

**CONSERVATION PLAN FOR
THE BLANDING'S TURTLE
AND THE IOWA DARTER:
INCIDENTAL TAKE
AUTHORIZATION
SUBMITTAL**



PROJECT SITE:

The Conservancy

Gilberts, Kane County, Illinois

PREPARED FOR:

Gilberts Development LLC
340 W. Butterfield Road, Unit 2D
Elmhurst, Illinois 60126

PREPARED BY:

V3 Companies, Ltd.
7325 Janes Avenue
Woodridge, Illinois 60517

FOR PRESENTATION TO:

Illinois Department of
Natural Resources

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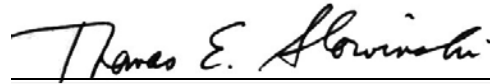
REVISED September 5, 2019

We hereby certify that this revised Conservation Plan has been prepared by V3 Companies for use by Gilberts Development LLC, their affiliates, lenders, and assignees.

Project Staff:



Daniel Jablonski
Wetland Scientist



Thomas E. Slowinski, PWS
Technical Director, Wetlands and Ecology
Natural Resources Division

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Illinois Department of Natural Resources
Conservation Plan for Blanding's Turtle and Iowa Darter
(Application for an Incidental Take Authorization)
Per 520 ILCS 10/5.5 and 17 Ill. Adm. Code 1080

150-day minimum required for public review, biological and legal analysis, and permitting

PROJECT INTRODUCTION

PROJECT APPLICANT: Gilberts Development LLC

PROJECT NAME: The Conservancy of Gilberts

COUNTY: Kane County

AREA OF POTENTIAL HABITAT: Project Area, 372.50 acres (Appendix 1, Figure 1)

PROJECT SUMMARY: The purpose of this project is to continue the overall residential development that was started by Neumann Homes (Neighborhood 1 in 2007) prior to their bankruptcy. The current owner purchased the property out of bankruptcy and is working with the Village of Gilberts to continue the project. Neumann Homes went bankrupt in 2007. In 2008 Indy Mac Bank (the lead lender to Neumann Homes) was taken over by the Federal Deposit Insurance Corporation (FDIC) which subsequently owned the property from 2008 until 2010. In 2010 the property was sold by the FDIC to One West Bank until such time as it was sold to the current owner, Mr. Troy Mertz the owner of Gilberts Development LLC, in 2012. No work was done on the project for a period of over 6 years until Mr. Mertz began the process of restructuring the municipal bonds which were sold by the Village to complete critical infrastructure required to construct the subdivision as well as the new Gilberts Elementary School. The \$15,000,000 in municipal bonds have since been restructured, with first interest payments being made in the fall of 2014 since the project had fallen into bankruptcy.

The project area serves as a single and complete project and includes Neighborhoods 1, 2 and 3 (Figure A, Appendix 1). The need for the project is to provide single family housing and townhomes within the Village of Gilberts. All efforts have been made to avoid and minimize wetland impacts and to preserve the wetlands and wetland buffers on the property, as reflected in the name of the project.

Extensive agency coordination has occurred on this project to minimize impacts to wetlands, wetland buffers and provide extensive areas of Best Management Practices (BMPs), and to revise the site plan to avoid and enhance nesting Blanding's turtle habitat. Agency coordination has included several meetings with the US Army Corps of Engineers (USACE), Village of Gilberts, Forest Preserve District of Kane County, Illinois Department of Natural Resources (IDNR) and Illinois Nature Preserves Commission. Meetings have occurred on May 6 and December 22, 2016, March 30, May 1, June 6, and August 3, 2017. Project correspondence from IDNR is provided in Appendix 2.

BLANDING'S TURTLE

POTENTIAL HABITAT: The project area totals 372.50 acres and consists of a single family residential and townhome development within the Village of Gilberts, approximately 2.70 miles east of Illinois Route 47 and adjacent to the Freeman Kame-Meagher (FKM) Forest Preserve on Freeman Road.

There is a known single nesting location on an 11.30 acre portion of the proposed project site, known as Blanding's Turtle Mitigation Area (Figure 4, Appendix 3). The area is currently farmed with the exception of a 1.43 acre woodland. A population of nesting Blanding's turtle (*Emydoidea blandingii*) is also known to occur on the FKM Forest Preserve and is being studied by the Forest Preserve District of Kane County (FPDKC). Therefore, potential habitat for the Blanding's Turtle is expected to occur throughout the project area, as the species has the potential to disperse over or within the neighborhoods.

The project has been modified to avoid direct impacts to the known nesting location through the preservation and enhancement of an 11.30 acre area identified as Blanding's Turtle Mitigation Area (Figure 4, Appendix 3). This area will also serve as mitigation for the USACE Regional Permit for the project. The 11.30 acre area will be preserved and enhanced with a native shortgrass prairie planting mix, the design of which has been coordinated with FPDKC staff and the existing woodland area will be enhanced. The area directly to the south of the Blanding's Turtle Mitigation Area, known as the Wetland Mitigation Area (Figure 3, 4, 5A, 5B, Appendix 3), totals 8.01 acres and will be rehabilitated and planted with native prairie buffer and the existing wetlands will be enhanced. The restoration and management of these areas will begin in 2019. The mitigation area vegetation will be managed and monitored for a minimum of 5 years. The 19.31 acres of mitigation will be placed in a conservation easement which will be granted to the FPDKC. The transfer of the Blanding's Turtle Mitigation Area (11.30 acres) and the Wetland Mitigation Area (8.01 acres) to the FPDKC has been discussed, however cannot be determined until after the USACE signs off on the success of the mitigation restoration, as determined by the performance standards approved by the USACE.

The project area totals 372.50 acres. The preserved or restored areas total 165.93 acres and include the following, as shown on Figure 4 (Appendix 3) and in Table 1:

- preservation of 64.70 acres of wetland
- preservation of 38.04 acres of existing vegetated buffer
- enhancement of 12.09 acres of existing vegetated buffer with native prairie
- 26.88 acres of prairie habitat creation
- 29.69 acres of naturalized stormwater management BMP areas consisting of emergent (3.26 acres) and sedge meadow habitat (26.22 acres)
- 3.31 acres of wetland enhancement, and
- 1.43 acres of woodland enhancement.

Overall, 63.19 acres of habitat will be planted or maintained as vegetated or native plant communities and will be actively management for 5 years or until performance standards are met as described in the Mitigation, BMP and Wetland Buffer Plan Summary and Management & Monitoring Plan (Appendix 4). 102.74 acres of wetland and existing vegetated buffer will be preserved and will remain subject to USACE

and Kane County regulatory requirements. Management of these areas, which will focus on the control of invasive species, will be the responsibility of the Homeowners Association.

Table 1: Total Acreage: Wetland Mitigation & MMP Implementation Plan

Total Project Area	Acres	Existing Habitat	Acres
Total	372.50	Preserved Wetland	64.70
		Existing Vegetated Buffer	38.04
		Sub-Total	102.74
		Habitat Enhancement/Creation	Acres
		Prairie	38.97
		Emergent	3.26
		Sedge Meadow	16.22
		Wetland Enhancement	3.31
		Woodland Enhancement	1.43
		Sub-Total	63.19
		Total	165.93

The construction of the Neighborhoods, which is comprised of single family residential and townhomes, has the potential for the incidental take of Blanding’s Turtles during the construction phase (2019-2021). As construction commences, the areas being developed will be isolated with silt fencing and monitored in accordance to the Illinois Natural History Survey Conservation Guidance for Blanding’s Turtle (**Appendix 5**) to prevent access by turtles.

IOWA DARTER

IMPACT AREA: A population of Iowa Darter (*Etheostoma exile*) is known to occur within the Kishwaukee River and tributaries. As stated in the June 30, 2017 IDNR letter (Appendix 2), the presence of the state-threatened Iowa Darter was documented in the project area by an IDNR survey. There are four proposed road/trail crossings for the residential development and one culvert extension, which would have a potential temporary impact on Iowa Darters during construction. The location and impacts associated with the crossings and culvert extension (Figure 2, Appendix 3) include the following:

1. New bridge crossing located on the South Branch of the Kishwaukee River to connect Neighborhoods 1 and 3, consisting of two 12’ x 18’ box culverts, 78 linear feet long
2. Culverted road crossing of Tributary 2 within Neighborhood 2 east Wetland 3A, consisting of a 48” diameter culvert, 80 linear feet long
3. Culverted road crossing, north end of Tributary 2 south of Wetland 4, consisting of a 72” diameter culvert, 80 linear feet long
4. Culverted trail crossing, north end of Wetland/Tributary 1, consisting of a 48” diameter culvert, 50 linear feet long.
5. Freeman Road culvert extension south of Wetland 8, consisting of a 21 linear feet extension of an existing 43” x 68” elliptical culvert.

Photographs of the crossing locations are provided in Appendix 6.

The construction of these bridges and culverts has the potential for the incidental take of Iowa Darters. After construction is completed, there will be no additional potential for an incidental take of Darters. During bridge construction, fish access to the construction area will be prevented. Any fish remaining within the construction area will be relocated to significantly reduce the chance of potential take.

The incidental taking of endangered and threatened species shall be authorized by the Illinois Department of Natural Resources (IDNR) only if an applicant submits a conservation plan to the IDNR Incidental Take Coordinator that meets the following criteria:

1. DESCRIPTION OF IMPACT

1A. Project Location

The project area is located north of Freeman Road, south of Huntley Road, east of Freeman Kame Nature Preserve and west of Galligan Road in Gilberts, Kane County, Illinois (Figure A, Appendix 1). Direct impacts to the Blanding's Turtle have been significantly reduced through the re-design process. Originally, 35 single family homes were planned for development in this area due to the lack of existing wetland and floodplain. However, through extensive agency coordination efforts with the developer have resulted in the increase in the size of the mitigation area size from 9.63 acres to 11.30 acres and the reduction of buildings from 35 single-family homes to 8 multi-family buildings with a net loss of 23 lots. The lost lots have a value of \$30,090 per lot, which represent a value of \$692,070. Furthermore, the vegetated buffer areas will be planted with native prairie seed and the existing wetland areas will be enhanced.

Based on extensive agency coordination related to a USACE Regional Permit for the project, wetland mitigation for the project will include an 11.30 acre area will be preserved and enhanced with native prairie vegetation, and an 8.01 acre wetland and wetland buffer which will also be preserved and enhanced. The existing conditions of the property and the proposed project plans are provided in Appendix 3. All created and enhanced habitat areas will be placed in a conservation easement and the 11.30 acre Blanding's Turtle Mitigation Area easement will be granted to the FPDKC following USACE signoff on the mitigation area. The restoration will occur during 2019 and 2020, as shown on the Mitigation, Wetland Buffer and BPM Planting Plan provided in Appendix 3, including plans specific to the restoration of the 11.30 acre turtle nesting and mitigation area. As a mitigation area, it will be managed and monitored for a minimum of 5 years or until performance standards are met. The transfer of the property to the FPDKC has been discussed with them, but will not occur until the USACE signs-off on the success of the mitigation restoration as determined by the performance standards approved by the USACE.

The potential for direct affects to Iowa darters will occur during the construction phase of the five road/trail crossings and culvert extension over the South Branch Kishwaukee River and tributaries (Figure 2, Appendix 3).

1B. Biological Data

Blanding's Turtle:

Blanding's turtles are medium sized, attaining lengths of 7 to 10 inches. The carapace is raised and overall is dark with yellow speckles. The chin and bottom of the throat on Blanding's turtles is bright yellow. Turtles typically become active in March and begin overwintering in November.

Blanding's turtles occur in a variety of wetland and upland habitats. They travel frequently between wetlands. Their main reasons for travel in uplands include finding suitable nesting locations and finding wetland pockets during drier times of the year which could bring them in close proximity to development activities. Blanding's turtles are omnivores and their diet ranges from snails, tadpoles, earthworms, insects, and fish to plant materials and seeds.

Nests typically occur in areas with sun exposure (little to no vegetative coverage) in well-drained and loose soils (naturally occurring or disturbed). Some examples include; sand, sandy loam, trail margins, and railroad embankments. Eggs are typically laid in May to July and hatch August to October. The soil type in the known nesting area is mapped as Will loam, a loamy, sandy soil. Information on the soils is provided in Appendix 5.

Biological surveys have been conducted by the Forest Preserve District of Kane County and Blanding's turtle nesting in the Blanding's Turtle Mitigation Area have been confirmed by District biologists during various project coordination meetings. V3 staff met with FPDKC staff on November 15, 2017 to discuss distribution of the current population, the design of the Mitigation Area and ongoing monitoring for Blanding's turtles. Forest Preserve tracking shows that most of the Blanding's turtle activity occurs in the Freeman Kame Forest Preserve. Infrequently, several turtles have been tracked moving through the development area and one turtle has nested in the Blanding's Turtle Mitigation Area several times. The main area of use for Blanding's turtles has been the far northwestern portion of the property, of which the main portion (the Blanding's Turtle Mitigation Area) will be preserved and enhanced to remain as a natural area and nesting site. Previous turtles observed within the development area are likely to find water sources during drier times of the year and nesting in the Blanding's Turtle Mitigation Area. Based on FPDKC data, it is unlikely that Blanding's turtles use the project areas except to find water during dry times of the year. The known nesting area has direct access to Freeman-Kame Forest Preserve so it is unlikely that turtles will travel into the construction and residential areas.

Iowa Darter:

Iowa Darters are small fish in the perch family that can reach a length of about three inches. It is typically olive or brownish colored and has eight to ten dorsal saddles. They also have ten to fourteen dark lateral blotches separated by reddish spaces. They have a dark, teardrop mark under their eye and a dark bar extending from the front of their eye. The lateral line typically does not extend past the second dorsal fin. Fins have barred markings. Eye diameter is greater than the snout length, they have two anal spines, and scaled cheeks. Iowa Darters spawn in April over organic matter such as roots and vegetation.

Iowa Darters occur in a variety of habits including: low-gradient streams, clear-well vegetated lakes, and sloughs. Historically, Iowa Darters occurred throughout the northern quarter of Illinois, but their range has been reduced due to environmental impacts. They are most common in glacial lakes and associated waters in northeastern Illinois. Young feed on plankton while adults feed on aquatic insects and small crustaceans.

On July 7, 2017 the IDNR conducted a fish survey (June 30, 2017 Letter, Appendix 2) and identified the state-threatened Iowa Darter within the project area. However, supplemental surveys conducted in June 2018 by the Ecological Consulting Group did not find Iowa Darter species present in the project area. The fish species encountered during the survey of the project area included central mud minnows (*Umbra limi*) and Johnny Darter (*Etheostoma nigrum*). The June 22, 2018 survey report is provided in Appendix 6.

1C. Project activities that may impact Blanding's turtle

Blanding's Turtle:

During construction activities there is a potential for interaction with Blanding's turtles including accidentally wounding or killing a turtle with construction equipment. This only has the potential to occur if a Blanding's turtle moves into the construction area. Activities that will occur in the construction zone include mass grading, trench excavation for utilities, home construction, road construction and construction traffic. To decrease the chance of a turtle encountering construction activities, active construction areas will have silt fence installed along the perimeter of the area as recommended in the Conservation Guidelines for Blanding's Turtles. The fence will be inspected to ensure that it remains intact throughout construction. Construction equipment and stockpile areas will only occur in areas that have had silt fence installed to reduce the chance of a turtle interaction. The adjacent Forest Preserve property, the wetlands, buffers, BMP's along the western portion of the project area, and the wetlands and agricultural fields north of the project area all have connectivity which will serve as dispersal corridors (Habitat Dispersal Corridor Map, Figure 5, Appendix 3), and limit the need for turtles to migrate into construction areas or future residential housing.

Project activities associated with the (2 year construction and 5 management and monitoring) 7 year take of Blanding's turtles within the project limits of the Neighborhoods includes but is not limited to: excavation associated with road, home, townhome, utility, and stormwater BMP construction, placement and storage of fill material may potentially impact unknown nesting sites or migration, residential proximity to known nesting locations, potential of increased predators (house cats, dogs, etc.), vehicle traffic (turtle signs will be installed along roadways), and management activities such as mowing, weed whipping, and herbicide application in the nesting and habitation location. Potential negative activities will be minimized using strategies discussed in Section 2 below. A Blanding's Turtle Identification Sheet (Appendix 5) has been prepared for use during all phases of the project.

Iowa Darter:

During construction activities there is a minimal potential for interaction with Iowa Darters, as they were not found during the June 2018 survey. Any potential interactions would be limited to the construction phased of road/trail crossings and culvert extension to connect the neighborhoods. To decrease the chance of a Darter encountering construction activities, active crossing areas will have small bladder

cofferdams (Appendix 6) installed upstream and downstream of the construction area. The cofferdams will be inspected to ensure that they remain intact throughout construction. Once the cofferdams are installed, the area will be seined to relocate all fish and aquatic organisms from the construction area. Fish will be relocated to the downstream non-construction side of the cofferdams. The cofferdams will be installed in order to construct grade crossings in the dry. Bypass pumping from upstream to downstream will take place in order to maintain flow. If pumping occurs within the dammed area the expelled water will first pass through a filter sock to an upland non-erodible area.

Project activities associated with the 2 year take (take only associated with the 2 year construction phase) of the Iowa Darter within the project limits of the Neighborhoods include, but is not limited to, having material dumped on a fish during construction and/or being crushed by a piece of machinery, fluctuations in hydrology during construction, migration blockages and habitat segmentation during construction, and potential harm during relocation if a Darter is found while seining within the construction limits. Long term activities are not expected to impact Iowa Darters and the stormwater BMPs, and native ecosystem re-establishment and rehabilitation aim to improve water quality and habitat for the Darter.

1D. Anticipated Adverse Impacts

Blanding's Turtle:

During construction, there are no anticipated impacts with a juvenile Blanding's turtle. There is a slight chance that an adult Blanding's turtle could wander into a construction area. This scenario is highly unlikely with the measures that will be implemented to prevent any Blanding's turtles from entering any construction area.

After construction is complete there is a long-term chance of an adult turtle being struck on local roads or by maintenance equipment (turtle crossing signs will be installed). A juvenile turtle could become in close proximity to predators including house pets like cats and dogs. However, turtle exclusion fencing will be installed along the property boundaries of the Wetland and Blanding's Turtle Mitigation areas (Figure 4, Appendix 3) In addition, predators such as raccoons and opossums may find more favorable conditions near residences, so the population of certain predators may increase. Native vegetation management in the turtle nesting area could adversely impact a nest or young, however management activities can be scheduled to avoid nesting periods.

There is some potential that an unknown nesting area could become located near a residential lot which may contain turf grass and landscaped ground cover. While urban landscapes are less desirable to Blanding's turtles, nesting and habitation in these areas have been documented. The installation of temporary exclusion silt fence around active construction sites and permanent exclusion fencing along the Wetland and Blanding's Turtle Mitigation areas will aim to deter turtles from nesting in urban landscapes. Areas impacted are generally limited to farm fields, so impacts for suitable foraging habitat are unlikely.

Based on discussion with the FPDKC, the project will not reduce the area of wetland or waterways which provide suitable habitat for the turtle. Exhibit 5, a Habitat Dispersal Corridor Map is provided in Appendix 3. This exhibit shows that the adjacent Forest Preserve property, the wetlands, buffers, BMP's along the

western portion of the project area, and the wetlands and agricultural fields north of the project area all have habitat connectivity.

Iowa Darter:

During construction activities there is a minimal potential for interaction with Iowa Darters, as they were not found during the June 2018 survey. Any potential interactions would be limited to the construction phased of road/trail crossings and culvert extension to connect the neighborhoods. To decrease the chance of a Darter encountering construction activities, active crossing areas will have small bladder cofferdams (Appendix 6) installed upstream and downstream of the construction area. Impacts to Iowa Darter habitat are restricted to the width and length of culverts being installed. Once installed, the culverts will allow for uninterrupted flow and allow for the movement of native substrate; thus, resulting in only short term impacts.

2. MEASURES TO MINIMIZE AND MITIGATE IMPACTS

2A. Plans to Minimize Affected Area

Blanding's Turtle:

Turtle exclusion details, including fencing along the property boundary of the Wetland and Blanding's Turtle Mitigation area are provided in Figure 4 (Appendix 3). Engineering Plans will be provided to the IDNR for review and approval concurrently with the submittal of plans to the Village of Gilbert. The remaining Neighborhoods are expected to be designed in 2019/2020 and constructed in 2019 through 2021, subject to the residential housing market. Given this construction timeframe and the five-year management and monitoring phase the period of incidental take would be seven years for the Neighborhoods with respect to the Blanding's turtle. Additional incidental take permits will be sought for other neighborhoods in the development if subsequent turtle surveys identify habitat.

Preventative measures and education will reduce any chance of incidental take. It is anticipated that there will be zero to two turtles taken during the project; however, the goal is zero incidental take through the duration of the project.

Iowa Darter:

During construction activities there is a limited potential for interaction with Iowa Darters only during construction of road/trail crossings and culvert extension to connect the neighborhoods. The potential impacts include having material dumped on a fish during construction and/or being crushed by a piece of machinery. To decrease the chance of a Darter encountering construction activity, active crossing areas will have small bladder cofferdams installed upstream and downstream of the construction area. The cofferdams will be inspected to ensure that they remain intact throughout construction. Once the cofferdams are installed, the area will be seined to relocate all fish and other aquatic organisms from the construction area. Fish will be relocated to the downstream non-construction side of the cofferdam. While the incidental take permit is for seven years for the Blanding's turtle to cover the two-year construction and 5 years of management and monitoring, the take for the Iowa Darter will be for 2 years as impacts will only occur during the two-year construction phase associated with road and trail crossings.

It is anticipated that 1-3 Iowa Darters will be taken during this time frame, with the goal of zero incidental take through the duration of the project.

2B. Management

Blanding's Turtle:

As provided in the Mitigation Plan Summary and Management & Monitoring Plan (MMP, Appendix 4) the existing nesting area will be restored with a low growing mesic prairie mix which was designed in coordination with the FPDKC. During the November 15, 2017 meeting with the FPDKC, it was conveyed that a short stature, moderate to low density native mesic prairie mix would likely be successful and will have appropriate performance standards. The low density prairie will be maintained in order to allow for ongoing and future nesting. Surrounding wetlands and buffers in the development will have the habitat rehabilitated to encourage usage by turtles increasing their suitable habitat.

Wetland buffers and BMP's will be managed to meet USACE vegetative performance standards (Appendix 4). Management practices will include chemical and mechanical weed control to reduce populations of non-native species and increase native species coverage and diversity. Generally, herbicide application will include backpack selective herbicide application. In the event of mowing or non-selective boom spraying, areas will be meander surveyed for the presence of turtles before machinery enters the project area.

Iowa Darter:

Potential impacts to Iowa darter's will be limited to the time it takes to install each culver/extension associated with the five road/trail crossings and culvert extension (approximately 1-2 weeks each). After the culverts/extensions are installed site hydrology will be restored and native substrate will be allowed to establish along the creek/tributary bottoms. In addition to restored hydrology, native vegetation will be established on both sides of the culverts/extensions as part of the overall site restoration plan (Appendix 3, Figure 4). Establishing native vegetation will improve soil stability along lotic systems, improve ground water percolation, and increase nutrient uptake resulting in overall water quality improvement and Darter habitat.

2C. Description of Measures to Avoid, Minimize, and Mitigate Effects

Blanding's Turtle:

Through extensive coordination with the USACE, IDNR, FPDKC and the Village of Gilberts, numerous changes have been made to avoid impacts to the Blanding's Turtle as follows. The potential value of each change is provided below. Overall, a conservative estimate of the total loss of income due to minimization and mitigation is currently \$2,800,000.00. As stated below, the current contract with NVR Ryan Homes for Neighborhood 2 was reduced from 299 units to 266 units and the lost value associated with that reduction has not yet been assessed.

- 19 lots which were originally slated for development near the know turtle nesting area were removed from the plans and established as the Turtle Mitigation Area to avoid impacts to the

Blanding's turtles nesting in that area. These lots had a value of \$100,000 per finished lot and a loss of \$10,000 per year in tax revenue to the Village of Gilberts.

- An additional 4 lots were originally removed along the Wetland Mitigation Area to increase the wetland buffer in this area. These lots had the same value as above.
- 51 single family lots (\$100,000 per lot) were subsequently replaced with 16 townhome buildings to further increase the wetland buffer along the Wetland Mitigation Area. This loss of value has not been quantified, but includes two years of delay due to master plan and engineering costs of approximately \$500,000, and reduced the current contract with NVR Ryan Homes for Neighborhood 2 from 299 units to 266 units.

Other items which provided conservation benefits to the species included the following:

- May 2019 Blanding's Turtle Survey, \$5,250.00
- Ongoing cooperation with the FPDKC regarding the telemetry surveying and monitoring being conducted within the Conservancy property, not quantifiable
- Construction of additional turtle habitat along the South Branch Kishwaukee River (identified as the W5 Pond in the May 2019 Survey), \$20,000.00
- 11.3 acre turtle mitigation area construction and monitoring and management (Figure 5A, Appendix 3), \$170,615.00.
- 8.01 acre wetland mitigation area construction and monitoring and management (Figure 5B, Appendix 3), \$198,052.00.

Proactive measures will be utilized to minimize the potential for any negative impacts to Blanding's turtles. During construction, a turtle exclusion fence (silt fence) will be installed around the perimeter of the active construction areas to reduce the chances of an encounter with a Blanding's turtle. The fence will be inspected from March to November to ensure that the fence is working properly and also to check for turtles in proximity to the fence and in active construction areas. Construction workers will be educated on the potential presence of Blanding's turtles, will be provided a turtle identification sheet, and will be informed of actions that should be taken if a Blanding's turtle is observed in the construction area. Any trenches will be backfilled daily and will also be inspected before backfill to check for the presence of turtles or other animals that may have fallen in the trench.

To reduce the chance a Blanding's turtle will get trapped in the street, turtle mountable curbs will be installed in areas that have a high chance of turtle movement. These areas will include all curbs near the Blanding's Turtle Mitigation Area and roadways near wetland or water crossings.

Post construction, a permanent fence will be installed between the Wetland and Blanding's Turtle Mitigation area to reduce the chance that a turtle will wander into a residential area (Appendix 3, Figure 4). Educational material identifying the presence of Blanding's turtles will not be distributed to the general public to limit poaching and habitat degradation by trespassers. In addition, turtle signs (not

identifying Blanding's) will be placed on roadways that have an increased chance of turtle crossing to reduce the chance of an incident. New homeowners will be informed of the potential presence of Blanding's turtles and best management practices to minimize an encounter with a Blanding's turtle. This information will include the life history, legal protections in place protecting the species, how to protect a nest, limit predator attraction in the vicinity of turtles, pet control, and cautious driving.

Ecologists working on the vegetation management in the turtle nesting area will be in contact with wildlife biologists from the Forest Preserve to determine if turtles are nesting in the area each year. If nesting is occurring, machinery should not be allowed in the area during May through October. Selective mowing and herbicide application will be conducted very cautiously. During the first two to three years of restoration, mowing typically occurs monthly from May to September. During these events, an ecologist will assess the area being mowed before the machinery enters the area. Herbicide application will follow the manufacturer's label. In aquatic areas, herbicides approved for aquatic use will be applied. Common chemicals include triclopyr and glyphosate that have specific formulations that are aquatic approved.

Iowa Darter:

Road/trail crossing and culvert extension construction over the Kishwaukee River tributaries will result in impacts associated to the Iowa Darter. In order to construct these crossings, bladder cofferdams will be constructed in order to work in the dry. Bypass pumping will be implemented in order to maintain downstream flow. If pumping is conducted between the check dams within the constructing area filter socks will be used and expelled to an upland non-erodible area. In case of flooding any equipment will be removed from the work area when active construction is not taking place and the cofferdams will be removed to reduce any upstream impacts. Once the up and downstream cofferdams are installed the area will be seined to relocate any Iowa Darters or other aquatic organisms to the downstream reach of the tributary. All areas associated with grade crossing construction will be stabilized with erosion control blanket and native seed as soon as grading is completed. Stabilizing the shore line with erosion control blanket and native seed as well as implementing prairie buffers and stormwater BMPs aims to increase water quality in the tributary and enhance the aquatic ecosystem for Iowa Darters and other aquatic organisms.

Over all site hydrology from the development of the Neighborhoods will not drastically change. In correspondence with the U.S. Fish and Wildlife Service (USFWS) and USACE total overall impervious area, excluding open water is equal to 15.7% of the total project area (Exhibit 6, Appendix 3). For a residential development this represents a very low-density percentage of impervious area; furthermore, since that correspondence, residential lots along the western extend of the project have been reduced, further reducing the overall impervious area. Most of the soils within the development are non-cohesive with higher than normal infiltration rates representative of hydrologic soil group B and consisting mainly of cropland pre-development. The proposed stormwater BMPs are designed to increase wetland habitat and promote infiltration resulting in a lower runoff curve post-development. The creation of the stormwater BMPs, and prairie and wetland re-establishment and rehabilitation will increase hemi-marsh habitat for Blanding's turtles and water quality improvements for Iowa Darters and other aquatic organisms.

In total the site development will result in the unavoidable impacts of 0.55 acres of wetland and 1.59 acres of wetland buffer. These impacts will be mitigated for through the re-establishment and rehabilitation of 63.16 acres of wetland, sedge meadow, prairie, and woodland habitat. This habitat creation and enhancement will provide long term benefits to Blanding's turtles and Iowa daters and far exceeds the 5.5:1 conservation ratio advised by IDNR.

2D. Long Term Monitoring

Blanding's Turtle:

Currently the FPDKC monitors the population of breeding Blanding's turtles in the Mitigation and surrounding areas. The developer's ecological consultant will work closely with the Forest Preserve to ensure that the incidental take potential is reduced as much as possible. A pre-construction Blanding's turtle survey was conducted in May 2019 by The Ecological Consulting Group (Appendix 5). The survey found no evidence indicating the presence of Blanding's turtles within the project boundaries.

Additional hoop trap and visual surveys will be conducted periodically in the 2nd and 5th year of the 5-year monitoring period. Surveys will take place in mid-March through July and will be consistent with the surveys previously conducted and provided in Appendixes 5 and 6). A letter report of the findings will be submitted to the IDNR each winter during the vegetation management period. Annual surveying will be funded by the developer. The surveys, along with input from the Forest Preserve, will help determine if management practices should be adjusted or are suitable to the Blanding's turtles needs. In addition, other wetland areas north of the project area will be surveyed to determine current usage by Blanding's turtles.

Iowa Darter:

Long term monitoring for the Iowa Darter will not take place beyond the construction phase of each culvert/extension as no work will take place within the creeks or tributaries that would result in the incidental take of this species. One post-construction survey for the Iowa Darter will be conducted. Long-term monitoring of fish species in the South Branch Kishwaukee River is an on-going effort by the Illinois Department of Natural Resources.

2E. Adaptive Management Practices

Blanding's Turtle:

The developer's ecological consultant will work closely with the FPDKC during construction and post construction to ensure that the Blanding's turtle risks are being minimized. Post construction, the Blanding's Turtle Mitigation Area will be monitored to ensure that the area is at the correct vegetative density to allow for successful Blanding's turtle reproduction. It will also be important to determine usage of natural areas throughout the development and adopt strategies to reduce the chance of negative encounters with a turtle.

If a Blanding's turtle is found by presence/absence trapping efforts by the consultant during the construction of the neighborhood, the turtle will be retained, and, upon consultation with and approval by IDNR and the FPDKC wildlife biologist, moved to a safer location. If not already a telemetered study

animal from FKM, it may be fitted with a transmitter and monitored by the FPDKC ecologist to ascertain future movements in relation to the project area. In the event of degradation of exclusion fencing, areas of failure will be replaced to prevent access to the construction area for Blanding's turtles. In the unlikely event that a turtle is found nesting in a parcel set for development, the nest will remain intact until the eggs have hatched and young have left the area. In addition, FPDKC will be notified and will assist in monitoring the nest.

Iowa Darter:

As impacts to the Iowa Darter will only take place during the construction of culverts/extensions adaptive management practices directly related to this species are not necessary; however, the areas surrounding the culverts are native BMPs which will be managed and monitored for five years. Areas not meeting the vegetative performance standards will be evaluated and management activities altered to meet the overall site goals and protection of endangered and threatened species habitat.

2F. Verification of Funding

The developer has adequate funds in order to carry out conservation plans, monitoring, management, and restoration as relates to the Blanding's turtle nesting area and other project natural areas. All of these activities will be required as a condition of the USACE Regional Permit for the project. Performance securities will also be required by the USACE and will be set up through the Village of Gilberts. In addition, the developer is currently setting aside funding for the establishment, management and monitoring with the homeowner association property manager.

3. ALTERNATIVE ACTIONS

The Conservancy residential development is a continuation of a Neumann Homes project that went into bankruptcy in 2007 and resulted in the default of approximately \$15 Million in municipal bonds. Based on this default, the "no-action" alternative is not feasible. The project was originally planned to construct critical water system improvements which were only partially completed by 2007. The original plan required the construction of a deep well or wells, a water treatment plant expansion, new water main to serve the project and the new school as well as a new elevated water storage plant. As a result of the Neumann bankruptcy, only the new water main and elevated water storage tank were constructed. Subsequently, the Village has been reaching critical water usage levels without the additional capacity which was to have been constructed over a decade ago. As such, the Village has approved a new Special Service Area municipal bond to be sold in order to complete the system improvements so that the municipality will have adequate water supply required for future growth in the community. The "no-action" alternative would negatively impact the economic and social growth of the Village of Gilberts by prolonging the development of much needed infrastructure to sustain a rapidly growing village.

Through extensive coordination with the USACE, IDNR, FPDKC and the Village of Gilberts, 19 lots which were originally slated for development were removed from the plans and established as a Blanding's Turtle Mitigation Area to avoid impacts to the Blanding's turtles nesting in that area. In addition to the preservation and enhancement of the 11.3 acre Blanding's Turtle Mitigation Area, the project also

involves the preservation of 64.7 acres of wetland, 50.13 acres of wetland buffer, and 29.69 acres of naturalized stormwater management areas.

In addition to the removal of 19 lots which are now part of the mitigation and overall site restoration plan an additional road crossing was eliminated from the original development plan. The elimination of this crossing will reduce the overall probability of incidental take of an Iowa Darter during construction. All of the crossing will be constructed in a manner that allows native substrate to establish along the bottom in order to eliminate habitat breaks within the lotic systems.

4. SPECIES VIABILITY

A survey for Blanding's Turtle was conducted in May 2019 (Appendix 5). The survey found no evidence indicating the presence of Blanding's turtles within The Conservancy site boundaries. Based on FPDKC tracking data, incidental take is unlikely during construction due to infrequent visits to the project area by Blanding's turtles. Long term, residential yards are not ideal habitat for Blanding's turtles, so they are more likely to move within the native vegetation of preserved natural areas as well as turtle exclusion fencing will limit migration into yards near the mitigation and enhancement areas. Tracking by the FPDKC shows that the majority of the Blanding's turtle activity occurs in the Freeman Kame Forest Preserve. Infrequently, several turtles have been tracked moving through the development area and one turtle has nested in the Blanding's Turtle Mitigation Area several times. The Chicago and Northwestern Railroad Company railroad line which separates the project area from Freeman Kame poses a major migration barrier. The railroad line is elevated with steep railroad ballast and there is only one culvert running under the railroad connecting Freeman Kame to the project area.

According to the Illinois Natural History Survey, Blanding's turtles occur most commonly north of the Illinois River ([http://www.inhs.illinois.edu/collections/herps/data/ilspecies/Blanding's turtles](http://www.inhs.illinois.edu/collections/herps/data/ilspecies/Blanding's%20turtles)). Long-term, this project will be increasing the vegetative quality of degraded sedge meadows, marshes, and mesic prairie giving the potential for more suitable habitat for Blanding's turtles. For these reasons, it is unlikely that species take will not occur nor reduce the likelihood of survival of Blanding's turtles in the State of Illinois.

Potential impacts to the Iowa Darter may only occur during the construction of the road/trail crossings and culvert extension. Care will be taken to make sure that no Iowa Darters are within the project area during construction. Isolation of the construction area from the rest of the river would allow for recolonization if incidental take would happen to occur. It is unlikely that species take will occur or that there will be an adverse effect on the local Iowa Darter population. Following construction, hydrology will be restored to the river and tributaries as well as the implementation of stormwater BMPs and re-establishment and rehabilitation of native vegetation will aim to enhance water quality and habitat for the Iowa Darter.

The project will not likely affect the survival of the Iowa Darters in the State of Illinois.

5. IMPLEMENTING AGREEMENT

In order to insure compliance with the conditions described in the Incidental Take Authorization for the Blanding's turtle and Iowa Darter for The Conservancy development, Gilberts Development, LLC, in conjunction with the Village of Gilberts and V3 Companies, the project's ecological consultant, agrees to implement the measures described in the Conservation Plan, and will continue coordination with the FPDKC on the protection of the Blanding's turtle. Annual monitoring reports will be provided to the IDNR. The project will comply with all federal (USACE), State, and Village of Gilberts permits and requirements. The project does not involve the consultation with the USFWS or any federal taking. Compliance with IDNR and USACE requirements will be documented in annual monitoring reports during project construction and a five-year monitoring period for each phase of the neighborhoods, which is shown on the Mitigation, Wetland Buffer and BMP Planting Plan in Appendix 3. The schedules for the Neighborhoods include the following:

Turtle Habitat Restoration

- May 2019 Turtle Survey Conducted
- Summer/Fall, 2019 Pre-seeding Weed Control
- Fall/Winter Dormant Seeding

Pre-Construction (on-going until each project phase is complete)

- Final Engineering Design (Fall/Winter 2019). Incorporate all turtle exclusion and Iowa Darter protection measures into engineering plans. A summary of all measures will be provided to the Village of Gilberts and IDNR.
- Coordinate exact construction schedule with the Village of Gilberts and the FPDKC for all project phases and install silt fences and other protective measures, and ensure that all construction staff are trained in the identification of Blanding's turtles and Iowa Darters.

During Neighborhood 2 Construction 2019/2020 (On-going until project is complete)

- Continuously monitor the construction zone for the presence of Blanding's turtles, report any Blanding's turtles to the Village of Gilberts and FPDKC staff, and maintain controls and the repair or replacement of silt fences or other protective measures as required.
- Institute road/trail crossing construction measures to minimize Iowa Darter take. Notify the IDNR of any sightings. During construction implement all maintenance, repairs or replacement of protective measures. Notify

Post Construction (2020-2025)

- Conduct ongoing monitoring in conjunction with the Village of Gilberts and the FPDKC.

- Comply with all USACE Section 404 permit requirements, including all mitigation monitoring, management and annual reporting.

The participants hereby certify that they have the legal authority to carry out their respective obligations and responsibilities under the Conservation Plan.

Gilberts Development, LLC

Signature: _____ 

Printed Name: Mr. Troy Mertz

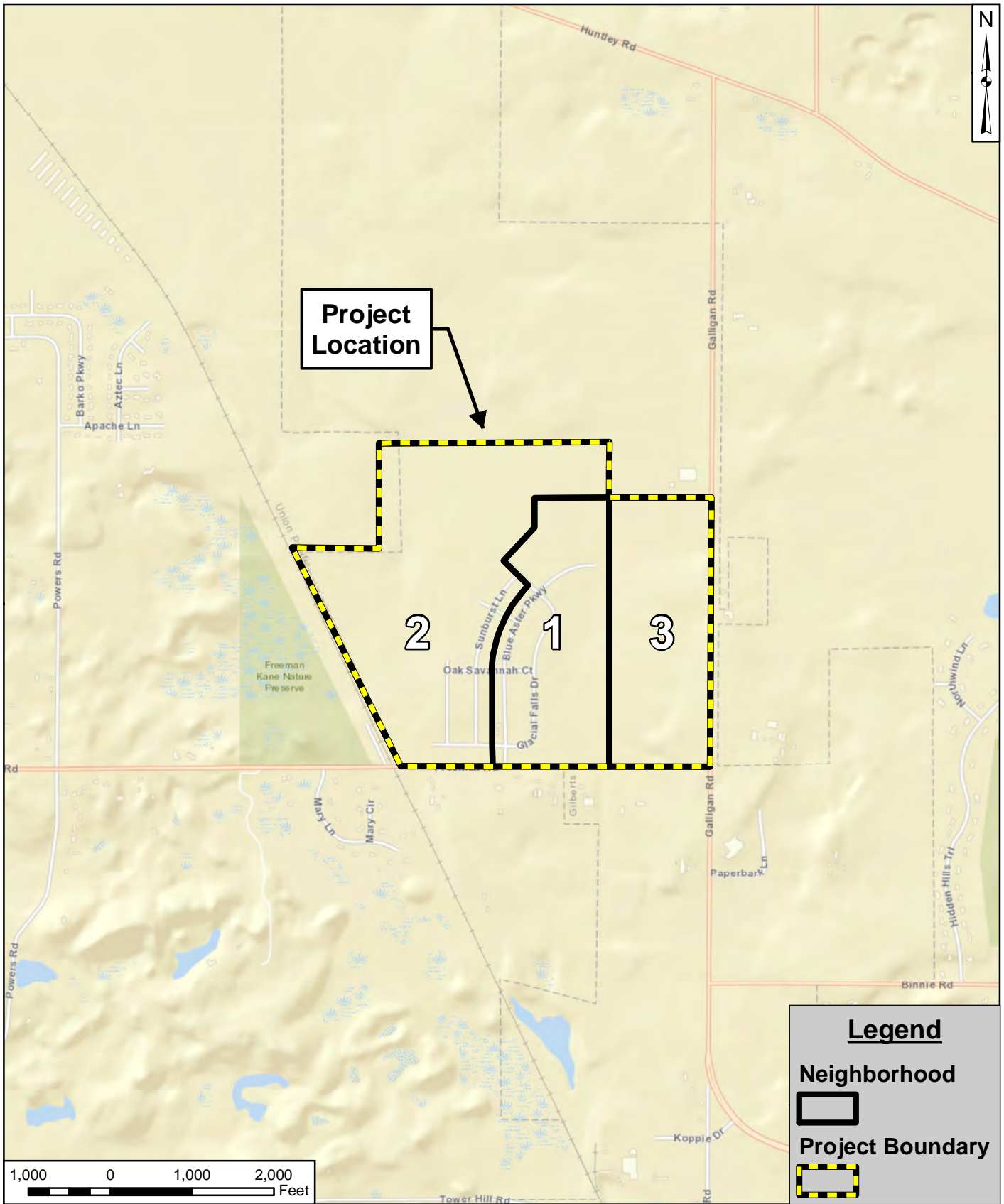
Printed Title: Owner


Date: June 25, 2019

PLEASE SUBMIT TO: Incidental Take Authorization Coordinator, Illinois Department of Natural Resources, Division of Natural Heritage, One Natural Resources Way, Springfield, IL 62702 OR DNR.ITAcoordinator@illinois.gov

APPENDIX 1

PROJECT LOCATION MAP



 <p>V3 Companies, Ltd. 7325 Janes Avenue Woodridge, Illinois 60517 630.724.9200 phone 630.724.9202 fax www.v3co.com</p>	<p>PROJECT NO.: 15074</p>	<p>CLIENT: Gilberts Development LLC 340 W. Butterfield Rd., Unit 2D Elmhurst, Illinois 60126</p>	<p>TITLE: PROJECT LOCATION MAP</p>	
	<p>CREATED BY: AMM</p>	<p>DATE: 08/07/19</p>	<p>BASE LAYER: ESRI World Street Map</p>	<p>SITE:</p>
<p>Visio, Vertere, Virtute... "The Vision To Transform with Excellence"</p>	<p>SCALE: See Scale Bar</p>	<p>The Conservancy Gilberts, Kane County, Illinois</p>		

APPENDIX 2

IDNR CORRESPONDENCE

Applicant: Troy Mertz
Contact: Alicia Metzger
Address: 340 W. Butterfield Road
Unit 2D
Elmhurst, IL 60126

IDNR Project Number: 1709063
Date: 04/05/2017
Alternate Number: 15074, 1600888

Project: The Conservancy
Address: Blue Aster Parkway, Gilberts

Description: The project proposes to develop the site as a residential subdivision.

Natural Resource Review Results

Consultation for Endangered Species Protection and Natural Areas Preservation (Part 1075)

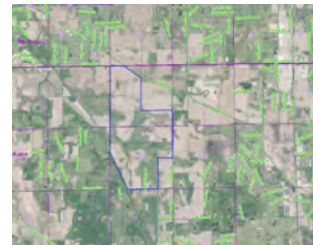
The Illinois Natural Heritage Database shows the following protected resources may be in the vicinity of the project location:

- Freeman Kame INAI Site
- Powers Road Fen INAI Site
- Freeman Kame Nature Preserve
- Freeman Rd & Powers Rd Fen & Woods Natural Heritage Landmark
- American Brooklime (*Veronica americana*)
- Blanding's Turtle (*Emydoidea blandingii*)
- Buckbean (*Menyanthes trifoliata*)
- Marsh Speedwell (*Veronica scutellata*)

An IDNR staff member will evaluate this information and contact you to request additional information or to terminate consultation if adverse effects are unlikely.

Location

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



<i>County:</i> Kane	<i>County:</i> McHenry
<i>Township, Range, Section:</i>	<i>Township, Range, Section:</i>
42N, 7E, 2	, ,
42N, 7E, 3	, ,
42N, 7E, 11	, ,
, ,	43N, 7E, 34
, ,	43N, 7E, 35

IL Department of Natural Resources
Contact
Natalia Jones
217-785-5500
Division of Ecosystems & Environment

Government Jurisdiction
Village of Gilberts
Mr. William Beith
87 Galligan Road
Gilberts, Illinois 60136

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.



EcoCAT Receipt **Project Code** 1709063

APPLICANT	DATE
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Troy Mertz
Thomas Slowinski
7325 Janes Avenue
Unit 2D
Woodridge, IL 60517

4/5/2017

DESCRIPTION	FEE	CONVENIENCE FEE	TOTAL PAID
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EcoCAT Consultation	\$ 500.00	\$ 11.75	\$ 511.75
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TOTAL PAID \$ 511.75

Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702
217-785-5500
dnr.ecocat@illinois.gov



Illinois Department of Natural Resources

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

Bruce Rauner, Governor

Wayne A. Rosenthal, Director

April 06, 2017

Alicia Metzger
Troy Mertz
340 W. Butterfield Road
Unit 2D
Elmhurst, IL 60126

RE: The Conservancy
Project Number(s): 1709063 [15074, 1600888]
County: Kane, McHenry

Dear Mrs. Metzger:

This letter concerns the Endangered Species Consultation for the project noted above, located in Kane County, Township 42 North, Range 7 East, Sections 2, 3, 11, 14. This project was submitted for consultation in accordance with the Illinois Endangered Species Protection Act [520 ILCS 10/11], the Illinois Natural Areas Preservation Act [525 ILCS 30/17], and Title 17 Illinois Administrative Code Part 1075.

The project consists of construction of a residential conservation subdivision.

The Department has completed its review of the project and determined that, with the exceptions below, the resources identified by EcoCAT in the vicinity are unlikely to be affected.

The state-endangered **Blanding's Turtle** (*Emydoidea blandingii*). These turtles hibernate in wetlands and emerge in March and April, depending on the temperature. Females start basking in April and hatchlings can still be active and traveling back to wetlands until October. They may travel up to one mile in their search for upland nesting habitat, nesting usually occurs in June. Records for this species exist within the boundaries of the proposed project area. It is likely that the species inhabits all wetlands located within the project area. To minimize adverse impact to this species, the Department recommends:

- Preserve the existing nesting habitat by allocating/shifting two (2) proposed neighborhoods on the south-west side of the parcel, along a railroad directly adjacent to the Freeman Kane Nature Preserve;
- The project activities are likely to result in a take of this species, which is a violation of the Illinois Endangered Species Protection Act. "Take" means, in reference to animals and animal products, to harm, hunt, shoot, pursue, lure, wound, kill, destroy, harass, gig, spear, ensnare, trap, capture, collect, or to attempt to engage in such a conduct. Because of the likelihood of a take, the Department recommends the developer consider applying for Incidental Take Authorization (ITA) for the Blanding's Turtle in accordance with 17

Ill Adm. Code Part 1080. Communication concerning the ITA application should be directed to Jenny Skufca, Office of Resource Conservation, 217-557-8243 or Jenny.Skufca@illinois.gov.

In addition, to minimize adverse effects to the species the Department recommends the following measures be incorporated into the project:

- Educate personnel working on site about the species. Post photos of juvenile and adult turtles at a central location;
- Install exclusionary silt fence around work areas by the end of March and maintain it through October (if needed) to prevent turtles from entering the construction area;
- Conduct daily inspections during construction to ensure that exclusionary fencing is properly installed (dug into the ground) and to check if turtles are present;
- Trenches should be covered at the end of each work day. Before starting each work day, trenches and excavations should be routinely inspected to ensure no turtles (or other reptiles) have become trapped within them;
- If Blanding's Turtles are encountered, crews should stop work immediately and contact IDNR at 630-553-13-72 or 217-557-0483;
- Mountable curbs in residential areas should be incorporated to the project plans to prevent turtles being trapped in streets;
- Exclusionary 6" curbing around entire parking lot areas (commercial areas, apartment complexes) should be incorporated into project plans to prevent turtles from entering lots and being hit or crushed by vehicles;
- Turtle crossing signs should be placed along roads/bike trails, in the areas most likely to be used by the species, from March to October, to minimize road mortality. Please, seek an opinion of qualified biologists to identify such areas;
- Educate homeowners of the species' presence, its life history, and action plan if the species is encountered. This responsibility should be passed along to the administrative organization in charge of the subdivision.

The federally- and state-endangered **Rusty Patched Bumble Bee** (*Bombus affinis*) is known to occur within four (4) miles of the proposed project area. This species prefers grasslands and tallgrass prairies; and nests underground (undisturbed soil) or in clumps of grasses. The species lives in colonies and has an annual life cycle. Queens hibernate overwinter, emerge in spring, feed on pollen and nectar from flowering plants, and lay eggs, thus starting a new colony. New queens and males hatch in late summer, disperse, and mate. The entire colony, except new queens, dies in fall. To minimize potential impact to this species, the Department recommends:

- Conduct a biological survey to determine if the species is present within the project area. Please refer to U.S. Fish & Wildlife Service for a guidance on survey protocols <https://www.fws.gov/midwest/endangered/insects/rpbb/guidance.html>. The results of the survey should be forwarded to the Department. Please note, any survey activity that will actually capture or handle endangered or threatened species requires personnel doing so to hold Scientific Collection Permits under Part 520 and Part 1070 of the Department's Rules;
- If the species is present, the consultation for the project should be reinitiated.

The Freeman Kane Nature Preserve. Nature preserves are protected by law and no adverse impact is allowed, including no changes to current hydrology without approval from the Illinois Nature Preserve Commission (INPC). While working in the vicinity of the nature preserve you must:

- Power-wash/completely clean all equipment off-site to reduce the chance of introducing invasive species into the preserve. Please contact Steve Byers, with the Illinois Nature Preserve Commission, if more detailed discussion is needed regarding this precaution;
- Locate all equipment/staging areas away from the Nature Preserve boundaries;
- Seed only native vegetation in landscape designs of parks, wetlands, and other green areas within the project property.

Consultation under 17 Ill. Adm. Code Part 1075 is completed. In accordance with 17 Ill. Adm. Code 1075.40(h), please notify the Department of your decision regarding these recommendations.

This consultation is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database at the time of the project submittal, 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, you must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Sincerely,

Natalia Jones
Impact Assessment Section
217-785-5500
natalia.jones@illinois.gov

cc: Ben Haberthur, Forest Preserve District of Kane County
Dan Kirk, Natural Heritage Biologist, IDNR
Jenny Skufca, Incidental Take Authorization Coordinator, IDNR
John Swedberg, Village of Gilberts
Kimberly Kubiak, U.S. Army Corps of Engineers
Steve Byers, Illinois Nature Preserve Commission, IDNR
Valerie Njapa, Natural Areas Defense Specialist, IDNR



Illinois Department of Natural Resources

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

Bruce Rauner, Governor

Wayne A. Rosenthal, Director

June 30, 2017

Alicia Metzger
Troy Mertz
340 W. Butterfield Road
Unit 2D
Elmhurst, IL 60126

RE: The Conservancy
Project Number(s): 1709063 [15074, 1600888]
County: Kane, McHenry

Dear Mrs. Metzger:

This letter concerns the Endangered Species Consultation for the project noted above, located in Kane County, Township 42 North, Range 7 East, Sections 2, 3, 11, 14. This project was submitted for consultation in accordance with the Illinois Endangered Species Protection Act [520 ILCS 10/11], the Illinois Natural Areas Preservation Act [525 ILCS 30/17], and Title 17 Illinois Administrative Code Part 1075.

The project consists of construction of a residential subdivision.

In accordance with 17 Ill. Adm. Code 1075.50 (d) the Department has reopened the consultation for this project due to significant modifications to the original project plans and the recent discovery of the threatened Iowa Darter within the project area.

Blanding's Turtle, *Emydoidea blandingii*.

The development plans received by the Department on June 1 indicate the relocation of a significant portion of the housing units in the neighborhood 2B-3 away from the known Blanding's Turtle nesting site. The Department concurs with this plan modification and additionally recommends installation of a permanent fence between the nesting site and all housing lots directly adjacent to this site, preventing turtles from entering the developing area and being taken by pets or mowers.

However, the proposed changes in neighborhood 2B-2 are not sufficient in protecting the endangered turtle. The houses on the West side of the road in neighborhood 2 are directly adjacent to the wetland that connects to the NP wetland and most likely is used by the turtles. Our records indicate that during the second meeting on May 1, the possibility of relocating the houses on the West side of the road was discussed and agreed. To protect the species habitat, the Department recommends shifting/relocating housing units 2B-12 through 2B-24.

In addition to current and previous recommendations, the Department recommends:

- Every wetland within the project area should be surveyed prior to any disturbance;
- The species survey must target adult and juvenile individuals. The juvenile Blanding's turtles are weak swimmers and mostly stay in shallow water where they can be captured using various traps. The Department has no preference of the trapping equipment. However, it is known that Promar Collapsible Live Bait Traps model TR 503 works sufficiently. All traps should have protection from the predators. If more information needed on this topic, please contact the Department at 217-557-0483;
- If the species are found, maintenance of a travel corridor between the wetlands is essential to protect the species' migration;
- Create a long-term conservation plan for all green/open/park/wild areas within the project area to provide for long term species habitat protection;
- Inform the Department if a golf course is planned to be built within the parcel, as management treatment can adversely affect the water quality and the listed species. Further recommendations regarding this construction will be made;
- All Blanding Turtles mortalities, if any, should be reported immediately to the Conservation Police Officer at 630-319-3882 or Keith.Siedsma@illinois.gov. This information must be included in educational materials provided to the homeowners;
- Speed bumps should be installed in the areas that are likely to be used by the turtles. Please seek a professional opinion in identifying such areas;
- The previous recommendation of applying for the ITA for the Blanding's turtle remains in effect;
- Submit all future development plans of this parcel for review when available.

Iowa Darter, *Etheostoma exile*:

On July 7, the Department conducted a fish survey that documented the presence of the state-threatened Iowa Darter within the project area. The project activities are likely to result in a take of this species, which is a violation of the Illinois Endangered Species Protection Act. "Take" means, in reference to animals and animal products, to harm, hunt, shoot, pursue, lure, wound, kill, destroy, harass, gig, spear, ensnare, trap, capture, collect, or to attempt to engage in such a conduct. Because of the likelihood of a take, the Department recommends the developer consider applying for Incidental Take Authorization (ITA) for the Iowa Darter in accordance with 17 Ill. Adm. Code Part 1080. Communication concerning the ITA application should be directed to Jenny Skufca, Office of Resource Conservation, 217-557-8243 or jenny.Skufca@illinois.gov.

Consultation under 17 Ill. Adm. Code Part 1075 is completed. In accordance with 17 Ill. Adm. Code 1075.40(h), please notify the Department of your decision regarding these recommendations.

This consultation is valid for two years unless new information becomes available that was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database at the time of the project submittal, 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, you must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Sincerely,

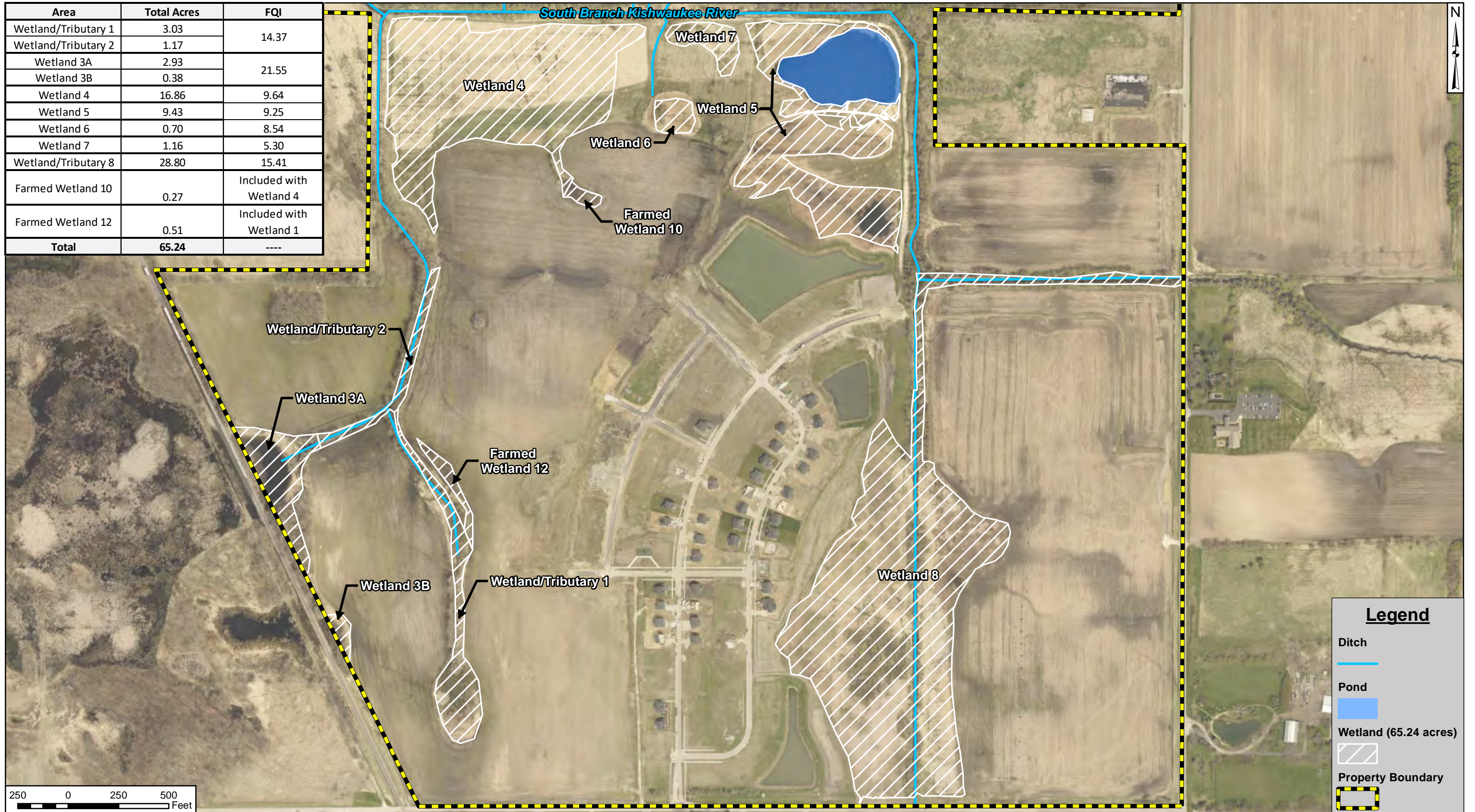
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John Swedberg, Village of Gilberts
Kimberly Kubiak, U.S. Army Corps of Engineers
Steve Byers, Illinois Nature Preserve Commission, IDNR
Valerie Njapa, Natural Areas Defense Specialist, IDNR
Keith Siedsma, Law Enforcement, IDNR

APPENDIX 3

PROJECT EXHIBITS

Area	Total Acres	FQI
Wetland/Tributary 1	3.03	14.37
Wetland/Tributary 2	1.17	
Wetland 3A	2.93	21.55
Wetland 3B	0.38	
Wetland 4	16.86	9.64
Wetland 5	9.43	9.25
Wetland 6	0.70	8.54
Wetland 7	1.16	5.30
Wetland/Tributary 8	28.80	15.41
Farmed Wetland 10	0.27	Included with Wetland 4
Farmed Wetland 12	0.51	Included with Wetland 1
Total	65.24	----




V3 Companies
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"The Vision To Transform With Excellence"

PROJECT NO.:	15074
CREATED BY:	AMM
DATE:	08/14/17
SCALE:	See Scale Bar

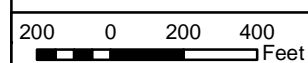
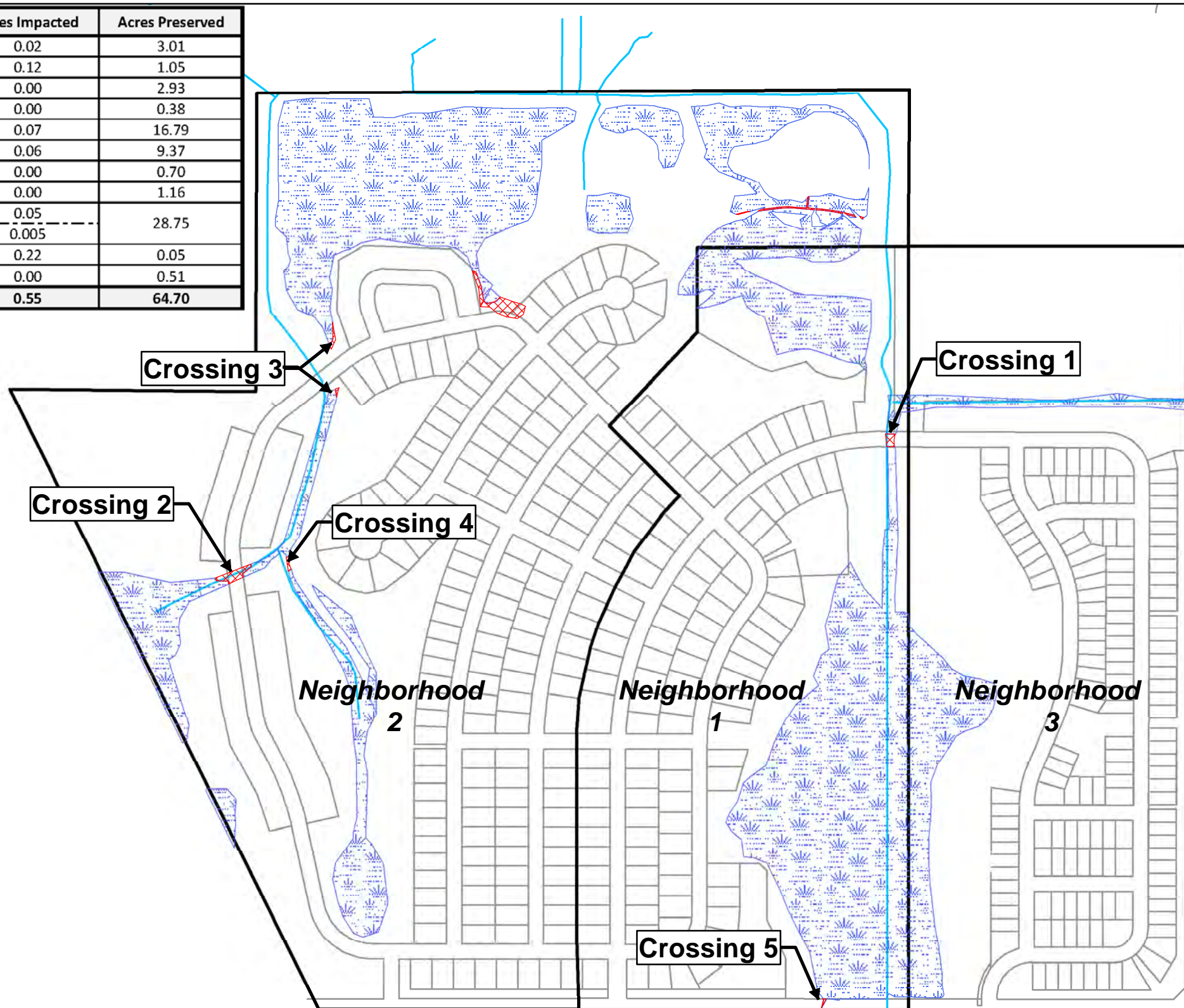
CLIENT:	Village of Gilberts 87 Galligan Road Gilberts, Illinois 60136
BASE LAYER:	Kane County Orthoimagery (2016)

SITE:
**The Conservancy
Gilberts, Illinois**


TITLE:
EXISTING WETLANDS AND WATERS OF THE U.S.

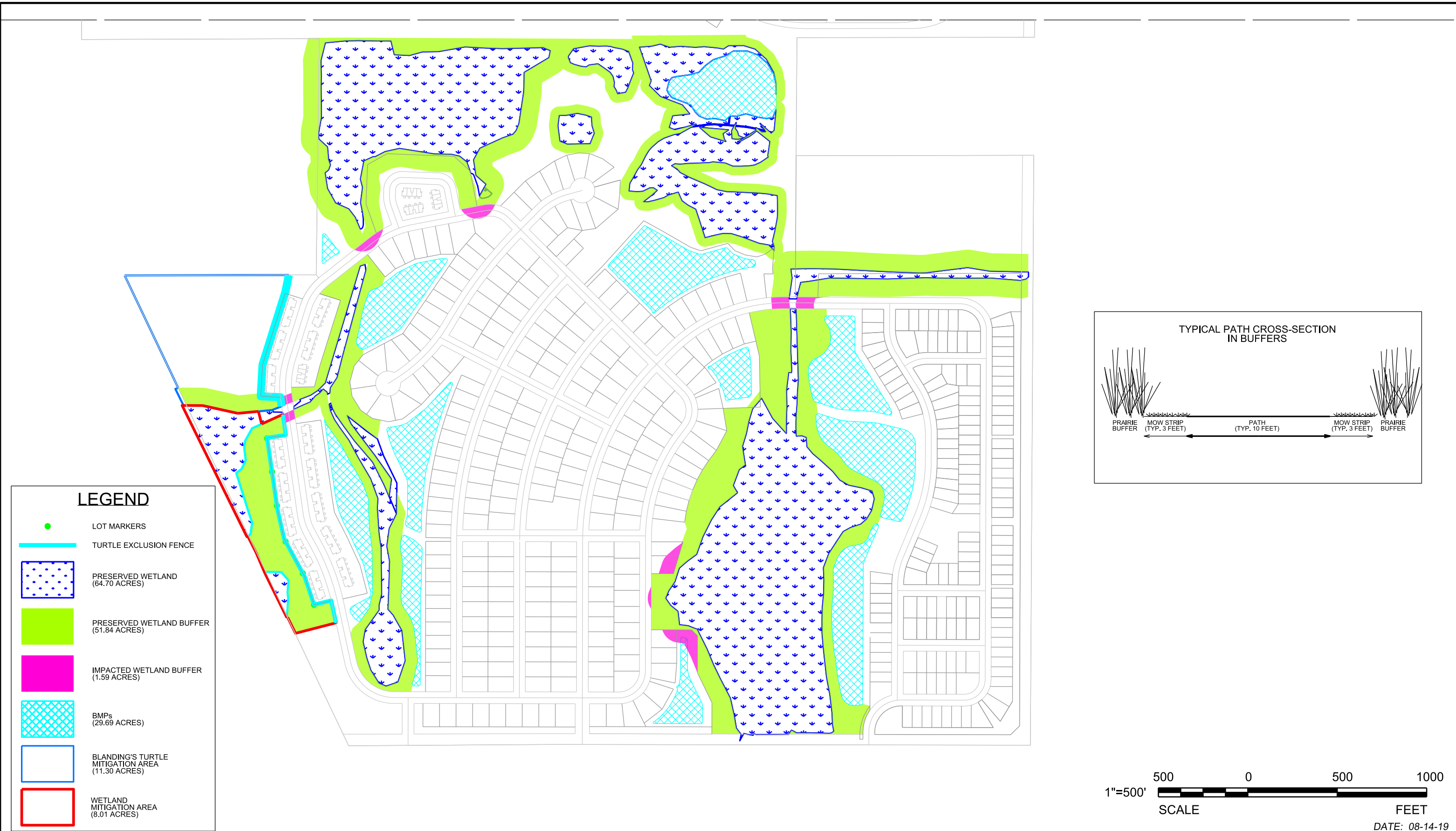
FIGURE:
1

Area	Total Acres	Acres Impacted	Acres Preserved
Wetland/Tributary 1	3.03	0.02	3.01
Wetland/Tributary 2	1.17	0.12	1.05
Wetland 3A	2.93	0.00	2.93
Wetland 3B	0.38	0.00	0.38
Wetland 4	16.86	0.07	16.79
Wetland 5	9.43	0.06	9.37
Wetland 6	0.70	0.00	0.70
Wetland 7	1.16	0.00	1.16
Wetland/Tributary 8 (Road Crossing)	28.80	0.05	28.75
Wetland/Tributary 8 (Freeman Road)		0.005	
Farmed Wetland 10	0.27	0.22	0.05
Farmed Wetland 12	0.51	0.00	0.51
Total	65.24	0.55	64.70



Legend	
Ditch	
Wetland Impacts (0.55 acres)	
Preserved Wetland (64.70 acres)	
Neighborhood Boundary	

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	CREATED BY: AMM	BASE LAYER: Manhard Consulting Base Land Plan (2019)			
	DATE: 08/14/2019				
	SCALE: See Scale Bar				



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












FIGURE 3:
MITIGATION, WETLAND BUFFER
AND BMP PLAN

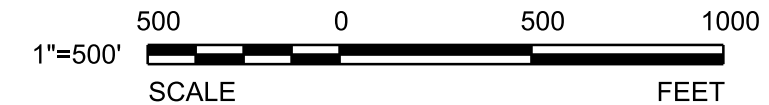


SCALE: 1"= 500'



LEGEND

 BASIN WET SWALE PLUG MIX (3.26 ACRES)	 TURTLE EXCLUSION FENCE	 WETLAND MITIGATION AREA (8.01 ACRES)
 BASIN SEED AND PLUG MIX (16.22 ACRES)	 BLANDING'S TURTLE MITIGATION AREA (11.30 ACRES)	 PRAIRIE SEED MIX (4.70 ACRES)
 PRAIRIE SEED MIX (24.40 ACRES)	 PRAIRIE SEED MIX (1.24 ACRES)	 WETLAND ENHANCEMENT (3.31 ACRES)
 EXISTING VEGETATED BUFFER (38.04 ACRES)	 PRAIRIE SEED MIX BUFFER (8.63 ACRES)	
 PRESERVED WETLAND (64.70 ACRES)	 WOODLAND ENHANCEMENT (1.43 ACRES)	



DATE: 03-21-19



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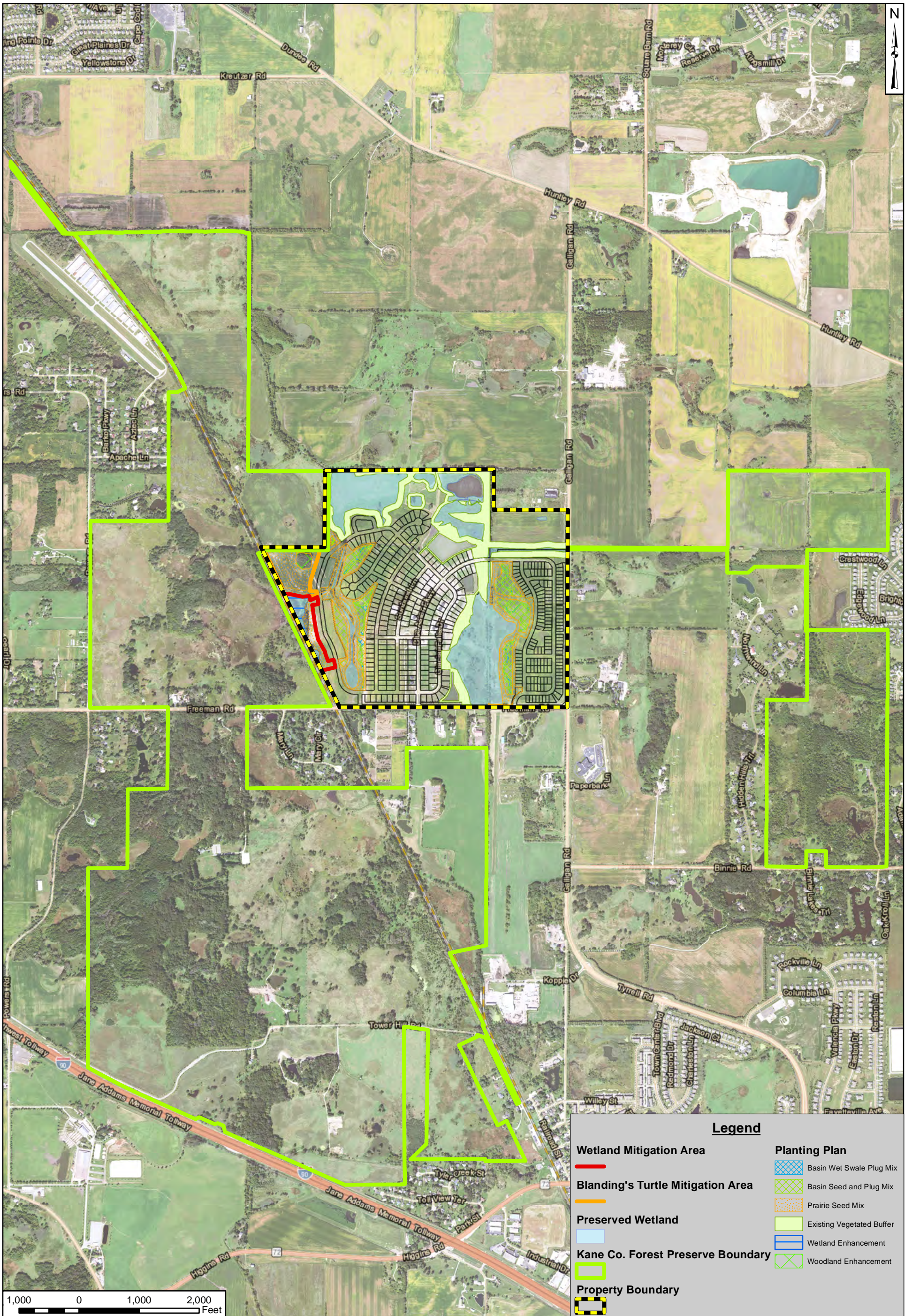
ILLINOIS

**FIGURE 4:
MITIGATION, WETLAND BUFFER AND
BMP PLANTING PLAN**



SCALE: 1"= 500'

GILBERTS



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PROJECT NO.: 15074
 CREATED BY: AMM
 DATE: 05/15/19
 SCALE: See Scale Bar

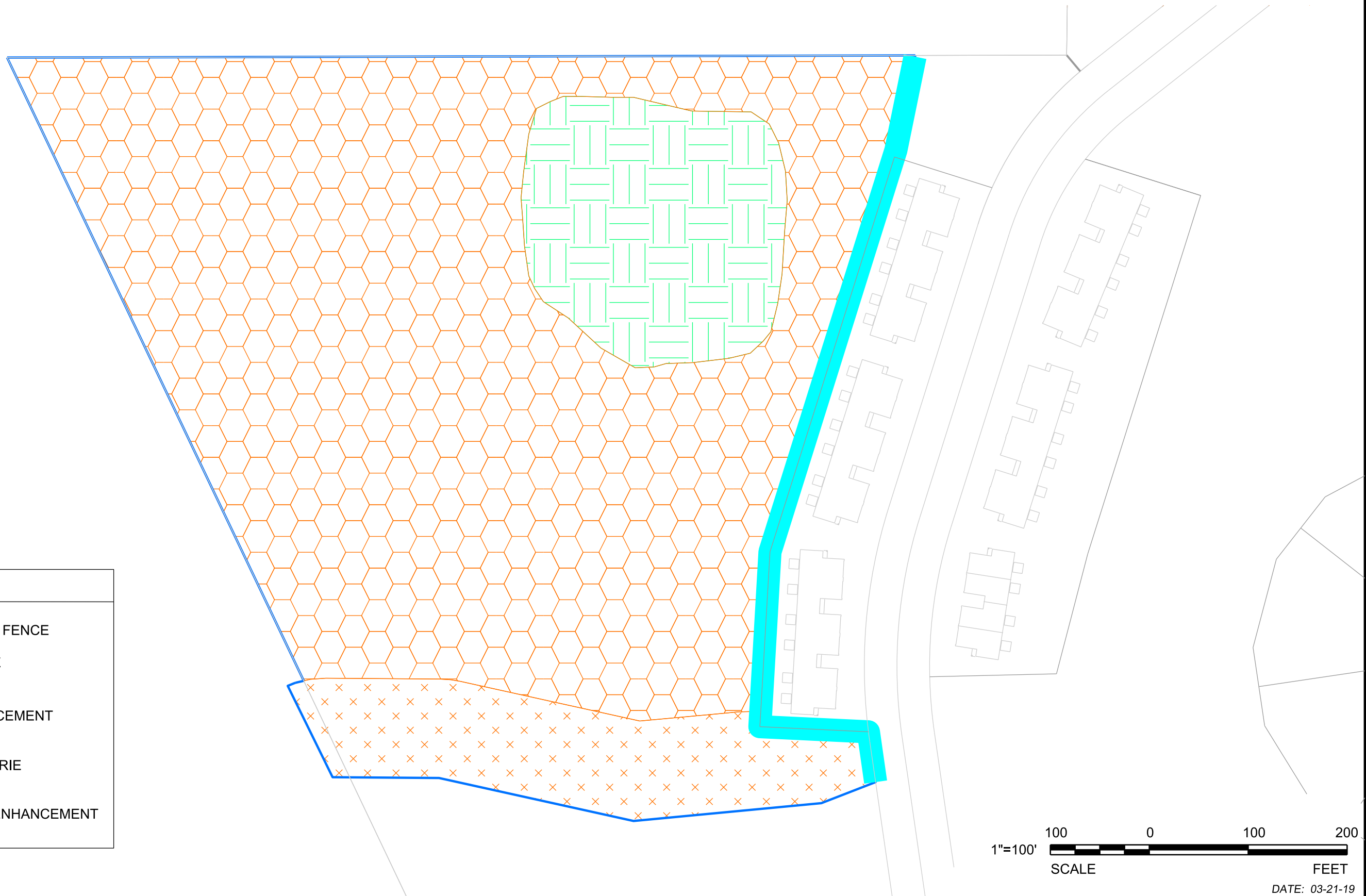
CLIENT: Gilberts Development LLC
 340 W. Butterfield Road, Unit 2D
 Elmhurst, Illinois 60126






BASE LAYER: Kane County Aerial Imagery (2018)

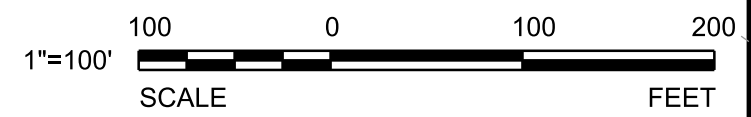
TITLE: **HABITAT DISPERSAL CORRIDOR MAP**

SITE: The Conservancy
 Gilberts, Illinois

FIGURE: **5**



LEGEND	
	TURTLE EXCLUSION FENCE
	BLANDING'S TURTLE MITIGATION AREA (11.30 ACRES)
	WOODLAND ENHANCEMENT (1.43 ACRES)
	SHORT-GRASS PRAIRIE (8.63 ACRES)
	WETLAND BUFFER ENHANCEMENT (1.24 ACRES)



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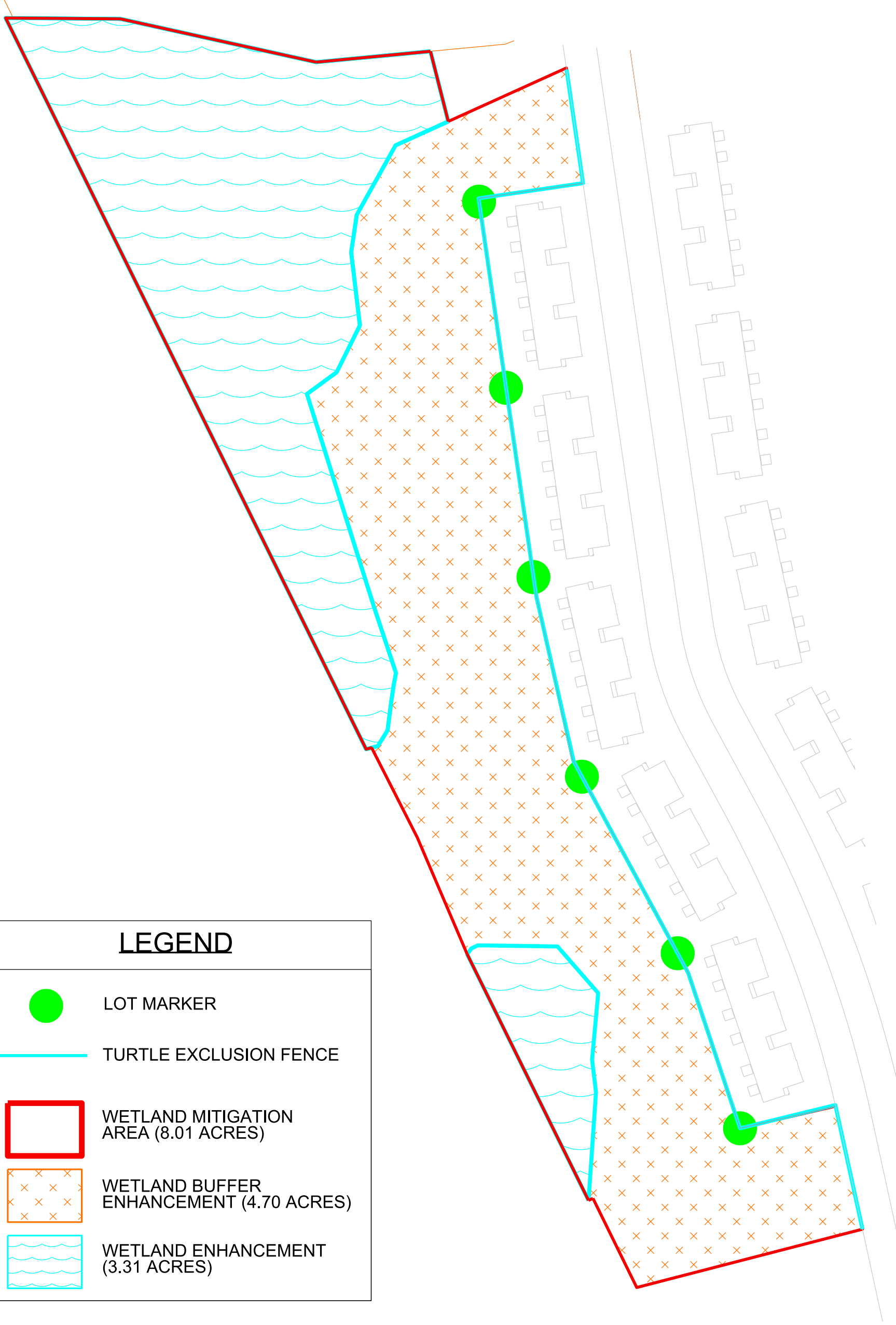
ILLINOIS




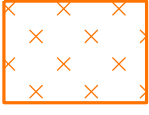
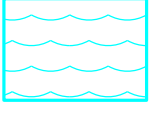
**FIGURE 5A:
NORTH MITIGATION PLAN**

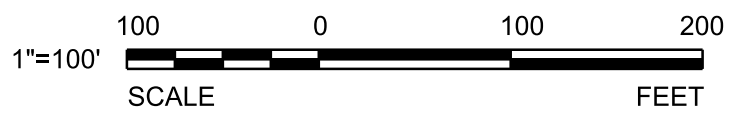


SCALE: 1"= 100'

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LEGEND	
	LOT MARKER
	TURTLE EXCLUSION FENCE
	WETLAND MITIGATION AREA (8.01 ACRES)
	WETLAND BUFFER ENHANCEMENT (4.70 ACRES)
	WETLAND ENHANCEMENT (3.31 ACRES)




DATE: 03-21-19



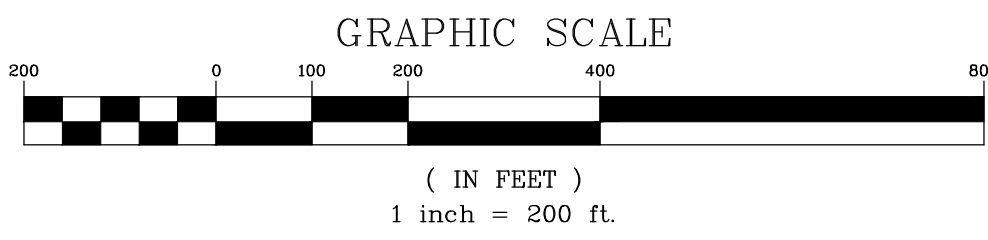
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**FIGURE 5B:
 SOUTH MITIGATION PLAN**



SCALE: 1"= 100'



IMPERVIOUS AREA						
	NH 1	NH 2A	NH 2B	NH 3A	NH 3B	TOTAL
TOTAL AREA	103.95 Ac	35.00 Ac	161.69 Ac	12.54 Ac	46.62 Ac	359.80 Ac
TOTAL IMPERVIOUS	16.27 Ac	9.75 Ac	14.93 Ac	5.61 Ac	13.77 Ac	70.51 Ac
PAVEMENT	5.39 Ac	3.29 Ac	4.09 Ac	1.36 Ac	3.68 Ac	17.81 Ac
SIDEWALK	1.87 Ac	1.12 Ac	1.39 Ac	0.47 Ac	1.38 Ac	6.23 Ac
LOTS (DRIVEWAYS INCLUDED)	9.01 Ac	4.81 Ac	7.62 Ac	3.08 Ac	7.84 Ac	32.36 Ac
OPEN WATER	6.33 Ac	0.53 Ac	5.68 Ac	0.70 Ac	0.87 Ac	14.11 Ac

LEGEND

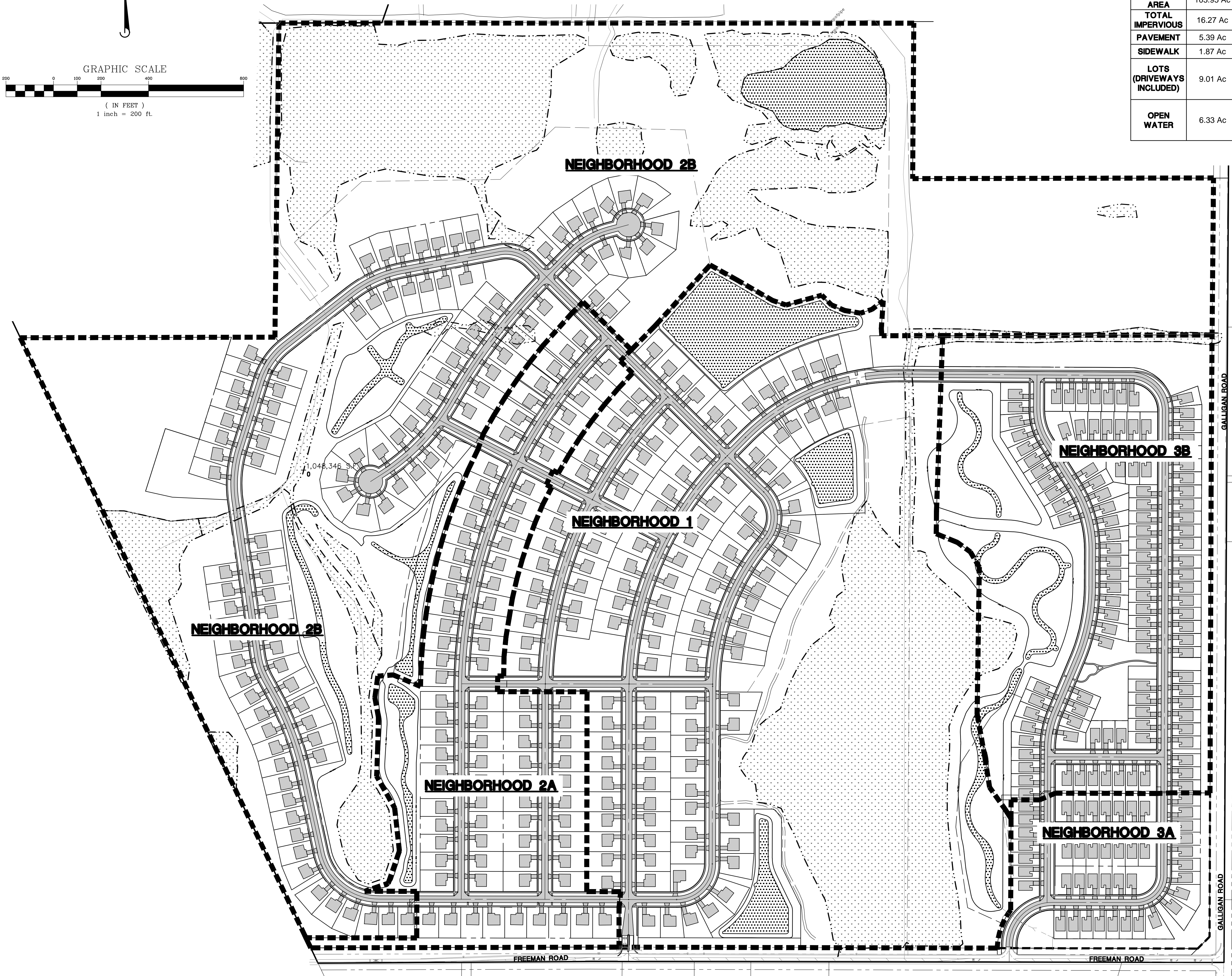
- NEIGHBORHOOD BOUNDARY
- IMPERVIOUS AREA
- WETLAND AREA
- OPEN WATER AREA

IMPERVIOUS COVERAGE SUMMARY

TOTAL IMPERVIOUS COVERAGE

$$= \frac{\text{TOTAL IMPERVIOUS AREA}}{\text{TOTAL AREA}} \times 100 = \frac{70.51}{359.80} \times 100 = 19.6\%$$

TOTAL IMPERVIOUS COVERAGE EXCLUDING OPEN WATER

$$= \frac{\text{TOTAL IMPERVIOUS AREA (EXCLUDING OPEN WATER)}}{\text{TOTAL AREA}} \times 100 = \frac{56.40}{359.80} \times 100 = 15.7\%$$


DRAWN BY: _____
 CHECKED BY: _____
 DATE: _____
 REVISIONS: _____
 DATE: _____

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THE CONSERVANCY - NEIGHBORHOODS 1 - 3
 VILLAGE OF GILBERTS, ILLINOIS
 IMPERVIOUS AREA EXHIBIT

PROJ. MGR.: JHM
 PROJ. ASSOC.: QDH
 DRAWN BY: JBK
 DATE: 04/27/18
 SCALE: 1"=200'
 SHEET
1 OF **1**
 GDLGIL01

APPENDIX 4

MITIGATION, BMP AND WETLAND BUFFER PLAN SUMMARY

AND

MANAGEMENT & MONITORING PLAN



**MITIGATION, BMP AND WETLAND
BUFFER PLAN SUMMARY AND
MANAGEMENT & MONITORING PLAN**

PROJECT:

THE CONSERVANCY
GILBERTS, KANE COUNTY, ILLINOIS

PREPARED FOR:

GILBERTS DEVELOPMENT LLC
340 W. BUTTERFIELD, ROAD
ELMHURST, ILLINOIS 60126

PREPARED BY:

V3 COMPANIES OF ILLINOIS, LTD
7325 JANES AVENUE
WOODRIDGE, ILLINOIS 60517

FOR PRESENTATION TO:

U.S. ARMY CORPS OF ENGINEERS

DECEMBER 14, 2016
REVISED JULY 6, 2017
REVISED MAY 3, 2018
REVISED JUNE 21, 2019

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APPENDICES

APPENDIX I	Mitigation, Wetland Buffer and BMP Plan, Planting Plan & Mitigation Plans
APPENDIX II	Native Seed and Plant Mixes

INTRODUCTION

This Mitigation, BMP and Wetland Buffer Plan Summary (Plan) and Maintenance & Monitoring Plan (MMP) has been prepared on behalf of Gilberts Development LLC for The Conservancy of Gilberts in accordance with the U.S. Army Corps of Engineers (USACE) Regional Permit Program (RPP). The locations of the proposed mitigation areas naturalized stormwater management basins and wetland buffers are shown on the Mitigation, BMP and Wetland Buffer Plan and Planting Plans provided in Appendix I. The native seed and plant mixes for all areas are provided in Appendix II.

MITIGATION

The proposed permittee responsible mitigation for the project consists of two areas. Both mitigation areas are adjacent to the Freeman Kame – Meagher Forest Preserve.

The North Mitigation Area consists of the preservation and restoration of 11.3 acres (directly north of Wetland 3A) of upland habitat used for nesting by the Blanding's Turtle. The Mitigation Plan North (Figure 5A) is provided in Appendix I. The majority of the mitigation area is currently farmed with the exception of a 1.43 acre oak woodland, which will also be restored, and 1.24 acres of ADID wetland buffer. The design of the mitigation has been coordinated with the Forest Preserve District of Kane County, and is consistent with the proposed restoration of the adjacent Forest Preserve property.

The South Mitigation Area consists of the rehabilitation/enhancement of 8.01 acres of wetland and wetland buffer, as shown on the Mitigation Plan South (Figure 5B, Appendix I). The 8.01 acres includes Wetland Areas 3A and 3B (3.31 acres) and 4.7 acres of associated wetland buffer.

The following items address the aspects of the proposed mitigation in accordance with the Federal Mitigation Rule and the USACE Permittee Responsible Compensatory Mitigation Checklist. Monitoring, maintenance, adaptive management and performance standards are addressed below.

MITIGATION OBJECTIVES & SITE SELECTION

The objectives for the proposed mitigation are to preserve and improve the known nesting habitat for the Blanding's Turtle on the Conservancy property and to preserve and enhance existing wetland and buffers adjacent to the Freeman Kame-Meagher Forest Preserve. The location and extent of the North Mitigation Area was determined during coordination meetings with the USACE, Illinois DNR, Illinois Nature Preserves Commission and Forest Preserve District of Kane County (FPDKC).

MITIGATION SITE PROTECTION & LONG-TERM MANAGEMENT

The wetland mitigation areas will be placed in a Conservation Easement granted to the FPDKC, which will be involved in the Long-term Management of the Mitigation Area.

MITIGATION CREDITS

The project will impact 0.55 acres of wetlands/waters of the US as summarized in the table below and as shown on the Wetland Impact Exhibit provided in Appendix I. A minimum of 1.035 acres of mitigation is required. The 1.035 acres of mitigation includes 3:1 mitigation for impacts to 0.12 acres associated with mapped ADID wetlands. The 11.3 acre north mitigation area provides 2.83 acres of mitigation credit (25% credit per acre). The 8.01 acre south mitigation also provides 2.83 acres of mitigation credit (3.31 acres @ 50% credit and 4.7 acres @ 25% credit). The 5.66 mitigation credits for the project provide a mitigation ratio of 10.3:1.

Area	Wetland Type	Total Acres	FQI (Native)	Impact Source	Acres Impacted	Mitigation Ratio	Mitigation Required	Acres Preserved
WL/Trib 1	Emergent, Drainage Ditch	3.03	14.37	Road Crossing	0.02	1.50	0.03	3.01
WL/Trib 2	Drainage Ditch	1.17	Incl. w/WL1	Road Crossing	0.12	1.50	0.18	1.05
WL 3A	ADID, Emergent	2.93	21.55	No impacts	0.00	NA	NA	2.93
WL 3B	ADID, Emergent	0.38	Incl. w/ WL3-N	No impacts	0.00	NA	NA	0.38
WL 4	ADID, Wet Meadow	16.86	9.64	Lot grading, 2 areas	0.07	3.00	0.21	16.79
WL 5	Emergent	9.43	9.25	Mowed Path	0.06	1.5	0.12	9.37
WL 6	Emergent	0.70	8.54	No impacts	0.00	NA	NA	0.70
WL 7	Emergent	1.16	5.30	No impacts	0.00	NA	NA	1.16
WL/Trib 8	ADID, Emergent	28.80	15.41	Road Crossing	0.05	3.00	0.15	28.75
WL8	ADID, Emergent			Freeman Road	0.005	3.00	0.015	
FW 10	Farmed Wetland	0.27	Incl. w/WL4	Lot and road grading	0.22	1.50	0.33	0.05
FW 12	Farmed Wetland	0.51	Incl. w/WL 1	No impacts	0.00	NA	NA	0.51
Total		65.34			0.55		1.035	64.70

MITIGATION WORK PLAN

The North Mitigation Area will be seeded with a Short-Grass Dry Prairie Seed Mix (Appendix II). The seed mix is intended to be similar to a natural gravel prairie and provide areas with minimal vegetative cover to promote Blanding's Turtle nesting. The woodland will be enhanced by the clearing of adventive shrubs, overstocked native trees, herbicide treatment of invasive herbaceous vegetation, and the seeding of a native Woodland/Savanna Seed Mix (Appendix II).

The South Mitigation Area wetlands (3A and 3B) will be enhanced by the control of invasive species activities and will be seeded and planted with a Wetland Enhancement Seed and Plug Mix (Appendix II). The woodland portion of the South Mitigation Area wetland buffer will be enhanced by the clearing of adventive shrubs, overstocked native trees, herbicide treatment of invasive herbaceous vegetation, and the seeding of a native Woodland/Savanna Seed Mix. The agricultural portion of the South Mitigation Area wetland buffer will be seeded with the Prairie Seed Mix

FINANCIAL ASSURANCES

A performance surety for both Mitigation Areas will be posted with the Village of Gilberts.

NATURALIZED STORMWATER MANAGEMENT BASINS

The proposed project includes numerous naturalized stormwater management basins/BMPs will be planted with the following as shown on the Planting Plan in Appendix I: Basin Seed and Plug Mix, 16.22 acres; Wet Swale Plug Mix, 3.26 acres. The seed and plug mixes are provided in Appendix II.

The slopes of the basins, some of which are also wetland buffers, will be planted with the Prairie Seed Mix. The purpose of establishing native vegetation (i.e., wetland and prairie) in these areas is to provide an aesthetically pleasing and environmentally beneficial alternative to riprap and turf grass stormwater areas. Native vegetation aids in sediment and toxicant retention/removal, and provides cover for wildlife. Besides providing cover and a food source for wildlife, prairie vegetation greatly reduces or eliminates the need for irrigation, aeration, fertilization, and use of many of chemicals (i.e., herbicides, fungicides, etc.) typically required by maintained turf grass. Prairie vegetation also provides better soil stabilization than turf grass (i.e., bluegrass, etc.) due to extensive root systems, many reaching depths of ten feet below the soil surface. These extensive root systems allow prairie vegetation to withstand drought and nutrient deficiencies in the soil. The extensive root systems also allow rainwater to percolate into the soil, aiding in groundwater recharge, instead of direct runoff typical of conventional basin designs.

WETLAND BUFFERS

A total of 24.4 acres of prairie will be planted with the Prairie Seed Mix, which includes the wetland buffers which are not currently vegetated.

CONSTRUCTION AND REVEGETATION

This section details construction and revegetation of the mitigation area and naturalized stormwater basins. These construction details will be shown on the applicable engineering plans for these features.

CONSTRUCTION AND SOIL SPECIFICATIONS

Grading and excavation of the naturalized basins will be completed in accordance with the engineering plans in order to achieve the requisite compensatory storage volumes. No grading of the mitigation area is proposed.

The following specifications will be followed to minimize impacts to these areas and provide a suitable medium for vegetation establishment:

1. All areas of the naturalized basins to be planted or seeded will be over-excavated a minimum of 1 foot below final grade to allow for the placement of top-dress material, unless a one foot thick topsoil layer is present following excavation to proposed final grade.
2. Top-dress material for the proposed naturalized basin plantings will originate from on-site. These soils are adequate to promote native vegetation establishment.
3. Wheel-based vehicles (scrapers, endloaders, etc.) shall not be used for topdressing work. Only low ground pressure wide-track equipment (quadtrack tractor and pull-type scraper assembly, wide track dozer, backhoe, or approved by Engineer) shall haul, move and spread topdress material.

4. Following top-dress placement, the surface shall be thoroughly disked using a small farm type disc (not a large construction disc). Top-dress material shall not be handled or the surface disked when wet.
5. No wheeled traffic shall occur in the naturalized basin planting areas after the final disking is complete, with the exception of a small farm type tractor if used for seeding.
6. All construction activities in the naturalized basins must be done under dry conditions.

REVEGETATION

All areas exposed by construction in or near the naturalized areas will be stabilized by vegetation immediately after completion of final grading, using a weed-free hydro-mulch or erosion blanket on slopes to prevent soil erosion as appropriate. All of the plant and seed mixes are provided in Appendix II.

MITIGATION AREAS

The North Mitigation Area will be seeded with a Short-Grass Dry Prairie Seed Mix. This seed mix has been selected to create low growing vegetation that provides sparse cover. This type of plant community is intended to promote Blanding's Turtle nesting. To achieve this type of sparse vegetative cover, the seeding rate of the dry prairie mix has been significantly reduced as compared to standard seeding rates. As a result of the seeding approach, the performance standards for the mitigation area reflect the type of habitat desired for the Blanding's Turtle.

The enhanced woodland will be seeded with the Woodland/Savanna Seed Mix following the clearing of adventive shrubs and overstocked native trees. The clearing activity is discussed in the Management and Monitoring Plan section of this document.

Control of reed canary grass and sandbar willow in the South Mitigation Area (Wetlands 3A and 3B) will be the main focus of the enhancement work. Following one-year of weed control activities, installation of an appropriate seed and plant plug mix will be conducted. The wooded portion of the South Mitigation wetland buffer will be seeded with the Woodland/Savanna Seed Mix following the clearing of adventive shrubs and overstocked native trees. The agricultural portion of the South Mitigation Area buffer will be seeded with the Short-Grass Dry Prairie Seed Mix following pre-seeding weed control/seedbed preparation.

NATURALIZED BASINS

The majority of the naturalized basin bottoms will be heavily seeded with a broad-spectrum Basin Seed and Plug Mix due to the variable hydrology and the micro-topography anticipated following construction. The bottom areas will likely be slightly inundated only for short periods following rain events and remain saturated to dry for the majority of the growing season. Based on the proposed ground elevations and anticipated post-constructed micro-topography of the bottom areas, isolated pockets of longer-term shallow inundation are likely. As such, the seed and plug mix contains a mixture of ruderal type plant species that can tolerate a range of soil moisture conditions.

The Basin Seed and Plug Mix is composed of mostly sedges and grasses, which are proposed at higher seeding rates than typical. These sedge and grass species range from sedge meadow to mesic prairie conditions to account for the variable conditions anticipated. Forbs are also included in the seed mix to improve floristic diversity.

In addition to the seed, plugs at 1,000 per/acre also will be installed in the basins, outside of the centralized channel, to promote vegetative establishment. Seven species of sedges and grasses, selected for their wide range of tolerance and rhizomatous nature, make up the plug portion of this mix.

A centralized, shallow meandering swale is proposed in all of the basins. The swales average approximately 20 feet in width and will be constructed to connect the inlet and outlet of each area. The swales have designed ground elevations equal to the invert elevations of the outlet pipes to promote flow through the basin. Based on the long-term shallow inundation anticipated in these swales, plugs will be installed. A Basin Wet Swale Plug Mix consisting of sedge meadow and shallow emergent species is proposed at 5,000 plugs per acre. This plug mix includes rhizomatous sedges and grasses that will provide quick vegetation establishment of the area.

PRAIRIE BUFFERS

The side-slopes of the basins and wetland buffers will be seeded with the Prairie Seed Mix. Following the seeding on any side slopes, North American Green S75-BN erosion control blanket will be installed.

MANAGEMENT AND MONITORING PLAN

This Mitigation, BMP and Wetland Buffer Management and Monitoring Plan (MMP) for The Conservancy of Gilberts establishes a means by which the mitigation, naturalized BMPs, and wetland buffer areas may be evaluated relative to pre-established goals and performance standards.

The duration of the management and monitoring program is five years for mitigation area (based on the proposed plant community), BMPs and wetland buffers, beginning with the completion of grading and planting. The management and monitoring program will be the responsibility of Gilberts Development LLC.

NATURAL AREA MANAGEMENT

This section addresses the management requirements for the North and South Mitigation Areas Naturalized Basins and Wetland Buffers. Proper management of these areas is critical for successful establishment of the proposed plant communities. Irrigation, periodic mowing, selective herbicide application and prescribed burning are commonly used as management techniques for natural plant communities.

Mowing. During the first two growing seasons after seeding, mowing or selective weed whipping the vegetation in the proposed prairie (side-slopes and mitigation area) and broad-spectrum seed mix (basin facilities) areas should occur as needed to maintain a plant height of no greater than 18 to 20 inches. To accomplish this, high-mowing the vegetation to a height of 6 to 9 inches several times during the growing season will be needed. Mowing will aid new plant growth as to allow more sunlight to reach young prairie seedlings. Mowing will aid in the control of annual weeds, which can undermine seeding efforts.

Herbicide Application. Management of the vegetation in all areas should include selective application of herbicide to control aggressive plant species, such as, but not limited to, Reed Canary Grass (*Phalaris arundinacea*), cattails (*Typha* spp), purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), thistles (*Cirsium* spp.), teasel (*Dipsacus* spp.), garlic mustard (*Alliaria petiolata*), common burdock (*Arctium minus*) buckthorn (*Rhamnus* spp.), multiflora rose (*Rosa multiflora*), honeysuckle (*Lonicera* spp.), dame's rocket (*Hesperis matronalis*), and sweet clovers (*Melilotus* spp.). These species,

including others, can displace desirable species, thereby reducing floristic diversity in the naturalized areas. Controlling these species will be required to achieve the performance standards for the project.

One-year of reed canary grass and sandbar willows control prior to seed and plant installation will occur in Wetlands 3A and 3B.

Natural regeneration of cattails, common reed and reed canary grass in the naturalized basins will likely occur following construction. Control of these weeds prior to seeding and planting will be mandatory as described below.

A pre-planting cattail, reed canary grass and common reed control will be conducted if any of these species are present. Hand pulling cattails can be conducted when the cattails are small enough to ensure that the entire root is removed. Off-site disposal of cattails will be required. Larger cattails will require herbicide applications. Application of herbicide to kill any reed canary grass and common reed will be conducted as well. Coverage of these species can be no greater than 5% prior to plant installation. Aggressive cattail, common reed and reed canary grass control will be required after planting throughout the management period to ensure plant establishment. After planting, the hand-wick application method to control cattails and common reed will be required.

A determination regarding the type of herbicide to be used should be made when it is known which nuisance species are present on the site. Depending on the target weed species, a selective herbicide may be available. The choice of herbicide and timing of herbicide application will be made by a trained, experienced professional based on the target weed species and conditions.

It is recommended that a minimum of four annual weed control application periods are conducted throughout the management and monitoring period. Below is a general guideline on the suggested schedule and target species for the application periods:

- Application Period One (early spring – April/May): problematic species such as, but not limited to, reed canary grass, red/white clover, garlic mustard, dame's rocket, cool season adventive grasses.
- Application Period Two (late spring to early summer – May/June): problematic species such as, but not limited to, teasel, white/yellow sweet clover, thistle, common burdock, buckthorn, multiflora rose, honeysuckle.
- Application Period Three (mid to late summer – July/August): problematic species such as, but not limited to, tall goldenrod, hairy aster, ragweed, cattails, purple loosestrife, buckthorn, multiflora rose, honeysuckle.
- Application Period Four (late summer and fall – September/October): problematic species such as, but not limited to, reed canary grass, thistle, common reed, red/white clover, garlic mustard, dame's rocket, cool season grasses.

Woodland Enhancement Area Clearing & Resprout Control. Bur oak (*Quercus macrocarpa*) is the dominant canopy tree in the 1.43-acre woodland enhancement area. The distribution of bur oak appears to be fairly uniform throughout the area, which may indicate a former open woodland or savanna community. However, due to the dense adventive shrub layer and abundance of weedy native tree species, the canopy is closed and minimal sunlight reaches the ground layer. As such, groundcover

vegetation is dominated by weeds, such as garlic mustard (*Alliaria petiolata*), although a few pockets of conservative species including Dutchman's breeches (*Dicentra cucullaria*) and wood anemone (*Anemone quinquefolia*) are present. Removal of the adventive shrubs and weedy trees to open up the canopy will be the first step in the enhancement process to restore this area to a savanna/open woodland condition. This will occur in the winter (January – March) under frozen ground conditions.

The woodland portion of the South Mitigation Area buffer is degraded and has minimal oaks present. Invasive shrubs and weedy trees will be removed from this area at the same time the clearing work is performed in the woodland enhancement area.

Target woody species will be cut no higher than 1-inch above the ground surface followed by application of herbicide to the cut stump to prevent resprouting. Herbicide applicators will follow closely behind the tree and shrub cutting crew to ensure that all cut stumps receive the herbicide application within 2 hours of the cut. This procedure will maximize effectiveness of the herbicide application and as a result reduce the intensity of resprouting.

The woody vegetation clearing will be conducted during the dormant season under frozen ground conditions. Conducting the work according to these specifications will minimize soil disturbance and avoid detrimental effects to desirable vegetation, which will promote regeneration of the seedbank.

All cut material will be placed in brush piles and burned immediately after clearing or chipped and disposed at an off-site location. Brush piles will be strategically placed to minimize the potential negative effects to the preserved oak species twigs and roots that can occur from the heat emitted from the brush pile burning. As such, every effort should be made to avoid placement of brush piles directly underneath oak trees. The brush piles should be placed outside of any oak canopy as well to avoid damaging the roots.

Resprout control will be conducted during the five-year period as needed to prevent reestablishment of the cut woody species. The resprout control will include a foliar application of the appropriate herbicides during the growing season.

Prescribed Burning. Prescribed burns should be conducted in all the areas during the management and monitoring period. Prescribed burning can reduce exotic weed species that may establish from seeds or rootstock material in the topsoil that is *in situ* or placed in these areas. Additionally, burning encourages the growth of native plant species from the established plant mix, and existing seedbank, and inhibits the growth of non-indigenous vegetation.

It is anticipated that one burn in the naturalized basins and the short grass prairie portion of the mitigation area will be performed during the five-year period, likely in year two or three. Two burns during the five-year period, one pre-seeding burn after the clearing and one post-seeding burn, may occur in the woodland enhancement area.

PERFORMANCE STANDARDS

Performance standards are established for all proposed projects involving naturalized areas so that the relative success of wetland mitigation efforts may be evaluated. If the performance standards are not achieved by the end of the five-year management and monitoring period, the permittee is responsible for correction of any deficiencies through further management activities, which may include replanting.

North Mitigation Area Turtle Prairie Habitat

1. At the end of the five-year management and monitoring period, absolute vegetative coverage shall be a minimum of 50%.
2. At the end of the five-year management and monitoring period, relative coverage of non-native species cannot exceed 15%.
3. At the end of the five-year management and monitoring period, the top three most dominant species as determined using the Relative Importance Values shall not be non-native species.

South Mitigation Area Wetlands 3A and 3B

4. At the end of the five-year management and monitoring period, relative coverage of non-native species cannot exceed 15%.
5. At the end of the five-year management and monitoring period, the top three most dominant species as determined using the Relative Importance Values shall not be non-native species.

Woodland Enhancement Area/Wooded Buffers

6. Absolute coverage of buckthorn (*Rhamnus* spp.), European honeysuckle (*Lonicera* spp.), and multiflora rose (*Rosa multiflora*) in aggregate shall be less than 10% at the end of the five-year period. Plot data results shall be utilized to evaluate this standard.
7. None of the three most dominant species in the herbaceous stratum, as determined using the Relative Importance Values, shall be non-native at the end of the five-year period. The transect data results shall be utilized to evaluate this standard.
8. At the end of the five year management and monitoring period, absolute vegetative coverage shall be a minimum 80% in the herbaceous stratum. Relative coverage of non-native species in the herbaceous stratum shall not exceed 15%. The transect data results shall be utilized to evaluate this standard.

Naturalized Stormwater Basins & Prairie Buffers

9. Within 3 months of seed installation, at least 90% of the seeded prairie zones (i.e., prairie seed mix), as measured by aerial coverage, shall be vegetated. A minimum 90% vegetative coverage shall be maintained throughout, and at the end of, the five-year period for the prairie seed zones.
10. At the end of the third year, at least 50% of the basin bottom (i.e., Basin Seed and Plug Mix zone), as measured by aerial coverage, shall be vegetated. At the end of the fifth year, at least 75% of the basin bottom as measured by aerial coverage shall be vegetated.
11. The naturalized areas shall not contain any rills greater than 4 inches wide and 4 inches deep throughout, and at the end, of the five-year period.
12. At the end of the third growing season, approximate relative coverage (determined by ocular estimation) of non-native species cannot exceed 30%. At the end of the fifth growing season, approximate relative coverage (determined by ocular estimation) of non-native species cannot exceed 15%. This standard shall be evaluated separately for the prairie seed zones and basin

bottoms.

13. At the end of the fifth growing season, the top three most dominant species (determined by ocular estimation) based on aerial coverage shall not be non-native or common reed. This standard shall be evaluated separately for the prairie seed zones and basin bottom.
14. Absolute coverage (determined by ocular estimation) of common reed, reed canary grass and purple loosestrife in aggregate shall be less than 10% throughout, and at the end of, the five-year period.

VEGETATION MONITORING

Erosion Control Monitoring. Monthly erosion control inspections will be conducted at the site during construction activities involving the naturalized areas between March 1 - October 1. Monthly erosion inspections will be conducted until the disturbed areas are fully vegetated. Additionally, erosion control inspections will be conducted within 24 hours of a significant rain event (>1 inch). Monthly reports documenting all erosion monitoring episodes conducted within the particular month will be prepared and submitted to the U.S. Army Corps of Engineers.

Vegetation Monitoring. Vegetative monitoring will begin the first full growing season follow planting/seeding, which will be Year Two of the five-year management period. Although vegetation monitoring will not be conducted during Year One, a monitoring report will still be required and will document general site conditions and activities conducted during Year One.

For the mitigation areas, vegetation monitoring will be performed semi-annually beginning in Year Two, to ensure both early and late season species are accounted for. The first monitoring event will occur during June/July, and the second during August/September. A floristic inventory will be compiled during the first monitoring event and general site conditions will be documented. During the second monitoring event, quantitative data will be collected along permanent sampling transects established in these areas. The transects will be permanently marked on the ground with metal pipes or some other appropriate method. A series of sample quadrats (1.0 m²) will be placed along all transects at 5 meter intervals to collect data that will adequately represent the vegetation. Data collected in each quadrat will include an inventory of all plants and the estimated coverage of each species. These data will be used to derive relative importance value (RIV) data for each species encountered on the transect. All data collected from the monitoring sessions will be inventoried and evaluated using the Floristic Quality Assessment (FQA) Computer Program. This data will then be used to evaluate the site's progress in regards to the performance standards. Along with the transect sampling, an inventory of all plant species present in these areas will be collected and will be used to calculate the native FQI.

To sample the shrub stratum in the woodland enhancement and wooded buffer areas, 5 meter by 5 meter plots will also be established. Absolute coverage of the shrubs will be recorded. The data collected from the plots will be used to evaluate Performance Standard 6 for the woodland.

Semi-annual vegetation monitoring will also be conducted during the five-year period in the naturalized basins and prairie seed mix zones. Ocular estimation will be used to collect approximate vegetative coverage and relative coverage data. The vegetation monitoring inspections will be conducted twice per year (May/June and August/September). In addition, an inventory of all plant species present in these areas will be collected and will be used to calculate the native FQI. Transect sampling will not be conducted in the naturalized basins or prairie seed mix zones.

ANNUAL REPORTING

An annual monitoring report will be submitted to the USACE by January 31 of each year during the five-year management and monitoring period or until performance standards are met and signoff is achieved.

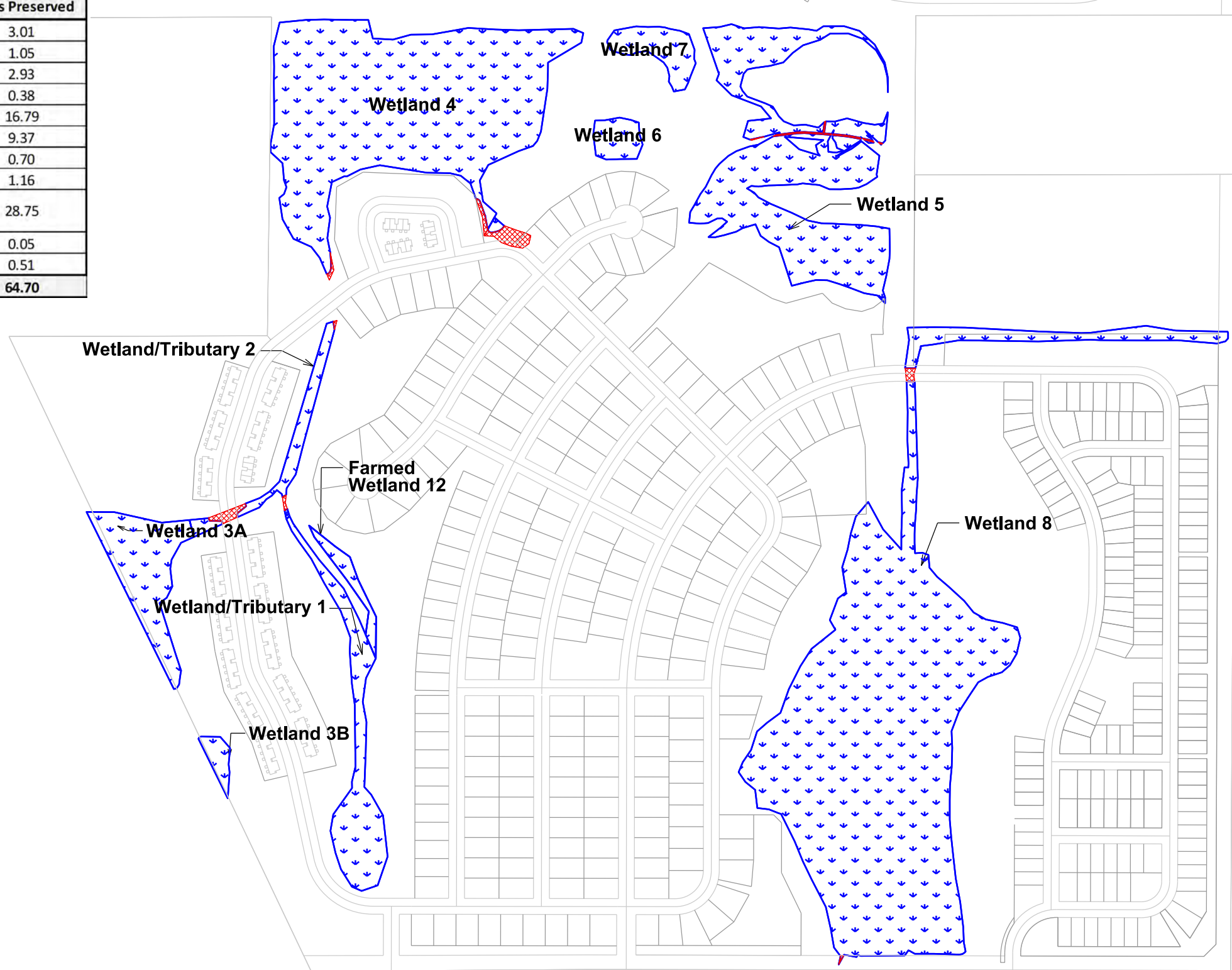
The annual report must include a review of site progression towards meeting the performance standards and propose any necessary remedial actions. More specifically, the monitoring report must contain the following information, which will be based on data collected during the monitoring inspections.

1. A summary of management activities conducted during the year.
2. Representative photographs depicting general site conditions.
3. Calculate native mean C and native FQI values, and the native mean wetness coefficient for each plant community zone.
4. Using the Floristic Quality Assessment (FQA) Computer Program for the mitigation areas calculate the relative frequency of native species (RF_n) and the relative frequency of adventive species (RF_a). Calculate the relative native cover (RC_n) and the relative adventive cover (RC_a). Calculate the RIV_n of total native species and the RIV_a of total adventive species. The sum of the RIV_n and RIV_a must equal 100.
5. For the naturalized basins and prairie seed mix zones, collect absolute and relative coverage estimates needed to evaluate the performance standards.
6. Evaluate the status of the areas relative to the performance standards.
7. Recommended management activities for the following year to address any issues related to site success.


APPENDIX I


**WETLAND IMPACT PLAN, MITIGATION, BMP AND WETLAND
BUFFER PLAN, PLANTING PLAN, &
MITIGATION PLANS**

Area	Total Acres	Acres Impacted	Acres Preserved
Wetland/Tributary 1	3.03	0.02	3.01
Wetland/Tributary 2	1.17	0.12	1.05
Wetland 3A	2.93	0.00	2.93
Wetland 3B	0.38	0.00	0.38
Wetland 4	16.86	0.07	16.79
Wetland 5	9.43	0.06	9.37
Wetland 6	0.70	0.00	0.70
Wetland 7	1.16	0.00	1.16
Wetland/Tributary 8 (Road Crossing)	28.80	0.05	28.75
Wetland/Tributary 8 (Freeman Road)		0.005	
Farmed Wetland 10	0.27	0.22	0.05
Farmed Wetland 12	0.51	0.00	0.51
Total	65.24	0.55	64.70



LEGEND

 WETLAND IMPACTS (0.55 ACRES)

 PRESERVED WETLAND (64.70 ACRES)

DATE: 03-21-19



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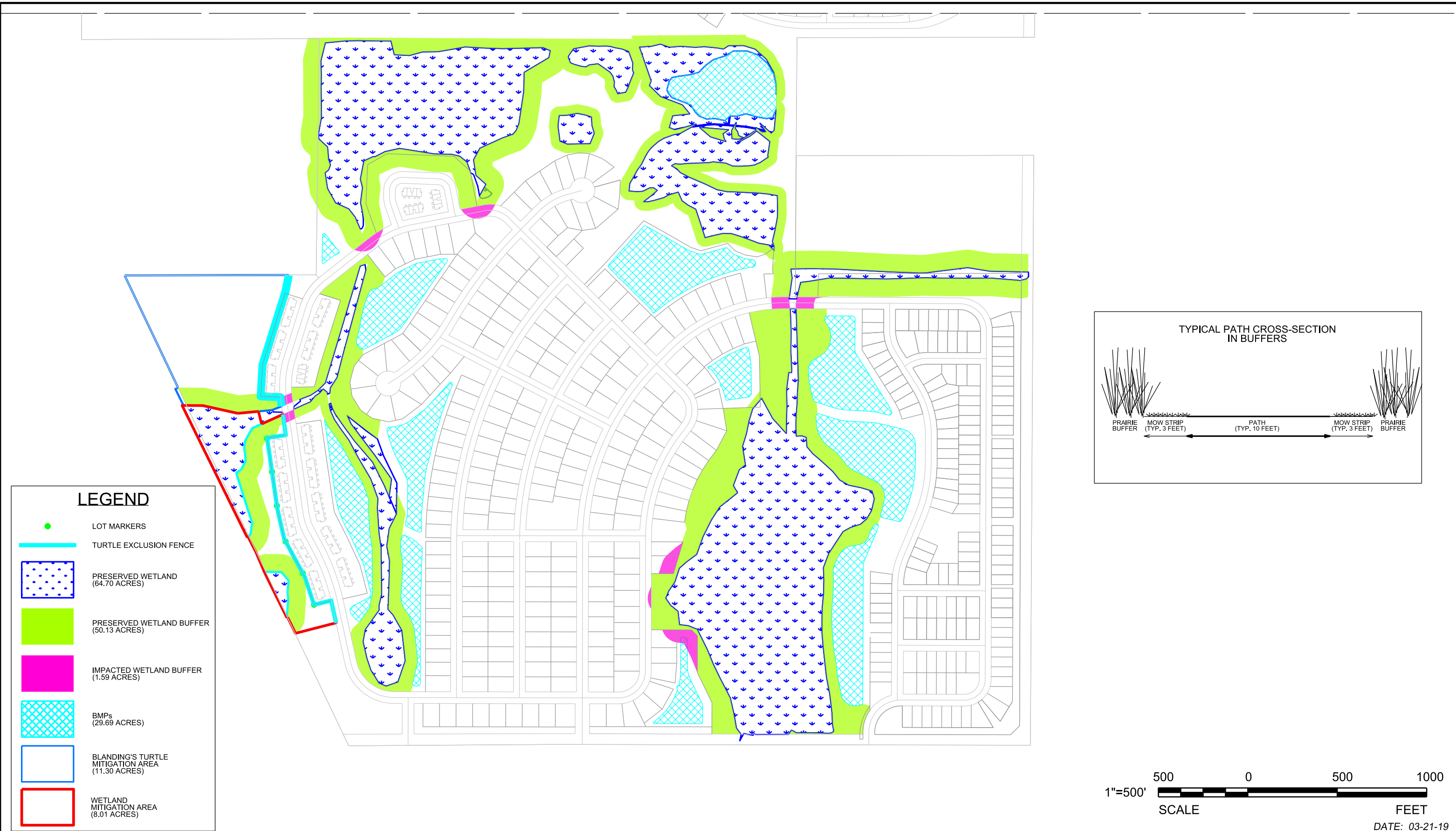
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**FIGURE 2:
WETLAND IMPACT EXHIBIT**



SCALE: 1"= 500'



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**FIGURE 3:
 MITIGATION, WETLAND BUFFER
 AND BMP PLAN**

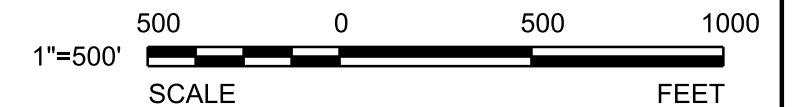


SCALE: 1"= 500'



LEGEND

	BASIN WET SWALE PLUG MIX (3.26 ACRES)		TURTLE EXCLUSION FENCE		WETLAND MITIGATION AREA (8.01 ACRES)
	BASIN SEED AND PLUG MIX (16.22 ACRES)		BLANDING'S TURTLE MITIGATION AREA (11.30 ACRES)		PRAIRIE SEED MIX (4.70 ACRES)
	PRAIRIE SEED MIX (24.40 ACRES)		PRAIRIE SEED MIX (1.24 ACRES)		WETLAND ENHANCEMENT (3.31 ACRES)
	EXISTING VEGETATED BUFFER (38.04 ACRES)		PRAIRIE SEED MIX (8.63 ACRES)		
	PRESERVED WETLAND (64.70 ACRES)		WOODLAND ENHANCEMENT (1.43 ACRES)		



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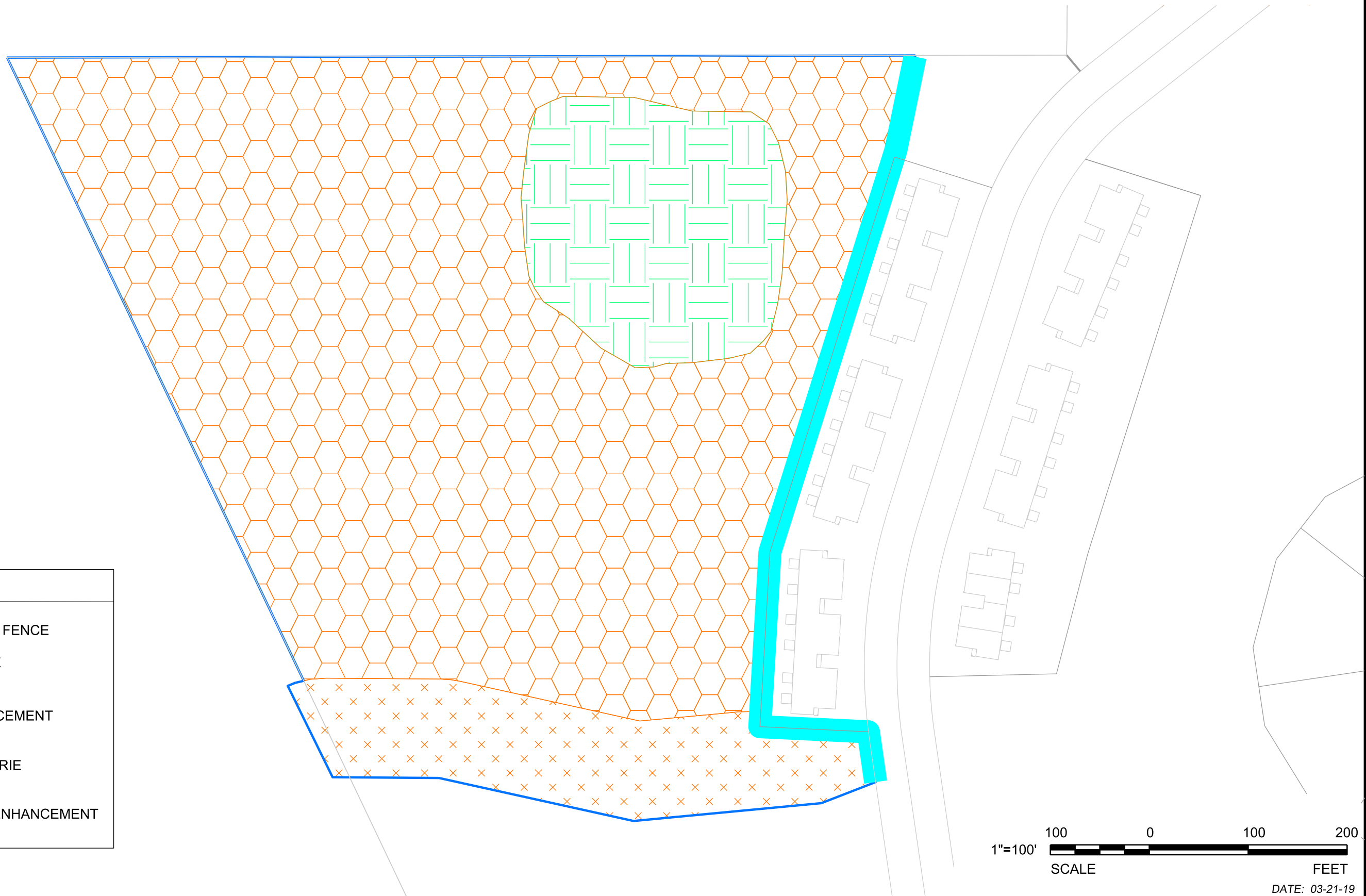
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



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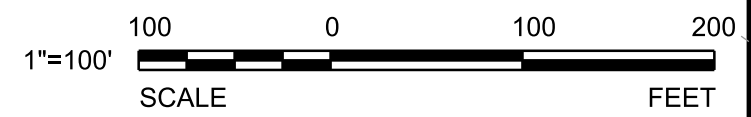
**FIGURE 4:
MITIGATION, WETLAND BUFFER AND
BMP PLANTING PLAN**



SCALE: 1"= 500'



LEGEND	
	TURTLE EXCLUSION FENCE
	BLANDING'S TURTLE MITIGATION AREA (11.30 ACRES)
	WOODLAND ENHANCEMENT (1.43 ACRES)
	SHORT-GRASS PRAIRIE (8.63 ACRES)
	WETLAND BUFFER ENHANCEMENT (1.24 ACRES)



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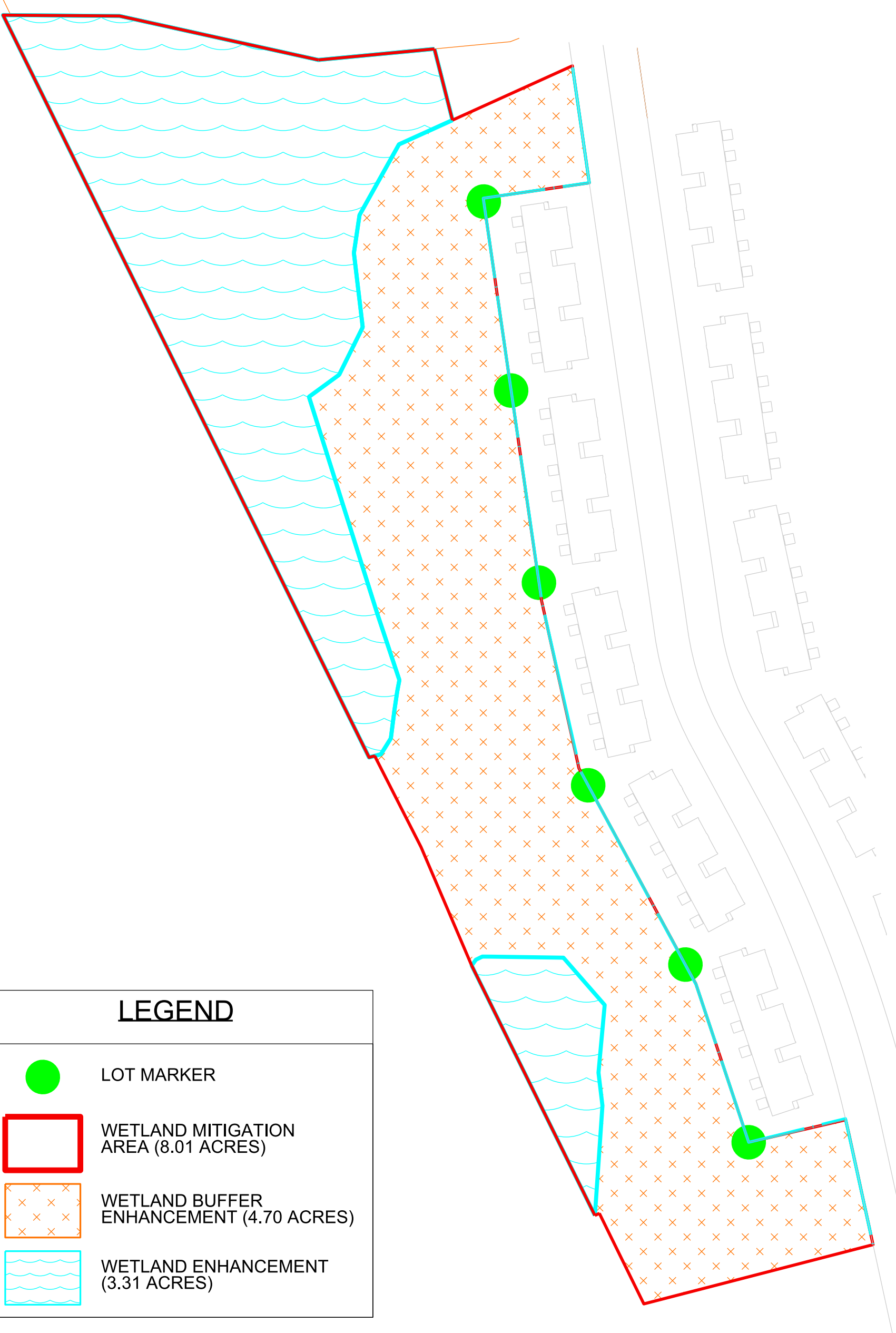
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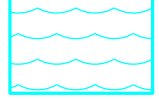
FIGURE 5A:
NORTH MITIGATION PLAN

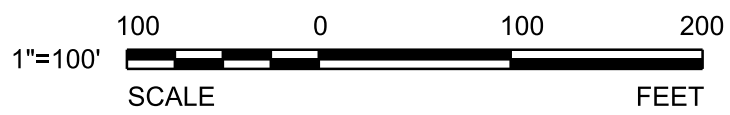


SCALE: 1"= 100'

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LEGEND	
	LOT MARKER
	WETLAND MITIGATION AREA (8.01 ACRES)
	WETLAND BUFFER ENHANCEMENT (4.70 ACRES)
	WETLAND ENHANCEMENT (3.31 ACRES)



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**FIGURE 5B:
SOUTH MITIGATION PLAN**



SCALE: 1"= 100'

APPENDIX II

NATIVE SEED AND PLANT MIXES

SHORT-GRASS DRY PRAIRIE SEED MIX		
Scientific Name	Common Name	Seeding Rate (lbs/ac)
Grasses & Sedges		
<i>Andropogon scoparius</i>	Little Bluestem	5.000
<i>Bouteloua curtipendula</i>	Side-oats Grama	5.000
<i>Carex bicknellii</i>	Bicknells Sedge	0.125
<i>Carex brevior</i>	Shorter Sedge	0.125
<i>Carex muehlenbergii</i>	Sand Sedge	0.250
<i>Elymus canadensis</i>	Canada wild rye	1.500
lbs/acre:		12.000
Forbs		
<i>Asclepias tuberosa</i>	Butterfly Weed	0.250
<i>Aster laevis</i>	Smooth Blue Aster	0.125
<i>Astragalus canadensis</i>	Canadian Milk Vetch	0.125
<i>Cassia fasciculata</i>	Partridge Pea	0.125
<i>Coreopsis lanceolata</i>	Sand Coreopsis	0.125
<i>Coreopsis palmata</i>	Prairie Coreopsis	0.125
<i>Echinacea pallida</i>	Purple Coneflower	0.125
<i>Heliopsis helianthoides</i>	False Sunflower	0.125
<i>Lespedeza capitata</i>	Round-Headed Bush Clover	0.125
<i>Monarda fistulosa</i>	Wild Bergamot	0.125
<i>Penstemon digitalis</i>	Foxglove Beard Tongue	0.125
<i>Petalostemum purpureum</i>	Purple Prairie Clover	0.125
<i>Petalostemum candidum</i>	White Prairie Clover	0.125
<i>Potentilla arguta</i>	Prairie Cinquifol	0.125
<i>Ratibida pinnata</i>	Yellow Coneflower	0.125
<i>Rudbeckia hirta</i>	Black-eyed Susan	0.125
<i>Rudbeckia subtomentosa</i>	Sweet Black-eyed Susan	0.125
<i>Silphium integrifolium</i>	Rosin Weed	0.125
<i>Verbena stricta</i>	Hoary Vervain	0.125
<i>Zizia aurea</i>	Golden Alexanders	0.125
lbs/acre:		2.625
*Total Permanent Species Lbs/Acre:		14.625
Cover Crop		
<i>Avena sativa</i>	Seed Oats	32.000
<i>*does not include Cover Crop</i>		

WOODLAND/SAVANNA SEED MIX			
Type	Scientific Name	Common Name	Seeding Rate (lbs/ac)
Forbs	<i>Agastache scrophulariaefolia</i>	Purple Giant Hyssop	0.125
	<i>Allium canadense</i>	Wild Onion	0.125
	<i>Anemone virginiana</i>	Tall Anemone	0.063
	<i>Aquilegia canadensis</i>	Wild Columbine	0.063
	<i>Asclepias tuberosa</i>	Butterfly Weed	0.125
	<i>Aster shortii</i>	Short's Aster	0.063
	<i>Aster sagittifolius drummondii</i>	Drummonds Aster	0.125
	<i>Campanula americana</i>	Tall Bellflower	0.125
	<i>Eupatorium purpureum</i>	Purple Joe Pye Weed	0.125
	<i>Heliopsis helianthoides</i>	False Sunflower	0.125
	<i>Monarda fistulosa</i>	Wild Bergamot	0.125
	<i>Penstemon digitalis</i>	Foxglove Beard Tongue	0.250
	<i>Ratibida pinnata</i>	Yellow Coneflower	0.250
	<i>Solidago ulmifolia</i>	Elm-leaved Goldenrod	0.063
	<i>Zizia aurea</i>	Golden Alexanders	0.250
		sub total	2.002
Grasses & Sedges	<i>Andropogon scoparius</i>	Little Bluestem	5.000
	<i>Carex davisii</i>	Awned Gracefull Sedge	0.063
	<i>Carex normalis</i>	Spreading Oval Sedge	0.125
	<i>Carex sparganioides</i>	Loose-Headed Bracted Sedge	0.063
	<i>Elymus canadensis</i>	Canada wild rye	1.500
	<i>Elymus virginicus</i>	Virginia Wild Rye	3.000
	<i>Hystrix patula</i>	Bottlebrush Grass	1.000
		sub total	10.751
		Total Permanent Species:	12.753
	<i>Avena Sativa</i>	Seed Oats	32.000

BASIN SEED AND PLUG MIX			
Species	Common Name	Seeding Rate (lbs/acre)	Planting Rate (plugs/acre)
Grasses			
<i>Agrostis alba palustris</i>	Bent Grass	1.000	0
<i>Andropogon gerardii</i>	Big Bluestem	3.000	0
<i>Elymus virginicus</i>	Virginia Wild Rye	3.000	0
<i>Leersia oryzoides</i>	Rice Cut Grass	0.250	0
<i>Panicum virgatum</i>	Switch Grass	3.000	0
<i>Sorghastrum nutans</i>	Indian Grass	1.000	0
<i>Spartina pectinata</i>	Prairie Cord Grass	0.000	500
sub total per acre:		11.250	500
Sedges and Rushes			
<i>Carex annectans xanthocarpa</i>	Small Yellow Fox Sedge	0.250	50
<i>Carex bebbii</i>	Bebb's Sedge	0.125	0
<i>Carex brevior</i>	Plains Oval Sedge	0.350	0
<i>Carex cristatella</i>	Crested Oval Sedge	0.125	50
<i>Carex frankii</i>	Bristly Cattail Sedge	0.750	0
<i>Carex lacustris</i>	Lake Sedge	0.000	100
<i>Carex molesta</i>	Troublesome Sedge	0.500	0
<i>Carex pellita</i>	Woolly Sedge	0.250	100
<i>Carex tribuloides</i>	Awl-Fruited Sedge	0.250	0
<i>Carex scoparia</i>	Lance Fruited Oval Sedge	0.250	0
<i>Carex vulpinoidea</i>	Brown Fox Sedge	1.000	100
<i>Eleocharis erythropoda</i>	Red-Rooted Spike Rush	0.125	0
<i>Juncus dudleyi</i>	Dudley's Rush	0.125	0
<i>Juncus torreyi</i>	Torrey's Rush	0.125	0
<i>Scirpus atrovirens</i>	Dark Green Rush	0.500	100
<i>Scirpus cyperinus</i>	Wool Grass	0.063	0
<i>Scirpus pendulus</i>	Red Bulrush	0.125	0
<i>Scirpus validus creber</i>	Great Bulrush	0.250	0
sub total per acre:		5.163	500
Forbs			
<i>Asclepias incarnata</i>	Marsh Milkweed	0.250	0
<i>Aster novae-angliae</i>	New England Aster	0.250	0
<i>Aster simplex</i>	Panicled Aster	0.125	0
<i>Bidens cernua</i>	Nodding Bur Marigold	0.250	0
<i>Coreopsis tripteris</i>	Tall Coreopsis	0.250	0
<i>Eryngium yuccifolium</i>	Rattlesnake Master	0.250	0
<i>Helenium autumnale</i>	Sneezeweed	0.500	0
<i>Heliopsis helianthoides</i>	False Sunflower	0.125	0
<i>Monarda fistulosa</i>	Wild Bergamot	0.125	0
<i>Penstemon digitalis</i>	Foxglove Beard Tongue	0.125	0
<i>Pycnanthemum virginianum</i>	Common Mountain Mint	0.350	0
<i>Ratibida pinnata</i>	Yellow Coneflower	0.350	0
<i>Rudbeckia subtomentosa</i>	Sweet Black-eyed Susan	0.125	0
<i>Silphium integrifolium</i>	Rosin Weed	0.125	0
<i>Silphium perfoliatum</i>	Cup Plant	0.125	0
<i>Vernonia fasciculata</i>	Common Iron Weed	0.125	0
<i>Verbena hastata</i>	Blue Vervain	0.500	0
<i>Zizia aurea</i>	Golden Alexanders	0.500	0
sub total per acre:		4.450	0
*total per acre:		20.863	1000
Cover Crop			
<i>Avena sativa</i>	Seed Oats	32.000	0.000
<i>Lolium multiflorum</i>	Annual Rye	1.000	0.000

*does not include Cover Crop

BASIN WET SWALE PLUG MIX		
Scientific Name	Common Name	Planting Rate (plugs/ac)
Grasses		
<i>Leersia oryzoides</i>	Rice Cut Grass	250
<i>Spartina pectinata</i>	Prairie Cord Grass	1,000
		1,250
Sedges and Rushes		
<i>Carex cristatella</i>	Crested Oval Sedge	250
<i>Carex emoryi</i>	Riverbank Sedge	250
<i>Carex lacustris</i>	Lake Sedge	250
<i>Carex pellita</i>	Woolly Sedge	250
<i>Carex vulpinoidea</i>	Brown Fox Sedge	250
<i>Juncus effusus</i>	Soft Rush	250
<i>Scirpus atrovirens</i>	Dark Green Bulrush	750
<i>Scirpus cyperinus</i>	Wool Grass	250
<i>Scirpus fluviatilis</i>	River Bulrush	250
<i>Scirpus validus creber</i>	Great Bulrush	600
		3,350
Forbs		
<i>Asclepias incarnata</i>	Marsh Milkweed	100
<i>Helenium autumnale</i>	Sneezeweed	100
<i>Iris virginica shrevei</i>	Blue Flag Iris	100
<i>Mimulus ringens</i>	Monkey Flower	100
		400
Total Plugs Per/Acre:		5,000

PRAIRIE SEED MIX		
Scientific Name	Common Name	Seeding Rate (lbs/ac)
Grasses		
<i>Andropogon gerardii</i>	Big Bluestem	1.000
<i>Andropogon scoparius</i>	Little Bluestem	8.000
<i>Bouteloua curtipendula</i>	Side-oats Grama	10.000
<i>Elymus canadensis</i>	Canada wild rye	3.000
<i>Panicum virgatum</i>	Switch Grass	1.000
<i>Sorghastrum nutans</i>	Indian Grass	0.500
lbs/acre:		23.500
Forbs		
<i>Asclepias tuberosa</i>	Butterfly Weed	0.350
<i>Aster laevis</i>	Smooth Blue Aster	0.250
<i>Aster novae-angliae</i>	New England Aster	0.250
<i>Astragalus canadensis</i>	Canadian Milk Vetch	0.250
<i>Baptisia leucantha</i>	White Wild Indigo	0.250
<i>Cassia fasciculata</i>	Partridge Pea	0.250
<i>Coreopsis lanceolata</i>	Sand Coreopsis	0.250
<i>Coreopsis palmata</i>	Prairie Coreopsis	0.250
<i>Coreopsis tripteris</i>	Tall Coreopsis	0.250
<i>Desmodium illinoiense</i>	Illinois Tick Trefoil	0.125
<i>Echinacea pallida</i>	Purple Coneflower	0.125
<i>Echinacea purpurea</i>	Broad-leaved Pur. Coneflower	0.350
<i>Eryngium yuccifolium</i>	Rattlesnake Master	0.250
<i>Heliopsis helianthoides</i>	False Sunflower	0.125
<i>Lespedeza capitata</i>	Round-Headed Bush Clover	0.125
<i>Monarda fistulosa</i>	Wild Bergamot	0.125
<i>Penstemon digitalis</i>	Foxglove Beard Tongue	0.250
<i>Petalostemum purpureum</i>	Purple Prairie Clover	0.250
<i>Petalostemum candidum</i>	White Prairie Clover	0.125
<i>Potentilla arguta</i>	Prairie Cinqufoil	0.125
<i>Pycnanthemum virginianum</i>	Common Mountain Mint	0.125
<i>Ratibida pinnata</i>	Yellow Coneflower	0.350
<i>Rudbeckia hirta</i>	Black-eyed Susan	0.250
<i>Rudbeckia subtomentosa</i>	Sweet Black-eyed Susan	0.125
<i>Silphium integrifolium</i>	Rosin Weed	0.125
<i>Silphium laciniatum</i>	Compass Plant	0.250
<i>Silphium terbinthinaceum</i>	Prairie Dock	0.250
<i>Solidago rigida</i>	Stiff Goldenrod	0.125
<i>Verbena stricta</i>	Hoary Vervain	0.250
<i>Vernonia fasciculata</i>	Common Iron Weed	0.125
<i>Zizia aurea</i>	Golden Alexanders	0.250
lbs/acre:		6.550
*Total Permanent Species Lbs/Acre:		30.050
Cover Crop		
<i>Avena sativa</i>	Seed Oats	32.000
<i>Lolium multiflorum</i>	Annual Rye	2.000

*does not include Cover Crop

APPENDIX 5

BLANDING'S TURTLE INFORMATION

- CONSERVATION GUIDANCE FOR BLANDING'S TURTLE
- WETLAND AREA PHOTOGRAPHS
- BLANDING'S TURTLE IDENTIFICATION SHEET
- JUNE 7, 2019 SURVEYS FOR BLANDING'S TURTLES
- WILL LOAM SOILS INFORMATION



**ILLINOIS NATURAL
HISTORY SURVEY**
PRAIRIE RESEARCH INSTITUTE

Conservation guidance for Blanding's Turtle (*Emydoidea blandingii*)

Bridget M. Henning
Leon C. Hinz Jr.

INHS Technical Report 2016 (57)

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Program

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Prairie Research Institute, University of Illinois at Urbana Champaign
Mark R. Ryan, Executive Director

Illinois Natural History Survey
Leellen Solter, Interim Director
1816 South Oak Street
Champaign, IL 61820
217-333-6830



Illinois Natural History Survey has undertaken a project producing documents that provide conservation guidance for listed species in Illinois for the Illinois Department of Natural Resources. The project is titled: *Conservation Guidance for Species in Greatest Need of Conservation (SGNC) T-96-R-001*. The primary purpose of guidance documents is to provide various project developers/land managers with information on the species, how their actions may impact the species, and how they can minimize/mitigate/monitor those impacts. In addition, the documents may be useful for identifying research needs to direct various funds, as a first step towards recovery planning, or for informing the general public. We intend the documents to be comprehensive and inclusive of scientific and experiential knowledge of the species and its conservation. The documents incorporate information on current conservation efforts, conservation opportunities and research needs.

Interviews with stakeholders were held to identify information that should be included in conservation guidance documents. We prioritized document production for species that were frequently the subject of Incidental Take Authorizations or were consulted on in the IDNR's EcoCat program. Initial literature reviews was conducted to produce first draft documents. Then a list of potential document reviewers, including academic taxa experts, conservation organizations, private consultants, and government agency staff, was compiled for each species. The documents underwent two rounds of review and revision. What follows is the final document providing conservation guidance for Blanding's Turtle, which was reviewed by 17 individuals.

Blanding's Turtle

Emydoidea blandingii (Holbrook, 1838)

IL status:
Endangered

US status:
Under review

Global rank:
Apparently secure¹
Endangered²

Trend:
Declining




Family:
Emyridae

Habitat:
Permanent and temporary
wetlands and waterbodies;
well drained uplands near or
between wetlands

Similar species:
Box turtles, Spotted turtle

Seasonal cycle:

Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

 Overwintering in wetlands
 Active on land and water
 Survey period

Species information

Characteristics

Blanding's Turtle is a medium-sized turtle (up to 10 inches in upper shell length) with a dark, lightly speckled, domed shell and a **bright yellow chin and throat**³. It has a **notched upper jaw** with an up-curved mouth giving the impression of a smile⁴. The upper shell or carapace usually has 12 scales (scutes) along each edge, and the lower shell or plastron has six pairs of scutes and a **crosswise hinge**³. Males and females appear similar with slight differences in size and shape. Males are often larger and heavier and the lower shell is concave⁵. Hatchlings are 1.2 to 1.4 inches long and dark brown to black or gray, usually with faint speckling⁴, and the underside hinge is not always apparent⁶.

Habitat

Blanding's Turtles inhabit mosaic landscapes, which include both permanent and temporary water bodies and upland habitat⁷. Occupied wetlands are often shallow with soft organic substrates, open water, and emergent vegetation, such as cattails and sedge tussocks⁸⁻¹¹, but Blanding's Turtles have been found using all wetland types in their home range and utilize multiple wetlands within a year^{9,12,13}. Individual Blanding's Turtles used 6.5 different wetlands per year on average and as many as 20 different wetlands in one year in Maine¹⁴. Although regional variation is apparent, marshes, ponds, shrub swamps and sloughs are favored over lakes, rivers and other open waters, yet these habitats are also used, especially in the case of drought when marshes may dry up^{9,14-20}. Isolated wetlands (more than 0.3 mi from another wetland) are less likely to be used by Blanding's turtles¹³. Sun exposure and basking sites are also important habitat characteristics, especially during the spring and early



Adult Blanding's turtle.

Photo by Joe Crowley, licensed under a Creative Commons Attribution-Non Commercial-No Derivs 2.0 Generic License.



Blanding's Turtle wetland habitat. Photo by Gary Glowacki

summer²¹. Although adults and juveniles use similar habitat types¹⁰, younger turtles have a stronger preference for wetlands with more abundant emergent vegetation^{16,22}. Adult and juvenile Blanding's Turtles typically overwinter in permanent wetlands with organic substrates and at least a few inches of unfrozen water^{10,23,24}.

Blanding's Turtles make more use of upland sites than many other aquatic turtle species. Upland habitats associated with wetlands are used as nesting sites and as overland travel corridors among permanent and temporary water bodies. Nesting areas are typically within 0.1 miles of a wetland, but may be as far as 1.2 miles away^{11,12,25-28}. Nesting sites are typically in well-drained, loose soil (e.g., sand, sandy loam) with exposure to sunlight and little to no vegetation cover^{10,11,17,29,30}. Sites with disturbed soil, such as gardens, road and trail margins, borrow pits, railroad embankments, and agricultural lands, are often used as nest sites^{10,12,19,25,30-34}. Nest sites adjacent to vegetation can become "root bound" with hatchlings unable to dig out of the nest⁷.

Taxonomy

Blanding's Turtle is the only species in its genus (*Emydoidea*) and there are no described subspecies^{7,35,36}. However, two recent alternative taxonomic schemes have been suggested, one maintaining Blanding's Turtle in its own genus and the other including Blanding's Turtle in the genus *Emys*³⁵. The Illinois List of Endangered and Threatened Fauna uses *Emydoidea blandingii*³⁷.

Distribution

Global distribution of Blanding's Turtle centers on the Great Lakes Region, extending to west-central Nebraska in the west, central Illinois in the south, and eastern Ontario in the northeast with a few separated populations in eastern New England and Nova Scotia¹. The northern distribution of Blanding's Turtle is likely limited by the failure of eggs to develop at cool incubation temperatures but the southern limitation may be due to interactions with other species^{34,38}.

In Illinois, Blanding's Turtle observations are most common in the northern quarter of the state, but spotty observations have occurred along the Illinois River valley down to Cass County and across the eastern



Blanding's Turtle nesting habitat with sparse vegetation.
Photo by Gary Glowacki

side of the state. It is estimated that Blanding's Turtles occur in just 22% of their historic range in Illinois²⁷.

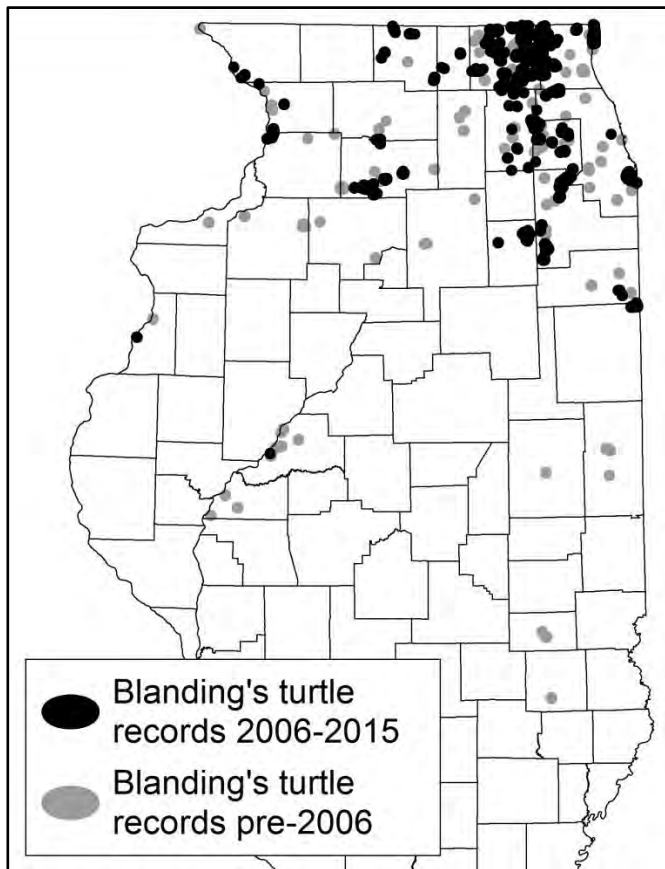
Status

Although populations in Nebraska and Minnesota are estimated to be very large with thousands of individuals, most populations are small and isolated^{5,39}. Blanding's Turtle is listed as endangered, threatened, or species of concern in all of the states in which it occurs³⁹. The International Union for Conservation of Nature has ranked Blanding's Turtle as globally Endangered², while NatureServe has ranked it as Apparently Secure meaning it is "uncommon but not rare" and there is "some cause for long-term concern due to declines or other factors"^{1,2}. Blanding's Turtle was first listed as Threatened in Illinois in 1999 due to its sensitive life history characteristics, and elevated to Endangered in 2009 due to threats and declining populations^{37,40}.

There are 162 Blanding's Turtle occurrence records in the Illinois Natural Heritage Database, 91 of which

have been observed in the last ten years (see map). The number of Blanding's Turtle records can be deceiving because the longevity of the species results in continued presence, of perhaps only a single individual, long after a population has become unviable, or incapable of reproducing itself⁴¹ (see population dynamics section). For example, of the 17 Lake County locations with Blanding's Turtle records only one has adequate population size and habitat area to be deemed potentially viable⁴².

Experts estimate that most Illinois populations have less than 25 individuals, at least four populations have 25–50 individuals, two populations have 50–100 individuals, and three populations have 100–500 individuals³⁹. More precise estimates of adult population size have been made for five sites in Illinois based on mark-recapture surveys with estimates ranging from 25 to 135 adults^{27,43–54}. The minimum number of individuals for six other populations are between 8 and 56 adults^{17,54–56}. A population viability analysis shows that the largest known population in Illinois has a 95% chance of going extinct in the next 50 years without active management⁵³.



Blanding's Turtle records from the Illinois Natural Heritage Database¹⁴⁸

Natural History

Blanding's Turtles spend most of their time in wetlands and often have a few small centers of activity around 5 acres in size, where individuals spend the majority of their time and return to year after year^{57,58}. However, upland areas do not form a barrier to their movement and Blanding's Turtles will frequently move between wetland complexes or to upland nesting sites, sometimes moving more than 0.6 miles in a day^{7,11,12,28,29,55,59}. Blanding's Turtles may move between wetlands to locate seasonally abundant food, mating partners, nesting sites, or overwintering sites, and will often move outside natural areas^{5,20,32,48,60,61}. Peaks in terrestrial movements occur during the nesting season (late May through early July) and in the spring and fall when individuals move to and from overwintering sites⁵. Blanding's Turtle home ranges vary considerably from tens of acres, to more than 200 acres and individuals have been found to move as much as 17 miles^{15,26,28,49,55,62}. Blanding's Turtles move much farther than other aquatic turtle species.

Individual Blanding's Turtle home ranges commonly overlap^{11,19} and they do not show antagonistic behavior towards other individuals⁹. Density of individuals varies considerably from site to site with fewer than 1 turtle/acre to as many as 23 adults/acre^{7,10,62}. Three populations in northeast Illinois had 0.3, 0.1, and 0.4 turtles/acre^{45,48}.

Blanding's Turtles are opportunistic omnivores that feed on both land and water. Their diet varies by season and has been found to include snails, crayfish, tadpoles, earthworms, leaches, insects, fish, frogs, and plant material^{5,10,32,63}. Blanding's Turtles prefer prey items at least 0.4 inches in size over more abundant smaller prey items³².

Turtle growth, activity, and productivity are dependent on body temperature, which is dependent on sunlight, air and water temperatures, and thermoregulation behavior^{10,64}. Blanding's Turtles prefer a body temperature of 71–77°F, which is lower than many other turtle species⁶⁵, but are active across a wide range of body temperatures (37–94°F)¹⁰. Overwinter body temperatures range between 32–36°F¹⁰. Blanding's Turtles typically emerge from hibernation in March to April, some as early as February, when their body temperature is still less than 38°F^{5,56,58,66}. Early in the spring Blanding's

Turtles seek areas with more sun exposure for basking^{8,67,68}. Blanding's Turtles have been observed to become inactive on land or in water during the summer for a few days to weeks^{11,48,58,60}.

Blanding's Turtles mate throughout the active season, but most commonly in early spring and fall when adults are moving around and come into contact with mates^{5,10,59,61,64}. Courtship and mating takes place in the water and lasts around 30–60 minutes^{5,69}. Males and females both mate with multiple partners^{59,61,70}. It is fairly common (11–56%) for a single clutch to have multiple fathers, and repeated paternity is common (70–83%) due to either repeated mating or female sperm storage over multiple years^{59,61,70,71}. Larger females reproduce more often and produce a slightly larger clutch than do smaller females^{10,30,61,72,73}.

The onset of annual nesting activity varies between populations and may be related to ambient temperature⁵. Nesting in Illinois has been observed between late May and early July, with an air temperature around 75°F and ground temperature around 72°F^{23,47,53}. The nesting period lasts from 13 to 28 days^{29,58,74}. Timing of nesting, nest site selection, and nest building play an important role in sex



Female Blanding's Turtle laying eggs in a nest.
Photo by Gary Glowacki.



Hatchling Blanding's Turtle emerging from nest.
Photo by Gary Glowacki.

determination because turtles eggs that develop at a temperature below 78°F become male while those that develop above 86°F become female^{38,75}. Eggs incubated below 71°F will not survive³⁸. Pregnant females will make long, multiple day, meandering migrations to nesting sites, often temporarily stopping in smaller wetlands for refuge along the way^{5,10-12,14,25,29,43,58,64}. Turtles commonly cross roads during these migrations¹⁹. Females have been observed using the same nesting site year after year^{26,29,64}, but may use newly available nesting habitat²⁵. Females have also been observed using shared nesting areas^{10,64}.

Most often nesting begins in the evening from 7–11 p.m. and lasts eight hours^{10,29,30,32}. The female will dig a depression about 5 inches deep with her hind legs, lay eggs in the nest, replace and compact the excavated material with her hind feet, and move away from the nest¹⁰. The nesting attempt may be abandoned and attempted another night, especially if an immovable object is encountered while digging^{10,12,29,30,32}.

Nest predation can be very high at 15–100%, especially in developed areas that support high populations of predators, such as raccoons^{11,27,53,54,76-78}. Protected nests in northeast Illinois had a much higher hatching rates, around 78%⁵⁴.

Eggs incubate 49–128 days depending on the temperature and emerge late August to October in mid-morning to afternoon^{5,10,29,38,53,79}. A single clutch will typically hatch within 1–2 days, but hatching can span as many as 11 days²⁹. Upon emergence hatchlings visually orient towards dark horizons, such as the wooded edges of a wetland as far as 0.2 miles

away^{80,81}. Hatchlings will often use temporary wetlands, terrestrial depressions, and terrestrial cover for a few hours to days before moving to permanent wetlands^{5,10,79,82–84}.

Blanding's Turtles typically enter winter dormancy between mid-September and October, sometimes as late as December, when water temperatures drop to 50–55°F^{10,11,56,58,66}. Typically, they will spend winter partially buried in wetlands, below ice if present^{11,85}. Blanding's Turtles exhibit high fidelity to wintering sites and multiple turtles often overwinter in the same wetland^{11,19,23,85}. They are capable of enduring freezing and oxygen depletion⁶⁶. Occasionally Blanding's Turtles, especially hatchlings, have been observed to overwinter on land^{6,58,83,84}.

Population dynamics

Blanding's Turtles are long-lived (>70 years) with delayed maturity (at 14–20 years old) and have low reproductive output (4 female eggs per year)^{1,5,7,53,72,74,77,86}. Nesting frequency is variable with females reproducing in 33–80% of years^{29,30,61,74,77}. Females produce a maximum of one clutch per year typically with 10–14 eggs, but as many as 18 eggs^{10,29,30,54,61}. In addition, survival from egg to one year tends to be low (7–26%) and variable^{53,74,77}.

The Blanding's turtle's life history strategy requires high juvenile survival rates (around 78%) and very high adult survival rates (around 94%) to maintain a viable population⁷⁷. Slightly lower adult survival (<90%), common in many populations, causes populations to decline^{53,62,73}. Population models have demonstrated that in terms of population growth rates the importance of a single mature female is equivalent to more than 90 female eggs⁸⁷.

Population age structure can indicate population growth patterns⁸⁸, and population models have shown that a stable Blanding's Turtle population will have a 3.5:1 ratio of juveniles to reproductive adults⁸⁷. Many Blanding's Turtle surveys have found populations with lower numbers of juveniles^{10,30,45,53,73}. This may indicate low nest and juvenile survival or it may be the result of biased survey efforts^{22,88,89}.

Populations with more of one sex relative to the other can be a conservation concern as sex bias reduces the effective population size and may lead to inbreeding and fewer offspring⁹⁰. Male-biased populations may

be due to the higher risk of road mortality to females on long distance nesting forays, while female-biased populations may be due to warmer nesting environments increasing the number of female offspring⁹¹. Non-biased, male-biased, and female-biased Blanding's Turtle populations have all been documented^{45,53,62,72,83,88}.

Community associations

Community associations include marsh, pond, sedge meadow, wet prairie, prairie, grassland, savanna, and woodland assemblages. The species composition of these assemblage varies across Blanding's Turtle range⁷. Predators of Blanding's turtles include raccoons, skunks, opossums, foxes, mink, and coyotes⁷⁸.

Other Species in Greatest Conservation Need (SGCN) that are found in marshes include: spotted turtle (*Clemmys guttata*), Kirtland's snake (*Clonophis kirtlandii*), smooth greensnake (*Opheodrys vernalis*), eastern massasauga (*Sistrurus catenatus*), buff-breasted sandpiper (*Tryngites subruficollis*), Wilson's phalarope (*Phalaropus tricolor*), American bittern (*Botaurus lentiginosus*), least bittern (*Ixobrychus exilis*), Wilson's snipe (*Gallinago delicatata*), common gallinule (*Gallinula chloropus*), yellow rail (*Coturnicops noveboracensis*), king rail (*Rallus elegans*), black rail (*Laterallus jamaicensis*), sandhill crane (*Grus canadensis*), whooping crane (*Grus americana*), black tern (*Chlidonias niger*), Forster's tern (*Sterna forsteri*), pied-billed grebe (*Podilymbus podiceps*), marsh wren (*Cistothorus palustris*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*)⁹².

Conservation and Management

Threats

The greatest threat to Blanding's Turtle populations is habitat loss and fragmentation, and the associated increase in road mortality and predation. Additional threats, such as collection, disease, climate change, invasive species, and pollution are lesser concerns. Between 2003 and 2014, the State of Illinois authorized the "taking" of Blanding's Turtle 14 times for residential, recreational, and commercial development, road construction, bridge replacement, wind farm construction, and electric transmission line maintenance (see Regulations section).

Habitat loss

Blanding's Turtle habitat loss and fragmentation has been extensive. In Illinois between the 1780s and 1980s, 85% of wetland acreage and 99% of prairie acreage was lost, primarily for agricultural production⁹³. Among the 32 Illinois counties with verifiable Blanding's Turtle records, the human population increased 325% between 1900 and 2000, from 3 million to 9.8 million²⁷. Increasing human populations and expanding urban development are reducing Blanding's Turtle habitat.

Only 7% of the area where Blanding's turtles have been observed is protected in the Illinois Nature Preserve system, and 37% is within "conservation lands"^{56,94}. "Conservation lands" are those recognized by federal, state and local government and private land holders as having a conservation purpose, but may include areas such as baseball diamonds⁹⁴.

Although numerous protected areas include Blanding's Turtle wetland habitat, the full extent of their habitat, such as upland nesting areas and travel corridors, often is not protected. An analysis of the 28 most frequently observed Illinois Blanding's Turtle populations revealed that only 13% of the wetlands and adjacent land (650 ft wetland buffer), where most nesting occurs, were protected in the Illinois Nature Preserve system, and only 3% of the area encompassing all adult activity (1.25 mi wetland buffer) was protected²⁷.

Roads and Rails

One of the largest concerns for Blanding's Turtle populations is road mortality, which is considered to be the largest source of adult mortality. Blanding's Turtles are more susceptible to road mortality than

other turtle species due to their long distance movements. An unsustainable annual rate of 5% road mortality has been estimated for the Great Lakes-Big Rivers Region, including Illinois⁹⁵. In one northeast Illinois population, road/rail mortality was responsible for loss of 11% of the population from 2002 to 2006⁹⁶. Injuries from vehicles are the most common injury treated by wildlife rehabilitation facilities in northeast Illinois.

Blanding's Turtles frequently cross roads and railways to access wetlands or nesting areas and may be drawn to roadsides as nesting areas^{10,19,25,97,98}. Although there is some evidence that Blanding's Turtles avoid crossing roads⁹⁹, the probability they will cross a road is higher the closer a road is to the center of its home range¹⁰⁰. Of turtles with home range centers within 0.12 miles of a road, 70–80% of turtles will cross a road, but less than 5% attempt to cross when the road is 0.6 miles away from the center of their home range¹⁰⁰. Unfortunately, in Illinois wetlands occupied by Blanding's Turtle and the adjacent land (0.12 mi buffer) contain on average 4.3 miles of road and 1.2 miles of railway, and the larger habitat area (0.6 mi buffer) that covers 87% of adult movements has on average 21 miles of roadway and 3 miles of railway²⁷. Furthermore, the likelihood of mortality increases with traffic volume, with more than 40% mortality per crossing attempt at traffic volumes $\geq 10,000$ vehicles per day¹⁰⁰. Road mortality may lead to population declines, but the full effect on the population may not be seen for decades due to Blanding's Turtle longevity⁴¹.

Predators

Another major concern is predation, especially of nests. Nest predation rates of 15–100% have been



Turtle killed while crossing railway. Photo by Gary Glowacki



Skunk predating a Blanding's Turtle nest. Photo by Gary Glowacki

observed^{11,27,53,54,76,77}. Raccoons and other meso-predators (medium-sized predators from the middle of the food chain) are especially abundant in developed areas where human sources of food and shelter are readily available and their natural predators are absent¹⁰¹⁻¹⁰⁴. In addition, higher nest predation rates have been observed when fur trapper harvest rates are low⁷⁷. Raccoon removal has temporarily reduced predation rates, but not eliminated predation from other predators⁷⁸. Domestic dogs may also contribute to predation⁷⁸. Most nest predation events occur within a few days after laying^{74,76}. Nests are detected by smell and the appearance of soil disturbance, and the concentration of nests due to habitat loss may further increase the chance of detection^{74,105}. Although infrequent, hatchling and adult turtles can also be predated and have been observed with missing limbs and shell injuries^{10,29,106}.

Habitat Degradation

Habitat degradation is also a threat to Blanding's Turtle populations. Forest succession and invasive species can increase vegetation cover that reduces heat input and basking opportunities in wetlands. Blanding's Turtles avoid wetlands that are filled in with cattails¹⁷. Agriculture, transportation infrastructure, urbanization, and storm-water management influence the quantity and quality of water flowing into and out of wetlands. Lowering the water level in a wetland during winter can be a threat to overwintering turtles¹⁰⁷. Dumping of garbage in Blanding's Turtle habitat has caused adult mortality⁵³.

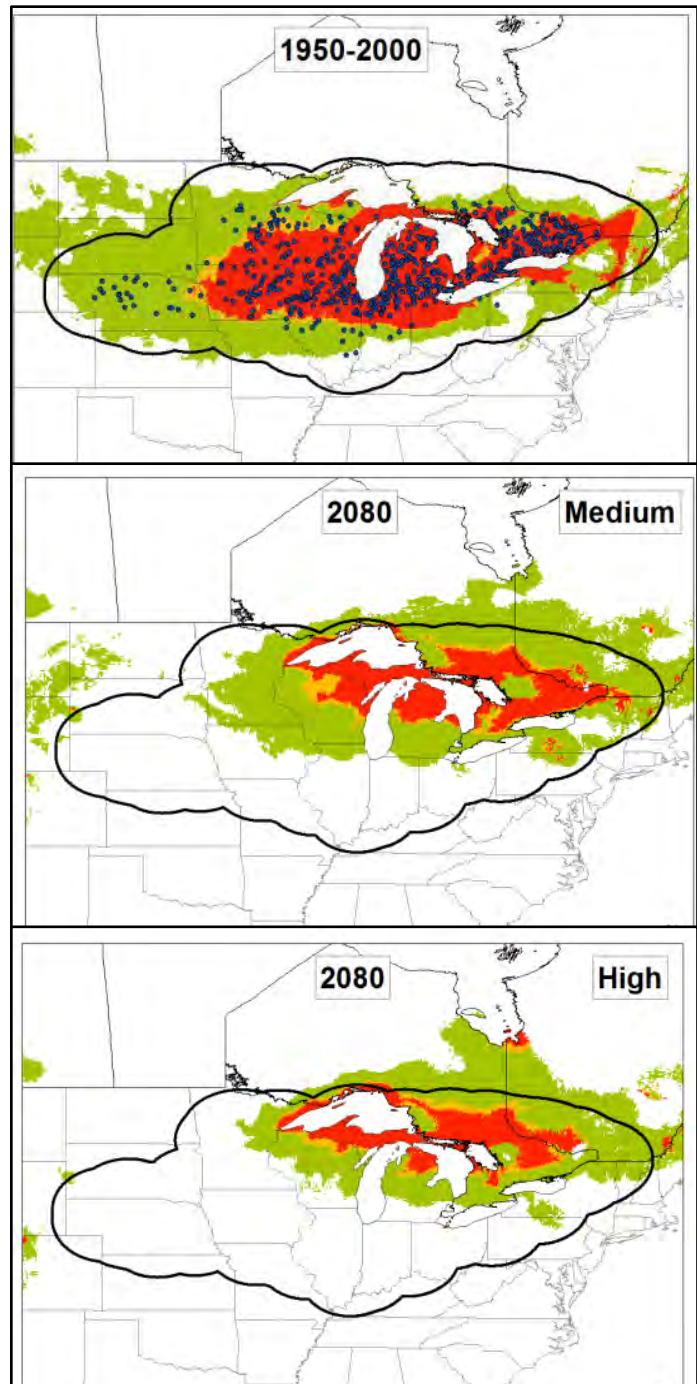
Nesting sites can also be degraded by vegetation encroachment, which eliminates bare soil, alters the incubation temperature, increases predation rates, and prevents hatchling emergence when nests become "root bound"^{5,76}. Altered landscape composition may reduce hatchling survival, as upon emergence they cue to dark horizons, which may no longer indicate suitable habitat, and put them at greater risk of mortality⁸⁰. Nests in disturbed areas are at risk of additional disturbance by garden tools, farm machinery, road graders, and other motor vehicles. Turtle mortalities can result from the flooding of nesting sites²⁹. Mowers and farm equipment can kill adult turtles¹⁰⁸.

Although collection of Blanding's Turtles is prohibited, it is a common concern of land managers

in Illinois²⁷, and collection by hobbyists or visitors has occurred in northeast Illinois populations⁵³.

Climate Change

The sensitivity of Blanding's Turtle to climate change is not clear. It has been described as both moderately vulnerable and highly sensitive to climate change depending on the scale of analysis and risk factor considered¹⁰⁹⁻¹¹¹. One study described Blanding's Turtle as physiologically vulnerable to climate



Current (top) and projected 2080 (middle and bottom) climatic suitability for Blanding's Turtle based on a current records and medium (middle) and high (bottom) emission levels. Black dots are occurrence records, red indicates maximum evidence for suitability, and green indicates minimal evidence for suitability¹⁰⁹.

change¹¹¹. Another study found that as little as 15% of Blanding's Turtle current range is projected to remain climatically suitable over the next several decades, mostly due to changes in mean annual temperature and annual precipitation¹⁰⁹. The already highly fragmented nature of Blanding's Turtle habitat reduces the potential for climate related migration should current habitats become unsuitable¹¹⁰. Altered wetland hydrology may change habitat suitability and lead to increased movement and risk of road mortality^{20,27}. As rainfall events are projected to become more extreme, there may be an increased risk of nest flooding. Warmer nest temperatures result in development of female turtles, which could lead to sex-bias populations⁹¹.

Loss of Genetic Diversity

Loss of genetic variation can be a conservation concern, especially for small, isolated populations. Long lived species, such as Blanding's Turtles, may breed with offspring causing inbreeding depression, and small population sizes can cause genetic drift. Indeed, the high number (48%) of inviable eggs found in one Illinois population may be the result of inbreeding¹¹², and the infrequent occurrence of multiple paternity and highly skewed reproductive success among males in another Illinois population⁵⁹ may indicate critically low population density. The long-generation time of Blanding's Turtle is expected to buffer against rapid loss of genetic variability and available data show that genetic variation in Illinois populations (0.57 average heterozygosity) is similar to the overall population (0.59 average heterozygosity), but long term projections show declining genetic diversity^{27,113}. Some Illinois Blanding's Turtle populations are genetically differentiated from each other (Lake vs Grundy Counties), indicating limited migration and exchange of genes between populations¹¹²⁻¹¹⁴. To prevent the loss of genetic diversity and maintain fitness in the long term, it may be necessary to manage for the exchange of genetic material.

Pollution

Although not specific to Blanding's Turtle, there is concern about the impacts of chemical, light, and sound pollution on turtles. Chemical contaminants, such as PCBs, organochlorine pesticides and dioxins, are known to accumulate in turtles¹¹⁵⁻¹¹⁷. The proximity of rails, roads, and pipelines to Blanding's Turtle habitats makes hazardous material spills an

ongoing threat. Artificial lighting may interfere with turtle orientation and sound may inhibit hatchling movements¹¹⁸.

Disease

Although evidence for emerging infectious disease among Blanding's Turtles in Illinois is lacking, this is a potential risk¹¹⁹.

Regulations

In Illinois, it is illegal to "take" any threatened or endangered animal, such as Blanding's Turtle. "Take" of listed species, defined as "to harm, hunt, shoot, pursue, lure, wound, kill, destroy, harass, gig, spear, ensnare, trap, capture, collect, or attempt to engage in such conduct", is prohibited by the Illinois Endangered Species Protection Act: <http://ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1730&ChapterID=43>

The IDNR Impact Assessment Section reviews proposed actions to assess potential impacts to listed species, using their online tool EcoCAT: <http://dnr.illinois.gov/ecopublic/>

IDNR can authorize the taking of listed species that is incidental to otherwise lawful activities. To receive Incidental Take Authorization, one must prepare a conservation plan and notify the public of the impact. See: <http://www.dnr.illinois.gov/conservation/NaturalHeritage/Pages/IncidentalTakeAuthorization.aspx>

Research, handling, possession, and management of listed species require IDNR permits, including a Scientific Collector Permit and an Endangered and Threatened Species Possession Permit, as well as additional site permits if activities take place on IDNR land or a protected Illinois Nature Preserve Commission site: <http://www.dnr.illinois.gov/conservation/NaturalHeritage/Pages/ResearchPermits.aspx>. Risks and impacts of methods on the species survival must be weighed against the benefits to justify the activity.

Species Conservation Goal

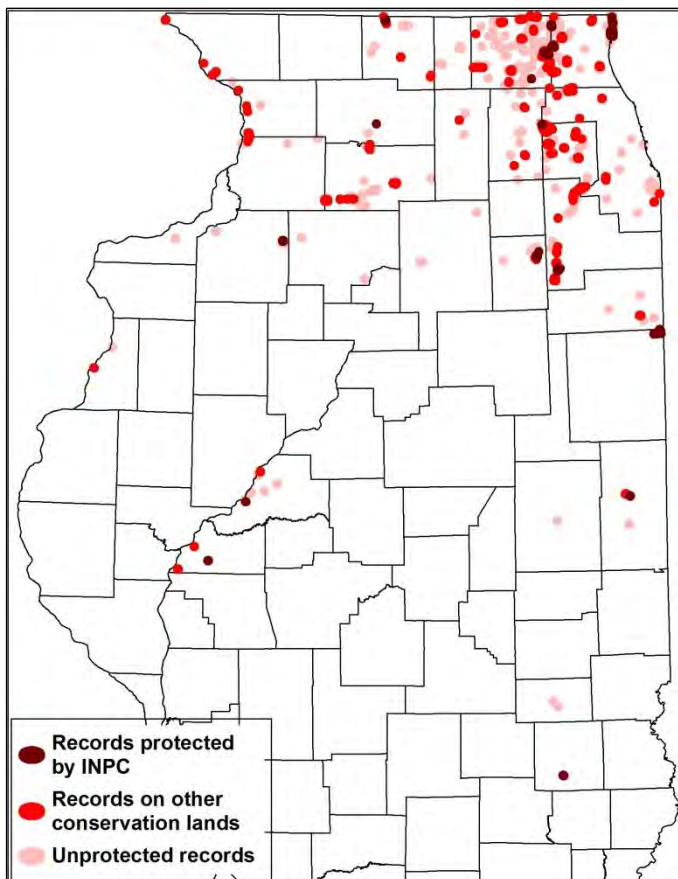
The "Illinois Conservation Assessment for the Blanding's Turtle" recommended a state-wide goal for the Blanding's Turtle population of at least 1500 adults over 40 years²⁷. The population should include at least ten populations each exceeding 50 adults at

protected sites, and together total at least 750 adults distributed across at least 3 geographic units and exhibit natural recruitment²⁷.

Conservation Efforts

The longevity of Blanding's Turtle enables individuals to persist long after populations are no longer viable. This longevity and delayed maturity provide time for conservation actions but means that recovery efforts may take decades or centuries. The "Illinois Conservation Assessment for the Blanding's Turtle" has identified actions necessary for recovery including monitoring, habitat protection and enhancement, and reduction of road mortality and predation rates²⁷.

The Illinois Nature Preserve Commission has dedicated 56 nature preserves and land and water reserves that protect Blanding's Turtle habitat⁵⁶. Blanding's turtle habitat conservation is also achieved through other types of conservation land such as federal wildlife refuges and county conservation districts⁹⁴ (see map). Although not specifically targeting Blanding's Turtles, there are a number of



Blanding's Turtle records from the Illinois Natural Heritage Database found on INPC sites (dedicated Nature Preserves and Land and Water Reserves), other "conservation lands" as identified by Ducks Unlimited, and non-conservation lands^{94,148}.

government-supported wetland conservation programs to assist private landowners in conservation (See <http://dnr.state.il.us/wetlands/ch5a.htm>).

Forest preserve districts are conducting on-site protection of nests with wire mesh and off-site protection of eggs collected from pregnant females to increase hatching rates (67% and 78% hatching rate respectively, compared to unprotected nests 23%)^{53,54}. In Lake County, control of predators through trapping has reduced nest predation^{54,78}. The Forest Preserve Districts of DuPage and Lake Counties, and the McHenry County Conservation District have experimented with head-starting (rearing of hatchlings to improve survival rates), which has demonstrated an annual juvenile survival rate of 66%⁵³. However, there is some concern about the possibility of creating a sex-bias population, the potential to alter behavior, and the effects of repeated use of oxytocin to induce egg laying in pregnant females^{31,120}. Vegetation management has also been used to maintain and improve Blanding's Turtle habitat.

Population modeling has revealed the relative importance of adult survival⁸⁷. Although protection of nests or head-starting may delay the loss of populations, the population will continue to decline unless adult survival is also improved⁵³.

Survey Guidelines

Monitoring for trends

A long term monitoring program is needed to identify population trends. A mark recapture approach should be used to enable estimation of population size and survival and recruitment rates. A standardized monitoring protocol has been developed for Blanding's turtle in the Northeast region of the USA and may serve as a model.

Surveys for presence

Surveys to determine presence or absence should include hoop traps and visual surveys. Baited hoop trap surveys should be conducted in mid-May to July by a permitted biologist. Traps should be set in the best habitat available. Trapping success is highest when water temperature is warmer and on days with cloud cover less than 60%^{53,121}. Capture rates vary between 0.02 and 0.1 captures per trap night and affect the amount of survey effort necessary to conclude absence to any degree of certainty (see table)^{54,121}. Detection rate varies with habitat and

population, and will be lowest at locations with fewer individuals.

The number of trap-nights necessary to determine presence or absence to various degrees of certainty depends on the detection rate.

	Low detection rate	Average detection rate	High detection rate
Trap-nights	<i>0.02</i>	<i>0.05</i>	<i>0.1</i>
27	42%	75%	94%
45	60%	90%	99%
100	87%	99%	99%

Note: Trap-night recommendations should be applied to 0.6 miles of linear shoreline habitat or 15 acres of wetland habitat.

Visual surveys for basking turtles should also be conducted to increase detection. Surveys should take place in March and April after ice-off when air temperatures reach at least 50°F¹²². While walking the shorelines of potential overwintering sites, surveyors should use binoculars to scan basking sites within 20 feet of the shoreline. At a minimum, 6 hours of surveying should be conducted per site, on at least 3 different days (3 days at 2 hours each), while it is sunny with calm to moderate winds. Additional methods, such as basking traps, funnel traps, dip nets, seines, and drift fences, may increase the chance of detection. Alternatively, new methods are being developed to use environmental DNA to detect Blanding’s Turtles presence in a wetland, which may prove more cost effective than field surveys¹²³.

Monitoring for impacts

Surveys to monitor impacts of habitat alterations, such as habitat restoration and Incidental Take Authorization, should assess changes in population size, survival, and recruitment. Monitoring should follow a before-after-control-impact design^{124,125}. A variety of trap sizes and types should be used across different habitats to capture adults, juveniles, and hatchlings^{53,126}. Each captured turtle should be marked with identifying notches along the edge of its shell or PIT tagged (Passive Integrated Transponder) to identify recaptures. Methods, such as radio telemetry, camera traps, nest monitoring or road mortality monitoring, may be useful for identifying specific

impacts and may strengthen the conclusions of monitoring.

Stewardship recommendations

Areas known or suspected of supporting Blanding’s Turtle populations should be managed to maintain suitable habitat¹²⁷. Wetland management for Blanding’s Turtles should focus on maintaining, enhancing and restoring habitat features such as emergent and submerged vegetation, open water areas, basking areas, such as logs in or around the wetland, and deep muck substrates⁸. Management should include monitoring site hydrology and preventing alteration of natural water level fluctuation and drainage patterns. Water quality should also be monitored to ensure pollution, such as from road, lawn, or agriculture run-off, does not impose a threat. Natural shorelines should be maintained, and garbage that has accumulated should be removed. Aquatic invasive species should be controlled to prevent the loss of open water habitat.

Upland habitat management should focus on providing large nesting areas and travel corridors between wetlands. Nesting areas may need to be created or maintained to provide open areas with well-drained, friable soil near wetlands²⁵. If maintenance is necessary to maintain open, friable soil conditions, tilling is preferred to mowing or weeding³³. Restoration of upland nesting habitat that increased the distance to forest edge resulted in increased population growth and decreased nest predation in Wisconsin⁷⁶. Turtle nesting mounds can be built but they may require nest protection to prevent predation¹²⁸. Upland habitat may require woody or invasive species control to maintain suitable, open areas¹²⁷. Burning, mowing, or tilling to maintain suitable conditions should occur between November and March¹²⁹. Mechanical and chemical removal of vegetation should follow INPC stewardship guidelines (<http://www.dnr.illinois.gov/INPC/Pages/INPCManagementGuidelines.aspx>). To increase adult survival managers should identify travel corridors among wetlands and nesting sites and mitigate barriers and threats. Fencing or curbing can be used to prevent turtles from entering hazardous areas.

To reduce nest predation managers can protect nests and/or reduce predator abundance. To protect nests on-site, female Blanding’s Turtles should be monitored for nesting movements (e.g., via

Avoidance, Minimization, Mitigation

Avoidance measures

It is difficult to ensure complete avoidance of Blanding's Turtles due to their use of all habitat types and long distance movements. To avoid all potential impacts work should occur more than 1.2 miles from an occupied wetland⁵⁷.

Minimization measures

Spatial and temporal efforts

The farther an impact occurs from occupied wetlands, the lower the impact will be. Development that occurs more than 0.6 mi from an occupied wetland may avoid nearly all nesting sites and most of adult turtle activity⁵⁷. Development more than 0.2 mi away may avoid impact to most nest sites (around 90%) but may still have an impact on adult activity⁵⁷. Development siting should avoid bisecting wetland complexes and travel corridors.

Wetlands should not be drained, dredged, deepened, or filled, but, if necessary, these activities are best conducted during between April and September when turtles can emigrate¹⁰⁷. Replacement wetlands should be made available to emigrating turtles with fencing to guide them prior to these activities. Upland work should be conducted during the overwintering period (November to March). Impacts to nesting areas should never occur from June to September.

Compatible design

Development designs should be compatible with continued Blanding's Turtle occupation and survival by incorporating natural landcover and Blanding's Turtle's habitat needs. Wetland impoundments should be designed to be suitable Blanding's Turtle habitat including natural shorelines and no use of riprap or retaining walls (see habitat section above)⁷⁹. Water control structures should be designed to allow for turtle movement and to prevent trapping of turtles. Artificial nesting areas that receive regular management should be included in designs (see stewardship section)³³. Wetlands and adjacent areas should remain un-mowed March to October¹⁰⁸. Artificial lighting should be minimized, reduced in intensity, and directed away from habitat¹³⁵.

Turtle travel corridors should be created to allow for movement among wetlands and nesting areas. Curbing

radiotelemetry) to locate nests; then following deposition, nests should be covered by wire mesh (2 ft diameter) and uncovered at the beginning of August^{32,34,53,79}. Electric fencing has also been used to protect nests on-site¹³⁰. On-site nest protection has been shown to decrease predation rates³⁴. In addition, meso-predator populations should be monitored and managed, and efforts should be made to eliminate human sources of food and shelter for them^{78,131}. Trapping may be necessary, especially before and during the nesting season. Three years of raccoon removal increased nest success from 8% to 69% in one Illinois population^{54,78}. However, meso-predator populations tend to rebound quickly, so control efforts need to be recurrent and cover a large area to have an impact on meso-predator abundance¹³².

Because some reptile populations may harbor infectious diseases, it is important to decontaminate prior to moving between wetland sites¹³³. Decontamination requires washing and disinfecting all equipment, boots, and waders with a bleach solution or other disinfectant. Anyone working with this species should follow the decontamination guidelines of NEPARC¹³⁴:

http://www.northeastparc.org/products/pdfs/NEPARC_Pub_2014-02_Disinfection_Protocol.pdf

Adjacent land owners and local residents should be informed of the presence and sensitivity of Blanding's Turtles and of practices that they can perform to support Blanding's Turtle survival, such as nest site creation/protection, elimination of meso-predator resources, conscientious driving, and confining pets.



Nest protection cage placed after egg deposition to prevent predation. Photo by Gary Glowacki



Reptile exclusion fencing. Photo credit Baxter-Gilbert 2015¹⁴⁰.

and barriers may prevent turtles from entering hazardous areas but allow them to leave. One-way "turtle curbs," which are gradual on the road side to allow turtles to leave roadways but are steep barriers on the other side, can discourage turtles from entering busy roadways¹³⁶.

New and existing roads and railways, especially those bisecting habitat, should be designed or retrofitted with safe passage systems¹³⁷. Turtles have been observed using safe passage ways and will follow barriers/fencing that direct them to these crossings^{97,138,139}. Although there is limited information on the effectiveness of passage systems, one safe passage system was found to greatly reduce road mortalities, while another failed to reduce road mortalities after numerous gaps developed in the barrier fencing, highlighting the importance of design and maintenance^{140,141}.

General safe passage system guidelines have been developed¹⁴². Barrier fencing should extend half a foot underground and at least two feet aboveground with an overhang to prevent some species from climbing



Spotted turtle using a railroad crossing structure in Massachusetts. Photo credit Pelletier et al. 2006¹⁴⁶

over and entering the roadway^{138,139}. Although wire mesh or plastic fencing may be used, it will require considerable amounts of maintenance to be effective; a concrete wall or steel barrier will be longer lasting and may be more effective¹⁴⁰.

In general, the effectiveness of passageways depends on their openness and light permeability^{143,144}. Openness is defined as (height x width)/length of the culvert or passage. An openness of at least 0.82 should be maintained^{143,145}. Bridges are preferred to culverts due to their natural open conditions¹²⁴. Flat-bottomed or elliptical culverts are ideal, and "skylights" can be used to increase light permeability. Blanding's Turtles have used culverts with variable bottom substrates, but logs and natural materials in the culvert may encourage use¹³⁸. Railroad passages can be made by allowing for gaps between adjacent rail ties (see photo)¹⁴⁶. Passageways should be located in the best travel corridor, often low-lying areas between wetlands^{138,139}. Costs of passageways vary widely, from \$3,000 to \$375,000¹⁴². Slower speed limits and rerouting of heavy traffic may also reduce road mortality rates. Turtle crossing signs have been used to inform motorists of crossing turtles, but the benefits are questionable¹⁴⁷.

Construction practices

Construction and maintenance practices should be sensitive to impacts to turtles and their habitats. Clearing of native vegetation should be limited. Staging areas should be located far from sensitive areas. The area impacted should be reduced as much as possible, and areas that are not to be disturbed should be flagged or fenced to alert construction personnel. Debris and excess materials should be removed and properly disposed. Erosion and sediment controls should be strictly implemented, monitored, and maintained for the duration of the project. Erosion control measures should be turtle safe, such as loosely woven, natural-fiber erosion control matting and native vegetation. Avoid using erosion control products that are made with welded plastic mesh or webbing. All project personnel should be informed of the sensitive nature of the project and notified of the proper procedures to follow if a turtle is found.

Silt fencing should be used to keep Blanding's Turtles from entering active construction sites. Trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.

Relocating adult turtles should be avoided whenever possible, but when necessary to move them out of dangerous areas, they should be moved by an IDNR authorized person to the closest safe location in the direction that they are moving.

Mitigation and Conservation Opportunities

Mitigation opportunities include protection, stewardship, and restoration of Blanding's Turtle habitat and research to inform conservation. Mitigation practices have included: habitat protection through conservation easement, wetland and upland habitat restoration, habitat stewardship through vegetation management, prescribed burning, native plantings, creation of nesting areas, predator control, public outreach, and compensatory payment to IDNR to support species conservation.

Protection

Unprotected and inadequately protected Blanding's Turtle populations should be first priority for habitat protection. Nine of the 28 most frequently observed populations have no protection in the Illinois Nature Preserve Commission system²⁷, and only three of these occur on other types of conservation land^{94,148}. Site protection should consist of both wetland habitat and surrounding 1.2 mi of upland habitat⁵⁷. In addition, protection of sites that are adjacent to occupied habitat and corridors will improve connectivity and increase the long term survival of those populations.

Land protection may consist of acquisition or conservation easement. Acquired land could be donated to a conservation agency or local conservation organization. Conservation easements may provide a level of protection without acquisition. Illinois Nature Preserves Commission permanently protects high quality areas and habitat for listed species on both private and public lands in the Illinois Nature Preserve System. Conservation easements on agricultural land can also protect habitat through retirement of farmed and previously converted wetlands. Conservation organizations that are active in the Blanding's Turtle Illinois range may be interested in partnering on conservation efforts and may be identified through the Prairie State Conservation Coalition (<http://www.prairiestateconservation.org>).

Stewardship

Beyond protection of Blanding's Turtle habitat, there is considerable stewardship work that could be done as mitigation to maintain habitat that is already protected, reduce adult mortality, and increase hatching rates (See stewardship recommendations section). Blanding's Turtle habitat stewardship opportunities exist on state-owned property, various forest preserve/conservation districts, and private properties.

Restoration

Upland and wetland habitats can be restored on undeveloped and agricultural land. It is expected that because Blanding's Turtles use a diversity of wetlands in habitat complexes, the addition of constructed wetlands and upland habitat will further increase the diversity and availability of resources and potentially reduce the distances they move across the landscape⁸. Blanding's Turtles have been observed using constructed wetlands seasonally for basking and foraging⁸. Constructed wetlands should aim to mimic suitable habitat conditions (see habitat section). Unfortunately, constructed wetlands tend to be warmer, drier, and have less cover and muck than Blanding's Turtle suitable habitat⁸. If habitat destruction will be followed by restoration, sediment and vegetation can be saved from the original wetland to produce comparable conditions¹³⁶. The "Illinois Wetland Restoration and Creation Guide" may provide guidance for restoring the wetland portion of Blanding's Turtle habitat¹⁴⁹.

The Natural Resource Conservation Service (NRCS) provides practice standards and estimated costs on various conservation practices that may be of benefit to Blanding's Turtles. Restoration of wetlands by removing or disabling drainage tiles (NRCS practice 657 and 649) costs an estimated \$600/ac. Creating wetlands (NRCS practice 643 and 658) costs an estimated \$1800–4500/ac. Maintaining suitable open nesting habitat (NCRS practice 647) costs an estimated \$100/ac.

Research needs

How viable are Blanding's Turtle populations across Illinois?

- Determine occupancy, survival, and recruitment rates for various populations across Illinois, especially northwestern and central populations.

How much suitable habitat is available to Illinois populations and what are the habitat limitations?

- Conduct a GIS analysis of Blanding's turtle records, land cover, roadway, and railway layers to identify habitats that are most likely to sustain populations in the long term and identify key barriers to connectivity that may be modified.

How do habitat needs and threats differ between juvenile and adult Blanding's Turtles?

- Assess habitat use, survival rates, and sampling bias between adults and juveniles.

How beneficial are safe passage systems to Blanding's Turtle?

- Compare movement, survival rates, and genetic exchange among various travel corridors.

What are the effects of light and noise pollution on Blanding's Turtle?

- Determine if hatchling or nesting turtles are attracted to artificial light and if certain lighting characteristics are more important than others.

What are the long-term effects of ex situ nest protection and head-starting?

- Compare the fitness of wild born and head-started Blanding's turtles.

How can genetic diversity be maintained across Illinois Blanding's Turtle populations?

- Assess population genetic structure in central and northwestern Illinois, identify gene flow limitations, and develop a genetic management plan.

Additional information

Species profiles

- <http://explorer.natureserve.org/servlet/NatureServe?searchName=Emys+blandingii>
- http://www.inhs.illinois.edu/collections/herps/data/ilspecies/em_blandin/

Conservation assessments

- http://niu.edu/biology/_pdfs/rking/Illinois-Blandings-Turtle-Conservation-Assessment-FINAL-25-Feb2013.pdf
- http://www.mwparc.org/products/blandings/Blandings_Turtle_Conservation_Assessment_2010_FINAL.pdf

Habitat management

- <http://www.mwparc.org/products/habitat/MWHMG-Full.pdf>

References

1. NatureServe. *NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1.* (2015).
2. Van Dijk, P. P. & Rhodin, A. G. J. *Emydoidea blandingii*. *The IUCN Red List of Threatened Species*. e.T7709A12, (2013).
3. Phillips, C., Brandon, R. & Moll, E. *Field guide to amphibians and reptiles of Illinois*. (Illinois Natural History Survey, Manual 8, 1999).
4. Harding, J. H. *Amphibians and Reptiles of the Great Lakes Region*. 378 (University of Michigan Press, 1997).
5. Congdon D., J. & Keinath A., D. *Blanding's Turtle (Emydoidea blandingii): a technical conservation assessment*. (2006). doi:10.2307/1437255
6. Conant, R. *Reptiles of Ohio*. (The American Midland Naturalist, University of Notre Dame, Indiana, 1951). doi:10.1017/CBO9781107415324.004
7. Congdon, J. D. *et al.* *Emydoidea blandingii* (Holbrook 1983) - Blanding's Turtle. *Chelonian Res. Monogr.* **5**, (2008).
8. Hartwig, T. S. & Kiviat, E. Microhabitat association of Blanding's Turtles in natural and constructed wetlands in southeastern New York. *J. Wildl. Manage.* **71**, 576–582 (2007).
9. Anthonysamy, W. J. B., Dreslik, M. J., Mauger, D. & Phillips, C. A. A preliminary assessment of habitat partitioning in a freshwater turtle community at an isolated preserve. *Copeia* **2014**, 269–278 (2014).
10. Sajwaj, T., Pieprgras, S. A. & Lang, J. W. *Blanding's Turtle (Emydoidea blandingii) at Camp Ripley: critical habitats, population status, management guidelines*. (Final Report to Minnesota Department of Natural Resources Nongame Wildlife Office, 1998).
11. Ross, D. A. & Anderson, R. K. Habitat use, movements, and nesting of *Emydoidea blandingii* in central Wisconsin. *J. Herpetol.* **24**, 6–12 (1990).
12. Refsnider, J. M. & Linck, M. H. Habitat use and movement patterns of Blanding's turtles (*Emydoidea blandingii*) in Minnesota, USA: A landscape approach to species conservation. *Herpetol. Conserv. Biol.* **7**, 185–195 (2012).
13. Ontario Ministry of Natural Resources. *General habitat description for the Blanding's Turtle (Emydoidea blandingii)*. 7 (2013).
14. Beaudry, F., deMaynadier, P. G. & Hunter, M. L. Identifying road mortality threat at multiple spatial scales for semi-aquatic turtles. *Biol. Conserv.* **141**, 2550–2563 (2008).
15. Hamernick, M. G. Home ranges and habitat selection of Blanding's Turtles (*Emydoidea blandingii*) at the Weaver Dunes, Minnesota. (Saint Mary's University, Winona, Minnesota, 2000).
16. Bury, R. B. & Germano, D. J. Differences in habitat use by Blanding's Turtles, *Emydoidea blandingii*, and Painted Turtles, *Chrysemys picta*, in the Nebraska Sandhills. *Am. Midl. Nat.* **149**, 241–244 (2003).
17. Kasuga, L. M. C. Small and large-scale landscape approaches for conservation of the imperiled Blanding's

- turtle, *Emys blandingii*. 112 (Iowa State University, 2007).
18. Edge, C. B., Steinberg, B. D., Brooks, R. J. & Litzgus, J. D. Habitat selection by Blanding's Turtles (*Emydoidea blandingii*) in a relatively pristine landscape. *Ecoscience* **17**, 90–99 (2010).
 19. Walston, L. J., Najjar, S. J., K.E. LaGory & Drake, S. M. Spatial ecology of Blanding's Turtles (*Emydoidea blandingii*) in southcentral New Hampshire with implications to road mortality. *Herpetol. Conserv. Biol.* **10**, 284–296 (2015).
 20. Anthonysamy, W. J. B., Dreslik, M. J. & Phillips, C. A. Disruptive influences of drought on the activity of a freshwater turtle. *Am. Midl. Nat.* **169**, 322–335 (2013).
 21. Sajwaj, T. & Lang, J. W. Thermal ecology of Blanding's Turtle in central Minnesota. *Chelonian Conserv. Biol.* **3**, (2000).
 22. Pappas, M. J. & Brecke, B. J. Habitat selection of juvenile blanding's turtles, *Emydoidea blandingii*. *J. Herpetol.* **26**, 233–234 (1992).
 23. Newton, E. J. & Herman, T. B. Habitat, movements, and behaviour of overwintering Blanding's turtles (*Emydoidea blandingii*) in Nova Scotia. *Can. J. Zool.* **87**, 299–309 (2009).
 24. Edge, C. B., Steinberg, B. D., Brooks, R. J. & Litzgus, J. D. Temperature and site selection by Blanding's Turtles (*Emydoidea blandingii*) during hibernation near the species' northern range limit. *Can. J. Zool.* **87**, 825–834 (2009).
 25. Frederic Beaudry, DeMaynadier, P. G. & Hunter, M. L. Nesting movements and the use of anthropogenic nesting sites by spotted turtles (*Clemmys guttata*) and Blanding's turtle's (*Emydoidea blandingii*). *Herpetol. Conserv. Biol.* **5**, (2010).
 26. Congdon, J. D., Pappas, M., Brecke, B. & Capps, J. Conservation implications of initial orientation of Naive hatchling Snapping Turtles (*Chelydra serpentina*) and Painted Turtles (*Chrysemys picta belli*) dispersing from experimental nests. *Chelonian Conserv. Biol.* **10**, 42–53 (2011).
 27. King, R. *Illinois conservation assessment for the Blanding's Turtle (Emydoidea blandingii)*. (Submitted to the Illinois Endangered Species Protection Board, 2013).
 28. Steen, D. a. *et al.* Terrestrial habitat requirements of nesting freshwater turtles. *Biol. Conserv.* **150**, 121–128 (2012).
 29. Standing, K. L., Herman, T. B. & Morrison, I. P. Nesting ecology of Blanding's turtle (*Emydoidea blandingii*) in Nova Scotia, the northeastern limit of the species' range. *Can. J. Zool.* **77**, 1609–1614 (1999).
 30. Banning, W. J. *Nesting ecology of the Blanding's Turtle, Emydoidea blandingii, at the Lockport Prairie Nature Preserve, Will County, Illinois*. 1–25 (Report to Illinois Department of Natural Resources, 2007).
 31. Congdon, J., Graham, T., Herman, T. & Lang, J. in *Conservation Biology of Freshwater Turtles and Tortoises* (Chelonian Research Foundation, 2008). doi:10.3854/crm.5.015.blandingii.v1.2008
 32. Spetz, J. C. Diet, habitat use, and reproduction characteristics in an ohio population of blanding's turtle (*Emydoidea blandingii*). (John Carroll University, 2008).
 33. Dowling, Z., Hartwig, T. S., Kiviat, E. & Keesing, F. Experimental management of nesting habitat for the Blanding's Turtle. *Ecol. Restor.* **28**, 154–159 (2010).
 34. Standing, K. L., Herman, T. B., Shallow, M., Power, T. & Morrison, I. P. Results of the nest protection program for Blanding's turtle in Kejimikujik National Park, Canada: 1987-1997. *Chelonian Conserv. Biol.* **3**, 637–642 (2000).
 35. Crother, B. *Scientific and standard English names of amphibians and reptiles of North America north of Mexico, with comments regarding confidence in our understanding*. (Society for the Study of Amphibians and Reptiles, 2012).
 36. Fritz, U., Schmidt, C. & Ernst, C. Competing generic concepts for Blanding's, Pacific and European pond turtles (*Emydoidea*, *Actinemys* and *Emys*)—Which is best. *Zootaxa* **2791**, 41–53 (2011).
 37. Nyboer, R. W., Herkert, J. R. & Ebinger, J. E. *Endangered and Threatened Species of Illinois: Status and Distribution, Volume 2- Animals*. 181 (Illinois Endangered Species Protection Board, 2006).
 38. Gutzke, W. & Packard, G. The influence of temperature on eggs and hatchlings of Blanding's Turtles, *Emydoidea blandingii*. *J. Herpetol.* **21**, 161–163 (1987).
 39. Midwest Partners in Amphibian & Reptile Conservation. *Blanding's Turtle (Emydoidea blandingii) Conservation Assessment Survey*. (2010).
 40. Illinois Endangered Species Protection Board. Minutes to the 139th meeting. (2008).
 41. Findlay, C. S. & Bourdages, J. Response time of wetland biodiversity to road construction on adjacent lands. *Conserv. Biol.* **14**, 86–94 (2000).
 42. Glowacki, G. *Blanding's Turtle recovery project: 2016 management plan*. 1–10 (Lake County Forest Preserve District, Wildlife Conservation Program., 2016).
 43. Rubin, C. S. Ecology and genetics of Blanding's Turtles in an urban landscape. (University of Illinois- Urbana-Champaign, 2000).
 44. Rubin, C. S., Warner, R. E., Bouzat, J. L. & Paige, K. N. Population genetic structure of Blanding's turtles (*Emydoidea blandingii*) in an urban landscape. *Biol. Conserv.* **99**, 323–330 (2001).
 45. Rubin, C. S., Warner, R. E., Ludwig, D. R. & Thiel, R. Survival and population structure of Blanding's Turtles (*Emydoidea blandingii*) in two suburban Chicago Forest Preserves. *Nat. Areas J.* **24**, 44–48 (2004).
 46. Thompson, D., Reklau, R. A., Augustine, R., Pawlicki, C. & Dosch, A. *Blanding's Turtle (Emydoidea blandingii) 2009 Program Summary*. (Forest Preserve District of DuPage County, 2010).
 47. Thompson, D., Reklau, R. A., Augustine, R., Nevis, J. & Dosch, A. *Blanding's Turtle (Emydoidea blandingii) 2010 Program Summary*. (Forest Preserve District of DuPage County, 2011).
 48. Dreslik, M. J., Banning, W. J., Schmidt, C. E., Noffke, L. & Phillips, C. A. *Spatial ecology of the Blanding's Turtle (Emydoidea blandingii) at Lockport Prairie Nature Preserve, Will County, Illinois*. **2007 (12)**, (Illinois Natural History Survey Technical Report, 2007).
 49. Dreslik, M. J., Banning, W. J. & Kirk, D. *Population biology of the state endangered Blanding's Turtle*

- (*Emydoidea blandingii*) at Goose Lake Prairie State Natural Area. (INHS Technical Report 2010 (11):1-50, 2010).
50. Dreslik, M. J., Banning, W. J., Marioni, N. & Phillips, C. A. *Monitoring of the Blanding's Turtle (Emydoidea blandingii) at the I-355 Des Plaines River Bridge Crossing*. (INHS Technical Report 2010 (3):1-237., 2011).
 51. Kuhns, A., Benda, C. D., Dreslik, M. J. & Phillips., C. A. *Annual Report 2005: Status of Blanding's Turtles in Lake County Forest Preserve District and feasibility of initiating a head-starting program at Rollins Savanna*. (Report to Lake County Forest Preserve District. INHS Technical Report 2006(3): 1-55., 2006).
 52. Kuhns, A., Banning, W. J., Dreslik, M. J. & Phillips., C. A. *Ecology of the state threatened Blanding's Turtle, Emydoidea blandingii, in the Chicago Wilderness Area*. (Report to Chicago Wilderness. INHS Technical Report 2007 (23): 1-115 +ii., 2007).
 53. Kuhns, A. R. *Recovery of the Blanding's Turtle (Emydoidea blandingii) at Spring Bluff Nature Preserve, Lake County forest preserves*. INHS Technical report 2010(38) 1-40 (2010).
 54. Glowacki, G. *Blanding's Turtle recovery program: 2015 summary report*. 1–38 (Lake County Forest Preserve District, Blanding's Turtle Recovery Program., 2015).
 55. Kasuga, L. M. C. & Janzen, F. J. *Home range size, movement and habitat use for a population of Blanding's Turtles (Emys Blandingii) in the Upper Mississippi River National Fish and Wildlife Refuge*. (Report to Illinois Department of Natural Resources, 2008).
 56. Illinois Department of Natural Resources. Natural Heritage Biotics 5 Database. (2015).
 57. Congdon, J. D., Kinney, O. M. & Nagle, R. D. Spatial ecology and core-area protection of Blanding's Turtle (*Emydoidea blandingii*). *Can. J. Zool.* **89**, 1098–1106 (2011).
 58. Rowe, J. W. & Moll, E. O. A radiotelemetric study of activity and movements of the Blanding's Turtle (*Emydoidea blandingii*) in northeastern Illinois. *J. Herpetol.* **25**, 178–185 (1991).
 59. Anthonysamy, W. J. B., Dreslik, M. J., Douglas, M. R., Marioni, N. K. & Phillips, C. A. Reproductive ecology of an endangered turtle in a fragmented landscape. *Copeia* **2014**, 437–446 (2014).
 60. Joyal, L. A., McCollough, M. & Hunter, M. L. Landscape ecology approaches to wetland species conservation: a case study of two turtle species in southern Maine. *Conserv. Biol.* **15**, 1755–1762 (2001).
 61. McGuire, J. M., Congdon, J. D., Kinney, O. M., Osentoski, M. & Scribner, K. T. Influences on male reproductive success in long-lived Blanding's turtles (*Emydoidea blandingii*). *Can. J. Zool.* **93**, 487–497 (2015).
 62. Hasler, C. T., Robinson, K., Stow, N. & Taylor, S. R. Population size and spatial ecology of Blanding's Turtle (*Emydoidea blandingii*) in South March Highlands, Ottawa, Ontario, Canada. *Can. J. Zool.* **93**, 509–514 (2015).
 63. Rowe, J. W. Observations of body size, growth, and reproduction in Blanding's Turtle (*Emydoidea blandingii*) from western Nebraska. *Can. J. Zool.* **70**, 1690–1695 (1992).
 64. Millar, C. S. & Blouin-Demers, G. Spatial ecology and seasonal activity of Blanding's Turtles (*Emydoidea blandingii*) in Ontario, Canada. *J. Herpetol.* **45**, 370–378 (2011).
 65. Nutting, W. L. & Graham, T. E. Preferred body temperatures in 5 nearctic freshwater turtles: a preliminary study. *Comp. Biochem. Physiol.* **104**, 243–246 (1993).
 66. Thiel, R. P. & Wilder, T. T. Overwintering characteristics of west-central Wisconsin Blanding's Turtles, *Emydoidea blandingii*. *The Canadian Field-Naturalist* **124**, 134–138 (2010).
 67. Millar, C. S., Graham, J. P. & Blouin-Demers, G. The effects of sex and season on patterns of thermoregulation in Blanding's Turtles (*Emydoidea blandingii*) in Ontario, Canada. *Chelonian Conserv. Biol.* **11**, 24–32 (2012).
 68. Beaudry, F. Road mortality risk for Spotted and Blanding's Turtle populations. (University of Maine, 2007).
 69. Baker, R. E. & Gillingham, J. C. An analysis of courtship behavior in Blanding's Turtle, *Emydoidea blandingii*. *Herpetologica* **39**, 166–173 (1983).
 70. Refsnider, J. M. High frequency of multiple paternity in Blanding's Turtle (*Emys blandingii*). *J. Herpetol.* **43**, 74–81 (2009).
 71. Gist, D. H., Dawes, S. M., Turner, T. W., Sheldon, S. & Congdon, J. D. Sperm storage in turtles: a male perspective. *J. Exp. Zool.* **292**, 180–6 (2002).
 72. Congdon, J. D. & Van Loben Sels, R. C. Growth and body size in Blanding's turtles (*Emydoidea blandingii*): relationships to reproduction. *Can. J. Zool.* **69**, 239–245 (1991).
 73. Ruane, S., Dinkelacker, S. A. & Iverson, J. B. Demographic and Reproductive Traits of Blanding's Turtles, *Emydoidea blandingii*, at the Western Edge of the Species' Range. *Copeia* **4**, 771–779 (2008).
 74. Congdon, J. *et al.* Nesting ecology and embryo mortality: Implications for hatchling success and demography of Blanding's turtles (*Emydoidea blandingii*). *Chelonian Conserv. Biol.* **3**, 569–579 (2000).
 75. Ewert, M. & Nelson, C. Sex determination in turtles: diverse patterns and some possible adaptive values. *Copeia* **1991**, 50–69 (1991).
 76. Reid, B. N., Thiel, R. P. & Peery, M. Z. Population dynamics of endangered Blanding's Turtles in a restored area. *J. Wildl. Manage.* **Early view**, (2015).
 77. Congdon, J. D., Dunham, A. E. & van Loben Sels, R. C. Delayed sexual maturity and demographics of Blanding Turtles (*Emydoidea blandingii*): implications for conservation and management of long-lived organisms. *Conserv. Biol.* **7**, 826–833 (1993).
 78. Urbanek, R. E., Glowacki, G. A. & Nielsen, C. K. Effect of raccoon (*Procyon lotor*) reduction on Blanding's turtle (*Emydoidea blandingii*) nest success. *J. North Am. Herpetol.* **2016**, 39–44 (2016).
 79. Butler, B. & Graham, T. Early post-emergent behavior and habitat selection in hatchling Blanding's turtles, *Emydoidea blandingii* in Massachusetts. *Chelonian Conserv. Biol.* **1**, 187–196 (1995).

80. Pappas, M. J., Congdon, J. D., Brecke, B. J. & Capps, J. D. Orientation and dispersal of hatchling Blanding's turtles (*Emydoidea blandingii*) from experimental nests. *Can. J. Zool.* **87**, 755–766 (2009).
81. Congdon, J. D., Pappas, M. J., Krenz, J. D., Brecke, B. J. & Schlenner, M. Compass orientation during dispersal of freshwater hatchling Snapping Turtles (*Chelydra serpentina*) and Blanding's Turtles (*Emydoidea blandingii*). *Ethology* **121**, 538–547 (2015).
82. McNeil, J. a, Herman, T. B. & Standing, K. L. Movement of hatchling Blanding's turtles (*Emydoidea blandingii*) in Nova Scotia in response to proximity to open water: a manipulative experiment. *Chelonian Conserv. Biol.* **3**, 611–617 (2000).
83. Pappas, M., Brecke, B. & Congdon, J. The Blanding's turtles (*Emydoidea blandingii*) of Weaver Dunes, Minnesota. *Chelonian Conserv. Biol.* **3**, 557–568 (2000).
84. Paterson, J. E., Steinberg, B. D. & Litzgus, J. D. Revealing a cryptic life-history stage: differences in habitat selection and survivorship between hatchlings of two turtle species at risk (*Glyptemys insculpta* and *Emydoidea blandingii*). *Wildl. Res.* **39**, 408–418 (2012).
85. Seburn, D. C. Blanding's Turtle, *Emydoidea blandingii*, habitat use during hibernation in eastern Ontario. *Can. Field-Naturalist* **124**, 263–265 (2010).
86. Congdon, J. D., Nagle, R. D., Kinney, O. M. & Van Loben Sels, R. C. Hypotheses of aging in a long-lived vertebrate, Blanding's turtle (*Emydoidea blandingii*). *Exp. Gerontol.* **36**, 813–827 (2001).
87. McDonald, D. & Ise, T. in *Blanding's Turtle (Emydoidea blandingii): a technical conservation assessment* (ed. Keinath, J. D. C. and D. A.) (USDA Forest Service, Rocky Mountain Region., 2006).
88. Browne, C. L. & Hecnar, S. J. Species loss and shifting population structure of freshwater turtles despite habitat protection. *Biol. Conserv.* **138**, 421–429 (2007).
89. McMaster, N. L. & Herman, T. B. Occurrence, habitat selection, and movement patterns of juvenile Blanding's Turtles. *Chelonian Conserv. Biol.* **3**, 602–610 (2000).
90. Conner, J. K. & Hartl, D. L. *A primer of ecological genetics*. (Sinauer Associates Incorporated, 2004).
91. Reid, B. N. & Peery, M. Z. Land use patterns skew sex ratios, decrease genetic diversity and trump the effects of recent climate change in an endangered turtle. *Divers. Distrib.* **20**, 1425–1437 (2014).
92. Illinois Department of Natural Resources. *2015 Implementation guide to the Illinois wildlife action plan*. (2015).
93. Dahl, T. E. *Wetlands losses in the United States 1780's to 1980's*. (U.S. Department of the Interior, Fish and Wildlife Service, 1990).
94. Ducks Unlimited. *Conservation and Recreation Lands (CARL)*. (2013).
95. Gibbs, J. P. J. & Shriver, W. G. W. Estimating the effects of road mortality on turtle populations. *Conserv. Biol.* **16**, 1647–1652 (2002).
96. Banning, W. Ecology of the Blanding's turtle (*Emydoidea blandingii*) at a northeastern Illinois prairie wetland community. (University of Illinois, Urbana-Champaign, IL, 2006).
97. Aresco, M. J. Mitigation measures to reduce highway mortality of turtles and other herpetofauna at a north Florida lake. *J. Wildl. Manage.* **69**, 549–560 (2005).
98. Steen, D. a. *et al.* Relative vulnerability of female turtles to road mortality. *Anim. Conserv.* **9**, 269–273 (2006).
99. Proulx, C. L., Fortin, G. & Blouin-Demers, G. Blanding's Turtles (*Emydoidea blandingii*) avoid crossing unpaved and paved Roads. *J. Herpetol.* **48**, 267–271 (2014).
100. Compton, B. W. *Status assessment for the Blanding's turtle (Emydoidea blandingii) in the Northeast*. (Department of Natural Resources Conservation, University of Massachusetts, 2007).
101. Gompper, M. E. & Vanak, A. T. Subsidized predators, landscapes of fear and disarticulated carnivore communities. *Anim. Conserv.* **11**, 13–14 (2008).
102. McKinney, M. L. Urbanization, biodiversity, and conservation. *Bioscience* **52**, 883–890 (2002).
103. Newsome, T. M. *et al.* The ecological effects of providing resource subsidies to predators. *Glob. Ecol. Biogeogr.* **24**, 1–11 (2015).
104. Prugh, L. R. *et al.* The rise of the mesopredator. *Bioscience* **59**, 779–791 (2009).
105. Strickland, J. T., Colbert, P. & Janzen, F. J. Experimental analysis of effects of markers and habitat structure on predation of turtle nests. *J. Herpetol.* **44**, 467–470 (2010).
106. Jones, M. T. & Sievert, P. R. Elevated mortality of hatchling Blanding's Turtles (*Emydoidea blandingii*) in residential landscapes. *Herpetol. Conserv. Biol.* **7**, 89–94 (2012).
107. Hall, C. & Cuthbert, F. Impact of a controlled wetland drawdown on Blanding's turtles in Minnesota. *Chelonian Conserv. Biol.* **3**, 643–649 (2000).
108. Erb, L. & Jones, M. T. Can turtle mortality be reduced in managed fields? *Northeast. Nat.* **18**, 489–496 (2011).
109. King, R. B. & Niiro, M. L. *Predicting Climate-Change Induced Distributional Shifts in Great Lakes Region Reptiles*. 1–76 (Report to Illinois Department of Natural Resources, 2013).
110. Walk, J., Hagen, S. & Lange, A. *Adapting Conservation to a Changing Climate: An Update to the Illinois Wildlife Action Plan*. 120 p. (Report to the Illinois Department of Natural Resources, 2011).
111. Schlesinger, M. D., Corser, J. D., Perkins, K. A. & White, E. L. *Vulnerability of at-risk species to climate change in New York*. **4757**, 61 (New York Natural Heritage Program, 2011).
112. Sethuraman, A. *et al.* Population genetics of Blanding's turtle (*Emys blandingii*) in the midwestern United States. *Conserv. Genet.* **15**, 61–73 (2014).
113. Anthonysamy, W. J. B. *et al.* *Consideration of life history and ecological strategies when assessing genetic patterns: A multi-species approach to conservation planning*. *Unpublished manuscript*
114. Klut, G. M. Genetic homogeneity among Blanding's Turtle (*Emydoidea blandingii*) populations across the Chicago Area. (Western Illinois University, 2011). doi:10.1017/CBO9781107415324.004
115. De Solla, S. R. & Fernie, K. J. Characterization of contaminants in snapping turtles (*Chelydra serpentina*)

- from Canadian Lake Erie Areas of Concern: St. Clair River, Detroit River, and Wheatley Harbour. *Environ. Pollut.* **132**, 101–12 (2004).
116. Overmann, S. R. & Krajcicek, J. J. Snapping turtles (*Chelydra serpentina*) as biomonitors of lead contamination of the big river in Missouri's old lead belt. *Environ. Toxicol. Chem.* **14**, 689–695 (1995).
117. Bell, B., Spotila, J. R. & Congdon, J. High incidence of deformity in aquatic turtles in the John Heinz National Wildlife Refuge. *Environ. Pollut.* **142**, 457–65 (2006).
118. Magyar, T. The impact of artificial lights and anthropogenic noise on Loggerheads (*Caretta Caretta*) and Green Turtles (*Chelonia Mydas*), assessed at index nesting beaches in Turkey and Mexico. 193 (University of Bonn, 2009).
119. Allender, M. C., Abd-Eldaim, M., Kuhns, A. & Kennedy, M. Absence of ranavirus and herpesvirus in a survey of two aquatic turtle species in Illinois. *J. Herpetol. Med. Surg.* **19**, 16–20 (2009).
120. Buhlmann, K. a *et al.* Reintroduction and head-starting: tools for Blanding's Turtle conservation. *Herpetol. Conserv. Biol.* **10**, 436–454 (2015).
121. Bourque, G. Investigating variables affecting Blanding's turtle (*Emydoidea blandingii*) patch occupancy and trapping success in Nova Scotia. (Acadia University, 2006). doi:10.13140/2.1.2471.2489
122. Wisconsin Department of Natural Resources. *Wisconsin Blanding's Turtle Species Guidance*. **PUB-ER-683**, 1–7 (2014).
123. Davy, C. M., Kidd, A. G. & Wilson, C. C. Development and validation of environmental DNA (eDNA) markers for detection of freshwater turtles. *PLoS One* **10**, e0130965 (2015).
124. Lesbarrères, D. & Fahrig, L. Measures to reduce population fragmentation by roads: What has worked and how do we know? *Trends Ecol. Evol.* **27**, 374–380 (2012).
125. Van der Grift, E. a. *et al.* Evaluating the effectiveness of road mitigation measures. *Biodivers. Conserv.* **22**, 425–448 (2013).
126. Tesche, M. R. & Hodges, K. E. Unreliable population inferences from common trapping practices for freshwater turtles. *Glob. Ecol. Conserv.* **3**, 802–813 (2015).
127. Kingsbury, B. & Gibson, J. *Habitat Management Guidelines for Amphibians and Reptiles of the Midwestern United States*. 155 (Partners in Amphibian and Reptile Conservation Technical Publication HMG-1, 2012).
128. Buhlmann, K. a & Osborn, C. P. Use of an artificial nesting mound by Wood Turtles (*Glyptemys insculpta*): a tool for turtle conservation. *Northeast. Nat.* **18**, 315–334 (2011).
129. Midwest Partners in Amphibian & Reptile Conservation. *Prescribed Fire Use and Important Management Considerations for Amphibians and Reptiles within the Midwest*. 1–10 (MWPARC, 2009).
130. Geller, G. Reducing predation of freshwater turtle nests with a simple electric fence. *Herpetol. Rev.* **43**, 398–403 (2012).
131. Midwest Partners in Amphibian & Reptile Conservation. *Raccoons and turtle conservation*. (MWPARC, 2009).
132. Conner, L. M. & Morris, G. Impacts of mesopredator control on conservation of mesopredators and their prey. *PLoS One* **10**, 1–16 (2015).
133. Duffus, A. L. J. *et al.* in *Ranaviruses: Lethal Pathogens of Ectothermic Vertebrates* (eds. Gray, M. J. & Chinchar, V. G.) (Springer International Publishing, 2015).
134. Northeast Partners in Amphibian Conservation. *Disinfection of Field Equipment to Minimize Risk of Spread of Chytridiomycosis and Ranavirus*. *NEPARC Publication 2014-02 4* (2014).
135. Gaston, K. J., Davies, T. W., Bennie, J. & Hopkins, J. Reducing the ecological consequences of night-time light pollution: options and developments. *J. Appl. Ecol.* **49**, 1256–1266 (2012).
136. Kiviat, E. *et al.* Restoration of wetland and upland habitat for the Blanding's Turtle, *Emydoidea blandingii*. *Chelonian Conserv. Biol.* **3**, (2000).
137. FHWA (Federal Highway Administration). *Wildlife crossing structure handbook: design and evaluation in North America*. (2011).
138. Taylor, S., Stow, N., Hasler, C. & Robinson, K. *Lessons learned: Terry Fox Drive wildlife guide system intended to reduce road kills and aid the conservation of Blanding's Turtle (Emydoidea blandingii)*. *Proceedings of the Transportation Association of Canada* **2**, (2014).
139. Woltz, H. W., Gibbs, J. P. & Ducey, P. K. Road crossing structures for amphibians and reptiles: Informing design through behavioral analysis. *Biol. Conserv.* **141**, 2745–2750 (2008).
140. Baxter-Gilbert, J. H., Riley, J. L., Lesbarreres, D. & Litzgus, J. D. Mitigating reptile road mortality: Fence failures compromise ecopassage effectiveness. *PLoS One* **10**, 1–15 (2015).
141. Dodd, C. K., Barichivich, W. J. & Smith, L. L. Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. *Biol. Conserv.* **118**, 619–631 (2004).
142. Ontario Ministry of Natural Resources and Forestry. *Best Management Practices for Mitigating the Effects of Roads on Amphibians and Reptile Species at Risk in Ontario*. 112 (Queen's Printer for Ontario, 2016).
143. Kuhns, A. R. Culvert dimensions for the safe passage of Blanding's Turtles, *Emydoidea blandingii*, under Illinois Route 26, Lee County, Illinois. **2014**, (2014).
144. Smith, D. J. *Monitoring wildlife use and determining standards for culvert design*. (Final report presented to the Florida Department of Transportation for Contract BC354-34., 2003).
145. Massachusetts Department of Transportation. *Design of bridges and culverts for wildlife passage at freshwater streams*. 294 (2010).
146. Pelletier, S. K., Carlson, L., Nein, D. & Roy, R. D. *Railroad crossing structures for spotted turtles: Massachusetts Bay Transportation Authority– Greenbush rail line wildlife crossing demonstration project*. 4–6 (Road Ecology Center, 2005).
147. Johnson, G. *Testing the effectiveness of turtle crossing signs as a conservation measure*. 1–14 (Final Report to

St. Lawrence River Research and Education Fund, 2010).
doi:10.1017/CBO9781107415324.004

148. Illinois Department of Natural Resources. Natural Heritage Biotics 5 Database. (2016).
149. Admiraal, A. N., Morris, M. J., Brooks, T. C., Olson, J. W. & Miller, M. V. *Illinois wetland restoration and creation guide. Natural History Survey Special Publication 19* Pp., viii+ 188 (1997).

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Photo 1: 04/15/2015. An emergent wetland (Area 3) with open water in the center.



Photo 2: 06/30/2015. A farmed wetland (Area 10) in early summer.



Photo 3: 07/22/2015. Wet prairie (Area 4) in mid-summer.



Photo 4: 07/22/2015. Wet prairie (Area 4) in-between pockets of trees.



Photo 5: 05/12/2017. A view of the Tributary 2.



Photo 6: 05/12/2017. A view of the floodplain forest along Tributary 2.



Photo 7: 05/12/2017. Another view of the woodland in the mitigation area.



Photo 8: 05/12/2017. Wet prairie fringe leading to an open water center (Wetland Area 3A).



Photo 9: 05/12/2017. Basking logs in open water in Wetland Area 3A.



Photo 10: 05/12/2017. An emergent wetland (Area 3B) in spring.



Photo 11: 06/07/2017. Wet prairie near a large stand of common reed (Wetland Area 4)



Photo 12: 08/23/2017. Reed canary grass in Wetland Area 4.

ATTENTION



The state endangered Blanding's Turtle occurs at this site.

If you see a Blanding's Turtle, immediately contact:

**Forest Preserve District of Kane County
630-232-5980**

Their staff will come move the turtle to safety.

How to identify a Blanding's Turtle:

1. Yellow chin and neck
2. Brown/black shell
3. Yellow flecks on shell (usually)

DO NOT HANDLE, MOVE, MOLEST OR HARM THE TURTLE.

**Surveys for Blanding's Turtle (*Emydoidea blandingii*) at
The Conservancy, Gilberts, Kane County, Illinois**

Prepared for V3 Companies, Inc.

By

Thomas G. Anton, The Ecological Consulting Group, LLC

TomAnton@comcast.net

David Mauger, Natural Resources Consulting, froggermauger@comcast.net



June 7, 2019

Introduction

Context for mitigation – The area of concern is within dispersal range of a known Blanding's turtle population occupying habitat at Freeman Kame Forest Preserve, owned and managed by the Forest Preserve District of Kane County (FPDKC). Since 2009, that population has been studied by the district's Wildlife Biologist, William (Bill) Graser. Iowa Darters were documented by numerous surveys by several state and federal agencies in the vicinity of the project area. The mitigation area is bounded by agricultural, subdivisional and commercial development, Freeman Rd to the South, and Galligan Rd to the East. Nevertheless, associated wetlands and scrub/shrub habitat at the site support fishes, amphibians and reptiles found in Kane County due to the immediately adjacent Freeman Kame Forest Preserve.

The secretive nature, habitat requirements and reproductive biology of the Blanding's turtle suggest that a viable, reproducing population does not occur in the project area. Any occupancy by Blanding's turtles of the project area will most likely involve individuals from the study population at Freeman Kame that may have wandered north from the preserve in search of foraging habitat or nesting sites. One or more of the turtles from the Freeman Kame population have wandered into or have been found in the project area (Bill Graser, personal communication, May 2018).

Trapping was conducted 16 through 22 May, 2019 at *The Conservancy South* project site to the N-side of Freeman Rd and W-side of Gallaghan Rd near Gilberts, Illinois. Ground-truthing, reconnaissance and photo-documentation of all farmed or delineated wetlands within the project boundary was conducted over the first two days. Traps were deployed over the first two days based on presence of suitable wetland habitat with adequate area and depth of water to support aquatic or semi-aquatic turtles. Visual Encounter Search (VES) was performed while ground-truthing wetlands, and when setting and checking traps. Pictures of wetlands at trap sites were taken, and notes regarding observed surface hydro-conditions and wetland quality were recorded.

Results

Three farmed wetland areas were initially assessed; two had pools with deeper water for turtles but were not trapped because these pools appeared to have been formed from recent construction activities and lacked fully established and diverse aquatic or emergent plant growth that would sustain turtle populations. These three areas included Farmed Wetland 12 (FW12), Farmed Wetland 10 (FW10) and another unmarked wetland/pool (UWP) area near the juncture of Tributary 2 (TRB2) and feeder creek from Wetland 3A (W3A).

Both pooled water areas at FW10 and UWP appear to have been formed or accentuated from preliminary excavation and grading for future roads within the planned subdivision. These pools were not trapped, but were checked for surface active turtles during ground-truthing and when heading to and from other wetland sites to check traps.

Wetland sites that were trapped for turtles included Wetlands 3A and 3B (W3A, W3B), Wetland 5 (W5), Wetland 7 (W7) and Wetland 8 (W8). Wetland/Tributary 1 (W/T1) and Wetland/Tributary 2 (W/T2) were not trapped as they were narrow, shallow flowing water in ditch-like channels with tree growth along the banks and deemed unsuitable to support turtle species. A small area of cattail (*Typha sp*) marsh at the S-end of W/T1 was heavily choked with thatch and had no or insufficient depth of surface water to support turtles or allow deployment of turtle traps.

Wetland 4 was a large reed canary grass (*Phalaris arundinacea*) dominated meadow, heavily choked with thatch and little to no surface water, excluding what appeared to be a short, narrow trough or ditch midway along the N-side with water depth of 6-10-inches. No traps were set there as there was insufficient area and volume. W4 also had a large stand of common reed (*Phragmites australis*) at the SE-side with some large cottonwood trees (*Populus deltoides*) centrally, but no surface water was present there, and in fact, the patch was bisected by well-worn deer paths and it appears they use the center underneath the cottonwood trees as a bedding site. W4 was deemed unsuitable to support turtles.

Wetland 6 (W6) and W7 were essentially large common reed stands, heavily choked with thatch and impenetrable standing culms from last year's growth. Reed canary grass dominated the perimeter. W6 lacked any surface water to support turtles, and most of W7 included common reed grass and growth lacked surface water to support turtles. The NE-corner of W7 had a small area of reed canary grass and cattail growth that had shallow water 6-10 inches deep. Although this patch of marsh was far too small to support populations of adult turtles, one small Promar trap was deployed to determine if any juveniles or recent hatchlings were present. This approach was also used at the small and isolated reed canary grass wetland W3B.

Both hoop net and Promar traps were used at the W3A and W5 sites, while conditions only permitted use of Promar traps at the W8 site and a single Promar trap each at the W3B and W7 sites. Three traps were used in the S-half of W5 (1 hoop & 2 Promar), and 3 hoop nets at the large open-water W5 pond. Two small areas of shallow, emergent marsh dominated by cattail and reed canary grass with groves of sandbar willow (*Salix interior*) and black willow (*Salix nigra*) occurred in W8 with water deep enough permitting use of Promar traps; one each in each of the two marsh pools, and two in the ditch/tributary that bisected W8. Map Figure 1 shows locations where traps were deployed. Appendix 1 provides photo-documentation and GPS coordinates for all trap and wetland site locations.

A total of 16 traps were used totaling 86 trap days and 2000 trap hours, yielding 10 captures of two turtle species (Table 1). One additional hand capture and another observation brought the total captures/observations to 12 (Table 2). Most of the turtles captured were snapping turtles (*Chelydra serpentina*), and all turtle captures occurred at W3A and W5. A single, adult male painted turtle (*Chrysemys picta*) was captured at the W3A site. No Blanding's turtles were captured or observed within *The Conservancy* South project site during this survey. No turtles were captured or observed at the W8, W3B or W7 sites, nor were any turtles observed in farmed wetland pools during recon and ad-hoc VES heading to and from trap sites.

Summary

The results of this trapping survey found no evidence indicating presence of Blanding's turtle within *The Conservancy* South project site boundary. All delineated wetlands that were surveyed and/or ground-truthed are of low-diversity and most lack sufficient area, water volume, or plant diversity to support populations of aquatic or semi-aquatic turtles. The only two wetlands large enough to sustain adult turtles were W3A and W5, and these were the only wetland sites turtles were captured or visually observed. The large, open-water pond in the N-half of W5 and the mix of shallower marsh pools in the S-half of W5 were considered the best potential wetland sites where Blanding's turtle might occur. Only a limited number of snapping turtles were captured there and this result supports the conclusion Blanding's turtle does not occur there. In summary, trapping, reconnaissance and VES conducted at all wetland sites within *The Conservancy* South project area indicated that Blanding's turtle does not occur there. In addition, no evidence of Blanding's turtles, i.e., shell remains, were found.

Figure 1 - Wetland and Trap Location Map



Table 1 Trap Location & Capture Summary

Trap No	Type	Wetland	UTM-E	UTM-N	Date Set	Time	Date End	Time	Trap Days	Captures	Species
T1	DH24	5	385968	4665473	05/16/19	1416	05/22/19	1328	6	1	Chse
T2	PR36	5	385966	4665490	05/16/19	1425	05/22/19	1333	6	0	
T3	PR24	5	385898	4665540	05/16/19	1447	05/22/19	1342	6	0	
T4	DH24	5P	385944	4665668	05/16/19	1500	05/22/19	1356	6	1	Chse
T5	DH24	5P	385856	4665702	05/16/19	1519	05/22/19	1403	6	1	Chse
T14	DH24	5P	385954	4665748	05/17/19	1440	05/22/19	1420	5	3	Chse
T6	PR24	3A	385036	4665146	05/16/19	1625	05/22/19	1520	6	0	
T7	DH24	3A	385065	4665113	05/16/19	1635	05/22/19	1523	6	0	
T8	DH24	3A	385046	4665072	05/16/19	1645	05/22/19	1535	6	3	2-Chse, 1-Chpi
T9	PR36	3A	385064	4665089	05/16/19	1700	05/22/19	1528	6	1	Chse
T10	PR24	3B	385158	4664854	05/16/19	1733	05/22/19	1550	6	0	
T11	PR24	8	385898	4664885	05/17/19	1217	05/22/19	1225	5	0	
T12	PR24	8	385945	4664791	05/17/19	1312	05/22/19	1250	5	0	
T15	PR24	8	386019	4664881	05/19/19	1024	05/22/19	1238	3	0	
T16	PR24	8	386012	4664756	05/19/19	1054	05/22/19	1258	3	0	
T13	PR24	7	385760	4665776	05/17/19	1417	05/22/19	1410	5	0	
									86	10	

16

Table 2 The Conservancy South Turtle Capture Summary

Date	Time	Species	No Cap	Type	Wetland	Trap No	Comments
05/16/19	1420	Chse	1	H	5		Stepped on; Location where T1 & T2 traps set; Not measured or marked; Mod-size Adult
05/17/19	1520	Chse	1	T	5	T5	Older Juv, CL=13.0 cm, not marked
05/17/19	1654	Chse	1	T	3A	T8	Adult M CL=27 cm; Not notched, "line" scratched on L4C
05/18/19	1115	Chse	1	T	5	T1	Adult F, CL=26 cm; Not notched, "X" scratched on R4C
05/19/19	1320	Chse	2	T	5	T14	Adult Fs, CL=28.5 cm marked 10R, CL=25.5 cm marked 8R
05/19/19	1405	Chse	1	O	3A	T6	Lg adult at surface 10-ft W of T6 trap, probably the M from 5/17
05/20/19	1352	Chse	1	T	5	T14	Recapture of 10RF
05/20/19	1423	Chse	1	T	3A	T9	Juv, CL=10.5 cm, marked 3R
05/20/19	1427	Chpi	1	T	3A	T8	Adult M, marked 1R
05/21/19	1313	Chse	1	T	5	T4	Male, CL=29cm, marked 12R
05/22/19	1535	Chse	1	T	3A	T8	Juv, CL=10 cm, marked 3R10R
				Chse	Chpi		
Total =			12	11	1		

Appendix 1 – Photo Documentation



P1 – W8, T11 site, S-view 5/23/19. T11 location UTM (16T); 0385898E; 4664885N ±16-ft.



P5 – Wetland/Tributary 2 (W/T2), N-View. Not trapped as hydro and habitat conditions unsuitable to support populations of turtles.



P6 – Wetland/Tributary 2 (W/T2), S-View



P7 – Wetland 3A (W3A), S-view, E/NE of T6 24-in Promar trap. Location T6 UTM (16T), 0385036E; 4665146N ±13-ft. T7, 24-in D-frame hoop further S at SE-side of open-water pool, UTM (16T) 0385066E; 4665146N ±13-ft



P8 – W3A N-view at T8, 24-in D-frame hoop S-side of open water pool, UTM (16T) 0385046E; 4665072N ±13-ft. T9, 36-in Promar just to E of T8 hoop, UTM 0385064E; 4665089N ±22-ft.



P9 – Wetland 3B (W3B), S-View at N-end where no surface water present.



P10 – W3B, N-view at T10, 24-in Promar trap, UTM (16T)
0385158N; 4664854N \pm 14-ft.



P11 – Wetland 8 (W8), T11 site, N-View, 24-in Promar trap in shallow, emergent cattail marsh. Location for T11 is UTM (16T) 0385898; 4664885 ±16-ft



P12 – W8, T11 site, W-view. Flag on cattail shows location of trap. See P11 for GPS coordinates.



P13 – W8 at location of ditch/tributary that bisects W8 and location of T15, 24-in Promar trap, N-view. Location for T15 is UTM (16T) 0386019E; 4664881N \pm 17-ft.



P14 – W8 ditch/tributary at T15 site, S-view. See P13 for GPS cords.



P15 – W8, T12 site, 24-in Promar trap, N-view. Location of T12 is UTM (16T) 0385945E; 4664791N \pm 15-ft.



P16 – W8, T12 site, 24-in Promar trap, S-view. T12 trap can be seen in lower right-hand corner of photo. See P15 for GPS coordinates.



P17 – W8 ditch/tributary, T16 site, 24-in Promar trap, N-view. Location for T16 UTM (16T) 0386012; 4664756 ±15-ft.



P18 – W8 ditch/tributary T16 site, 24-in Promar trap, S-view. Stake with flag shows trap in water. See P17 for GPS coordinates.



P19 – Wetland 5 (W5), T1 & T2 site W-view.



P20 – W5, T1 site close-up, 24-in D-frame hoop, W-view.
T2, 236-in Promar trap not shown, but in emergent
cattail growth far upper R-side corner of photo. Location
for T1 trap UTM (16T) 0385969; 4665473 ±18-ft.



P21 – W5, T3 site, 24-in Promar trap, W-view. Location for T3 UTM (16T) 0385898; 4665539 ±10-ft.



P22 – W5 Pond, T4 site, 24-in D-frame hoop, 330-deg view. Location for T4 is UTM (16T) 0385944; 4665668 ±13-ft.



P23 – W5 Pond, T5 site, 24-in D-frame hoop, E-view.



P24 – W5 Pond, T5 site, W-view. Location for T5 UTM (16T)
0385856; 4665702 ±15-ft.



P25 – Wetland 7 (W7), T13 site, 24-in Promar trap, W-view.



P26 – W7, T13 site, close-up, W-view. Flag in background shows location of trap and location is UTM (16T) 0385760; 4665776 ±17-ft.



P27 – W5 Pond, T14 site, 24-in D-frame hoop, S-view. Stake with flag shows trap set in water and location is UTM (16T) 0385954; 4665748 ±13-ft.



P28 – WP102, 220-deg view. In association with Farmed Wetland 10 area. No trapping conducted here. Location is UTM (16T) 0385554; 4665417.



P29 – WP103, 250-deg view, same area slightly S of FW10.
Location is UTM (16T) 0385479; 4665418.



P30 – WP105, 250-deg view, same area S of FW10. Location is UTM (16T) 0385530; 4665494.



P31 – WP104, 300-deg view, likely actual location of part of FW10 that has emergent cattail and other growth, but water too shallow to permit trapping even with Promar traps. VES was conducted here to find juvenile or hatchling turtles. Location is UTM (16T) 0385522; 4665517.



P32 – WP106, E-View of Unmarked Wetland (UW1) area in association with juncture of W/T2 with E-branch from W3A and W/T1. Extensive, flooded farm field area with water deep enough to trap, but considered farmed wetland and unsuitable to sustain populations of turtles. Some VES conducted there to and from checking traps at W3A. Location for WP106 UTM (16T) 0385257; 4665140.



P33 – WP107, UW1, 230-deg view at same area P32. Location UTM (16T) 0385206; 4665169. Another pooled area in farm field further North (UW2) occurred at UTM (16T) 0385091E; 4665288N. These areas were not trapped, but some VES conducted during initial recon and when checking traps at other sites.



P35 – 2 Chse large adults captured in T14 at W5 Pond on 5/19/2019. Both adult females larger one CL=28.5cm marked 10R and lessor-sized CL=25.5cm marked 8R.



P36 – Closer view same Chse adults in P35.

- The somewhat poorly drained Kane soils on summits and footslopes
- The poorly drained Will soils on toeslopes

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Crops and Pasture”
- “Forestland”
- “Wildlife Habitat”
- “Engineering”
- “Soil Properties”

Interpretive Groups

Land capability classification: 3e

Prime farmland status: Not prime farmland

Hydric soil status: Nonhydric soil

329A—Will loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, stream terraces, and kames

Position on the landform: Toeslopes

Soil Properties and Qualities

Parent material: Loamy glaciofluvial deposits over sandy and gravelly glaciofluvial deposits

Drainage class: Poorly drained

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface (apparent)

Ponding: None

Depth to restrictive feature: Very deep (more than 60 inches)

Permeability: Moderate in the upper part; very rapid in the lower part

Map Unit Composition

Will and similar soils: 90 percent

Dissimilar soils: 10 percent

Minor Components

Similar soils:

- Soils that contain sandy and gravelly deposits beginning at a depth of less than 20 inches or more than 40 inches
- Soils that contain less sand and more silt in the upper one-half of the profile than the Will soil
- Soils that do not have a subsurface layer

Dissimilar soils:

- The somewhat poorly drained Kane soils on summits and footslopes
- The poorly drained, calcareous Hoopole soils on toeslopes
- The very poorly drained Houghton soils on the slightly lower toeslopes

Management

For general and detailed information about managing this map unit, see the following sections of this publication:

- “Crops and Pasture”
- “Wildlife Habitat”
- “Engineering”
- “Soil Properties”

Interpretive Groups

Land capability classification: 2w

Prime farmland status: Prime farmland where drained

Hydric soil status: Hydric soil

330A—Peotone silty clay loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines

Position on the landform: Toeslopes

Soil Properties and Qualities

Parent material: Colluvium

Drainage class: Very poorly drained

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface (apparent)

Ponding frequency: Frequent

Depth to restrictive feature: Very deep (more than 60 inches)

Permeability: Moderately slow

Map Unit Composition

Peotone and similar soils: 90 percent

Dissimilar soils: 10 percent

Minor Components

Similar soils:

- Soils that are lighter colored in the upper one-half of the subsoil than the Peotone soil
- Soils that contain less clay in the subsurface layers and subsoil than the Peotone soil
- Soils that are overlain by recent, light-colored deposition

APPENDIX 6

IOWA DARTER INFORMATION

-ROAD CROSSING PHOTOGRAPHS

-CONSERVANCY NORTH SURVEY REPORT, JUNE 22, 2018

-BLADDER COFFERDAM DETAIL



Photo 1: 03/19/2018. East crossing area.



Photo 2: 03/19/2018. East crossing substrate.



Photo 3: 03/19/2018. Northwest crossing area.



Photo 4: 03/19/2018. Northwest crossing substrate.



Photo 5: 03/19/2018. Southeast crossing area.



Photo 6: 03/19/2018. Southeast crossing substrate.

**Surveys for Two Endangered and Threatened Species at
The Conservancy, Gilberts, Kane County, Illinois**

Prepared for V3 Companies, Inc.

By

Thomas G. Anton, The Ecological Consulting Group, LLC

TomAnton@comcast.net

David Mauger, Natural Resources Consulting, froggermauger@comcast.net



June 22, 2018

Introduction *Context for mitigation* – The area of concern is within dispersal range of a known Blanding’s turtle population occupying habitat at Freeman Kame Forest Preserve, owned and managed by the Forest Preserve District of Kane County (FPDKC). Since 2009, that population has been studied by the district’s Wildlife Biologist, William (Bill) Graser. Iowa Darters were documented by numerous surveys by several state and federal agencies in the vicinity of the project area. The 500+-acre mitigation area is bounded by agricultural, subdivisional and commercial development, and Huntley Rd to the North, Galligan Rd to the East and West, and Freeman Rd to the south. Nevertheless, associated wetlands and scrub/shrub habitat at the site may support fishes, amphibians and reptiles found in Kane County.

The secretive nature, habitat requirements and reproductive biology of the Blanding’s turtle suggest that a viable, reproducing population does not occur in the project area. Any occupancy by Blanding’s turtles of the project area will most likely involve individuals from the study population at Freeman Kame that may have wandered north from the preserve in search of foraging habitat or nesting sites. One or more of the turtles from the Freeman Kame population have wandered into or have been found in the project area (Bill Graser, personal communication, May 2018).

A trapping survey was conducted 23 through 29 May, 2018 at the Conservancy North Project Site near Gilberts, Illinois. Ground-truthing and reconnaissance of all farmed and delineated wetlands was conducted over the first two days. Traps were deployed over the first few days. Visual Encounter Search (VES) was performed when ground-truthing wetlands, and when setting and checking traps. Pictures of wetlands and trap sites were taken, and notes regarding observed surface hydrologic conditions recorded.

Methods

Fifteen traps of two types were used; 24-in diameter D-Frame hoop net traps (Millards Turtle Farms, Inc.) and 12-in diameter, 24-in long minnow/crayfish traps (Promar, Inc.). Each pond site had two sampling stations, pairing one D-Frame and one Promar trap. The D-Frame traps capture all turtles of all species and sizes, including large, adult male snapping turtles and are effective in deeper water or ponds. The Promar traps capture smaller turtles such as Painted turtles, but also effective at capturing moderate size turtles like the Blanding’s turtle. The Promar traps are most effective in shallow peripheral marsh or pond edges in waters 8-12-in deep. Traps were set on 23 May and checked daily from mid to late afternoon through Tuesday, 29 May 2018. Traps were baited with sardines and re-baited once on # May. Voucher specimens of fishes and amphibians and reptiles were salvaged and deposited in the research collection of the Illinois Natural History Survey. Photo vouchers were taken of T/E (IL-threatened/Endangered Species).

Results

All farmed wetland areas were initially checked but disregarded from further survey attention as none had vegetation or hydro-conditions with surface water depth or duration that would support aquatic or semi-aquatic turtles. All of the delineated wetlands were of low diversity, dominated by reed canary grass (*Phalaris arundinacea*), cattail (*Typha angustifolia*) with scattered growth or groves of sandbar willow (*Salix interior*), black willow (*Salix nigra*) and cottonwood (*Populus deltoides*), and many with invasion/stands of *Phragmites communis*.

All of the delineated wetlands were hydrologically altered by extensive ditch systems, and with exception of two, none had and significant surface water present. One exception was the small gravel pit pond (wetland Area-05). The other exception was Area-09, which had two small pools, one a *Phalaris*-Cottonwood dominated pool at the southeast side, then another smaller pool with sandbar willow and *Phalaris* at the northwest-side. The gravel pit pond (Area-05) had sufficient water to support aquatic or semi-aquatic turtle species. The two pools in Area-09 were sufficiently deep enough and Promar traps were set in each one, but it was expected they were too small and dry up too soon to attract or sustain populations of adult turtles. The only other wetland habitat on the project site that aquatic or semi-aquatic turtle species could potentially inhabit were the #1, #2, #3, #4 and #7 ditches, and adjacent or along the west boundary of the project site, the South Branch of the Kishwaukee River (SBKR).

Though 15 traps were deployed, only three sites had water deep enough to permit use of the larger, 24-in diameter D-Frame hoop net traps; two were set in the quarry pit Area-05 wetland (T5 & T6), and the other in Ditch #3 at the confluence with the SBKR (T9). The remaining 12 traps set were the smaller, 12-in diameter Promar crayfish-minnow traps that have been used successfully over the years to catch aquatic and semi-aquatic turtles including painted turtles, smaller snapping turtles, spotted turtles and Blanding's turtles.

Four of the Promars were set in various locations along Ditch #3 (T1, T2 & T3), and two used along the South Project Boundary at Ditch #4 (T12) and Ditch #7 (T13). However, sufficient water depth at these two ditch systems only occurred at or very near the confluence with the unnamed ditch-like stream that drains west to the SBKR. Ditch #5 and Ditch #6 were of comparatively short length and one had no surface water while the other only nominal water at the confluence and did not permit or justify trapping.

Three Promar traps were used at wetland Area-09 (T7, T8 & T14), and two in Ditch #1 at wetland Area-03. A single Promar trap was used in the small ditch that drains wetland Area-17 (T15) at the far southwest corner of the project site to the southwest side of the SBKR. The largest delineated wetland, Area-08, had no surface water capable of supporting turtles or would permitting trapping, with at best 2-4 in of surface water in localized pockets. But all of this wetland complex was heavily choked with thatch at the surface, and especially notable was the "East Lobe" of Area-08 which had dense stands of above-surface stems of cattail or *Phragmites*. As a result, trapping of this wetland complex resorted to setting three Promar traps in Ditch #3 that drains from the northwest lobe of the wetland Area-08. The attached Figure 1 map shows all trap locations used in this survey. Refer to the attached Survey Pictures Document for visual examples and additional details for the sites that were ground-truthed and surveyed.

A total of ten captures and three observations of turtles were made during this survey; all common snapping turtles (*Chelydra serpentina*), including adults, moderate-size immatures or older juveniles (Table 1). The three observations were of three individuals (2 adults, 1 immature) observed surface basking by Tom Anton in Ditch #1 approximately 40-ft West of where the author was setting the T10 trap. No Blanding's turtles were captured either in traps or while conducting VES. No shell remains were found.

Some Promar traps set in ditch systems yielded captures of central mud minnows (*Umbra limi*), the only fish species encountered in this survey. Total central mud minnow captures included 16 in T1, 11 in T3 and 2 in T4 within the Ditch #3 system, 1 in T13 at confluence of Ditch #7 with unnamed ditch/stream, and 2 in T15 of Ditch #8. No Iowa darters were encountered. Another dedicated fish survey conducted by the principal investigator (TGA) and Phillip Willink of the Field Museum on 20 June using seine and dipnet collected 9 darters, all of which proved to be *Etheostoma nigrum* (Johnny Darter).

Summary

The results of this trapping survey found no evidence indicating presence of Blanding's turtle within the project site boundary. All of the delineated wetlands that were surveyed and/or ground-truthed are of low-diversity and lack sufficient volume and duration of surface water to support aquatic and semi-aquatic turtle species and are not capable of sustaining Blanding's turtle presence. Sufficient water only occurred in wetland Area-05 and the primary Ditch #1 and Ditch #3 and Ditch #8 systems, or the unnamed ditch/stream and SBKR. Trapping and VES conducted in these areas supports conclusion of lack of presence of Blanding's Turtle.

Incidental observations took the form of amphibians and reptiles that are widely distributed in Kane County and at Freeman Kame Forest Preserve (Anton, 2009). Photo vouchers in the HerpMapper online photo database are included below.

Bullfrog = HM 221912

Green frog = HM 221911

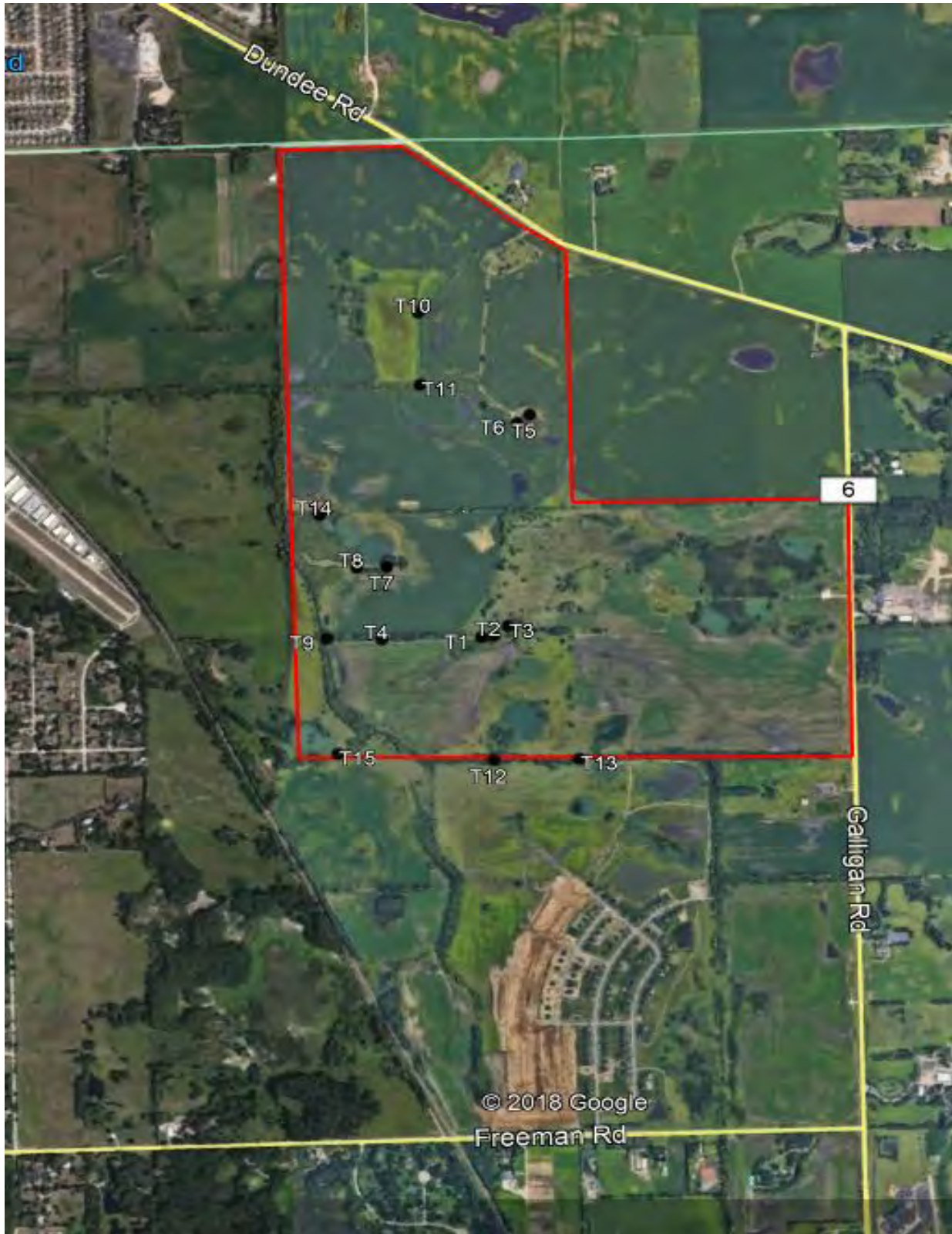
Northern leopard frog = HM 222079

Snapper = HM 221910

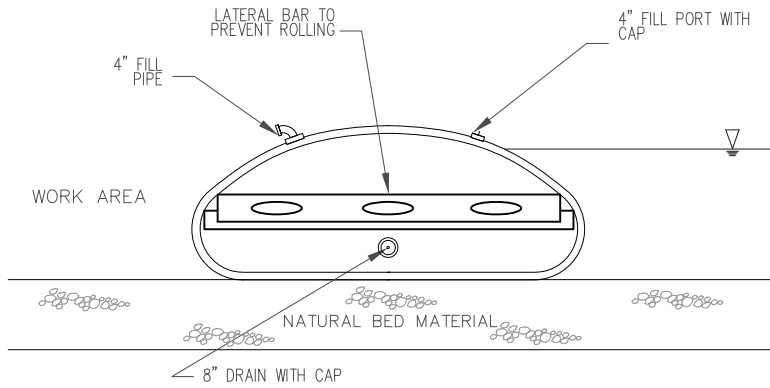
Table 1. Summary of Turtle Trap Captures

Date	Time	Trap	UTM-E	UTM-N	N	Species	Comments
5/24/2018	1108	T1	385388	4666293	1	<i>C. serpentina</i>	Large female biting and extending neck into entrance Promar trap, CL = 28 cm. Photographed.
5/24/2018	1220	T5	385556	4666912	1	<i>C. serpentina</i>	Adult male, CL = 24.5 cm
5/24/2018	1235	T6	385519	4666887	1	<i>C. serpentina</i>	Large adult male, CL = 27 cm; Photographed.
5/25/2018	1045		385243	4667254	3	<i>C. serpentina</i>	Observation by T. Anton of 2-large adults & 1 smaller immature surface basking at bend in N-branch #1 ditch 40-ft W/NW of T10.at junction of NE and N branches of 31 ditch system.
5/26/2018	1335	T2	385423	4666205	1	<i>C. serpentina</i>	Sub-adult or young adult, CL = 19.5 cm
5/26/2018	1445	T11	385247	4667022	1	<i>C. serpentina</i>	Younger male, CL = 22 cm
5/26/2018	1500	T5	385556	4666912	2	<i>C. serpentina</i>	Adult male recapture; Large adult male, CL = 28 cm
5/28/2018	1218	T10	385251	4667254	1	<i>C. serpentina</i>	Immature or young adult, sex undeterminable, CL = 20.5 cm
5/29/2018	1319	T1	385388	4666293	1	<i>C. serpentina</i>	Juvenile, CL = 9.5 cm
5/29/2018	1622	T9	384944	4666217	1	<i>C. serpentina</i>	Large adult female, CL = 27 cm; Photographed
Total					13		

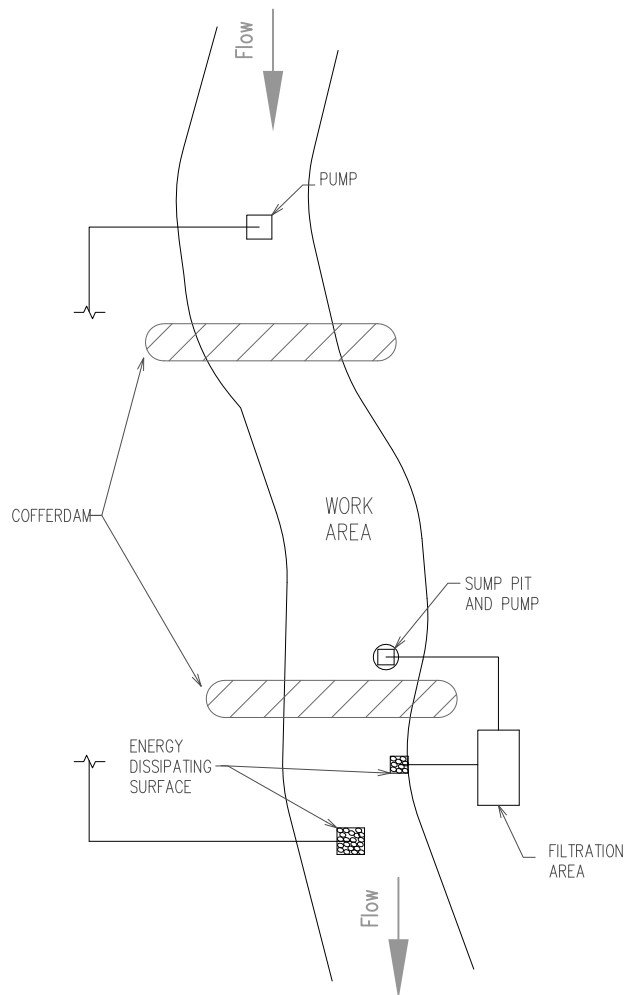
Figure 1 - Trap Locations



BLADDER COFFERDAM



COFFERDAM PROFILE



PLAN VIEW

NOTES:

1. ALL DISCHARGES SHOULD BE ON ENERGY DISSIPATING SURFACES.
2. LOCATIONS FOR THE SUMP PIT, FILTRATION AREA, AND ENERGY DISSIPATING SURFACES MAY VARY DEPENDING ON SITE CONDITIONS.

REFERENCE

Project _____
 Designed _____ Date _____
 Checked _____ Date _____
 Approved _____ Date _____



STANDARD DWG. NO.

IUM-503BF

SHEET 3 OF 7

DATE 7-09-2012