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Lower Menominee River Area of Concern Menekaunee Harbor & South Channel Maintenance Plan

Prepared for

City of Marinette

1905 Hall Avenue

Marinette, Wisconsin 54143

Project No. 13775014

Authored By:

NES Staff

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INTRODUCTION

The City of Marinette (the City), in cooperation with the Wisconsin Department of Natural Resources (WDNR), undertook ecological habitat restoration activities designed to improve degraded fish and wildlife habitat within the Lower Menominee River Area of Concern (LMRAOC) at two sites. Funding was secured through various sources including the City and the Great Lakes Restoration Initiative (GLRI) to implement restoration projects at Menekaunee Harbor and South Channel, located in Sections 4, 5, 8 & 9, T30N, R24E, City of Marinette, Marinette County, Wisconsin (Figure 1). Final plans were developed by NES Ecological Services – A Division of Robert E. Lee & Associates, Inc. (NES) in 2015 and 2016, respectively, following recommendations outlined in the *2013 Fish and Wildlife Population and Habitat Management and Restoration Plan Update for the Lower Menominee River Area of Concern*. Plans were designed to restore native vegetation communities and optimize fish and wildlife habitat to eliminate Beneficial Use Impairments (BUIs) within the degraded wetland complexes and adjacent upland buffers in the two project areas which encompass 16.77 and 21.37 acres in Menekaunee Harbor (Figure 2) and South Channel (Figure 3), respectively.

The purpose of this plan is to identify strategies for controlling populations of non-native, invasive species found within the two project areas. Three years of post-construction maintenance activities were conducted by Applied Ecological Services (AES) at both sites. NES is currently performing an additional two years of maintenance at Menekaunee Harbor and one year at South Channel. Although invasive species populations were reduced and effectively controlled, the threat of re-emergence or establishment of new stands could impair the restored habitats; therefore, routine monitoring and management should be conducted to ensure continued native plant establishment and successful community development. Management within the established native plant communities could include the implementation of an assortment of methods and techniques conducted throughout the year on an annual basis. In addition to addressing invasive plant populations, routine maintenance activities may be performed on habitat features, primarily nesting structures, which were constructed and installed throughout the two sites. Maintaining both the vegetation communities and the wildlife structures will prevent degradation of habitat values within the restored areas of the LMRAOC.

The City, in conjunction with UW-Marinette, may undertake one or more of the management activities discussed below to ensure the quality of the restored/created native vegetation communities remains high and provides optimal wildlife habitat. Maintaining these project areas will provide both aesthetically appealing spaces and improved recreational opportunities within the community for residents to enjoy. Students will benefit by having an outdoor laboratory in which they can learn firsthand about invasive species identification, management techniques and wildlife habitat. Conducting hands-on activities will allow students to learn about the many species of native plants, birds, mammals, amphibians, reptiles and fish species that inhabit the site and Northeast Wisconsin. UW-Marinette staff may want to utilize this plan along with the invasive species monitoring form to assist with their studies; however, additional forms may be developed to better fit planned classroom curriculum.

MANAGEMENT PLAN

Site Inspections

A variety of maintenance activities and methods may be implemented at Menekaunee Harbor and South Channel due to the diversity of restored and enhanced native upland and wetland community types found within each (Table 1). In order to determine appropriate maintenance strategies, each site should be

inspected every other month (April, June, August & October) throughout the growing season to document the presence of non-native, invasive species and their percent coverage within each community type (Figures 2 & 3). Data would be recorded on the vegetation monitoring form found in Appendix A and populations mapped to allow for easier follow-up maintenance activities and to track changes over time. Documented species and current site conditions would dictate the methods recommended for implementation. Invasive plant control efforts could consist of herbicide treatments, mowing, bio-control and/or prescribed burning. Results of the implemented activities would be tracked over time to determine if alternative methods or combinations should be employed to achieve higher rates of success. Changing strategies based upon observations and professional experience and objectives is often referred to as adaptive management.

In addition to inspecting vegetation found throughout the sites, trash could be removed during the site visits and damage to educational signs and wildlife structures noted and reported. Observations of wildlife could also be recorded.

Table 1. Restored, Created & Enhanced Communities within the LMRAOC.

Menekaunee Harbor	Community Type	
	Restored/Created	Enhanced
	Emergent Aquatic	Ephemeral Pool
	Mesic/Wet Mesic Prairie	Emergent/Wet Meadow
	Northern Sedge Meadow	Open Water
	Dry Mesic/Mesic Prairie	Northern Mesic Forest
	Shrub-Carr	Submergent Aquatic
	Northern Wet Mesic Forest	Beach
South Channel		
	Emergent Aquatic	Emergent Aquatic
	Northern Mesic Forest	Northern Sedge Meadow
	Mesic Prairie	Open Water
	Northern Sedge Meadow	Alder Thicket
	Shrub-Carr	Northern Wet Mesic Forest
	Wet Mesic Prairie	
	Northern Wet Mesic Forest	

Invasive Species Control

Herbicide Application

Herbicide applications are often times the most cost effective and successful means to control aggressive, perennial invasive species such as thistle (*Cirsium spp.*), giant reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), hybrid invasive cattails (*Typha spp.*), reed canary grass (*Phalaris arundinacea*), birdsfoot trefoil (*Lotus corniculatus*), crown vetch (*Coronilla varia*), Japanese knotweed (*Polygonum cuspidatum*), spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula*) and teasel species (*Dipsacus spp.*). Application methods will be dictated by the population size and location of the undesirable species. Hand wicking is often conducted on small, scattered populations that are intermixed with native vegetation to reduce collateral damage; whereas, backpack sprayers are used to selectively treat slightly larger populations that can't be controlled efficiently via hand wicking. Glyphosate based herbicides such as Roundup or equivalent will be used often, both in upland (Roundup®, Makaze®,

etc.) and wetland (AquaNeat® or Rodeo® – aquatic approved) situations. Glyphosate is a highly effective broad-based herbicide that is cost effective as well. Chemicals such as imazapyr (Polaris® or Habitat®), triclopyr (Garlon 3A® – aquatic approved or Garlon 4®), clopyralid (Transline®), clethodim (Intensity®) and sethoxydim (Poast®) can be utilized as well when necessary to control particular invasive plants. Caution should be exercised when using any chemical as improper use could cause damage to the surrounding vegetation even though some of the chemicals are selective in nature. Extra pre-cautions should be taken when utilizing glyphosate and imazapyr since they are non-selective herbicides and will negatively impact surrounding vegetation if allowed to drift. For most applications, a surfactant such as Activator 90 or Methylated Seed Oil (MSO) should be added to the herbicide solution because the wetting agent and activator helps break down the waxy leaf cuticle, thus increasing herbicide uptake. A marking dye such as Hi-Light Blue should also be added to ensure appropriate coverage and to reduce overspray. All conditions including following the recommended application rates and wearing the appropriate Personal Protective Equipment (PPE) listed on the chemical labels must be followed.

In general applications should not occur if:

- Winds >15 mph – drift onto adjacent properties and non-targeted vegetation shall be avoided
- Vegetation is wet
- Rain is expected within 2-6 hours of treatment (label required dry time)
- Temperature inversions are possible

Following the above guidelines will also prevent ecological damage, potential health issues and loss of productive time due to ineffective applications.

Applicators must be certified and licensed (if conducting the work for hire) in the appropriate categories including Aquatic & Mosquito (Category 5.0) & Right-of-Ways and Natural Areas (Category 6.0).

Prior to conducting any herbicide application over water or saturated soils, a permit for the chemical application must be secured from the Wisconsin Department of Natural Resources (WDNR); and, all posting and notification requirements followed (NR 107). Herbicide Application Records (WDNR Form 3200-111 for aquatic applications and DATCP form for upland applications) shall be submitted within 30 days of each treatment to the City of Marinette and the WDNR for the aquatic applications.

Mowing

Mowing is used for various reasons to assist with vegetation management. For established communities that require some form of occasional disturbance such as prairies, mowing is conducted to remove dead material from previous growing seasons and set back undesirable cool season species and woody vegetation growth. Thatch removal allows sunlight to reach the ground more quickly, which in turn allows the soil to warm faster and spur plant growth, a similar benefit provided by burning. An earlier start to the growing season allows warm season species (i.e., prairie plants) to compete with cool season species. Mowing for this purpose is often times conducted in the spring every few years. An ATV or small tractor with a mower is often the most effective within smaller plant communities.

In some cases, patches of weeds within native plantings are cut to prevent seed development. Annual and biennial species can be effectively controlled or eliminated through targeted and timely mowings. Perennial species, on the other hand, may be mowed not only to prevent flowering but also to stimulate re-sprouting during times that are more favorable for herbicide applications such as in fall when conditions may be drier or native species are dormant. A combination of mowing and herbicide treatments is effective in controlling many of the perennial, invasive species. Larger equipment may not

be very effective in maintaining small areas; therefore, brush saws and/or machetes should be utilized to cut these populations. Timing of this activity is very important especially when the prevention of seed development is the goal. Invasive species flower throughout the growing season so this activity could be conducted from April through October.

Hand Pulling/Cutting

Single plants or small populations could be removed by pulling them, provided the soil is moist and the plants are small enough to easily remove. This method can be more effective at eliminating the undesired plant compared to mowing, provided the whole root is extracted. Caution should be used when conducting this activity since too much soil disturbance could result in additional weed invasions to the area. If weather and/or site conditions delay maintenance activities and viable seed heads are present on the plants, they should be pulled or cut and placed in thick, plastic bags. If bags develop tears during the process due to puncturing, the compromised bag and its contents should be placed inside another bag to achieve full containment. Bagged material shall be securely closed and remove to a licensed landfill facility for proper disposal. Prior to moving the materials, all equipment and clothing shall be inspected thoroughly to ensure no plant fragments or seeds are dispersed in the process. Plants removed prior to or during the early stages of flowering could be composted on-site. As with mowing, this activity will depend on the species present and could be conducted any time between April and October.

Cut Stump or Basal Bark Applications

Typical woody vegetation that tends to invade natural areas are species such as non-native honeysuckle (*Lonicera sp.*) and buckthorn, both common and glossy (*Rhamnus cathartica* and *Frangula alnus*). Seedlings can often be eliminated through hand pulling any time the ground is not frozen; however, larger specimens are best addressed by cutting the stem/trunk and applying a solution of either glyphosate or triclopyr to the cut cambium and outer bark of the remaining stem/trunk. Shortly after a woody species is cut, a solution containing 20-30% triclopyr and Bark Oil or 50% glyphosate (aquatic approved, if necessary) shall be applied with either a backpack or hand sprayer to promote herbicide absorption. Equipment utilized for cutting the targeted woody vegetation includes loppers, brush saws and chainsaws. Unless removal is desired, all cut material can remain on-site.

Another option is basal bark treatment. This method involves the application of a chemical solution, discussed above, on the outer bark of the entire stem from the ground to approximately 18-24" up the trunk. Woody species that are basal bark treated would not be cut, which can provide a benefit for wildlife, while still controlling the plants. The only downside to this particular activity is the material could be considered unsightly. Basal bark treatments are effective during the active growing season and on woody species that are less than 3" in diameter.

Girdling could also be employed, but foliar herbicide applications would be required to treat the re-sprouts since this method will only kill the upper portion of the plant. However, applying a herbicide solution, same as cut stump, to the wound(s) produced by the cut will often times eliminate plant growth and the need for follow-up foliar applications. This technique is usually applied to larger diameter specimens.

Treatment of woody vegetation via these methods can be done throughout the year except during heavy sap flow in spring; however, most often times the work is completed between November and mid-March.

Prescribed Burning

Conducting a prescribed burn in the prairie communities would help control woody species and set back any cool season species. The controlled burn will also blacken the ground allowing the soil to warm more quickly which will promote prairie plant growth. Unlike mowing, burns, if conducted frequently enough (e.g., 3-5 years), will kill small, invading woody vegetation. Burning will also result in a more thorough consumption and removal of thatch build-up which further assists plant growth.

Conducting prescribed burns within urban settings is often construed as a dangerous and risky practice due to a lack of knowledge regarding the amount of planning and preparation conducted prior to starting the fire and the caution taken while performing the burn. Educating and communicating with the local fire department and City staff is paramount in ensuring they are comfortable with the process. Providing examples of similar burns in urban settings along with burn crew qualifications will assist with the education. All crew members will have basic National Wildfire Coordinating Group (NWCG) training including S-130 (Firefighter Training), S-190 (Introduction to Wildland Fire Behavior) and L-180 (Human Factors in the Wildland Fire Service). Individuals in charge of overseeing the fire lines will have additional S-290 (Intermediate Wildland Fire Behavior) training while the Burn Boss, individual in charge of the burn, will have S-390 (Introduction to Wildland Fire Behavior Calculations) credentials.

Provided the concept of conducting a prescribed burn is accepted and approved, the first step would be the preparation of a burn plan. The plan will outline the following:

- Landowner Information
- Burn Objectives
- Current Site Conditions
- Ignition Plan
- Mop-up Plan
- Safety Plan
- Burn Team Members and Qualifications
- Adjacent Landowner Contacts
- Agency Contacts
- Required Permits

In order to address items to be included within the plan, an initial site assessment should be conducted. Fire department personnel and City staff are invited to the on-site evaluation to review the step-by-step process of implementing, controlling and suppressing the fire. The on-site review is also necessary to better determine the timing of the burns; areas that are conducive to a burn and those that are not; and the field work that will be required prior to conducting the burns, mainly creation of burn breaks. Once the plan is complete, it will be submitted to the City of Marinette Fire Department as part of the request for a burn permit. A permit is also required from the WDNR since Marinette County is located within the DNR Forest Fire Protection Area.

Due to the nature of these sites, there are lawn areas, hard surfaces (e.g., streets, parking lots & gravel trails), and open water that would act as burn breaks, to contain the fire. But it is also expected that some time would need to be spent mowing or cutting areas to create or improve these barriers where they may not be adequate in their current state. Mowing around select trees and shrubs should also be conducted to ensure they are not damaged by the fire. Installation of fire breaks are often done the fall prior to conducting a spring burn; however, breaks can be mowed just prior to conducting a burn.

A week or two prior to implementing the burn, locally affected residents adjacent to the burn sites shall be notified. Newspaper announcements or mailed letters are often utilized to provide proper notification. On the day of the burn, additional flyers are distributed to residents alerting them of the maintenance activity to be conducted. In addition to the residents, local Police and Fire Departments along with City staff are notified to confirm operations and determine if additional precautions are warranted. Signage would be placed at all street locations that are entry and access points for the affected burn units. Once all the notifications are in place, a brief but thorough team meeting would be held prior to conducting the burn. The plan and layout for each site shall be reviewed and any associated hazards and concerns discussed. Overall weather conditions including wind speeds, direction and humidity levels within the region and at each site shall be thoroughly reviewed prior to beginning any burn. Wind direction will be particularly important when burning near high traffic or dense residential areas. If necessary, a test fire shall be conducted to ensure site conditions, including fuel levels, are conducive for the burn. The Burn Boss shall make the final decision and either cancel the procedure or move forward with the burn, which would then be conducted per the plan. After the burn is completed, a mop-up crew would ensure there are no remaining embers that could spark another fire in the hours following the burn. The burns would be conducted during the traditional spring burn season – very late March into April, and possibly early May; however, fall burns in October or November are possible if conditions allow.

The burn crew would consist of 3-5 trained staff. A minimum of 2 pickup trucks would be utilized for mobilization, transport of crews, and hauling of equipment, both large and small, within and between burns. The trucks would also carry water which shall be present at each burn site. A minimum of 2 UTV/ATV's would be utilized for transporting and spraying water. They would also be used to transport crew members and provide the required lookout personnel during the burns. Small standard burn equipment would also be used including: hand held drip torches for lighting fires, matches for lighting the drip torches, hand rakes and flappers for controlling the fire, PPE such as NOMEX coveralls, gloves, and boots, hard hats, water backpacks, two-way communications radios for communication amongst all crew members, and maps of the burn units and associated burn plans & instructions.

Bio-Control

Although research continues to identify potential bio-control measures targeting specific species, there are currently few options available. To date, there are three plant species (purple loosestrife, spotted knapweed and leafy spurge) in which insects have been successfully utilized to slow or control their spread. Loosestrife beetles (*Galerucella pusilla* or *Galerucella californiensis*), knapweed root weevils (*Cyphocleonus achates*) and leafy spurge insects (*Oberea spp.* & *Aphthona spp.*) feed on the targeted plants which often times prevent them from producing seed heads, thus preventing or limiting further seed production. Loosestrife beetles are abundant enough within the region that they can either be raised or purchased while the knapweed and spurge insects are typically purchased from an out-of-state vendor and released in the early portion of the growing season. Investment in the insects is warranted if large populations of the invasive species are present and other maintenance activities are not achieving the desired level of control.

Target Invasive Species

The information below is a discussion of different treatment methods that have been utilized successfully on various invasive plants. The species discussed are not meant to be all inclusive of those found throughout the two restoration sites; but rather, the material covers many of the species routinely being treated within the project areas. Appendix B contains a general maintenance schedule for many of the below species.

Table 2. Recommended timing of maintenance activities.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reed Canary Grass												
Purple Loosestrife												
Cattail												
Phragmites												
Buckthorn & Honeysuckle												
Sweet Clover & Wild Carrot												
Garlic Mustard & Dames Rocket												
Spotted Knapweed												
Thistle												
Bird's-foot Trefoil												
Perennial Cool Season Grasses												



Reed Canary Grass

Single Plants or Small Clusters

- 1) If seed heads are present, they should be cut, bagged and removed for proper disposal.
- 2) A herbicide solution, including the chemical glyphosate or imazapyr, a surfactant or MSO, ammonium sulfate, and marking dye, should be applied through one of the below methods in spring and fall:
 - a) Apply solution containing 5% chemical to the plant using the “Glove of Death” technique. The technique involves spraying the solution onto a cotton glove that is worn by the applicator over chemically resistant gloves; the applicator then takes hold of the plant near the base and runs the cotton glove up the plant stem.
 - b) Spot spray solution containing 2% chemical on the target plants.

Large Clusters or Populations

- 1) Mow prior to seed development. Activity would need to be conducted again in fall unless the plants are treated.
- 2) Broadcast spray as discussed above. A follow-up fall herbicide application to treat re-sprouts and new plants would be necessary. If possible, fall treatments would occur when native plants are dormant.

Other chemicals that could be utilized are clethodim and sethoxydim, grass selective herbicides that won't impact sedges and rushes. However, an aquatic formulation of these chemicals is currently not available; therefore, the wetland communities would need to dry out prior to its use since standing water or saturated soils must be absent. Depending on the year, conditions may become favorable in late summer or fall.

Purple Loosestrife

Single Plants or Small Clusters

- 1) Cut, bag and properly dispose of seed heads and plants.
- 2) A herbicide solution, including the chemical glyphosate, imazapyr or triclopyr, a surfactant or MSO, ammonium sulfate, and marking dye, should be applied through one of the below methods between July and September:
 - a) Apply solution containing 25-30% chemical directly to cut stem with sponge type applicator so that it can be absorbed into the root system.
 - b) Apply solution containing 5% chemical to the plant using the “Glove of Death” technique.

- c) Spot spray solution containing 2% chemical on the target plants.

Large Clusters or Populations

- 1) Broadcast spray solution containing 2% chemical on the target plants. Spray prior to flowering to achieve best control.
- 2) If plant populations become large enough, release loosestrife beetles (*Galerucella pusilla* or *Galerucella californiensis*) on-site.

Cattail Species

Single Plants or Small Clusters

- 1) Stems can be cut under the water surface two or three times during the growing season. When the stems are under water, the rhizomes are unable to receive an air supply, which is detrimental to the plant. Material may be removed and composted.
- 2) A herbicide solution, including the chemical glyphosate or imazapyr, a surfactant or MSO, ammonium sulfate, and marking dye, would be applied through one of the below methods in late summer and fall:
 - a) Apply solution containing 5% chemical to the plant using the “Glove of Death” technique.
 - b) Spot spray solution containing 2% chemical on the target plants.

Large Clusters or Populations

- 1) Patches of dead cattail should be burned or mowed during the winter months to remove biomass making it easier to treat new growth.
- 2) Broadcast spray solution containing 2% chemical on the target plants.

Giant Reed Grass

Single Plants or Small Clusters

- 1) A herbicide solution, including the chemical glyphosate or imazapyr, a surfactant or MSO, ammonium sulfate, and marking dye, should be applied through one of the below methods in late summer and fall:
 - a. Solution containing 5% glyphosate or imazapyr is applied to the plant using the “Glove of Death” technique.
 - b. Solution containing 5% glyphosate or imazapyr is applied to the plant using the “cut surface” technique. The technique involves cutting the stem near the base of the plant with a pruners then applying the solution onto the hollow stem with a fine tipped squeeze bottle.

Large Clusters or Populations

- 1) If conditions allow, stands should be mowed in either late fall/early winter or early spring to remove the previous year's dead material. The material removal will reduce the amount of herbicide required and allow easier movement within the stand for treatment.
- 2) If conditions allow, mow patches in late June or early July with a follow-up application on re-growth.
- 3) Broadcast spray solution containing 2% chemical on the target plants.

Buckthorn & Honeysuckle Species

Seedlings & Small Saplings

- 1) Pull and compost if soil conditions allow.
- 2) Spot spray herbicide solution containing 2% of one of the following chemicals: glyphosate, imazapyr or triclopyr, a surfactant or MSO, ammonium sulfate, and marking dye during the active growing season.

Saplings and Large Shrubs

- 1) Cut stem/trunk and apply herbicide solution containing 20-30% triclopyr and Bark Oil or 50% glyphosate during fall and winter months.
- 2) Apply a herbicide solution containing 20-30% triclopyr and Bark Oil to the bark of the lower 18-24" of the stem/trunk – Basal Bark Application.

Biennial & Annual Broadleaf Weeds (e.g. Sweet Clovers, Queen Anne's Lace, Houndstongue, Common Burdock, Garlic Mustard & Spotted Knapweed.)

Single Plants or Small Clusters

- 1) Pull and compost if soil conditions allow.
- 2) Cut, bag and properly dispose of seed heads and plants.
- 3) For species such as burdock and spotted knapweed that have deeper taproots and can't easily be pulled, a herbicide solution containing 2% of one of the following chemicals: glyphosate, imazapyr, triclopyr or clopyralid, a surfactant or MSO, ammonium sulfate, and marking dye should be applied during the active growing season prior to seed development. Ideally applications are conducted in the spring and fall when native species are dormant.

Large Clusters or Populations

- 1) Mow or spot mow plants just after seed head development to prevent mowing too early. Timing will depend on the species targeted.
- 2) Conduct follow-up mowing application in fall if re-growth occurs after first mowing or new plant growth is observed.
- 3) Broadcast spray a herbicide solution containing 2% of one of the following chemicals: glyphosate, imazapyr, triclopyr or clopyralid, a surfactant or MSO, ammonium sulfate, and marking dye. Ideally applications are conducted in the spring and fall when native species are dormant. These applications would primarily target common burdock, spotted knapweed and garlic mustard.

Perennial Broadleaf Weeds (e.g., Thistles, Dames Rocket & Bird's-foot Trefoil)

Single Plants or Small Clusters

- 1) Pull and compost if soil conditions allow.
- 2) Cut, bag and properly dispose of seed heads and plants.
- 3) Spot spray herbicide solution containing 2% of either glyphosate or clopyralid, a surfactant or MSO, ammonium sulfate, and marking dye during the active growing season. Ideally applications are conducted in the spring and fall when native species are dormant.

Large Clusters or Populations

- 1) Broadcast spray herbicide solution containing 2% of either glyphosate or clopyralid, a surfactant or MSO, ammonium sulfate, and marking dye during the active growing season. Ideally applications are conducted in the spring and fall when native species are dormant or after a prescribed burn.
- 2) Mow or spot mow plants just after seed head development to prevent mowing too early, which would allow the plants to re-flower. Mowing would be conducted to address plants missed during initial treatment efforts as mowing alone will not control these species. Timing will depend on the species targeted.

Perennial Grasses (e.g., Smooth Brome, Kentucky Bluegrass & Quackgrass)

Single Plants or Small Clusters

- 1) Cut, bag and properly dispose of seed heads.
- 2) A herbicide solution, including the chemical glyphosate, clethodim or sethoxydim, a surfactant or MSO, ammonium sulfate, and marking dye, should be applied through one of the below methods in spring and fall:
 - a) Apply solution containing 5% chemical to the plant using the “Glove of Death” technique.
 - b) Spot spray solution containing 2% chemical on the target plants.

Large Clusters or Populations

- 1) Implement a prescribed burn in the spring. Multiple years of burning may be required if dense stands of cool season grasses persist.
- 2) Broadcast spray herbicide solution containing 2% of either glyphosate, clethodim or sethoxydim, a surfactant or MSO, ammonium sulfate, and marking dye during the active growing season. Ideally applications would use grass selective chemicals to reduce overall impacts and are conducted in the spring and fall when native species are dormant.
- 3) Mow dense stands just after seed head development, typically in June. A follow-up mowing may be required in fall. Mowing is only necessary if burning or herbicide applications are not conducted. A combination of these three maintenance activities should be performed to provide the best results.

Areas containing large, dense populations of the above species may require over-seeding with native grasses and/or wildflowers in the fall. The addition of seed will help ensure treated areas are not invaded by another undesirable species and retain species diversity within the planting.

Wildlife Habitat Structures

The restored and created native, vegetation communities found throughout the two restoration sites provide ample habitat for a variety of wildlife species; however, further improvements were made through the construction and installation of habitat structures (Table 2), most of which provide increased shelter and nesting opportunities. In addition to invasive plant species monitoring and management, some of the habitat structures within the two sites could have annual maintenance activities conducted to ensure they continue providing favorable conditions and benefits to those species utilizing them. Annual wear and potential damage from vandalism will result in maintenance requirements to some of the structures. During the annual inspections, observations regarding the use of various structures could be recorded and tracked over time to determine if the overall diversity of wildlife is increasing.

Table 3. Menekaunee Harbor Habitat Structures installed within the LMRAOC.

Structure	Benefit Provided	Suggested Maintenance	Frequency of Maintenance
Bat House	Roosting	Repair Baffle & House	Inspect Annually & Repair/Replace as needed
Brush Pile	Shelter/Loafing	None	--
Fish Sticks	Shelter	None	--
Half Log Structure	Shelter	None	--
Rock Pile	Shelter/Loafing	None	--
Screech Owl Nest Box	Nesting	Repair Baffle & House	Inspect Annually & Repair/ Replace as needed
Snag/Downed Trees	Nesting/Feeding	None	--
Forester's Tern Nesting Platform	Nesting	Install/Remove Platforms & Repair	Install – Early May Remove – Late September Repair/Replace as needed
Tree Swallow Nesting Box	Nesting	Remove Old Nest Repair Baffle & House	Box Clean Out - Fall Repair/Replace as needed
Wood Duck Box	Nesting	Remove Old Nesting Materials, Repair Baffle & House	Box Clean Out/Add New Wood Shavings - Winter Repair/Replace as needed
Woody Debris	Shelter/Loafing	None	--
Osprey Nesting Platform	Nesting	None	Inspect Pole Annually

Table 4. South Channel Habitat Structures installed within the LMRAOC.

Structure	Benefit Provided	Suggested Maintenance	Frequency of Maintenance
Bat House	Roosting	Repair Baffle & House	Inspect Annually & Repair/Replace as needed
Brush Pile	Shelter/Loafing	None	--
Fish Sticks	Shelter	None	--
Great Blue Heron Nesting Platform	Nesting	None	Inspect Poles Annually
Loafing Platform	Loafing	Replace Boards	Inspect Annually & Repair/ Replace as needed
Log Structure	Shelter/Loafing	None	--
Osprey Nesting Platform	Nesting	None	Inspect Pole Annually
Rock Pile	Shelter/Loafing	None	
Screech Owl Nesting Box	Nesting	Repair Baffle & House	Inspect Annually & Repair/ Replace as needed
Snag/Downed Trees	Nesting/Feeding	None	--
Tree Swallow Nesting Box	Nesting	Remove Old Nest Repair Baffle & House	Box Clean Out - Fall Repair/Replace as needed
Turtle Nesting	Nesting	Vegetation Removal	Spring - Pull Plants to Keep Sandy Area Clear of Vegetation
Willow Hinge Cut	Shelter/Feeding	None	--
Wood Duck Box	Nesting	Remove Old Nesting Materials, Repair Baffle & House	Box Clean Out/Add New Wood Shavings - Winter Repair/Replace as needed

Wildlife Monitoring

Recording observations of wildlife species utilizing the two sites provides a good gauge regarding the success of the restorations and health of the ecosystem; however, performing these surveys has no bearing on the overall management of the site. Conducting invasive species removal and maintaining the wildlife structures are key to ensuring long-term success of the sites; nevertheless, exposing students to a variety of outdoor activities including wildlife monitoring may fuel their interest in the field of ecology. These students may one day become the botanists, wildlife managers and restoration ecologists that continue the improvement and protection of our valuable ecological resources. If UW-Marinette staff chose to incorporate these surveys into their curriculum, the following are some activities that could be conducted.

Frog/Toad Surveys

Surveys could be conducted beginning in late March in the evening after the initial winter thaw to capture early species (i.e., chorus, spring peepers & wood frogs). One, maybe two, evening surveys under good conditions will capture these species, if present. Other species such as green and leopard frogs along with toads can be heard in June during the late day or evening hours. Additional information can be found on the WDNR website: www.wiatri.net/inventory/Frogtoadsurvey. The information provide on their site will give more detailed information regarding surveying techniques and allows surveyors to submit collected information.

Turtle/Snake Surveys

Glassing the loafing structures and platforms in the water prior to dense vegetation growth in April and May on a nice sunny day should allow observation of turtles found within the area. The turtle nesting habitat established at South Channel should see activity in June so a periodic review of that area could prove fruitful. Snakes emerging from their hibernaculums in early spring can often times be seen sunning themselves on rocks or other structures; therefore, an early survey of those structures along with the brush pile habitats could be conducted to identify snake species within the area. Snakes can also be more easily seen within the early emerging vegetation so walking through the different community types could yield good results. Although most of the above surveys are to be conducted in the early portion of the year, observations could be made throughout the summer and fall prior to winter hibernation.

Birds Surveys

Many species of birds can be observed during spring and fall migration. Although these species may not be utilizing the site as breeding habitat, it's important to know if the communities are providing essential items for migratory species. The location of the sites suggests they could be fallout areas that could be teeming with birds during this timeframe. A minimum of 2 or 3 site visits during late April and mid-May and again in late August and September should provide good information on bird use. Time of day for these surveys is not as critical since birds can be present throughout the day during this period. Breeding bird surveys (2-4 site visits) between late May and mid-July will provide information on those species using the site for nesting. These surveys should be conducted from just before sunrise to around 9-10 in the morning. Collected observations can be submitted to the eBird website which uses the sightings for conservation purposes. In addition to performing the migratory and breeding bird surveys, information regarding the use of nesting structures can be noted and entered into the database when they are inspected annually. If bluebirds are found nesting on-site, additional information can be completed at the following site: www.braw.org/index.php/annual-report-form/ez-form-2017.

Bat Surveys

Information regarding the use of roosting boxes can be noted and entered into a WDNR database (www.wiatri.net/Inventory/Bats/Volunteer/Roosts) when they are inspected annually. Bats in general should be able to be identified by size and shape since there are likely only a handful that are present within the area; however, acoustic surveys could also be performed in an effort to identify all species utilizing the site and migrating through the area. Additional information can be found on the WDNR website: www.wiatri.net/inventory/bats. The information provide on their site will give more detailed information regarding surveying techniques and allows surveyors to submit collected information.

Mammal Surveys

Time spent on-site conducting the above surveys should allow the direct observation of mammals or evidence (e.g., tracks, scat, etc.) of their presence. Additional information, particularly for smaller animals, could be gathered through live trapping. Sherman traps of varying sizes could be set to capture and then release animals unharmed. Smaller traps are very useful in capturing those smaller species not easily observed such as mice, voles and shrews. Digging pit traps could also be a means of capturing these species, but the holes must be dry; otherwise, animals will be subjected to drowning. Game cameras could also be utilized to capture evidence of a variety of mammals and other wildlife species. The WDNR has a program (Snapshot Wisconsin) in which they ask volunteers to submit photos of wildlife captures with these cameras. Information regarding the program can be found at <https://dnr.wi.gov/topic/research/projects/snapshot>.

A

APPENDIX A

Invasive Species Monitoring Form

INVASIVE SPECIES MONITORING FORM

Location:

Date:

Observer:

Species		% Coverage	Recommended Treatment/Timing
Common Name	Scientific Name		
Garlic Mustard	<i>Alliaria petiolata</i>		
Common Burdock	<i>Arctium minus</i>		
Smooth Brome	<i>Bromus inermis</i>		
Cheat Grass	<i>Bromus tectorum</i>		
Spotted Knapweed	<i>Centaurea maculosa</i>		
Canada Thistle	<i>Cirsium arvense</i>		
Bull Thistle	<i>Cirsium vulgare</i>		
Common Hound's-Tongue	<i>Cynoglossum officinale</i>		
Orchard Grass	<i>Dactylis glomerata</i>		
Queen Anne's Lace	<i>Daucus carota</i>		
Quackgrass	<i>Elymus repens</i>		
Dame's Rocket	<i>Hesperis matronalis</i>		
Tartarian Honeysuckle	<i>Lonicera tartarica</i>		
Bird's-Foot Trefoil	<i>Lotus corniculatus</i>		
Purple Loosestrife	<i>Lythrum salicaria</i>		
White Sweet Clover	<i>Melilotus albus</i>		
Reed Canary Grass	<i>Phalaris arundinacea</i>		
Kentucky Bluegrass	<i>Poa pratensis</i>		
Hybrid Cattail	<i>Typha x glauca</i>		

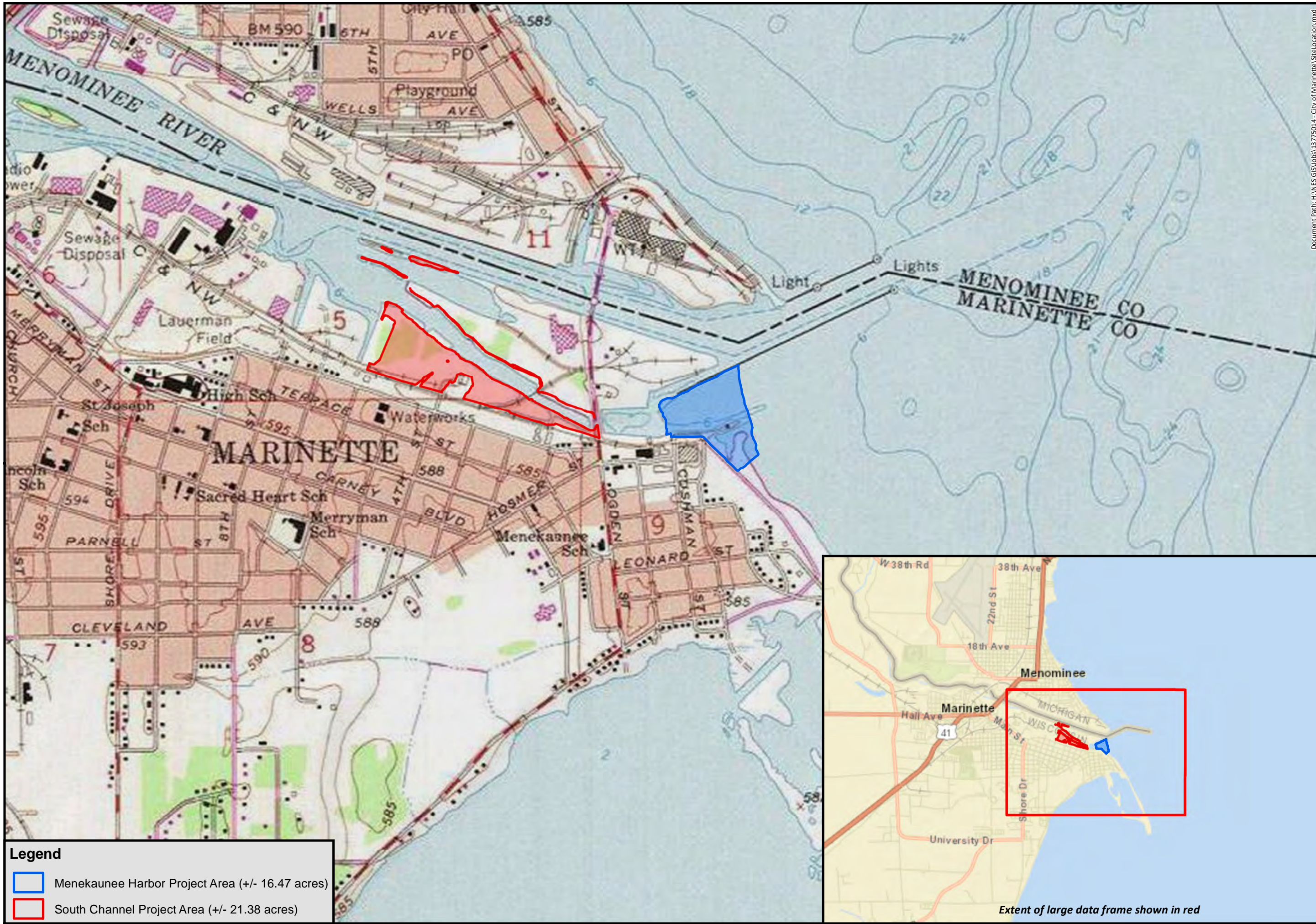
Percent Foliage Cover	Rank
1-5	1
5-25	2
25-50	3
50-75	4
75-95	5
95-100	6

Populations GPS'd? Yes No

Trash Pick-up Required? Yes No

Damage to Wildlife Structures? Yes No If yes, list structures and observed issues:

Wildlife Observations:



Legend

- Menekaunee Harbor Project Area (+/- 16.47 acres)
- South Channel Project Area (+/- 21.38 acres)

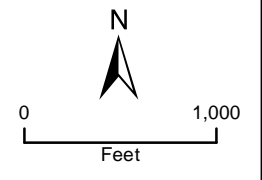


Figure 1
Site Location

2/5/2019

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

Located in part of:
 Section 4, 5, 8, & 9
 T30N, R24E
 City of Marinette
 Marinette County
 Wisconsin



Document Path: H:\NES_GIS\Jobs\13775014 - City of Marinette\SiteLocation.mxd

Extent of large data frame shown in red

Legend

- Invasive Species Control Area (+/- 7.08 acres)
- Existing Trees
- Wood Chip Trail
- Existing Trail
- Existing Tree Areas
- Enhancement Zone
- Rework Zone

Habitat Improvements

- Bat House
- Brush Pile
- Fish Sticks
- Half Log Structure
- Log Structure
- Rock Pile
- Screech Owl Nest Box
- Snag Tree
- Forster's Tern Nesting Platform
- Tree Swallow Nest Box
- Wood Duck Box
- Woody Debris
- Osprey Nesting Platform

Plant Community Zones

- Emergent Aquatic (1.00 acres)
- Emergent Aquatic - Wild Rice (1.07 acres)
- Emergent / Wet Meadow Planting (0.06 acres)
- Ephemeral Pool (0.05 acres)
- Mesic to Wet Mesic Prairie (0.32 acres)
- Northern Sedge Meadow (0.82 acres)
- Open Water (4.07 acres)
- Prairie (0.32 acres)
- Shady Woodland Planting (0.22 acres)
- Shrub Carr (0.51 acres)
- Submergent Aquatic (0.03 acres)
- Wet Mesic Forest (1.22 acres)

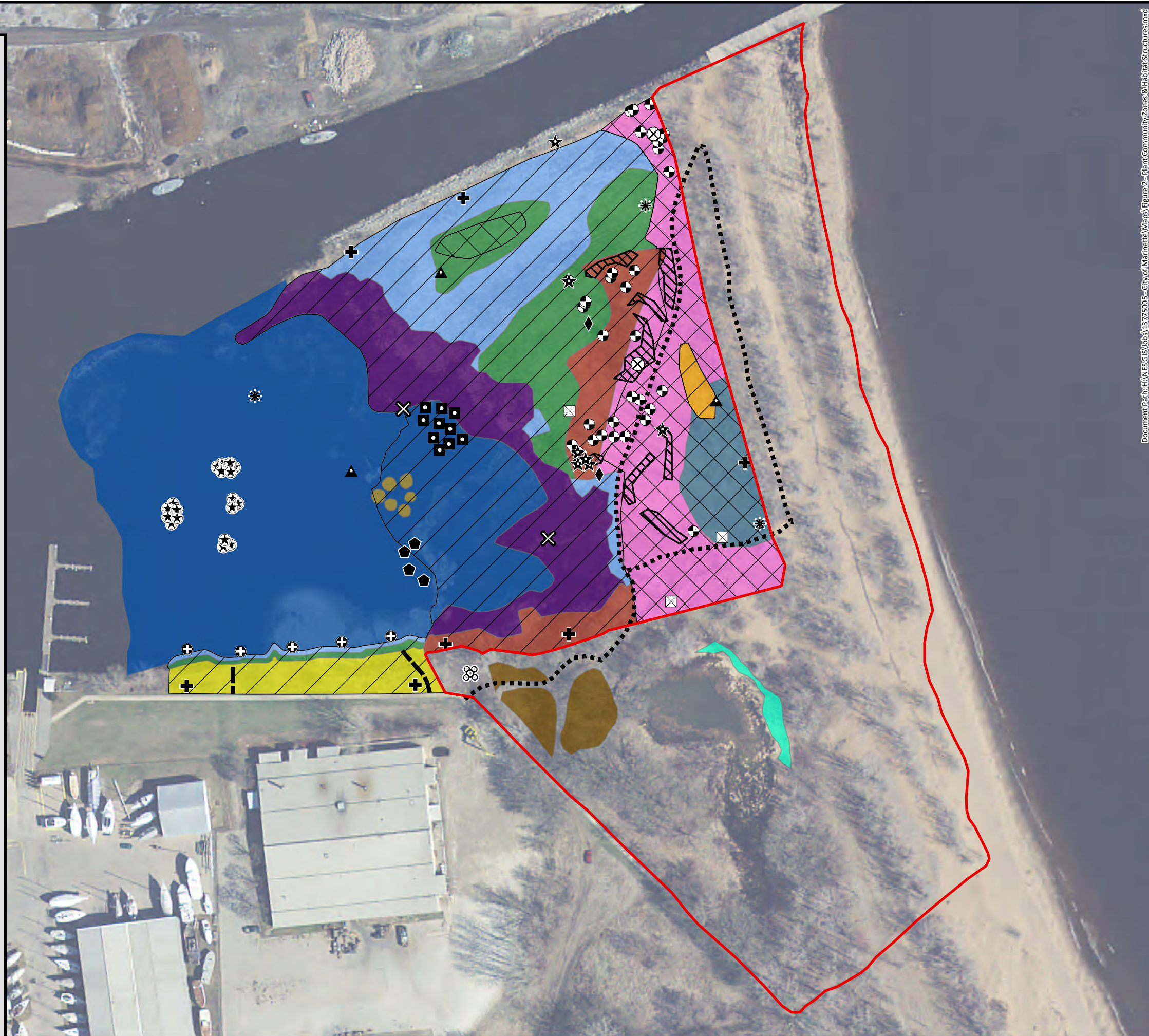
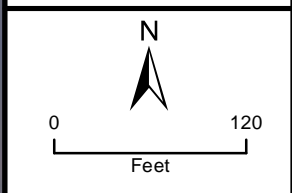


Figure 2
Plant Community Zones
& Habitat Structures

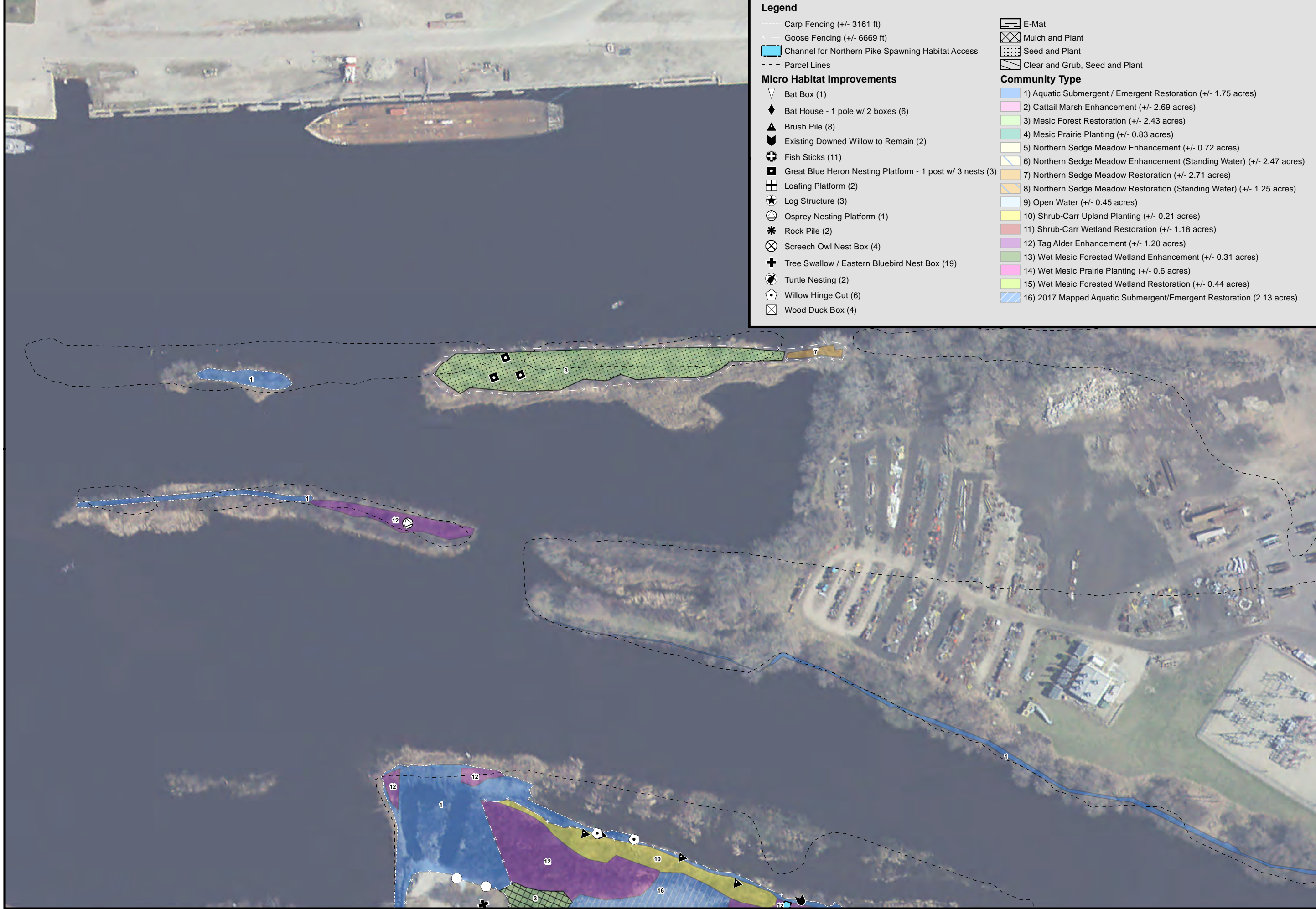
2/5/2019

Lower Menominee River Area of Concern
Menekaune Harbor Restoration Project
City of Marinette-Grant/Proj. No. GL-00E01312-0
REL Project No. 13775005
Marinette, Marinette County, WI

Located in parts of:
Section 4 & 9
T30N, R24E
City of Marinette
Marinette County
Wisconsin



Document Path: H:\WES\GIS\Jobs\13775005-City of Marinette\Maps\Figure 2-Plant Community Zones & Habitat Structures.mxd



Legend

- Carp Fencing (+/- 3161 ft)
- Goose Fencing (+/- 6669 ft)
- Channel for Northern Pike Spawning Habitat Access
- - - Parcel Lines

Micro Habitat Improvements

- ▽ Bat Box (1)
- ◆ Bat House - 1 pole w/ 2 boxes (6)
- ▲ Brush Pile (8)
- Existing Downed Willow to Remain (2)
- ⊕ Fish Sticks (11)
- Great Blue Heron Nesting Platform - 1 post w/ 3 nests (3)
- ⊕ Loading Platform (2)
- ★ Log Structure (3)
- ⊙ Osprey Nesting Platform (1)
- * Rock Pile (2)
- ⊗ Screech Owl Nest Box (4)
- ⊕ Tree Swallow / Eastern Bluebird Nest Box (19)
- ⊙ Turtle Nesting (2)
- ◇ Willow Hinge Cut (6)
- ⊗ Wood Duck Box (4)

- E-Mat
- Mulch and Plant
- Seed and Plant
- Clear and Grub, Seed and Plant

Community Type

- 1) Aquatic Submergent / Emergent Restoration (+/- 1.75 acres)
- 2) Cattail Marsh Enhancement (+/- 2.69 acres)
- 3) Mesic Forest Restoration (+/- 2.43 acres)
- 4) Mesic Prairie Planting (+/- 0.83 acres)
- 5) Northern Sedge Meadow Enhancement (+/- 0.72 acres)
- 6) Northern Sedge Meadow Enhancement (Standing Water) (+/- 2.47 acres)
- 7) Northern Sedge Meadow Restoration (+/- 2.71 acres)
- 8) Northern Sedge Meadow Restoration (Standing Water) (+/- 1.25 acres)
- 9) Open Water (+/- 0.45 acres)
- 10) Shrub-Carr Upland Planting (+/- 0.21 acres)
- 11) Shrub-Carr Wetland Restoration (+/- 1.18 acres)
- 12) Tag Alder Enhancement (+/- 1.20 acres)
- 13) Wet Mesic Forested Wetland Enhancement (+/- 0.31 acres)
- 14) Wet Mesic Prairie Planting (+/- 0.6 acres)
- 15) Wet Mesic Forested Wetland Restoration (+/- 0.44 acres)
- 16) 2017 Mapped Aquatic Submergent/Emergent Restoration (2.13 acres)



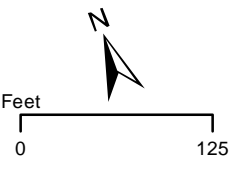
Figure 3
Plant Community Zones
& Habitat Structures
Map 1

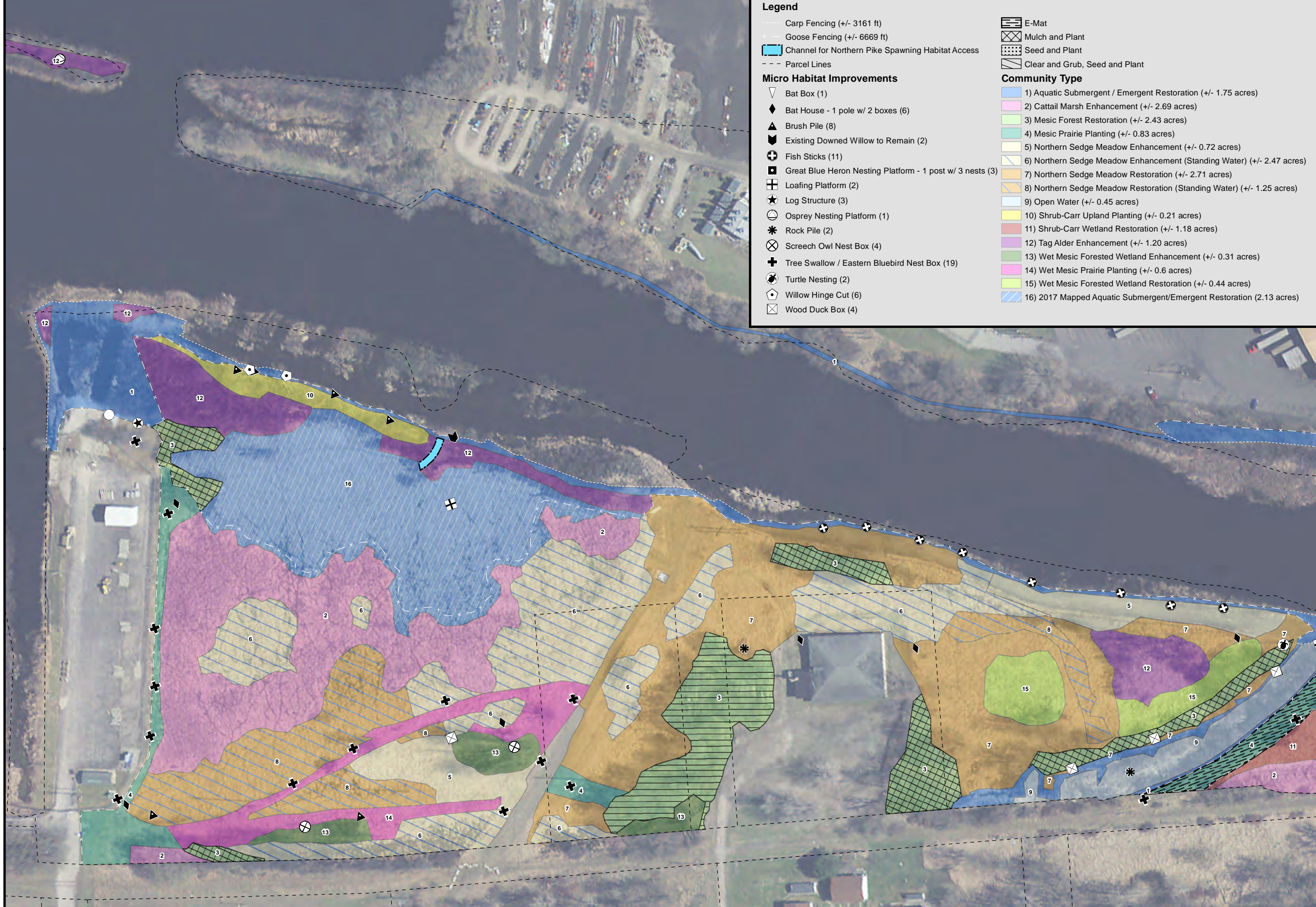
2/5/2019

City of Marinette
Preliminary Wetland Analysis
Contract No. 3775-16-02
City of Marinette
Marinette County, Wisconsin

Sources: Robert E. Lee & Associates, Inc., Marinette County

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Other Legend Items:

- E-Mat
- Mulch and Plant
- Seed and Plant
- Clear and Grub, Seed and Plant



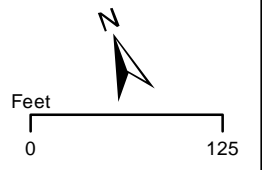
Figure 3
Plant Community Zones
& Habitat Structures
Map 2

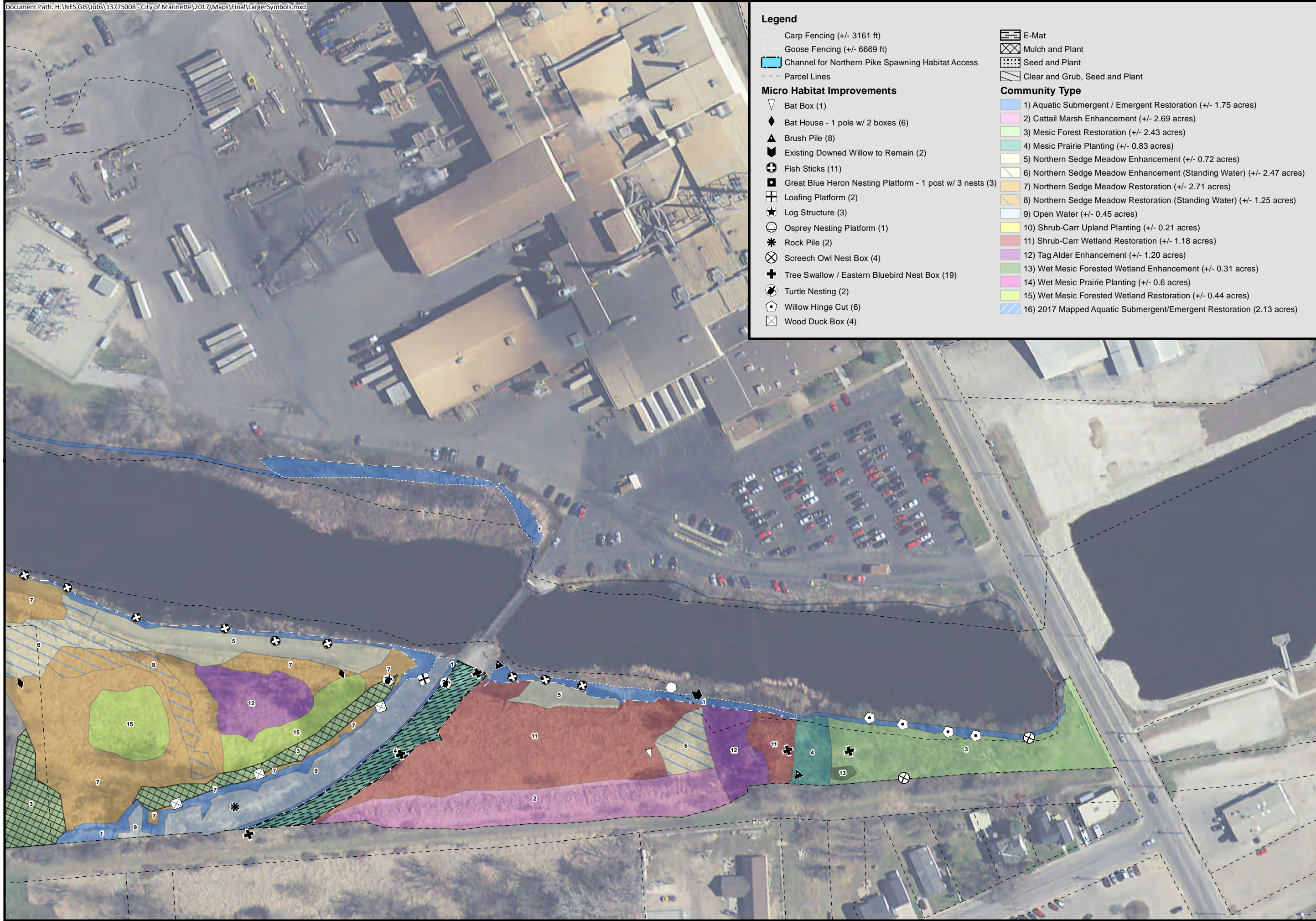
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Figure 3
Plant Community Zones
& Habitat Structures
Map 3

2/5/2019

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