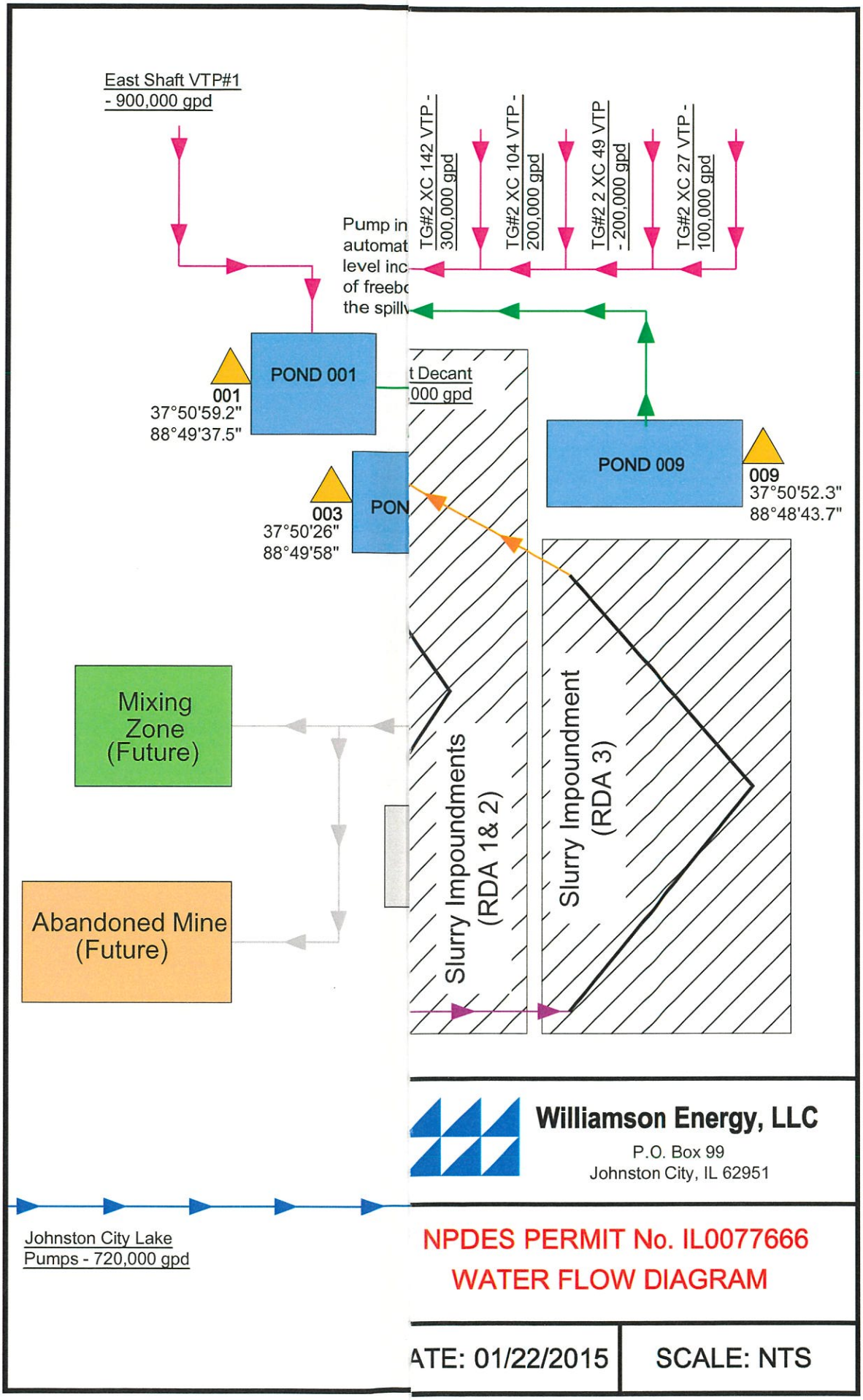
DISCHARGE #	001	002	003	004	005
QUARTER SECTION	NW	SW	SW	SW	SW
SECTION	12	12	12	12	12
TOWNSHIP	8 South	8 South	8 South	8 South	8 South
RANGE	3 East	3 East	3 East	3 East	3 East
COUNTY	Williamson	Williamson	Williamson	Williamson	Williamson
AVERAGE FLOW (gpd) if discharge does not result from precipitation.	Precipitation	Precipitation	Precipitation	Precipitation	Precipitation
MAX FLOW (gpd) if discharge does not result from precipitation.	Precipitation	Precipitation	Precipitation	Precipitation	Precipitation
SOURCE OF DISCHARGE	Surface Runoff	Surface Runoff	Surface Runoff	Surface Runoff	Surface Runoff
SAMPLING METHOD	Grab	Grab	Grab	Grab	Grab
Acidity (mg/l)	**20**	**20**	**20**	**20**	**20**
Alkalinity (mg/l)	**300**	**300**	**300**	**300**	**300**
Lead (mg/l)	0.05	0.05	**0.05**	**0.05**	**0.05**
Iron (mg/l)	1.5	3	**1.0**	**3**	**3**
Magnanese (mg/l)	0.2	0.2	0.2	0.2	0.2
pH (range)	6.5 - 8.5	6.5 – 8.5	**6.5 – 8.5**	**6.5 – 8.5**	**6.5 – 8.5**
Zinc (mg/l)	0.1	0.1	**0.1**	**0.1**	**0.1**
Fluoride (mg/l)	1.0	1.0	**0.8**	**1.0**	**1.0**
Total Suspended Solids (mg/l)	10 – 50	10 – 50	**5 – 20**	**10 – 50**	**10 – 50**
Sulfate (mg/l)	2000	2000	2000	2000	2000
Total Dissolved Solids (mg/l)	450	450	450	450	450
Chloride (mg/l)	500	500	500	500	500
Receiving Stream	Unnamed	Unnamed	Unnamed	Unnamed	Unnamed
Tributary to	Pond Creek	Pond Creek	Pond Creek	Pond Creek	Pond Creek
Tributary to	Big Muddy River	Big Muddy River	Big Muddy River	Big Muddy River	Big Muddy River
Tributary to	Mississippi River	Mississippi River	Mississippi River	Mississippi River	Mississippi River

SCHEDULE A

DISCHARGE #	006	007	008	009 (Proposed)	
QUARTER SECTION	SW	NW	NW	NW	
SECTION	12	12	12	7	
TOWNSHIP	8 South	8 South	8 South	T8S	
RANGE	3 East	3 East	3 East	R4E	
COUNTY	Williamson	Williamson	Williamson	Williamson	
AVERAGE FLOW (gpd) if discharge does not result from precipitation.	Precipitation	Precipitation	Precipitation	Precipitation	
MAX FLOW (gpd) if discharge does not result from precipitation.	Precipitation	Precipitation	Precipitation	Precipitation	
SOURCE OF DISCHARGE	Surface Runoff	Surface Runoff	Surface Runoff	Surface Runoff	
SAMPLING METHOD	Grab	Grab	Grab	Grab	
Acidity (mg/l)	20	20	20	30-905	
Alkalinity (mg/l)	300	300	300	200	
Lead (mg/l)	0.05	0.05	0.05	0.5	
Iron (mg/l)	3	3	3	3 – 6	
Magnanese (mg/l)	0.2	0.2	0.2	4	
pH (range)	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6 – 9	
Zinc (mg/l)	0.1	0.1	0.1	0.5 – 1.0	
Fluoride (mg/l)	1.0	1.0	1.0	1.0	
Total Suspended Solids (mg/l)	10 – 50	10 – 50	10 – 50	35 – 70	
Sulfate (mg/l)	2000	2000	2000	2100	
Total Dissolved Solids (mg/l)	450	450	450	3500	
Chloride (mg/l)	500	500	500	1000	
Receiving Stream	Unnamed	Unnamed	Unnamed	Unnamed	
Tributary to	Pond Creek	Pond Creek	Pond Creek	Pond Creek	
Tributary to	Big Muddy River	Big Muddy River	Big Muddy River	Big Muddy River	
Tributary to	Mississippi River	Mississippi River	Mississippi River	Mississippi River	

WATER FLOW DIAGRAM

R08784



Drawing: \Acl-acad\caddrawings\14626\14626B1.dwg - Layout Tab: Model
Date: Feb 13, 2015-4:29pm - Plotted by: ssutphin

Xrefs:

Williamson Energy, LLC
P.O. Box 99
Johnston City, IL 62951

NPDES PERMIT No. IL0077666
WATER FLOW DIAGRAM

ATE: 01/22/2015 | SCALE: NTS

ACI DRAWING NO. B14-626-B1

WILLIAMSON ENERGY. LLC
POND CREEK MINE NO. 1
ANTI-DEGRADATION ASSESTMENT

February 13, 2015

Antidegradation Assessment
Williamson Energy LLC
Renewal of NPDES Permit IL0077666 with Modifications
Williamson County, IL

Introduction

In conjunction with IDMM Permit No. 417, the subject facility has applied for a NPDES permit for one additional discharge point from sediment control structures for the subject permit area. This point will be in addition to the eight discharge points authorized under NPDES Permit IL0077666. The proposed discharge will report to an unnamed tributary of Pond Creek.

Williamson Energy, LLC is applying for a renewal of NPDES Permit No. IL0077666. In addition to the renewal application, Williamson Energy, LLC is requesting to add a new outlet, Outlet 009, which is associated with the pending IDNR-OMM permit, Permit 417; Pond 009. The purpose for Permit 417 is to permit a new refuse disposal area for the underground mining operation associated with Permit 375. Williamson Energy submitted a joint application for an Individual Section 404 Permit from the U.S. Army Corps of Engineers (USACE)and a Section 401 water quality certification for impacts associated with modifications to and expansions of the Pond Creek 1 mine refuse disposal areas located approximately 6 miles Northeast of Johnston City, IL.

Details of the pond designs, collection ditches and outfall points were included in the original permit submittal as well as in the pending IDNR-OMM Permit 417 application and subsequent revisions/modifications to Permit No. IL0077666. Included within this document are attachments that indicate project location, general mine surface facility layout, and water quality reports for each outfall. All sediment control structures (ponds) have been constructed and have been operating with the exception of Pond 009. Since Pond 009 will be a sediment control structure receiving drainage from a refuse area, the water quality of this pond would be comparable to the existing Pond 007 which receives runoff from the existing refuse facility. At this time, Williamson Energy, LLC is requesting authorization for this pond and the proposed outfall to be included in this permit renewal.

In addition to adding Outlet 009 to IEPA Permit IL0077666, Williamson Energy, LLC is also requesting a minor drainage modification to Outlet 005. IEPA Permit No. 2014-MW-4275 was issued to Williamson Energy, LLC on October 2, 2014. The permit allowed the development and operation of an area in which fine refuse was pumped into geotextile tubes. In accordance with the permit, surface runoff and dewatering of the geotextile tubes is collected in a "no-discharge" perimeter containment basin. All water pumped from the containment basin is directed to the existing refuse disposal area or the coal preparation plant for use in the coal processing circuit. The pumps operate by a float system that automatically starts and stops the pumps based on the water elevation in the pond. A minimum freeboard level of 2 feet and the pumping capacity are being

maintained to keep the pond from discharging. Upon the issuance of this permit and the construction of the new refuse facility, the geotextile tube area is no longer necessary. Williamson Energy, LLC is requesting to modify the drainage control plan to allow stormwater runoff from the area to discharge through sediment ditches and spillway, into existing Ditch D-5C and through Pond 005. This drainage pattern is not a deviation from the originally approved drainage plan. This change is being requested to eliminate stormwater being pumped into the impoundment and thus limiting the available operation life of the facility. Furthermore, due to the nature of the geotextile tubes, surface water quality is not anticipated to be affected once they are out of service and no longer being utilized. All groundwater protections and the reclamation plan for the area will remain as approved in the permit.

Purpose and Anticipated Benefits of the Proposed Activity

Pond Creek Mine commenced construction in July of 2005 and the first coal was produced in November of 2006. The estimated annual clean coal production is 6.0 million tons per year. The mine has a life expectancy of more than 20 years.

The purpose of this project is to allow the continued operation of a longwall coal mine that employees many persons and provides a significant contribution toward the energy security of our nation. The mine makes a substantial contribution to the local community through economic benefit and employment opportunities. The following is a discussion of the importance of the mine from an economic and social development perspective with emphasis on the negative effect should the mine be unable to continue operation.

Illinois ranks fifth among the states producing coal in the United States. Many other coal producing states have experienced declining coal production in the last few years. Illinois, however, is actually producing at a rate in excess of 2013 with production up by approximately 5.6% by the end of the year. Illinois coal mining ended the year of 2014 with clean coal production in excess of 52 million tons.

Assuming an average price of $50 per ton, the State's 2014 coal production generated $2.6 billion in gross revenues for the State's producers. Illinois has the largest reported bituminous coal resources with almost 25% of our nations reserves (ICA). Illinois coal is classified as bituminous with energy content ranging from 10,000 to 14,000 Btu/lb and is said to contain more energy than the oil reserves of Saudi Arabia and Kuwait combined. The coal industry remains a mainstay of the economy in downstate Illinois. For many decades, coal mining has been a major impact on the employment of Illinoisans, on their culture and on their communities.

Pond Creek Mine produced approximately 6.48 million tons of coal in 2014. The coal produced was capable of generating over 12 billion kilowatt hours of electricity, enough to power over 1.1 million average American households for the year, based on U.S. Energy Information Administration data.

Put another way, this single coal mine produced enough energy to power every household in the state of Arkansas in 2014.

Pond Creek Mine directly employs 170 full time personnel with an annual payroll of approximately $20 million. In addition to these 170 direct employees, it is estimated that another 179 persons are employed in daily work associated with the mine's production. This includes truck drivers, supply and support personnel, train crews, and technical personnel. Further, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job (ICA), an additional 514 persons are employed as a result of this mine. All told, approximately 859 persons should enjoy continued employment by the continuation of mining at this site.

Supplies and services purchased from local and regional vendors results in expenditures of about $30 million per year. This expenditure includes items such as equipment, maintenance, fuel, tires, equipment supplies, oil, filters, rock dust, roof bolts, cribbing, props, and numerous miscellaneous supply and service items. Employment statistics indicate the November 2014 unemployment rate for Williamson County was at 6.5%. With an estimated available work force of 40,690 persons, this would equate to in excess of 2,600 persons without employment. Due to the relative size of the employment base in this County and the high rate of unemployment, the importance of the continued operation of this mine on the economy of the region is significant.

Estimated annual sales tax paid by Pond Creek Mine is $497,000 which includes state and local tax shares. The estimated tax paid on coal production is $8.5 million. The estimated real estate replacement tax and real estate tax totals $1.3 million per year. The total local, state, and federal revenues generated by the continuation of this mine should be in excess of $31.8 million annually.

Summarizing, continuation of mining and coal sales at the Pond Creek Mine will benefit the local community in many ways including the employment of approximately 859 people and local and regional economic development. Coal mined at the site will provide economic benefits that are necessary to power the state and national economy and assist in improving the quality of life for the citizenry. The benefit to the local, state, and regional social climate and economic development provided by continuation of mining at this location clearly justifies the minimal discharge of waters from this mine.

Identification and Characterization of Receiving Stream

As indicated above, an unnamed tributary to Pond Creek will receive the discharge from the pond outlets within the permit area. The unnamed tributary has not been assessed by the IEPA and therefore is not listed as impaired in the draft 2012 Illinois Integrated water quality report and section 303 (d) list.

Prior to making application for NPDES permit IL0077666, sampling was undertaken by Williamson Energy of the receiving stream. All data from that pre-mining sampling period is included in the original application materials for the NDPES permit.

A review of the data from this sampling period indicates the stream water quality has been well within the limits as set in Title 35, Subtitle C, Chapter 1, Part 302, Subpart B, Section 302.208. This serves to validate the success in the performance of the water quality control measures being taken at the Pond Creek Mine.

Identification of Proposed Pollutant Load Increases and Potential Impacts on Affected Waters

Considering that the discharge from the mines' sediment control ponds will ultimately report to waters of the state in response to surface water runoff from storms of larger magnitude, it is appropriate to evaluate the effect of such pollutant load increases on the receiving stream system. Surface water runoff from the permit area first reports to the designed sediment control ponds. The ponds then discharge to the aforementioned unnamed tributary to Pond Creek. The relevant preliminary monitoring points for Refuse Area #1 are two (2) surface water monitoring stations: PC-1, which is upstream in the watershed of the project location, and PC-2, which is downstream in the watershed of the project location (See Drawing No. B14-626-M1, Operational Plan Map). The location of PC-2 is downstream from the discharge of the NPDES Outlets 001 through 008 and the newly proposed NPDES Outlet 009.

Outlets 006 and 007/008, responsible for the discharge of waters from RDA#1 & 2, discharge into an unnamed tributary of Pond Creek, and has a 7Q10 flow of zero (0) cfs. The unnamed tributary is a "general-use" water, with no segment code. The most suitable preliminary water quality monitoring stations for the proposed RDA#3 are PC-4, which is located furthest upstream within the watershed outside of any surface activity, and PC-3, located just upstream of RDA#3 (See Drawing No. B14-626-M1, Operational Plan Map). It is expected that the surface activity and scope of RDA#3 will be similar in nature to RDA#1 & 2. Thus, the preliminary monitoring of the surface water quality stations for RDA#1&2 are also representative of waters from the area surrounding RDA#3. These locations can be used as a secondary resource to establish baseline water quality values for RDA#3 as well.

Mixing Zone

Williamson Energy LLC's Pond Creek Mine is proposing to use a stormwater mixing zone for the discharge of Pond 007/008 during certain precipitation events and corresponding flows in Pond Creek. Regulatory mixing zones, as contained in the general policies of the Illinois WQS (Title 35; Subtitle C; Chapter I; Part 302.102), are allowed at the discretion of the state. A physical mixing zone can be calculated and, if approved, implemented on a site specific basis through the Pond Creek Mine's NPDES permit.

Refer to the report included within this document titled Pond Creek Mine Stormwater Analysis preliminary study for storm event sizes and corresponding allowable discharge.

Water Conservation at Pond Creek Mine

Considering the continuous need for water in numerous mining activities and in coal processing, harvesting of surface runoff from rain events and water reuse is of utmost importance to the success of the Pond Creek Mine's need to have adequate water for operations, especially during dry periods. Williamson Energy, LLC has established a water recirculation system, which incorporates mine pumpage and pumping water collected in the existing sediment control structures (ponds) into HDPE pipelines. The pumped water is utilized in the mining and cleaning operations.

Fresh water (purchased from Johnston City, IL) is pumped to the property and stored in Pond 005. Water pumped from the Johnston City Lake is automatically controlled when the pool elevation of Pond 005 drops. The water in Pond 005 functions as the source for underground mine usage, and storage in times of drought.

The majority of water used at the mine site is required for separating raw coal from rock in the preparation plant. The larger rocks are screened off from the incoming feed to the plant where they are deposited onto the refuse belt. This material is used to construct the refuse impoundment. The fine material ultimately ends at the thickener units. The static thickener unit attached to the preparation plant requires approximately 2,000 gpm of incoming water while in operation. The underflow from the static thickener is pumped into the fine coal refuse slurry impoundment of Refuse Disposal Facilities 1 & 2.

Over time, the fine solid particles settle to the bottom of the impoundment leaving clean water on the surface. At this point, the clarified water is able to be recycled by pumping it back into the system (a process known as "decanting"). The decant pump is located on the opposite side of the slurry impoundment from the thickener underflow discharge. This maximizes retention time and ensures water clarity at the decant pump. This decant water is piped back into the preparation plant and reused in the process.

It should be noted that clarified decant water is not always available. When clarified water is not available, fresh water is pumped from Ponds 001, 002, 003, 004, 006, and/or 009.

Assessment of Alternatives to Proposed Increases in Pollutant Loading or Activities

Pond Creek Mine will use sediment ponds for treating collected mine water and stormwater. The use of sediment ponds is standard practice in the mining industry for treating settable solids. It is technically and economically the most effective and efficient way to hold water, preventing discharge, and for treating mine water and stormwater for discharge. All water discharged from the Pond Creek Mine permit area will pass through sediment ponds. Sediment ponds treat mine water

and stormwater by retaining the influent for a sufficient amount of time for the majority of the settable solids to settle out and be retained in the pond.

This assessment includes consideration of the following alternatives: 1) no mining; 2) no discharge of stormwater from the site; 3) reduction in the number of outfall points; 4) alternative on-site treatment technologies, 5) use of alternative sediment control and treatment devices, 6) collect and treat surface water in accordance with the proposed permit, and 6) Alternative Treatment Technologies: A) Filtration, B) Reverse Osmosis, C) Bioremediation, D) Coagulation (Chemical) Precipitation, E) Ion Exchange, F) Cost Effective Sulfate Removal (CESR), G) Supervac.

Pollutants of concerns are settable solids, chloride and sulfate. The options listed above were examined to determine whether the measure is technically feasible and economically reasonable and would result in a lesser load increase, no load increase or minimal environmental degradation.

ALTERNATIVE NO. 1

Do Not Mine

Presently, and for the foreseeable future, coal is essential to the generation of electricity in Illinois, the United States and most countries around the world. The need for low cost electricity in today's economy is essential to allow recovery from what has been termed the most serious economic downturn in our life times. The coal industry is crucial to the economic health of Illinois and the country. Hundreds of millions of dollars are generated for the people of Illinois through direct mining jobs, taxes and support industry jobs.

If no mining is conducted at this site, the following economic losses are estimated to occur:

- Loss of approximately 170 direct jobs with a payroll of approximately $20 million annually. Many of these employees are long term miners and are not currently trained for other employment. In addition to the direct employees, approximately 179 additional persons such as truck drivers, engineers, and support personnel are employed full time through operation of the mine. Further, based on an economic formula widely accepted in the state of three persons employed in indirect or induced jobs per each direct coal industry job (ICA), an additional 514 persons are employed as a result of this mine.
- The mining industry is vitally important to the local economy of Williamson County and the surrounding counties as well as to the region and state.
- Since over 40% of the electricity produced in the U.S. and nearly 47% of the electricity produced in Illinois comes from coal-fired plants, it is, therefore, vital to the local, state and national economy that available high quality coal be mined to maintain a continuous supply of fuel to the coal-fired plants. Economic losses will occur if sufficient electricity is not provided to private and commercial energy consumers. If the Pond Creek Mine produced no coal, approximately 1.1 million

American households' worth of energy would have to be replaced (likely at a higher cost) or foregone to meet the world's energy demand.

- The loss in tax revenue to Illinois and Williamson County, both direct and indirect, would be significant, particularly when a replacement industry is unknown.

In addition, Pond Creek Mine has significant resources invested in the acquisition of land, coal reserves, permitting expenses, mining equipment, and etc. in this project. The economic loss to the company should mining at the site cease would be substantial because of the significant investment in land, coal reserves, permitting expenses, and mining equipment made by the company using a business plan dependent on maximizing recovery of the coal reserve.

Considering the above economic contributions and the importance of coal to our society, the "Do Not Mine" alternative is not considered a reasonable alternative.

ALTERNATIVE NO. 2

No Discharge of Stormwater

Ponds which are used to collect and treat mine water and stormwater are frequently no discharge facilities except for the periods during which sufficient precipitation has fallen to generate surface runoff that exceeds the storage capacity within the ponds. Mine water that is collected in ponds during non-precipitation periods is normally recirculated and reused for the ongoing mining and coal processing operations.

Considering that the area of the proposed Pond Creek Mine receives in excess of 40 inches of precipitation as an annual average, often times in high intensity over short periods, total containment with no discharge of stormwater is not technically feasible. The surface area required to accomplish such a feat is massive, and would begin to crowd out other productive land uses, such as farming. Even if held through the precipitation event there is not a feasible way to perpetually store the water, never discharging it. Discharges from sedimentation ponds are in accordance with applicable regulation in the State of Illinois so long as the quality of discharged water remains within the water quality parameters required.

Total elimination of stormwater discharges from the mine is not an available option.

ALTERNATIVE NO. 3

Reduce The Number of Outfalls

While combining certain outfall points from within the permit area is possible, such combinations would not result in any improvements in receiving stream water quality. Any combination of

outfalls will result in the same amount of total water discharge to the receiving streams. It is likely that the resulting water quality would remain the same as the total of the water quality from the planned discharge points.

Since a reduction in the number of outfalls will not result in improvement in water quality or quantity, this option is ruled out for further consideration.

ALTERNATIVE NO. 4

Use Alternative Sediment Control and Treatment Devices

Alternatives to the use of sediment control ponds exist for control of discharge of settable solids. Such alternatives include chemical soil stabilizers, erosion control blankets, geotextile filter bags, fiber rolls, silt fencing, straw mulch, straw bale dikes, and temporary seeding. These measures are aimed at minimization of the generation of settable solids. Most of these measures have been used during the construction and operations of the Pond Creek permit which is under review for renewal. They have been used to provide supplemental treatment and prevention of generation of settable solids. No discharges are made without additional treatment through retention time in sediment control ponds.

The use of alternative sediment control measures is considered practical and cost effective for the surface runoff in conjunction with sediment control ponds. However, the use of these practices to eliminate the proposed sediment control ponds is not feasible.

ALTERNATIVE NO. 5

Collect and Treat Surface Water Runoff in Accordance With the Proposed Permit Application

As referenced in Alternative #4 above, the use of sediment control ponds has proven very effective in the treatment of settable solids in surface runoff from the mine operations. By placement of such ponds in the down-gradient portions of the permit area, collection ditches are very effective in collecting and conveying surface runoff to the respective treatment ponds. It should also be noted that the SMCRA provisions administered by IDNR at 62 ILL. Adm. Code 1816.46(b)(2) and 1817.46(b)(2) require all surface discharge from the disturbed permit area be passed through a siltation structure (defined as sediment pond) before leaving the permit area except were exemptions are granted for small drainage areas.

Alternative #5 is presented as the most cost-effective and practical alternative to the effective treatment of surface water runoff from the proposed mine operation.

ALTERNATIVE NO. 6

Alternative Treatment Technologies

A. Filtration

Filtration is a water treatment process by which discharge water is passed through a physical barrier which removes particulate matter from the water stream. Filtration of mine water and stormwater would involve installation of a very large and elaborate filtration system. These systems would remove settable solids and produce an effluent with similar characteristics as those to proposed settling ponds. Dissolved solids would not be filtered and removed by this technology. It is considerably more expensive to operate a full-scale filtration system than the sediment ponds proposed for this facility. Filtration systems generate a sludge that must then be disposed of. Another impracticality associated with filtration is that a relatively steady flow of water is required into the system. This is not the case for stormwater runoff from mining operations, as storm surges would need to be held for processing.

Filtration is a technology that is not feasible for the proposed facility because: 1) filtration does not remove dissolved solids, 2) filtration is much more expensive than sediment ponds both in initial cost and long-term maintenance and operation, 3) filtration processes require a steady stream of water for treatment which is not the case in treating stormwater runoff, 4) a large area of land would be required for such a facility, and 5) maintenance and supervision of the filtration and sludge disposal operation would be burdensome and would increase production costs.

B. Reverse Osmosis

Reverse Osmosis systems treat dissolved solids. In reverse osmosis, water for treatment is pumped through a closed membrane system at extremely high pressures. Purified water is produced and the contaminant is trapped on the membrane. The contaminants are periodically released from the membrane by backwashing at high pressure. This creates a waste stream of water with a high concentration of contaminants.

Pond Creek's affiliate, Sugar Camp Energy operates a Reverse Osmosis system as a treatment system process to be able to create more clean water suitable for use in the mining and cleaning process.

Several problems are present with this system as it would be applied to treatment of both mine discharge and stormwater at the Pond Creek Mine. These systems

are extremely expensive to install and to operate. The concentration (the reject stream) requires disposal. The concentration of Chlorides is too high to dispose of through an NPDES outlet, including any conceivable mixing zone. The volume of concentration is about 25% of feed water. That volume is too high to simply store perpetually. Sugar Camp is injecting the concentrate into deep Class I injection wells. That process is very expensive and reliability and longevity is unknown.

Stormwater runoff from a mining operation will contain settable solids. Such particle size is not suitable for treatment in RO systems. Additionally, the intermittent nature of stormwater flows is not suited for RO, which requires a steady input of influent water.

Considering the above, reverse osmosis technology is not considered either applicable or feasible for the proposed operation. IEPA has consistently agreed this conclusion as applied to mining operations. *See,* Illinois Pollution Control Board case R07-09.

C. Bioremediation

Bioremediation is the use of treatment wetlands to create anaerobic and aerobic environments to remove sulfates, some metals, and other contaminants. It is not suitable for treatment of settable solids, the primary pollution in stormwater runoff. Water would have to be pumped into the wetland in a controlled flow rate and allowed to slowly travel through the system to achieve treatment. Anaerobic bacteria would be expected to remove sulfates by converting sulfates to sulfides. Under aerobic conditions, plant life would serve to remove certain metals through plant uptake.

Constructed wetlands have proven to be effective for treatment of some dissolved solids with several limitations. These limitations include 1) low and consistent rates of inflow, 2) reduced or stoppage of winter condition inflow due to reduced biological activity of the sulfate reducing bacteria and aerobic plant life, 3) eventual sludge accumulation requiring dredging and wetland reconstruction, and 4) release of hydrogen sulfide and other digestive gases into the atmosphere from sulfate digestion processes. Use of wetlands in mine stormwater runoff treatment would be limited by the enormous amount of land required to construct a wetland of sufficient size for the flow rates to be expected from such an operation.

Pond Creek affiliates, Sugar Camp Energy and Hillsboro Energy, both have pilot wetlands. These are experiments that are designed to determine if Bioremediation will benefit an already compliant NPDES discharge. The wetlands are each designed to treat less than 100 gpm, which is a small fraction of the total mine water and stormwater managed at the operations. Even at the small flow rate, the surface area used by the wetlands is significant. Even if the wetlands can sufficiently and reliably treat effluent, the surface area required for the amount of water generated by the Pond Creek Mine would be enormous and would begin to crowd out other beneficial land uses. The wetlands are in the early stages of development. Water has been running into the systems for less than a year. It is too early to tell if the systems are beneficial.

Evan if shown to be beneficial, Bioremediation will not be a primary treatment system.

D. Coagulation (chemical) Precipitation

This process consists of the addition of alkaline chemicals to acid mine effluent to induce metals to precipitate and to reduce acidity. Chemicals typically used include hydrated lime, limestone, soda ash, caustic soda and ammonia. Variables that are considered in the design and application of such a system include the level of acidity, suspended solids, iron and manganese concentrations, and flow rates.

Concerns with the use of chemical precipitation at the proposed coal mine include 1) worker safety regarding the chemicals to be used, 2) treatment cost, 3) process operation and maintenance, 4) disposal of precipitate sludge in a landfill possibly considered a hazardous substance, 5) necessity of such treatment considering that acid water is not considered a factor for the proposed operation, 6) susceptibility to system malfunction due to high volume flows from storm events, 7) improbability of actual improvement in overall water quality when compared to the use of sedimentation ponds.

Considering the above, the use of this technology is considered inappropriate at the proposed Pond Creek Mine.

E. Ion Exchange

Ion exchange removes unwanted ions, generally metals, by passing the effluent stream through a resin designed specifically for the individual ion to be removed.

These processes are designed for very specific removal applications, usually low flow regimes such as softening of hard water (calcium and magnesium removal) for human consumption purposes or for metal removal in industrial plating processes. For ion exchange to be successful, input water that is relatively free of suspended solids is essential to avoid fouling of the resin. Ion exchange is just that – it involves "swapping" one ion for ions considered less objectionable. For example, ion exchange as it relates to water softening involves removal of calcium and magnesium ions and replacing them with sodium ions. This results in an output stream that is not reduced in the amount of chemical components.

Additional operational considerations with ion exchange include large amounts of water needed for regeneration of the resins and disposal of brine that is produced in the process. Further, the processes require large amounts of water and energy for operation.

Considering the above, ion exchange technology is not feasible, nor applicable for use at the proposed Pond Creek Mine.

F. Cost Effective Sulfate Removal (CESR) Process

CESR is a proprietary technology developed to improve sulfate removing technology.

It is a four step process as follows: Step one includes the addition of hydrated lime to the feed water to precipitate gypsum; the non-hazardous gypsum sludge is removed by dewatering and filtration. Step two involves additional liming to raise the pH to 10.5 and results in the precipitation of dissolved metals as metal hydroxides which is also removed by dewatering and filtration. Step 3 involves additional liming to increase pH to 11.5 and the addition of a proprietary reagent to precipitate ettringite. Step four involves reducing the pH with CO2 to meet local discharge criteria. This step also involves clarification with accompanying sludge removal from the clarifier.

With additional consideration to the extreme complexity and unproven theory aspect of this technology, it is considered impractical for use at the Pond Creek Mine because 1) each precipitation step is time consuming and would require the use of large amounts of land 2) infrastructure costs, including the installations of tanks and storage handling equipment is high, 3) this proprietary technology is still being developed and is cost-prohibitive at this time, 4) this technology is plagued by severe scaling and precipitation of minerals, 5) the very large amounts

of resultant sludge would need to be disposed of as solid or hazardous waste, 6) the water treated in this system has a high specific conductivity and a high concentration of total dissolved solids, and 7) there is a high supervision and maintenance requirement to use this technology.

G. Supervac

Supervac is a technology to handle solid wastes and sludge that result from other water treatment technologies. This technology would be appropriate only in conjunction with another water treatment technology. This technology would not be feasible for use at the Pond Creek Mine because it is not a stand-alone water treatment technology.

POND CREEK MINE STORMWATER ANALYSIS

AquAeTer

optimizing
resources | water, air, earth

MEMORANDUM

TO: **Simon Stepp**
CC:
FROM: John Michael Corn
DATE: February 10, 2015
JOB NO.: 142336
RE: **Pond Creek Mine Stormwater Analysis**

INTRODUCTION

The Pond Creek Mine ("Mine") utilizes ponds on-site for site process water. Stormwater that falls on-site is also directed into various ponds. During these storm events, it is possible that the ponds need to discharge the excess water. The wet weather tributaries nearest the site are too small to have a discharge from the site and still maintain water quality standards. The closest tributary, Pond Creek, has a larger drainage basin that includes the site drainage. This analysis assumes that Pond Creek is a 0 7Q10 low flow stream. The Illinois Environmental Protection Agency allows the full use of the stream during a storm event for these streams.

The Mine site currently plans to pipe the stormwater from Pond 7 or Pond 8 to Pond Creek directly, rather than discharging to the smaller tributary of Pond Creek. The maximum allowable discharge was calculated based on meeting the WQS based on the volumetric flowrate in the stream and the concentrations in the Pond and in the Creek.

SUMMARY

A range of rainfall amounts for 6-hour storm events and 24-hour storm events were modeled for the discharge event from Pond 7 at the Mine site into Pond Creek, which is located north of the facility. A peak flow and an average flow over the 36-hour period beginning with the storm are shown in Table 1. The allowable discharge was based on meeting the chloride water quality standard, as it was more stringent than the sulfate water quality standard. The allowable discharges are presented in Table 1. The average discharge is based on meeting the water quality standard during the 36-hour period following the beginning of the storm. At the average discharge calculated, the total volume predicted to enter the pond due to the storm event can be discharged over a period of less than 2 hours. However, the peak discharge from the pond predicted is greater than the average flow condition. Therefore, a peak discharge was calculated based on the predicted peak flow in the creek. The peak discharge condition is intended to relieve the pond during its peak condition, which is predicted to occur in the same time frame as the peak in the Creek.

Table 1. Peak Flow from 6-hr and 24-hr Storm Events

	BASIN	POND CREEK FLOW		ALLOWABLE DISCHARGE			
	Rainfall Amount	Peak Drainage Basin Flow (cfs)	36-hour Average Basin Flow (cfs)	Average (cfs)	Average (gpm)	Peak (cfs)	Peak (gpm)
6-hr Storm	0.5"	3,433	437	70.1	31,449	550	247,045
	1.0"	4,018	505	81.0	36,341	644	289,205
	1.5"	4,428	585	93.7	42,076	710	318,655
	2.0"	4,738	670	107.4	48,194	760	641,016
	2.45"	4,961	749	120.1	53,890	796	357,245
	3.04"	5,066	793	127.2	57,072	812	364,426
	3.51"	5,337	941	150.9	67,706	856	384,173
	4.17"	5,499	1,062	170.2	76,412	882	395,842
	4.72"	5,610	1,168	187.2	84,033	900	403,920
	5.29"	6,204	1,270	203.7	91,408	995	446,556
	5.59"	6,709	1,325	212.5	95,356	1076	482,812
	5.8"	7,084	1,366	219.0	98,310	1136	509,858
24-hr Storm	0.5"	111	30	4.8	2,132	17.8	7,989
	1.0"	116	43	6.9	3,083	18.6	8,348
	1.5"	241	90	14.4	6,459	38.7	17,369
	2.0"	508	144	23.1	10,378	81.4	36,532
	2.5"	805	201	32.3	14,483	129	57,895
	3.0"	1,127	272	43.6	19,555	181	81,233
	3.48"	1,160	341	54.7	24,557	186	83,477
	4.33"	2,060	474	76.0	34,129	330	148,104
	4.62"	2,294	722	115.7	51,936	368	165,107
	4.65"	2,338	739	118.5	53,181	375	168,230
	5.04"	2,750	585	93.8	42,110	441	197,921
	5.95"	3,325	756	121.2	54,409	533	239,210
	6.71"	3,926	885	141.9	63,685	630	282,744
	7.51"	4,607	1,034	165.9	74,451	739	331,633
	7.73"	4,754	1,065	170.7	76,629	762	342,132

Note: The Maximum Discharge allowable is based on the more stringent standard. In this case, it is the chloride standard.

WATER QUALITY STANDARD

The Illinois Water Quality standard for chloride concentration is 500 mg/L and the standard for sulfate is 2,000 mg/L. The sulfate concentration is based on hardness of the receiving stream. Historic hardness data was gathered at a USGS gage located on Pond Creek from 1980-1997. The dispersion from Pond 7 to Pond Creek was then determined for both sulfate and chloride using historic USGS gage data, the specified water quality standard, and

laboratory concentration data obtained from Pond 7. The dispersion needed to meet the sulfate water quality standard is 1.76 and the dispersion needed to meet the chloride water quality standard is 7.24. The dispersion will be used to determine the maximum discharge allowed from Pond 7 into Pond Creek.

PEAK FLOW DETERMINATION

To determine the peak flow at this discharge point in Pond Creek, the USGS StreamStats program was utilized. The drainage basin was delineated from the discharge location at Pond Creek (Latitude: 37° 51' 19"N, Longitude: 88° 49' 36"W). The program produced peak flow values for 24-hour 2-yr-, 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr storm events. This program is limited to producing 24-hour storm events, so the HEC-HMS modeling program was used to determine peak flows for the 6-hour storm events.

First, HEC-HMS was used to produce peak flow values for 24-hour storm events to compare results from this program to results obtained from USGS StreamStats. The HEC-HMS program utilized the SCS Curve Number loss method to estimate flows. A curve number of 77 was used based on land use; the drainage area is open space in good condition with a combination of C and D soil types. The drainage area was determined using GIS software with a 10-meter digital elevation model; for the previously mentioned discharge location in Pond Creek, the drainage area was 7,176 acres. Rainfall data was also input into the HEC-HMS model to calculate flows for this drainage area. Historic rainfall amounts at Pond 7 were obtained from the National Oceanic and Atmospheric Administration (NOAA) Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS). These amounts are listed in Table 2 below. The distribution of the rainfall over the 24-hour period was taken from the Huff and Angel report "Rainfall Frequency Atlas of the Midwest." For the 24-hour storm, the third-quartile distribution was used.

Table 2. Rainfall Amounts for Storm Events

Storm Duration	Recurrence Interval (Years)					
	2	5	10	25	50	100
6-hr	2.45"	3.04"	3.51"	4.17"	4.72"	5.29"
24-hr	3.48"	4.33"	5.01"	5.95"	6.71"	7.51"

The HEC-HMS model produced peak flows that were comparable to the peak flows obtained from the StreamStats model. The 2-yr, 5-yr, and 10-yr storms were run and percent differences between these two models were found to be 22%, 0.25%, and 5.68%, respectively. Next, the 6-hr storms were calculated using HEC-HMS. For the 6-hr storm, the first quartile rainfall distribution from the Huff and Angel report was used. The peak flows can be found in Table 1.

In addition to the storm events, peak flows for more frequent storm events for 6-hour and 24-hour storm durations were also modeled using the HEC-HMS program. The rainfall amounts for each storm event can be found in Table 1. The peak flows for each storm event can be found in Table 1.

DISPERSION CALCULATION

The maximum allowable discharges for each storm event, which are based on Illinois Water Quality Standards of chloride and sulfate, were determined using the dispersion values previously calculated (1.76 for sulfate and 7.24 for chloride) and the peak discharges obtained from HEC-HMS. The flowrates presented in Table 1 are based on meeting the more stringent water quality standard for chloride.

If you should have questions or comments concerning our assessment, please call us at (615) 373-8532 or by FAX at (615) 373-8512 or by e-mail at jmcorn@aquaeter.com.

DOCUMENT 50

3001-115-A
Due date: 3-26-15
R08805

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-2829

BRUCE RAUNER, GOVERNOR LISA BONNETT, DIRECTOR

IEPA - DIVISION OF RECORDS MANAGEMENT RELEASABLE

AUG 02 2019

REVIEWER: JMR

MEMORANDUM

Date: February 10, 2015

To: Joe Stitely

From: Bill Buscher BB

Subject: Review and Comment on the Pond Creek Mine Permit #417 Refuse Disposal Facility #3 groundwater monitoring and protection plan, Johnston City, Illinois

At the request of the Mine Pollution Control Program (MPCP) the Groundwater Section has reviewed the data for the Pond Creek Mine, permit no. 417, Refuse Disposal Facility No. 3 dated November 2014. The purpose of the review is to evaluate groundwater protection and monitoring system design for the new coal refuse facility.

1. A low permeability liner will be required to be installed under the proposed new refuse footprint area. The low permeability liner must consist of four feet of compacted clay with a hydraulic conductivity of $1x10^{-7}$ cm/s or less. A synthetic liner capable of providing an equivalent level of groundwater protection may also be used.

2. The final cover must be designed and constructed to limit the amount of water which can infiltrate through the final cover, to a quantity that is less than or equal to the amount of water which can infiltrate through the bottom liner of the proposed disposal facility.

3. Five monitoring wells are required. It appears the locations of existing monitoring wells GW-11, GW-12, GW-13, and GW-28 are acceptable. The Agency is requesting an additional monitoring well directly south of the refuse disposal area. This well should be located near the center of the south side of the disposal facility. The applicant will need to provide a map showing the proposed location of the additional well for Agency review and approval prior to construction of the well.

4. The monitoring wells are required to be sampled a minimum of six times over the course of a year for the inorganic parameters listed in Table A prior to placement of refuse and also six times post-reclamation. An adequate number of samples must be collected to calculate a statistical representation of existing groundwater quality ("background") in the area, prior to disposal of slurry in the proposed disposal area. Sampling frequency must be bi-monthly until an adequate data set exists to calculate statistically based background concentrations. Quarterly sampling during active mining will be required.

5. A statistical representation of existing water quality must be established using the method outlined in Attachment 1, or another Agency-approved method, for each of the monitoring wells. The statistical procedures described may not be appropriate under existing and proposed site conditions. Alternative statistical methods may need to be used. This method should be used to determine the 95 percent confidence limit for each parameter.

6. The post mining statistical method used may depend upon the initial background statistics method.

ATTACHMENT 1

A. A statistically valid representation of background (existing) and/or post-mining groundwater quality shall be submitted to the Agency utilizing the following method. This method should be used to predict the confidence limit when single groundwater samples are taken from each monitoring (test) well.

Should the Permittee determine that an alternate statistical method would be more appropriate based on the data being evaluated, the Permittee may request utilization of such alternate methodology. Upon approval from the Agency, the alternate methodology may be utilized to determine a statistically valid representation of background and/or post-mining groundwater quality.

1. Determine the arithmetic mean $(\overline{X}_b)$ of each indicator parameter for the sampling period. If more than one well is used, an equal number of samples must be taken from each well.

$$\overline{X}_b = \frac{X_1 + X_2 + \ldots X_n}{n}$$

Where:

$\overline{X}_b$ = Average value for a given chemical parameter

X_n = Values for each sample

n = the number of samples taken

2. Calculate the variance (S_b^2) and standard deviation (S_b) for each parameter using the values (X_n) from each sample of the well(s) as follows:

$$S_b^2 = \frac{(X_1 - \overline{X}_b)^2 + (X_2 - \overline{X}_b)^2 + \ldots + (X_n - \overline{X}_b)^2}{n-1}$$

$$S_b = \sqrt{S_b^2}$$

3. Calculate the upper confidence limit using the following formula:

$$CL = \overline{X}_b \pm t\sqrt{1+1/n}\ \ (S_b)$$

Where:

CL = upper confidence limit prediction
(upper and lower limits should be calculated for pH)

t = one-tailed t value at the required significance level and at n-1 degrees of freedom from Table 1
(a two-tailed t value should be used for pH)

4. If the values of any routine parameter for any monitoring well exceed the upper confidence limit for that parameter, the permittee shall conclude that a statistically significant change has occurred at that well.

5. When some of the values are less than the Method Detection Limit (MDL), a value of one-half (1/2) the MDL shall be substituted for each value that is reported as less than the MDL. All other computations shall be calculated as given above.

B. If all values are less than the MDL for a given parameter, the Practical Quantitation Limit (PQL), for the analytical method utilized, shall be used to evaluate data from monitoring wells. If the analytical results from any monitoring well exceed two (2) times the PQL for any single parameter, or if they exceed the PQLs for two or more parameters, the permittee shall conclude that a statistically significant change has occurred.

Table 1
Standard t-Tables Level of Significance

Degrees of freedom	t-values (one-tail)		t-values (two-tail)*		
		99%	95%	99%	95%
4	3.747	2.132	4.604	2.776	
5	3.365	2.015	4.032	2.571	
6	3.143	1.943	3.707	2.447	
7	2.998	1.895	3.499	2.365	
8	2.896	1.860	3.355	2.306	
9	2.821	1.833	3.250	2.262	
10	2.764	1.812	3.169	2.228	
11	2.718	1.796	3.106	2.201	
12	2.681	1.782	3.055	2.179	
13	2.650	1.771	3.012	2.160	
14	2.624	1.761	2.977	2.145	
15	2.602	1.753	2.947	2.131	
16	2.583	1.746	2.921	2.120	
17	2.567	1.740	2.898	2.110	
18	2.552	1.734	2.878	2.101	
19	2.539	1.729	2.861	2.093	
20	2.528	1.725	2.845	2.086	
21	2.518	1.721	2.831	2.080	
22	2.508	1.717	2.819	2.074	
23	2.500	1.714	2.807	2.069	
24	2.492	1.711	2.797	2.064	
25	2.485	1.708	2.787	2.060	
30	2.457	1.697	2.750	2.042	
40	2.423	1.684	2.704	2.021	

Adopted from Table III of "Statistical Tables for Biological Agricultural and Medical Research" (1947, R.A. Fisher and F. Yates).
* For pH only when required.

Table A

Aluminum	Fluoride	Sulfate
Antimony	Iron (dissolved)	Thallium
Arsenic	Iron (total)	Total Dissolved Solids
Barium	Lead	Vanadium
Beryllium	Manganese (dissolved)	Zinc
Boron	Manganese (total)	pH
Cadmium	Mercury	Acidity
Chloride	Molybdenum	Alkalinity
Chromium	Nickel	Hardness
Cobalt	Phenols	Static Water Elevation
Copper	Selenium	
Cyanide	Silver	