BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

PEOPLE OF THE STATE OF ILLINOIS, LISA MADIGAN, Attorney General of the State of Illinois, Complainant, vs. MONTALBANO BUILDERS, INC., an Illinois corporation, CORTLAND-I-88, LLC, an Illinois limited liability company, MBX XIV, LLC, a revoked Delaware limited liability company, and RB RESOLUTION PROPERTIES, LLC, an Illinois limited liability company, Respondents.	)	PCB No. 2010-20 (Enforcement - Water)

AMENDED NOTICE OF FILING

PLEASE TAKE NOTICE that today, December 16, 2015, I filed with the Office of the Clerk of the Illinois Pollution Control Board, a corrected Stipulation and Proposal for Settlement With RB Resolution Properties, LLC ("Stipulation"), which notes that Respondent RB Resolution Properties, LLC is properly named as "RB Resolution Properties, LLC – Chestnut Grove Series" and which includes a copy of previously omitted Exhibit A to the Stipulation a copy of which is attached hereto and hereby served on you.

Respectfully Submitted,

EVAN J. McGINLEY
Office of the Illinois Attorney General
69 West Washington Street, Suite 1800
Chicago, Illinois 60602
312.814.3153
emcginley@atg.state.il.us

THIS FILING SUBMITTED ON RECYCLED PAPER

CERTIFICATE OF SERVICE

I, EVAN J. McGINLEY, do hereby certify that, on December 15, 2016, I caused to be served on the individuals listed below, by first class mail, a true and correct copy of the attached Amended Notice of Filing and a corrected Stipulation and Proposal for Settlement in the above-referenced matter:

John Therriault
Assistant Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph, Suite 11-500
Chicago, lllinois 6060 I

Bradley Halloran
Hearing Officer
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph, Suite 11-500
Chicago, Illinois 60601

Norman B. Berger
Whyte Hirschboeck Dudek S.C.
125 South Wacker
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Gina Krol
Cohen and Krol
105 West Madison Street
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Chicago, IL 60602-4600

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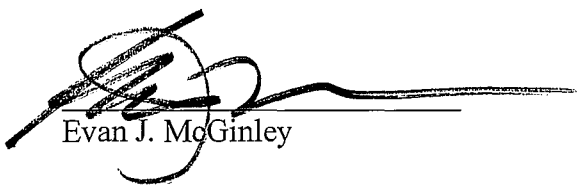
200 North LaSalle Street, Suite 2020
Chicago, Illinois 60601



Evan J. McGinley

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

PEOPLE OF THE STATE OF ILLINOIS, LISA MADIGAN, Attorney General of the State of Illinois, Complainant, vs. MONTALBANO BUILDERS, INC., an Illinois corporation, CORTLAND-I-88, LLC, an Illinois limited liability company, MBX XIV, LLC, a revoked Delaware limited liability company, and RB RESOLUTION PROPERTIES, LLC – CHESTNUT GROVE SERIES, an Illinois limited liability company, Respondents.	)	PCB No. 2010-20 (Enforcement - Water)

STIPULATION AND PROPOSAL FOR SETTLEMENT WITH RB RESOLUTION PROPERTIES, LLC

Complainant, PEOPLE OF THE STATE OF ILLINOIS, by LISA MADIGAN, Attorney General of the State of Illinois ("Complainant"), the Illinois Environmental Protection Agency ("Illinois EPA"), and Respondent, RB RESOLUTION PROPERTIES, LLC, an Illinois limited liability company, (properly named as "RB Resolution Properties, LLC - Chestnut Grove Series) ("Respondent" or "RB"), have agreed to the making of this Stipulation and Proposal for Settlement ("Stipulation") and submit it to the Illinois Pollution Control Board ("Board") for approval. This stipulation of facts is made and agreed upon for purposes of settlement only and as a factual basis for the Board's approval of this Stipulation and issuance of relief. None of the facts stipulated herein shall be introduced into evidence in any other proceeding regarding the violations of the Illinois Environmental Protection Act ("Act"), 415 ILCS 5/1 *et seq.* (2014), and the Board Regulations, alleged in the Second Amended Complaint, except as otherwise provided

herein. It is the intent of the parties to this Stipulation that it be a final adjudication of this matter. This Stipulation resolves the State of Illinois's case against Respondent RB, only, and does not resolve the State of Illinois's case against any of the other Respondents in this action.

I. STATEMENT OF FACTS

A. Parties to the Stipulation

1. On October 15, 2009, a Complaint was filed on behalf of the People of the State of Illinois by Lisa Madigan, Attorney General of the State of Illinois, on her own motion and upon the request of the Illinois EPA, pursuant to Section 31 of the Act, 415 ILCS 5/31 (2014), against Respondent Montalbano Builders, Inc., concerning activities at the Site.

2. On June 6, 2013, the Board accepted Complainant's Second Amended Complaint for filing, in which the Attorney General, on her own motion, named Respondent RB as a respondent in this action.

3. The Illinois EPA is an administrative agency of the State of Illinois, created pursuant to Section 4 of the Act, 415 ILCS 5/4 (2014).

4. At all times relevant to the Second Amended Complaint, Respondent RB was and has been an Illinois limited liability company in good standing and which has been authorized by the Illinois Secretary of State to transact business in the State of Illinois.

5. At all times relevant to the Second Amended Complaint, Respondent RB has owned certain real property within the Chestnut Grove subdivision, which is located near the south side of Route 38 East near the intersection of Route 38 and Hahn Drive, in the town of Cortland, DeKalb County, Illinois, specifically parcel number 09-33-100-009 ("Site").

B. Allegations of Non-Compliance at the Site

Complainant and the Illinois EPA contend that Respondent RB violated the following provisions of the Act and Board regulations:

Count I: Cause, Threaten or Allow Water Pollution, in violation of Section 12(a) of the Act, 415 ILCS 5/12(a) (2014), and 35 Ill. Adm. Code 302.203.

C. Non-Admission of Violations

Respondent RB neither admits nor denies the violations alleged in the Complaints filed in this matter and referenced herein.

II. APPLICABILITY

This Stipulation shall apply to and be binding upon the Complainant, the Illinois EPA and Respondent RB, and any officer, director, agent, or employee of the Respondent RB, as well as any successors or assigns of the Respondent RB. The Respondent RB shall not raise as a defense to any enforcement action taken pursuant to this Stipulation the failure of any of its officers, directors, agents, employees or successors or assigns to take such action as shall be required to comply with the provisions of this Stipulation. This Stipulation may be used against Respondent RB in any subsequent enforcement action or permit proceeding as proof of a past adjudication of violation of the Act and the Board Regulations for all violations alleged in the Complaint in this matter, for purposes of Sections 39 and 42 of the Act, 415 ILCS 5/39 and 42 (2014).

Respondent RB shall notify each contractor to be retained to perform work required in this Stipulation of each of the requirements of this Stipulation relevant to the activities to be performed by that contractor, including all relevant work schedules and reporting deadlines, and

shall provide a copy of this Stipulation to each contractor already retained no later than thirty (30) calendar days after the date of entry of this Stipulation. In addition, Respondent RB shall provide copies of all schedules for implementation of the provisions of this Stipulation to the prime vendor(s) supplying the control technology systems and other equipment required by this Stipulation.

III. IMPACT ON THE PUBLIC RESULTING FROM ALLEGED NON-COMPLIANCE

Section 33(c) of the Act, 415 ILCS 5/33(c)(2014), provides as follows:

> In making its orders and determinations, the Board shall take into consideration all the facts and circumstances bearing upon the reasonableness of the emissions, discharges, or deposits involved including, but not limited to:
>
> 1. the character and degree of injury to, or interference with the protection of the health, general welfare and physical property of the people;
>
> 2. the social and economic value of the pollution source;
>
> 3. the suitability or unsuitability of the pollution source to the area in which it is located, including the question of priority of location in the area involved;
>
> 4. the technical practicability and economic reasonableness of reducing or eliminating the emissions, discharges or deposits resulting from such pollution source; and
>
> 5. any subsequent compliance.

In response to these factors, the parties to this Stipulation state the following:

1. Sediment run-off from the Site poses a potential threat of water pollution to waters of the State.

2. The social and economic benefits of Respondent RB's efforts to develop the Site are not an issue.

provide notice to the Complainant and the Illinois EPA of each failure to comply with this Stipulation and shall pay stipulated penalties in the amount of $250.00 per day until such time that compliance is achieved. The Complainant may make a demand for stipulated penalties upon Respondent RB for its noncompliance with this Stipulation. However, failure by the Complainant to make this demand shall not relieve Respondent RB of the obligation to pay stipulated penalties. All stipulated penalties shall be payable within thirty (30) calendar days of the date Respondent RB knows or should have known of its noncompliance with any provision of this Stipulation.

2. If Respondent RB fails to make any payment required by this Stipulation on or before the date upon which the payment is due, Respondent RB shall be in default and the remaining unpaid balance of the penalty, plus any accrued interest, shall be due and owing immediately. In the event of default, the Complainant shall be entitled to reasonable costs of collection, including reasonable attorney's fees.

C. Future Compliance

1. In February 2015, Respondent RB submitted a site management plan to the Complainant for Complainant's review and approval ("Site Management Plan"). The Illinois EPA subsequently reviewed and approved the Site Management Plan and a copy of the Site Management Plan is attached to this Stipulation as Exhibit A and made a part hereof.

2. On or before August 30, 2016, Respondent RB shall complete all work tasks identified in the Site Management Plan, according to the work schedule identified therein. Respondent RB shall continue to manage the Site according to terms of the Site Management Plan until August 30, 2016.

3. On or before September 30, 2016, Respondent RB shall submit to Complainant a certification by a responsible corporate official, under penalty of perjury, specifying that it has completed all of the work identified in the Site Management Plan Paragraph. ("Certification").

4. In addition to any other authorities, the Illinois EPA, its employees and representatives, and the Attorney General, her employees and representatives, shall have the right of entry into and upon the Site which is the subject of this Stipulation, at all reasonable times for the purposes of conducting inspections and evaluating compliance status. In conducting such inspections, the Illinois EPA, its employees and representatives, and the Attorney General, her employees and representatives, may take photographs, samples, and collect information, as they deem necessary.

5. This Stipulation in no way affects the responsibilities of Respondent RB to comply with any other federal, state or local laws or regulations, including but not limited to the Act and the Board Regulations.

6. Respondent RB shall cease and desist from future violations of the Act that were the subject matter of the Second Amended Complaint.

D. Release from Liability

In consideration of the Respondent RB's commitment to cease and desist from violations of the Act, as set forth in Paragraph IV.C.6, above, its completion of the compliance measures described in Section IV.C, above, and upon the Board's approval of this Stipulation, the Complainant releases, waives and discharges Respondent RB's from any further liability or penalties for the violations of the Act and Board Regulations that were the subject matter of the Complaint herein. The release set forth above does not extend to any matters other than those

expressly specified in Complainant's Second Amended Complaint filed on June 6, 2013. The Complainant reserves, and this Stipulation is without prejudice to, all rights of the State of Illinois against Respondent RB's with respect to all other matters, including but not limited to, the following:

a. criminal liability;

b. liability for future violation of state, federal, local, and common laws and/or regulations;

c. liability for natural resources damage arising out of the alleged violations; and

d. liability or claims based on the Respondent's failure to satisfy the requirements of this Stipulation.

Nothing in this Stipulation is intended as a waiver, discharge, release, or covenant not to sue for any claim or cause of action, administrative or judicial, civil or criminal, past or future, in law or in equity, which the State of Illinois or the Illinois EPA may have against any person, as defined by Section 3.315 of the Act, 415 ILCS 5/3.315 (2014), or entity other than the Respondent.

E. Correspondence, Reports and Other Documents

Any and all correspondence, reports and any other documents required under this Stipulation, except for penalty payments, shall be submitted as follows:

As to the Complainant

Evan J. McGinley
Assistant Attorney General
Environmental Bureau
Illinois Attorney General's Office
69 W. Washington Street, Suite 1800
Chicago, Illinois 60602

Charles Gunnarson
Acting Deputy Chief Legal Counsel
Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

As to the Respondent

RB Resolution Properties, LLC
Edward Freud
Ruff, Freud, Breems & Nelson Ltd.
200 North LaSalle Street
Suite 2020
Chicago, Illinois 60601

With copy to

Norman B. Berger
Whyte Hirschboeck Dudek S.C.
125 S Wacker Drive
Suite 2150
Chicago, IL 60606-4473

F. Enforcement and Modification of Stipulation

Upon the entry of the Board's Order approving and accepting this Stipulation, that Order is a binding and enforceable order of the Board and may be enforced as such through any and all available means.

G. Execution of Stipulation

The undersigned representatives for each party to this Stipulation certify that they are fully authorized by the party whom they represent to enter into the terms and conditions of this Stipulation and to legally bind them to it.

WHEREFORE, the parties to this Stipulation request that the Board adopt and accept the foregoing Stipulation and Proposal for Settlement as written.

FOR THE COMPLAINANT:

PEOPLE OF THE STATE OF ILLINOIS

LISA MADIGAN
Attorney General
State of Illinois

MATTHEW J. DUNN, Chief
Environmental Enforcement/
Asbestos Litigation Division

BY: _____
ELIZABETH WALLACE, Chief
Assistant Attorney General
Environmental Bureau

DATE: 12/3/15

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

LISA BONNETT, Director
Illinois Environmental Protection Agency

BY: _____
JOHN J. KIM
Chief Legal Counsel

DATE: 11/30/15

FOR THE RESPONDENT:

RB PROPERTIES RESOLUTIONS, LLC-
CHESTNUT GROVE SERIES

BY: _____

Print Name: _____

Title: _____

DATE: _____

FOR THE COMPLAINANT:

PEOPLE OF THE STATE OF ILLINOIS

LISA MADIGAN
Attorney General
State of Illinois

MATTHEW J. DUNN, Chief
Environmental Enforcement/
Asbestos Litigation Division

BY: _____
ELIZABETH WALLACE, Chief
Assistant Attorney General
Environmental Bureau

DATE: _____

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LISA BONNETT, Director
Illinois Environmental Protection Agency

BY: _____
JOHN J. KIM
Chief Legal Counsel

DATE: 11/30/15

FOR THE RESPONDENT:

RB PROPERTIES RESOLUTIONS, LLC-
CHESTNUT GROVE SERIES

BY: _____

Print Name: _____

Title: _____

DATE: 1 Dec 2015

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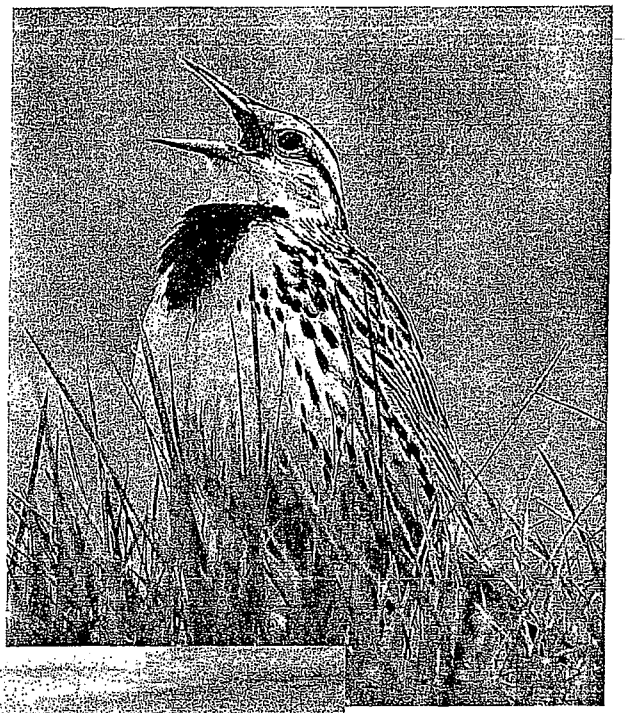
[redacted]

February 11, 2015



SITE MANAGEMENT PLAN

Chestnut Grove Subdivision
in part

Cortland, Illinois
DeKalb County

RB Resolutions, LLC:
Chestnut Grove Series
2221 Camden Court, Oak Brook, Illinois 60523

[redacted]

13832 Crescenzo Drive, Manhattan, Illinois 60422 ✧ 815.478.4800

EXHIBIT
tabbies
A

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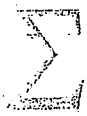

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SITE MANAGEMENT PLAN

FOR: Chestnut Grove Subdivision *in part*
Cortland, DeKalb County, Illinois

INTRODUCTION

This management plan is intended to satisfy multiple stakeholders representing ownership, state and federal environmental and natural resource stewards, and local government. All stakeholders desire an agreement that is in the best interests of both the environment and ownership. There are four goals which shall be accomplished in the short term and then monitored for stability and /or compliance with the various regulations governing the numerous aspects of the project and site for a set period of time.

Table 1	**GOALS**
1.	Remove or use abandoned construction materials, and remove and prevent, to the extent reasonable, further deposition of debris
2.	Remediate site safety concerns
3.	Reduce, to the natural level, the release of silt originating on site, to Section 10-Waters of the US, and preserve the natural flow of water across the site while reducing soil passthrough from neighboring sites.
4.	Establish a plant community protective of the functional values of fallow fields and/or seral prairie, the encourage the natural succession of that community.

SITE DESCRIPTION

The subject property is 0.71 miles east of County Road 12 - Somonauk Road, on the south side of Route 38, in Cortland (Maps in **Appendix 1**). It comprises the southwest corner of Chestnut Grove Subdivision. The portion of the subdivision that is addressed by this site management plan is vacant land upon which certain infrastructure was partially completed – storm water drainage and sewerage, and electrical cables and boxes. Most of this infrastructure is underground. What remains at least partially exposed are street storm sewer grates, storm water manholes, sanitary and potable water line junction vaults, check dams, marking posts, and electrical junction boxes. The site was denuded of vegetation during development, and the top soil was stripped and placed into three large stock piles on site that run north to south, are 15 to twenty feet tall and 442, 462, and 467 feet long each. The site has revegetated partly by seeding, and partly by natural succession.

Vegetation Analysis

DESCRIPTION OF VEGETATION

The results of the vegetation data analysis are included in **Table 1** below, followed by our narrative description of the site and its various plant communities. A full list of species, with their frequency, cohesion coefficient and wetland affinities is located in **Appendix 2.**

The plant community is dominated by grasses. Most important of these is *Phalaris arundinacea*, reed canarygrass (66% quadrat frequency), *and Poa pratensis*, Kentucky bluegrass (30% quadrat frequency). The actual cover values may be higher than the frequency values indicate. The most common associates are *Melilotus officinalis*, yellow sweet clover, and *Solidago nemoralis,* old field goldenrod, *Agrostis alba*, redtop, *Populus deltoides,* cottonwood, *Trifolium repens*, white trailing clover. The community is a seral community wrought from denuded land. The assemblage is composed of ruderal species and species of early secondary colonization known as *stress tolerators* after Grime (1977). As such, it is changing rapidly (Bazzaz[1] 1968, 1975).

TABLE 2 Vegetation Data Summary

Species Richness (S) = Number of Species		2014	63	62% increase
		2013	39	
Species per Quadrat		2014	3.8	5% increase
		2013	3.6	
Species Diversity				
Index	$^{NP}D = 1-[\sum_1^S (p/r)_i]$		0.69	
Effective No. of Species	$^{NP}DENS = {}^{NP}D(S)$		43.54	
Vegetative Synecology: Community Cohesion Index $CC=[\sum_1^S (s\ R)_i]S^{-1}$		2014	0.65	103% increase
		2013	0.32	
Number of Effective Constant Species: $^{CC}S=[\sum_1^S (s\ R)_i]$		2014	41	95% increase
		2013	21	
Wetland / Hydric Affinity				
Average			4	FAC-
Weighted Average			5	FAC
Proportion of Wetland Species			57%	
Vegetative Cover (mean per quadrat – raw)		@ 54 in.	122.6%	
		@ 12 in.	71.0%	

Wetland Affinity

Eighty percent of the species (57 of the 69) are wetland species. This is in keeping with the gradual slope of the land from the north and west to the southeast where drainage is released to a manmade pond. They represent a much greater percentage of the cover, as *Phalaris arundinacea* for example covers a significant portion of the property. The average species wetland status is facultative (FAC) using the USFWS system of grading. This is the driest of the species gradations that can be still be called wetland. See **METHODS** for a more thorough explanation of the system.

Species Richness

There are 69 species presently catalogued. If we use the adjustment suggested by Preston (1962a, 1962b), and Gaston (1983), we can adjust the number for those species missed, and add 8 species to the observed total. The result is 77 probable species. Species are missed due to a number of reasons: They are very small and therefore hidden by other vegetation; quadrats simply miss the species; the seasons of data collection may not coincide with the obvious presence of the species; the species may inhabit a very narrow range of conditions on the property that was not captured in sampling; or it may have a very small population of just a few individuals that are just entering the community or that are being eliminated due to competition. We sampled during several different stages of vegetation development in two different years. Also, we used a large number of quadrats. We have made a sampling effort that generally conforms to that necessary to make an evaluation that allows a reasonable estimate of species missed (Odum 1994). Twenty eight (28) of the species observed are native species and an additional 2 may be native (there is disagreement on this point) the most significant of which is *Phalaris arundinacea*, reed canarygrass (see discussion later in this text). This is a typical richness level for a spontaneous revegetation. Though, there is some evidence that the site was seeded at one time based on the presence of smooth brome grass, timothy, Kentucky bluegrass, birds foot trefoil, and alsike clover which are common meadow mix species (Hoveland 2005; Langer 1997). Brome and Timothy are the only grasses that retain most of their grazing nutrient value when dry and bluegrass is one off the most nutritious when green, so many commercially available pasture/meadow mixes contain these grasses (Langer 1997). Reed canarygrass is commonly found in pasture seed mixes and is used for erosion control (Swink and Wilhelm 1994) as it can handle moist conditions better than the other grasses. It is valued as a forage crop due to its nutrient value. Since there is so much of it on site it is possible perhaps likely that its abundance is due to seeding.

Species Diversity

I have calculated species diversity using a non-parametric index, ^{NP}D, that is more robust and than other measures and which conforms to an extremely wide range of species abundance distributions (Sabuco 2012). I then calculated the effective number of species using $^{NP}DENS$. The diversity index ^{NP}D returned a value of 0.69 (out of 1) which is relatively high, but normal, for a young plant community such as this (Bazzaz 1968, 1975). The index values and the effective number of species, increase with the equitability of abundance among species and with an increase in the number of species. The effective number of species (ENS) is 43. The ENS is species richness, a measure that conservationists find quite valuable, corrected by the underlying disparity in the abundance distribution. Diversity is greater when this value is closest to the number of species on site. The site diversity, is relatively high, partially due to numerous weed species.

Synecology

Community quality is a factor that is often considered in the discussion of restoration or conservation. The term is bandied about often without considering that *quality* is subjective and not measurable. Humans associate a species' ability to compete in crowded habitats with being more desirable (woodland flowers versus the weed in a crack of a sidewalk), and we value constancy over impermanence (a forest over a crop of spontaneous weeds). What is truly being valued is the degree to which species in an assemblage eschew or flourish in a community of neighbors that mollifies harsh environmental conditions – a degree of interdependence or cohesion underpinned by relative community constancy (Holling 1973), rather than species resilience, that we call synecology. Facilitation requires community constancy and so a codependant cohesion. The life history traits required to colonize harsh open conditions do not translate well to the ability to tolerate or propagate in crowded communities. Conversely, the ability to produce successful propagules (compete) in crowded habitats with scarce available resources bespoils the ability to compete in harsh, open, resource-rich habitats. Community cohesion can be measured quite objectively with only a small measure of subjectivity. The concept, is based on empirical evidence of plant species' predilection for, and performance in, harsh, barren, resource-rich habitats at one end of a continuum, and crowded habitats with community-mollified microclimates, and few available resources on the other. In ecological terms this is a continuum between autecologically evolved organisms which compete best with non-biological conditions, and synecologically evolved organisms which compete best with other organisms. We can track, therefore, a community's succession by using an index of community cohesion. The complete process description is found in METHODS.

The Community Cohesion Index, CC, for this property in 2013 was 0.32 (out of 2) and this increased to $CC = 0.65$ in 2014. While this is a significant increase, it is not unexpected and will likely slow to a near halt before arriving at $CC = 1$. It will take considerable time for CC to exceed 1, if ever. I would not expect a site with so many counts against it to much exceed $CC = 1$. It is rare for a site to exceed $CC = 1.25$ and 1.5 is exceptional. The greatest result recorded was 1.79 at Zander Woods. This subject site can easily reach $CC = 0.75$in two year's time. In our Midwestern open field habitats, the primary colonizers are almost all non-native plants (Bazzaz 1968, 1994), and this site is no different. Therefore, all plants with coefficients of 0 are non-native. **So, the CC score of 65% natives is excellent for a site of this type and is consistent with SWPPP requirements.**

The *Number of Effective Constant Species* (NECS) (Sabuco 2004), ${}^{cc}S$, sums the community cohesion coefficients (C, S, & R) of each species, but since the *ruderal* species coefficient is 0, only the *stress tolerant* and *competitive* species contribute to the total (See METHODS). This value can be quite useful when compared to a simple count of species richness as it delivers a more realistic evaluation of the progress of restoration/conservation efforts. NECS is the species richness of the community adjusted by a weighting the species by their requirement for cohesion and constancy. The ${}^{cc}S$ value for this site for 2014 is 41 up from 21 the year before. **The practical importance of this result is that the site has made a tremendous increase in community cohesion and constancy in one year.**

Species Distribution

The average number of species per quadrat was 3.6 in 2013 and is 3.8 as of 2014. Typically, as the site fills with species this number increases. As the various niches are filled and the site resources are garnered, the distribution becomes more clumped with some species excluding others through competition in those niches to which they are better adapted (Bazzaz 1996, Grieg Smith 1983). The property is now nearing the high end of species richness per quadrat where prowess in resource competition as opposed to prowess in open space colonization becomes more important in determining which species remain or are excluded. Soon, the species per quadrat will begin to decrease. Once the decrease stabilizes, the number of new species arriving at the site slows significantly (Bazzaz 1996).

The new arrivals are the secondary and tertiary colonizers (*stress tolerant* and *competitive* species), though the occasional opening of bare ground can still be invaded by *ruderals*. **The practical meaning of this result is that the plant community is now measurably more stable.**

Vegetative Cover

We calculated raw (as opposed to relative) foliar cover in 10 randomly placed quadrats with 10 readings per quadrat. Foliar cover usually exceeds 100% due to the overlap of foliage canopies. Foliar cover of greater than 100% is necessary to fully ameliorate the effects of rainfall on sheet erosion and subsequent siltation (Bazzaz 1969,). Because we will be discussing management, we measured cover at 12 inches above ground and at 4.5 feet above ground surface (ags) (see METHODS). At 4.5 feet ags, the highest cover value was that we calculated was 156.4%. The lowest was 98.1% with an average of 122.6%. At 12 inches ags the cover values ranged from 24% to 88% with an average of 71%. Had our quadrats captured them, there are areas with much lower cover values. However, these areas are quite small and very few in number.

The important implication is that a reduction of the height of the vegetation will decrease the soil surface coverage and this in turn will allow greater rainfall to impact the soil directly. Further, since greater sunlight gets to the soil, the soil temperature increases. The increase in temperature increases the stress on competitive species (Armesto & Pickett 1985, Bazzaz 1968, 1975, 1996). The additional sunlight encourages ruderal vegetation to establish and impedes the replacement of ruderals by stress tolerant and competitive species (Armesto & Pickett 1985, Bazzaz 1968, 1975, 1982, 1996, Geiger 1965, Givinish 1988).

METHODS

Field measurements

ΣYNERGYA Pure & Applied Science LTD, in 2013, located 16 transects lines on the subject site each running east to west and placed evenly from an east-west line 30 feet south of the fence line on the south edge of the Cortland Elementary School property to the south edge of the subject property. The transects are about 100 feet apart. In 2013, we placed 48 quadrats at random intervals along these transects. Each circular quadrat was 15 feet in diameter. In 2014, we placed 132 quadrats along these transects, again, at random intervals. The increase in quadrats was to facilitate the use of species frequency as a surrogate for other abundance measurements such as species foliar cover (arguably the best measurement) as this was the fastest (2 days effort versus an expected 6 days) and therefore the least expensive method of calculating abundance. Peter Grieg-Smith (1983) and Mueller-Dombois and Ellenberg (1974) pointed out, statistically, that as quadrats become more numerous they increasingly emulate cover data for the calculation of abundance. For example, consider an extreme number of quadrats of minuscule sampling points the size of a needle point packed so closely together that there is no space between them. Then we note the species present at each needle point. Since the points would blanket the entire site, the calculation of frequency is identical to the calculation of cover. Sampling thusly avoids the very painstaking and time-consuming calculation of species-specific cover for the estimation of species abundance. We noted the occurrence of each species in each quadrat and calculated frequency. The results are in **Appendix 2** tables.

A important issue we must address *a priori* is the native or non-native status of *Phalaris arundinacea*. For several decades the local variant of *P. arundinacea* has been considered a genotype that is native to Europe, even though the species is circumboreal and is, indeed, part of our native flora. Swink & Wilhelm (1994) have considered the species non-native based on the discussions of Dore and McNeill (1980) in their study of Ontario flora, and Deam (1940) in part, even though Drs. Swink and Wilhem considered it native in previous editions of their tome. Dore and McNeill (1990) considered the southern phenotype in Ontario to be a separate strain based on differences in behavior and stem characteristics and supposed it may be of European origin rather than considering that the southern phenotype could simply be a variety of the species originating locally. Higley & Radin (1891) both indicated they encountered the grass in the native flora of the region well before the grass was used regularly in cultivation in this area. Deam (1940) in an off-hand comment said *P. arundinacea* specimens found away from Lake Michigan were "undoubtedly escapes from cultivation" without so much as a shred of evidence. Recently, sceptics of the non-native status of *P. arundinacea*, Mergliano and Lessica (1998), noted that in the western United States the local variants are clearly native having the same genotype of herbarium specimens that were collected shortly after settlement of the area. They also proposed that perhaps the invasiveness forms of *P. arundinacea* is not necessarily of European origin. Lavergne and Molofsky (2004) admit that, after extensive research in literature and in the lab, "the origin of the invasive genotypes is unknown" though they believe them to be from Eurasia. There are clearly genotypes that are invasive and those that are not, but to simply classify all invasive genotypes as non-native based on case study observations is lacking in scientific rigor. Therefore, we consider *P. arundinacea* to be a native species and this status should be considered the null, until unseated. This is important in calculating the abundance of native species.

Total Foliar Cover

Ten of the 132 quadrats were randomly selected for the estimation of total foliar cover (as opposed to species specific foliar cover discussed above). The estimation of foliar cover was executed by using a self-leveling laser crosshair site on a 5 foot tall tripod. The sight is 9 inches in length with 6 inches protruding below the top of the tripod. The sight produces a cross hair that illuminates the vegetation below. Wind was buffered using a stiff paper tube 24 inches in diameter and 24 inches tall (a modified lamp shade) which is placed over the top portion of the vegetation so that the laser pointed down through the center. I then used a forceps to pull each piece of foliage away from the crosshair and add up the number of intersections or "hits." This was executed 10 times in each of the 10 quadrats. The intersections are divided by the number of points (100) to arrive at the percent of ground covered. The method is useful for vegetation that is below 4.5 feet in height. If the quadrat falls in a space where there is a tree, this method cannot be used. Fortunately, that did not occur.

Species Diversity

The measurement of diversity was executed using the ^{NP}D and $^{NP}DENS$ indices (Sabuco 2012). These non-parametric methods use relative abundance values, which we calculated from the frequency measurements, then subjects those values to the following equations:

1. $$^{NP}D = 1-\left[\sum_1^5 (p/r)_i\right]$$

2. $$^{NP}DENS = {}^{NP}D(S)$$

where p_i = proportional abundance of each species ordered greatest to least; r_i is the rank order of each species; and S in the total number of all species.

And so, we describe this value as the additive inverse of the sum of ranked species abundances ordered from greatest to least and divided by their numerical ranks.

The bracketed quantity in equation 1 is clearly a measure of *concentration* (Whitaker 1972). The equation takes the additive inverse of concentration. The *effective number of species* $^{NP}DENS$, (Whittaker 1972,) is, for this application calculated as the product of species richness (S) and ^{NP}D. Sabuco (2012) demonstrated, statistically, that the equation is superior in sensitivity to abundance distribution and species richness to either the Shannon Weiner *H'* of the Gini-Simpson *D* – the most commonly used measures of diversity. It is also robust regarding yearly fluctuations in relative abundance.

Synecology

Community synecology – the observed between-species interactions and their strength in a community – was calculated using the Community Cohesion Index, *CC* (Sabuco 2004) where *CC* is the average of one of three successional classification values (community cohesion coefficients) assigned to each species (after Grime 1977). The values of 0, 1, or 2, refer to the following categories:

Table 3 Community Cohesion Coefficients

Value	Category	Habitats and Attributes
0	Ruderal	Earliest stage of succession; open ground between individuals; begin to die out when crowded or shaded. Can tolerate higher temperatures in the soil wide temperature fluctuations in the soil. Requires red light/far red light spectrum for germination. Often C4 carbon fixating plants.
1	Stress Tolerant	Secondary invaders of early successional communities. Tolerate sunny, dry sites where the soil is shaded and moisture is somewhat conserved. Competes poorly on extremely shaded sites.
2	Competitive	Tertiary colonizers on sites with close neighbors and considerable shade. Cannot colonize denuded sites. Can compete/propagate in a crowded neighborhood where most resources are garnered and sequestered by itself and neighbors. Requires blue light spectrum for germination.

In equation form:

3. $$CC = \left[\sum_1^S (s\ R)_i\right] S^{-1}$$

Early succession communities will generally have index values below 1, and late succession communities values above 1. The vast majority of communities so assessed will have index values between 0.75 and 1.25. Old field successions will generate index values of approximately 0.3 in the first year, 0.6 in the second, and 0.75 in the fifth year.

The best way to use the, Community Cohesion Coefficients, is in conjunction with a modification to equation 3 taking the sum of the values, without averaging, to arrive at the *number of effective constant species*, ${}^{CC}S$.

4. $$ {}^{CC}S = \left[\sum_1^S (s\ R)_i\right]$$

This number is exceptionally useful as it measures in virtual species, the constancy of the community. This adds the element of species richness to the result, but only of the stress tolerators and the competitors, giving extra weigh to the competitors (Ruderals are weighted 0 and therefore don't add tho the result.)

When measuring the results of a revegetation, wetland mitigation, ecosystem enhancement, or any other type of conservation effort, **this could be the single most important number when comparing the status of efforts to create a fully functioning ecosystem**.

Swink & Wilhelm (1994 – updated from 1979), created the Floristic Quality Index (FQI) – the first index of its kind. Each taxon in the Chicago region flora is assigned a number, a coefficient of conservatism, from 0 to 10 based on its "conservatism" or fidelity to a stable habitat. The index averages the "conservancy" of each species encountered then multiplies that number by the square root of species richness. This last operation (multiplying by richness) received considerable criticism because each new species that is encountered contributes less to the final result than the last. The authors provided no ecological justification for this approach. Rather it is based on the sampling concept that the greater the effort expended (Odum 1994), or the land area evaluated (Preston 1962, 1962) the greater the number of species one will encounter (Preston 1962a, 1962b, Odum 1994) and they believe this should not increase the rating of the site as the smaller site is a subset of the whole. Most ecologists find this to be counter intuitive. Clearly, the greater the number of species in the metacommunity, the greater the likelihood that any subdivision thereof remains constant as metacommunity can re-contribute a species to the smaller community upon the extinction of species therein. This adjustment for species richness has been largely eliminated and only the average of coefficients ($_{avg}C$)is now used in the index.

Other criticisms have arisen. The authors define conservatism as ". . . fidelity to specific habitat integrity." What does that mean and how do we judge that? It seems to amount to an evaluation of rarity. The authors provide the coefficients for us but the ratings are their opinion of this nebulous characteristic. In addition, the fine scale of coefficients (0-10) is too fine to be useful. The differences between categories in any set of values becomes more subjective at finer scales. Also, the reason a plant is rare has many causes many of which have nothing to do with the "floristic quality" of the ecosystem. Kevin Gaston (1994) demonstrates this exquisitely in his classic book, *Rarity*. So the rating of the habitat may be skewed by factors unrelated to, and occasionally even antithetical to, the end goal. Last, the role a plant plays in the succession of a community may change during the life of the plant (Bazzaz 1994, Grime 1977, Grace 1990). The FQA does not account for this change as the coefficients are static. Bowles and Jones (2006) tested the efficacy of the FQA on many prairie sites before and after burns and other restoration efforts and conditions and found that it is simply not sensitive enough to detect significant changes – particularly in species richness. Clearly, a more comprehensive, less subjective, ecologically sound, and more portable approach to community assessment was required.

The *number of effective constant species* (NECS) can be translated easily to any ecosystem or even to different trophic levels. One of the most important features of the method is that it can be quickly utilized on other sites because the *community cohesion coefficients* are easy to assess as opposed to the FQI in which each species must be tediously rated according to its conservativism (rarity) – a highly subjective process. For the NECS method, one can simply determine which species are initial colonizers and cannot reproduce in a crowded environment. What species replace those ruderals? Then what species arrive once the site has been modified by the stress tolerators that require a constant neighborhood of species for reproduction and persistence? At each stage, the web of species interactions within an ecosystem increases and become requisite. Specific life history traits related to that synecology are apparent. This is a rather simple method for a competent ecologist, or biologist. *Community cohesion coefficients* can easily be adjusted to accommodate the role a species is playing at the time of assessment. The method actually measures an area's position in the successional process and this is directly related to the goals at hand.

Wetland Affinity

Wetland affinity is measured using the federal system of wetland classification adopted by U.S. Fish & Wildlife. For each vegetative region there exists a published list of wetland affinity classifications in 5 categories based on the probability of finding that plant in a wetland environment. Swink & Wilhelm (1994) assigned subcategories for the Chicago region based on their more thorough scale of investigation, which resulted in 11 categories. We assigned numeric values to the classification, in keeping with standard procedures for this region, then averaged the values to arrive at the site's vegetation wetland affinity as a whole. The chart below represents the affinity classification and its numeric equivalent.

Table 4 Wetland Affinity Categories and Values

Category	Percent Frequency in Wetlands	Acronym	Rank
Upland	0<1	UPL	0
Facultative upland – less wet		FAC-	1
Facultative upland	1-33	FAC	2
Facultative upland – more wet		FAC+	3
Facultative – less likely		FAC-	4
Facultative	34-66	FAC	5
Facultative – more likely		FAC+	6
Facultative wetland – less likely		FACW-	7
Facultative wetland	66-99	FACW	8
Facultative wetland – more likely		FACW+	9
Obligate	>99	OBL	10

WILDLIFE ASSESSMENT

SPECIES OF NOTE

There are at least four species of significance present at the subject site. The Canada Goose, *Branta canadensis*, the Mallard, *Anas platyrhynchos*, the Northern Shoveler, *Anas clypeata*, and the Eastern Meadowlark, *Sturnella magna*. Of these, the first 3 were identified on the lake which just touches the south eastern border of the property, but that receives the water from rainfall from the subject property. Neo-tropical migrants were not addressed in this study because they are restricted in their use of this site. It is, however, the only lake (9A) in the immediate area, and one of only two in an 8 mile radius large enough for geese.

Geese and Ducks

The waterfowl listed above are undoubtedly only a small portion of the species present. Geese were by far the most numerous waterfowl with their numbers reaching many hundreds on several days on which we observed. They are fully and strictly protected under the Migratory Bird Treaty Act of 1918. With the exception of a brief hunting season, the birds, their nests, nest sites and eggs may not be possessed, disturbed, molested or harmed in any way. The management of the soil on the subject property is critical to this edict. The release of silt to the lake will likely foul the water so that the birds will not be able to use the lake. They must have clear water to forage.

Eastern Meadowlark

The eastern meadowlark was found breeding on the subject property. I found a nest and males in breeding plumage singing to attract mates. Photos may be found in the Photo Log in **Appendix 4**. Meadowlarks must have grassland habitat to survive. They have a strong attraction to degraded prairie and meadows such as our site – stronger, surprisingly, than their attraction to more fully functional native prairie (Hull 2000). Meadowlarks may have numerous (3 to 4) broods if they are not successful in rearing young on the first or second try, but the stress on the female causes an excessive mortality among them during the winter months (Pijankowski 1992, Hull 2000). The decline in Meadowlarks is first and foremost due to habitat loss and this means early mowing as much as anything. The loss of the grass of appropriate height is loss of habitat. The first brood fledges in April or May. This first brood is parasitized mercilessly by the brown headed cow bird (over 70% of nests) which has increased dramatically due to the unnatural land use practices of the last 50 years or more (Hull 2000, Butcher, Niven & Sauer 2008). This in itself would not be of concern, normally, except that the subsequent brood will not fledge until the middle of July. Therefore, mowing before July 27 will destroy the nests and eggs leaving few or no replacements for the parents.

For this, among other reasons, meadowlark populations are in precipitous decline. Meadowlarks are hardly ever seen in Cook County or any of the collar counties of the Chicago region. They are quite rare in DeKalb County. In 1979, the Christmas Bird Count (CBC) found 281 meadowlarks in the Chicago Metropolitan Area. In 2012, the number had dwindled to 4. There have been no sightings of Meadowlarks during the CBC in DeKalb County in the last three years. The center of population is moving west as the bird is extirpated from one county after another from east to west.

Please note these quotes from authoritative sources:

> This species has undergone a large and statistically significant decrease over the last 40 years in North America (-71.5% decline over 40 years, equating to a -26.9% decline per decade(!). Data from [the] Breeding Bird Survey and/or Christmas Bird Count
>
> Butcher and Niven (2007).

> Eastern Meadowlarks are a declining species. The North American Breeding Bird Survey shows a severe rangewide decline estimated at between **2.9 percent and 14.8 percent *per year*** from 1966 to 2010. **Cumulative loss to population numbers may be as high as 75 percent during that time.**
>
> Losses are due to their disappearing grassland habitat. Prairie is scarce in the eastern United States, and the kinds of farms that once hosted meadowlarks—small, family farms with pastureland and grassy fields—are being replaced by larger, row-cropping agricultural operations or by development. **Early mowing,** overgrazing by livestock, and the use of pesticides can also harm meadowlarks nesting on private lands. According to the State of the Birds 2011 report, **more than 95 percent of the Eastern Meadowlark's distribution is on private lands, meaning farmland conservation practices are vital to the survival of this species.**
>
> Cornell University Ornithology Lab

Butcher, Niven & Sauer (2008) also point out causes and remedies for the Meadowlark's precipitous decline, in their exceptional presented paper *A Forty-year Decline of Grassland Birds in North America*.

****

Continues with *Vegetation and Wildlife Management Plan*

VEGETATION & WILDLIFE MANAGEMENT PLAN

ALLOCHTHONOUS VEGETATION

It is our intention only to prevent colony-forming, aggressive vegetation from overrunning the property. Most weeds will be eliminated as succession progresses. We have listed some invaders that are worthy of special vigilance.

Pyrus calleryana

Callery Pear is an extremely noxious, thorny, woody weed. The seeds of domesticated non-native Bradford pears and other cultivars are consumed by birds. The seeds are scarified in their intestines increasing the probability of germination. The birds deposit the seeds on site while perching on wires and fences. There are few such perches on site at this time but as the Cottonwoods and other stress tolerant trees colonize the property, the likelihood that the pear becomes prevalent increases. When located on site, the pear should be cut to the ground and the stumps treated with potassium nitrate.

- The pears should be removed with loppers before they reach 2 inches in diameter and as close the ground as possible.
- Use a drill bit on a battery-powered drill to drill straight down the center of the each stem stump approximately 8 to 10 inches. Use a bit that is as close to 3/4 of the diameter of the stump as possible.
- Pour granular potassium nitrate into the holes until it reaches one inch from the top. Pour a small amount of water into the holes until the water is visible at the top.
- Use sugarless chewing gum to seal the holes to prevent access by children.

Elaeagnus angustifolia, E. umbellata

Russian olive and autumn olive are pests brought to site in the same manner that the Callery pear arrives. They grow so fast that they smother neighboring native woody vegetation. They are also armed with small spines. Eliminate it in the same manner prescribed above.

Rhamnus cathartica, Crataegus mollis, C. punctata, C. crus-galli

Les likely to occur than the previous species, buckthorn, downy hawthorn, dotted hawthorn, and cockspur hawthorn, respectively, are potential secondary invaders. They all are frequent in moist flood plain similar to conditions that we have on a majority of the site. All can form impenetrable thickets of thorny stems. Eliminate as above.

Forbs

About half of the primary invader weeds have already declined significantly in number. In time, we believe that they all will slowly disappear from the property (though never entirely) (Bazzaz & Garbutt 1988). Unusually aggressive species forming monoculture stands should attended. The management team should make note of such species/colonies s they are encountered.

Phragmites communis (syn. P. australis)
Common reed is a tall (6 to 8 feet), robust, aggressive grass with the ability to produce huge quantities of edible seed that is preferred by small birds. It can grow under any edaphic conditions. Though it prefers wet soil, it can grow on very dry sites, too. It can form impenetrable stands that grow significantly with each new year. Only shade eliminates it. There a few small patches of reed on site, but they are in tiny depressions that are quite wet. The reed can be exterminated with salt of glyphosate. The herbicide should be applied with a wick. The small patches should be monitored at this time and eradicated if it becomes necessary.

MOWING

Some of the stakeholders have indicated their preference for mowing the vegetation to maintain a 12 inch maximum height. We believe this is contraindicated for the following reasons.

- **Increased Siltation to the Pond** —
  - **Reduction in Foliar Cover** — As our analysis shows, the 71% percent cover at 12 inches above grade is considerably lower than the 122% at 54 inches above grade. This means that if the vegetation is mowed to a 12-inch height, nearly 30 percent of the soil surface will be *directly impacted by rainfall* and this of course will cause erosion followed by siltation of the pond (Bazzaz 1969).
  - **Low Presence of Turf-forming Grasses** — Mowing favors turf-forming grasses and reduces the abundance of forbs and clump-forming grasses (Cofield *et al* 2007, Smith Bula & Walgenbach 1986, Bittman Schmidt and Cramer 1999, Langer 1990). This means that mowing could help form a tight turf if the abundance of turf-forming grasses is great enough. There are only four species (*Poa* - 2 species, *Agrostis* and *Agropyron*) turf-forming grasses on site making up just 12% of total abundance combined. Mowing would therefore would create large areas of open soil as it eliminated more species intolerant of mowing with each mowing. The turf-formers could not possibly invade fast enough to fill the gaps *if* they could do so from such low abundance levels. The result is that soil erosion would increase dramatically.

- **Interference with Succession**
  - **Reduced Seed Production of Desirable Plants** — Mowing plants with architectures that carry flowers and seeds above the mow heights (as do most of the species on site) obviously prevents flowers from forming or removes the flowers or seeds before ripe with rare exceptions. Mowing brings succession by seed recruitment to a near standstill (Bazzaz 1996, Smith & Smith 1997).
  - **Eradication of Species Sensitive to Mowing** — Mowing grasses that produce no budding stems (culms) below mow height (most of the grasses on site), usually results in the death of the plant (Smith Bula & Walgenbach 1986, Smith & Smith 1997, Hoveland 2005, Langer 1990).

- **Increased Soil Temperature** — Bazzaz (1996) and Armesto & Pickett (1985) determined that ruderals prefer widely variable soil temperatures while stress-tolerant and competitive plants prefer steady or ameliorated soil temperatures (Geiger 1965). Mowing increases the light penetration to the soil level increasing soil temperatures. Mowing, therefore, slows the progression toward a more stable perennial plant environment.
- **Increased Sunlight at Soil Level** — Ruderal species (early colonizers) require a significant amount of energy from the red/far red light spectrum (Bazzaz 1979, 1996). This is present in direct sunlight (Bazzaz 1996). Secondary and tertiary successional invaders (stress tolerant and competitive plants) require a greater quantity of blue spectrum light found in shadier conditions (Bazzaz 1979, 1996, Grime & Jeffrey 1965). Mowing increases the direct – red spectrum – light at the soil level causing ruderal species to maintain their hold on the environment and reducing or stopping succession toward a more stable habitat (Barnes *et al* 1990, Bazzaz & Carlson 1982, Givinish 1988). The SWPPP requirements are a stable habitat with certain goals for plant cover and composition that cannot be achieved and maintained when mown. Mowing, therefore, is antithetical to this goal.

- **Significant Deleterious Effect on Meadowlark populations** — Meadowlarks nest on the ground among the grasses. Meadowlarks fledge their first brood of the year between April 20 to May 15 in northern Illinois (Hull 2002). They often produce a second brood which fledges by July 27 on average (Hull 2002). Mowing could easily disrupt both of these cycles as mowing will destroy the nests and the young. Brown headed cowbird predation often drives meadowlarks to produce a 2nd brood. As many as 70% of nests are predated (Hull 2002). Therefore, the second brood is most critical to survival of the species. It is the second and third mowing that is the most likely to occur while the young are in the nest. The vegetation gets to an "intolerable" height for most aesthetics, and is cut before July 27. While the meadowlark can produce a third and sometime a fourth brood (Hull 2002) the third brood is still very much in danger of death by mowing as it fledges around Labor Day. Further, the stress on the female that produces third and fourth broods is so great that female mortality increases to critical levels. Only about 60% of females producing a 4th brood return the following year (Hull 2000) The brood itself is also less likely to survive as the food abundance has decreased by it's fledge date. The lack of progeny and the risk of mortality will undoubtedly eliminate the breeding meadowlarks at this site and further reduce its critically low number in DeKalb county. Last, it is illegal to molest a migratory nesting bird, the young, the nest or the eggs according the *Migratory Bird Treaty Act.* (Some eastern meadowlarks migrate from Canada to the southern U.S. thus crossing an international boundary.) In addition, The State of Illinois is ward for all animal life in the state (The Illinois Environmental Protection Act). In other words, the landowner does not own the animal and has no right to disturb the nest or the bird under the *Illinois Non-Game Wildlife Protection Act* (30 ILCS 155/1) (from Ch. 61, par. 401) Sec. 1. Therefore, it would be flatly illegal to mow in such a way as to *knowingly* harm the birds, the nest, or the fledglings.

CLOSING WEST SIDE INLETS

ΣYNERGYA Pure & Applied Science LTD analyzed the efficacy of 11 storm water inlets along the west property line that are installed in a straight line from north to south. Inputs were as follows:

- 119 acres of drainage area (see accompanying topography – approximate elevations were derived from Google Earth) from the farm to the west of the site.
- A slope of 1.33%
- A run length of 1586 feet from the highpoint to the closest grates.
- An observed 2 inch head during a 100 yr storm.
- A grate with 5.4 sq ft opening. To be safe on this estimate we assumed that the opening was greater than the specifications of the closest grate spec that we could find to the grates on site (see attached). The specification has 1-inch slots. We assumed 2.25-inch slots. We also assumed 1-inch bars.

The grates in total will handle 24.2 cfs. The total runoff for the area for a **10 year storm** is 254 cfs. Subtracting the water that can be handled by the grates, 229 cfs of water bypasses the grates. This means the grates are greatly undersized for the flow. The 90.5% of the runoff water already rushes past the inlets causing erosion as we have documented. It would take one foot of head for the inlets to handle the full quantity of water runoff. The entire calculation was executed using the *rational method* (worksheet attached) by Jeffrey R. Reis, PE, PTOE. See **Appendix 3.**

Reasons to close the inlets:

- The inlets are ineffective. They do not handle the required flow.
- To make the inlets effective would take considerable earth moving to create a detention basin that would allow for 1 foot head to handle the excess 229 cfs of water.
- Because the farm field to the west of the subject property gives up considerable silt to heavy rains, the water that *does* get through the grates carries the silt directly to the lake – in violation of the Clean Water Act, and Section 10 of the Rivers and Waters Act.
- Siltation to the pond can be reduced to the lowest levels possible by other measures (see below) only after closing the inlets.

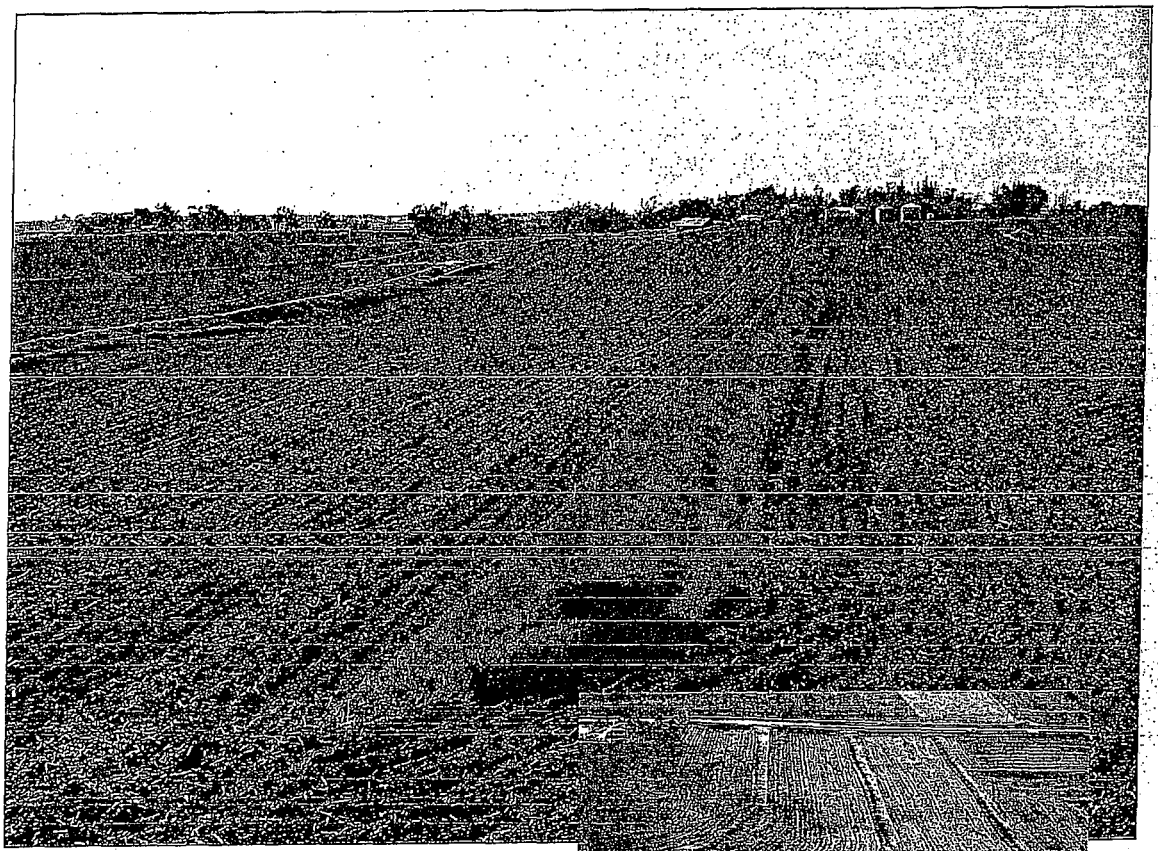
Therefore we recommend closure as per **Abiotic Concerns: Execution and Management.**

HANDLING WATER FLOW TO THE POND – CONTROLLING SILTATION

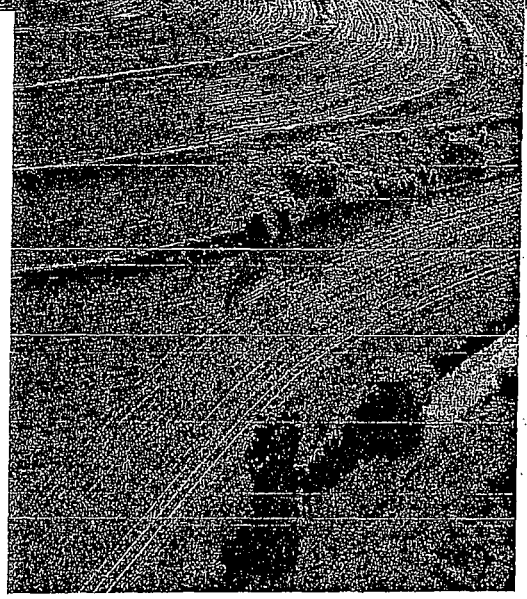
ΣYNERGYA Pure & Applied Science LTD proposes to create 6 sheet flow settling terraces. These terraces would be 12 inches in height and would stretch from 440 feet north to south west of the pond and between the south soil stockpile and the pond. These berms will slow the progress of water to the pond allowing silt to drop out of the water column. This type of terrace fills in with soil on the uphill side over time and creates a smooth undulating landscape element. The terraces are constructed with a base of gravel acquired on site then topped with heavy soil also acquired on site from the stockpiles, then compacted. See example photographs next page.

Examples of siltation/erosion control terrace such we are proposing west of the pond. Openings in the wall of the terraces allow water to slowly release and direct water to solid sections of terrace downhill.

Decorah Iowa



O'Fallon, Illinois



VEGETATION & WILDLIFE MONITORING AND MANAGEMENT SCHEDULE

There will be 2 site visits per year for two consecutive years as scheduled below. Stakeholders to be notified 10 days or more in advance of any site visit. Stakeholder may attend but Owner is not required to adjust time or date of scheduled visit to accommodate others, they will attempt to do so.

First Visit **Between May 15 & June 30, 2015 and 2016**

- Assess vegetation succession progress according to notes above
  - Note excessive dominance by listed allochthonous species size and extent
  - Augment species inventory
- Assess vegetative cover
- Assess for soil erosion and siltation to pond
- Vigilance for Eastern Meadowlark

Second Visit **Between August 1 and August 30 2015 and 2016** – before August 15 if herbicides must be applied

- Address any allochthonous vegetation concerns as prescribed above
- Vigilance for eastern Meadow Lark
- Complete Species Inventory

ABIOTIC CONCERNS: EXECUTION & MANAGEMENT SCHEDULE

Work and Management Visits shall be coordinated to be concurrent with, to the extent possible, the schedule for Vegetation and Wildlife Monitoring and Management

Execution of Agreed Tasks

COMPLETED TASKS

- Replace missing manhole covers – Completed January 2015
- Install "No Trespassing" signs – Completed January 2015

ALL TASKS TO BE COMPLETED BY MAY 15, 2015

- Break large concrete debris into cobble-sized pieces to be used as fill for other projects on site.
- Fill in trench at central west edge of property
  - Use concrete construction debris cobbles for lowest layer of fill.
  - Use stockpile gravel to fill within 2 feet of soil surface.
  - Use stockpiled soil on site to fill the last 2 feet of the trench
  - All materials to be installed in 12-inch lifts and each lift compacted
- Backfill around eroded west-side stormwater inlets with stockpiled gravel

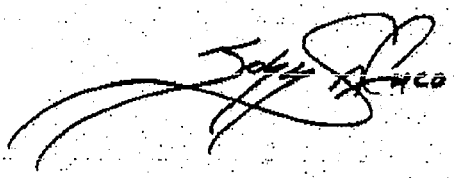
- Remove and dispose fly-dumping debris
  - Monitoring/Management Schedule to Monitor Fly-dumping/No trespassing
    - 1 visit per year to identify concerns concurrent with above schedule
    - 1 visit per year to correct deficiencies concurrent with above schedule
    - Monitoring ends after 2nd year
- Remove and dispose silt fence and associated stakes
- Remove and dispose other wooden stakes and PVC standpipes left on site
- Close west side inlets using solid covers permanently attached to the sewer stand
- Create six (6) 12-inch tall sheet flow settling check dikes, as per design, in drainage flat west of pond

Monitoring and Management Tasks for Abiotic Concerns

To be completed at each visit. Visits concurrent with Vegetation Management and monitoring visits.

- Determine if a site safety concern exist:
  - Fly dumping
  - Missing manhole covers/sewer grates
  - Check inlets for erosion and closure if applicable.
  - Sink holes, collapsed sewer lines or trenches
- Assess siltation to pond:
  - Turbidity
  - Sediment layer thickness
- Inspect sheet flow erosion control terraces
- Assess soil erosion

Prepared by:



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