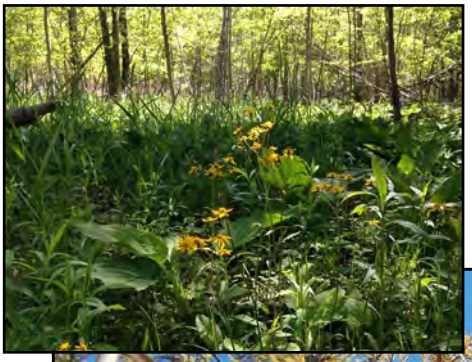
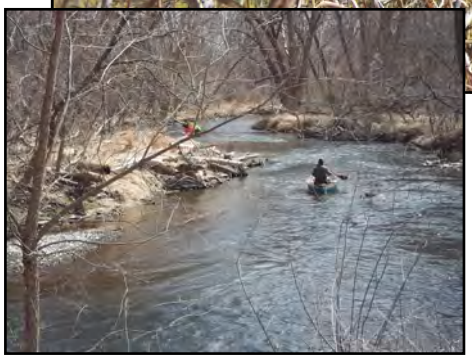
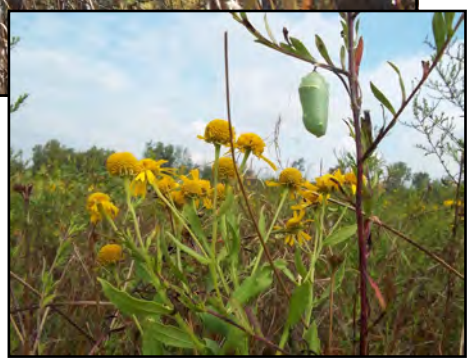
October 2015

CITY OF ROCHESTER HILLS

Rochester Hills
Natural Features Stewardship Program
Long-Term Management Plan



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EXECUTIVE SUMMARY

The City of Rochester Hills (City) is located in eastern Oakland County, Michigan. The population is approximately 73,500, with future estimates approaching approximately 77,000 in the coming years. The City's 32.2 square miles are largely developed (~12% open space remains). The community is very active and utilizes the available open space for recreational activities. The City is sensitive to ecological issues and values the preservation of its natural resources; having the ability to restore or enhance valuable green space and to control invasive plants that are threatening the quality of its community is a significant priority. Green space in this portion of the state has been rapidly declining through development practices resulting in substantial wetland loss, the loss of wildlife habitat, sedimentation of our watercourses, alteration of hydrology, and the introduction of non-native vegetation. Enhancing degraded habitat, restoring historic land use, and preserving open space is a crucial element of maintaining the City's green infrastructure. Management of green space will ensure the City's investment will be protected and enhanced for future generations. Long-term planning ensures the City's resources provide the greatest benefit to the community for future generations. The establishment of the Rochester Hills Greenspace Advisory Board (GSAB) and the Greenspace Perpetual Care Trust Fund will ensure that the City's significant investment in open space will be protected and enhanced through ongoing stewardship activities.

In 2014, Niswander Environmental was contracted by the City to implement its Natural Features Stewardship Program. Under this program, Niswander Environmental is tasked with providing invasive species control, habitat restoration, comprehensive wetland services (including delineations, permitting, mitigation design/build, and mitigation monitoring), open space evaluations and planning, ecological assessments, endangered species surveys, GIS services, and any additional ecological services as needed by the City. In order to effectively implement this program, Niswander Environmental proposed to develop a Long-Term Management Plan that would guide the City in its management goals. In the spring and summer of 2015, ecological assessments were conducted on all the green space properties (Greenspace). Each Greenspace property along with the Clinton River was assessed in spring and early summer 2015, with particular attention paid to existing and potential ecological issues that impact or could otherwise potentially harm the integrity of the properties or surrounding natural features. Based on the identified threats to the Greenspace properties, Niswander Environmental developed over 20 individual projects to ensure the long term preservation and stewardship of these properties. Example projects include invasive species control, streambank restoration, wetland enhancement, and prairie restoration. A project rating system was developed and each project was ranked based on metrics developed using the goals and objectives of the GSAB. Based on these assessments, a Long-Term Management Plans was developed for all the properties.

This Long-Term Management Plan outlines the results of the ecological assessments for each property and the Clinton River, potential restoration/enhancement projects, a priority rating of restoration/enhancement activities, and an annual work plan with immediate, short-term (5-year), and long-term (10^{+}-year) goals identified. The Long-Term Management Plan should provide guidance to the GSAB as they make decisions on the management and stewardship of the Greenspace Properties.

I. INTRODUCTION

In September 2005, a 0.3 mill 10-year Open Space Millage was passed to acquire and preserve natural Greenspace in the City of Rochester Hills (City). To manage the Open Space Millage, a 9-member Green Space Advisory Board (GSAB) comprised of citizens, City Council representatives, City staff, and Youth Council representatives was established for the purpose of developing strategies and recommendations to City Council regarding the expenditure of millage funds to: 1) permanently preserve natural green spaces (Greenspace), wildlife habitats and scenic views; (2) protect woodlands, wetlands, rivers and streams; and (3) to expand the Clinton River Greenway and other trail corridors. The GSAB identifies, evaluates, and prioritizes parcels for potential preservation based on the Rochester Hills Natural Features Inventory (NFI). The top ranked properties in the Rochester Hills NFI (Priority I Critical Natural Areas) were recommended to the City Council for consideration for acquisition. As of June 2015, the City has acquired six Greenspace properties, totaling approximately 108 acres (Figure 1 – Greenspace Location Map). In addition to the Greenspace properties, the City also owns and/or controls several parklands that complete a unique collection of natural areas and open spaces that are critical to maintaining the community appeal and recreational opportunities for its citizens.

In 2004, Niswander Environmental, LLC completed a comprehensive field evaluation of all accessible natural features within the City as part of a City-wide Natural Features Inventory. Initial site selection and ranking criteria was developed using the ***2004 Oakland County Potential Conservation/Natural Areas Report*** published by the Michigan Natural Features Inventory (MNFI). To fit the goals of the City, the MNFI criteria were modified and an analysis was conducted for all of the Natural Area properties located in the City borders (Figure 2 – Natural Areas Map). Natural Areas are defined as public and private land that are primarily undeveloped and include lands devoted to active or passive recreational use or lands retained for visual or natural resource protection purposes. Natural Areas typically contain wetlands, woodlands, watercourses, floodplains, or active recreation areas. Individually, each property provides wildlife habitat, water quality benefits, visual buffers, and improved air quality. As a whole, these properties are part of the Clinton River riparian corridor and provide passive recreational opportunities, flood storage, critical habitat linkages, and connectivity of valuable greenspace. The Rochester Hills NFI analysis included total size of the Natural Area, size of core area, ecological quality of the natural resources, presence of stream and riparian corridors, connectivity to other Natural Areas (including other existing City open space), vegetative quality, ecological restoration potential, and the number of parcels involved in protecting the Natural Area (indicates the potential ability of the City to acquire the entire Natural Area). Over the past 10^{+} years, the Rochester Hills NFI has proven to be a valuable tool for the City and the GSAB by directing land protection and evaluating land use decisions from a City-wide landscape perspective. In addition, the Rochester Hills NFI has been instrumental in direction the City's natural features protection and GSAB's land acquisition programs.

The acquisition of the Greenspace properties has been very successful and an important part of ensuring the long-term protection of these important natural features within the City. To understand the values associated with each parcel, Niswander Environmental conducted ecological assessments of each of the Greenspace parcels along with the Clinton River corridor in spring and early summer 2015. These assessments focused on identifying short-term and long-term ecological threats to each property and potential restoration opportunities that would maintain or enhance the values of the properties.

Specifically, the baseline assessments found that many of these properties are under significant threat from non-native invasive species such as Phragmites, buckthorn, and honeysuckle that, without proper management, could devastate the natural features of the site while also disrupting public access and use. In addition, many of these properties have small pockets of rare and valuable habitats that contain a significant amount of the City's biodiversity and natural heritage. Through strategic ecological planning and management, many of these high value habitats can be restored and, in some cases, expanded to maintain the natural heritage of the City. Over 20 individual projects have been identified and prioritized as of September 2015, including invasive species control, streambank restoration, wetland enhancement, and prairie restoration. These projects will help maintain the ecological and societal values that made these properties worthwhile for long-term protection.

Assessment of the Clinton River corridor in July 2015

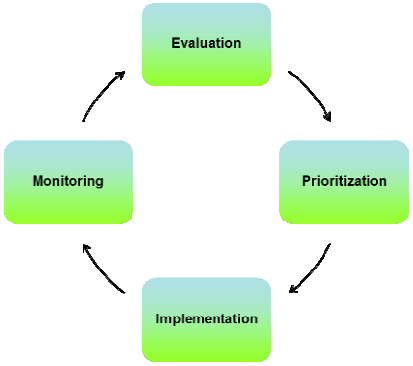
Proper management of natural areas such as the Greenspace properties requires the development of a Greenspace Management Plan (Management Plan) to clearly establish immediate, short-term, and long-term goals and objectives for each site. The development of the individual Management Plans must rely on conducting baseline ecological assessments, habitat mapping, identification of potential threats/concerns, and recognition of the long-term use/goals of the property. Each property has been assessed and short-term and long-term projects have been identified to ensure that a focused, goal-oriented outcome will be reached for each property. Each individual project was ranked based on feasibility, cost, expected outcomes, and public participation to ensure that the limited resources of the City and the GASB are focused on the best potential projects with the greatest chance of success. The overall goal of the Management Plan is to preserve and maintain high quality areas, allow for continued enhancement of degraded areas, implement new restoration (***i.e.***, wetland, woodland, or prairie creation), and provide volunteer/education/interpretation opportunities

This Management Plan outlines Niswander Environmental's assessment of the parcels, the recommended priority of restoration activities, and annual work plans for with immediate, short-term (5-year), and long-term (10^{+}-year) goals for each Greenspace property and the Clinton River. The establishment of the Rochester Hills Green Space Perpetual Care Trust Fund will ensure significant annual funding for stewardship activities for as long as the trust fund exists. This Plan was developed with significant and valuable input from the Mike Hartner (Director, Rochester Hills Parks and Forestry Dept.), Lance DeVoe (Naturalist, City of Rochester Hills), and the GSAB.

II. GREENSPACE GOALS

In September 2005, the City residents approved a Green Space millage to acquire and preserve natural green space in their community. The millage allowed expenditures of funds to permanently preserve natural green spaces, wildlife habitats, and scenic views, to protect woodlands, wetlands, rivers and streams, and to expand the Clinton River Greenway and other trail corridors. In 2013, voters approved a revision to the Green Space millage to allow expenditure of funds to be used for the protection, care and maintenance of green space, and to improve pedestrian accessibility to and within, green spaces and natural features owned or controlled by the City, in addition to funding the purchase of additional land and interests in land.

Following the charters established in the Green Space millage, the City has established a nine member Green Space Advisory Board (GSAB) for the purpose of developing strategies and making recommendations regarding the long-term management and stewardship of the Green Space properties, the Clinton River Greenway, and other trail corridors. Stewardship is the responsible managing of land to protect, conserve, and enhance biodiversity and natural features, for the benefit of current and future generations. The overall GSAB green space goals are to provide long-term funding for stewardship, restoration, and educational and volunteer opportunities with the City. To accomplish this goal, the GSAB established a process to evaluate each property, develop potential restoration projects, prioritize each project, implement the projects based on prioritization, and monitor to ensure the anticipated outcome is achieved.



EVALUATION

Each of the Greenspace properties is unique and offers natural features that provide valuable ecological functions and societal values. The Greenspace properties contain a variety of habitat types, including upland forest, wetland, old field, scrubland, and riparian floodplain forest. Identifying each habitat type within a property is important to evaluating the overall functions and values of each property, which will allow for the establishment of short-term and long-term stewardship goals. For instance, each property abuts a watercourse (either the Clinton River or Clear Creek) that serves as a buffer from surrounding urban development that protects water quality and the ecological integrity of the waterways, while also serving as a trailway that brings people out to explore, learn about, and enjoy nature. Maintaining these waterway buffers is critical to the GSAB goals. In addition, proper evaluation will allow for goals to be established based on site-specific conditions. These goals may include passive management that maintains the site in its current condition (***i.e.***, monitor a fen to ensure invasive species do not become established)

or to actively restore an area to native habitat (***i.e.***, remove an established invasive species population and re-plant native prairie species).

PROJECT PRIORITIZATION

Based on the evaluations, individual stewardship projects will be identified and prioritized based on a project prioritization scoring system (Appendix A) developed to address the available funding, likely ecological outcomes, aesthetic values, and public participation opportunities. Restoration or enhancement projects may include a variety of activities including streambank stabilization, invasive species management, removal of woody plants, (***i.e***., trees and shrubs), sediment control, etc. Each property will have an individual stewardship plan (presented in Section V) that relies on an adaptive management approach. Adaptive management is a structured management approach for addressing uncertainties by testing hypotheses, linking science to decision making, and adjusting implementation, as necessary, to improve the probability of restoration success. Adaptive management will be implemented by the GSAB by monitoring the outcome of each project and taking the necessary actions to ensure long term success.

PROJECT IMPLEMENTATION AND MONITORING

The management plans for each Greenspace property outlines the ecological goals and objectives for each site and identifies several potential management projects at each location. The GSAB will select the projects to be implemented based on the Restoration/Enhancement Value score (Appendix A), which takes in to account the likelihood of success, enhancements to the natural features, impact on public use and value, approximate cost, and expected educational and volunteer opportunities.

Most projects will be viewed as a long-term effort that includes annual work plans, a five-year goal, and a long-term (10^+ year) goal. Unfortunately, restored natural areas generally do not remain pristine after work has been completed; annual monitoring, maintenance, and corrective actions are often required. Therefore, all projects will be monitored annually to ensure their success.

EDUCATIONAL AND VOLUNTEER OPPORTUNITIES

Community involvement and public participation is critical to the long-term success of the Greenspace properties. Community involvement includes a focus on establishing opportunities for all residents to get involved with the stewardship of the Greenspace properties. A major goal of the GSAB is to increase stewardship opportunities for local residents and volunteer groups (school groups, scouts, non-profit organizations, corporations, etc.) to get the community directly involved with the management of the GSAB properties. It is important to educate the public about stewardship so they have an understanding not only as to how a project was completed, but for what purpose. Studies have shown that outdoor education encourages youth (our future) to pursue careers in environmental and natural resources management. Ultimately, the collective wisdom of our citizens, gained through education, will be the most compelling and most successful strategy to meet the City's long-term stewardship goals.

II. GREENSPACE GOALS

People tend to become more interested and involved if they feel a connection to an area, especially those inhabiting urban environments. In areas where much of the land use is developed and paved, people want to get back to nature. The Greenspace properties and the Clinton River corridor provide ample outdoor recreation opportunities, and opportunities exist to educate the public about the work that will be conducted to help preserve the quality and biotic integrity of these areas. Promotion of these activities through interpretive signage in high-use areas, the City's website, and other avenues will likely lead to a sense of ownership and ultimately increased volunteerism.

Stewardship opportunities will vary but will include volunteers working on the ground to restore habitats, providing educational opportunities such as establishing age appropriate K-12 curriculum, and increasing continuing educational opportunities for adults and families (e.g., educational signage, nature walks, plant identification classes, kayak trips, etc.). Anticipated volunteer activities include invasive species control, habitat monitoring, seeding and planting, fundraising, trail maintenance, and trash cleanup, among others. Not only does the public gain knowledge and interest through these activities, but volunteers will also help reduce annual costs for monitoring and maintenance of these properties. The long-term success of the Greenspace properties is dependent on having community support.

To ensure long-term sustainability of this effort, the GSAB will pursue addition partnerships, grants, and other donations to leverage the millage funds. Significant opportunity exists with collaborative efforts with our corporate, non-profits, and educational organizations. Ultimately, the collective resources and wisdom of our citizens, gained through experience, trust, and education, will be the most compelling and most successful strategy to meet the City's long-term stewardship goals.

III. METHODS

FIELD RECONNAISSANCE

Six (6) Greenspace properties and the entire Clinton River corridor were evaluated by conducting in-office reviews and field assessments in the spring and summer of 2015. Each property was evaluated based on the Greenspace Advisory Board's long-term objectives to reduce potential ecological issues that impact or could otherwise potentially harm the integrity of the properties or surrounding natural features. Available Geographic Information System (GIS) data compiled from various sources was utilized to develop preliminary base maps to identify potential locations of wetlands, watercourses, woodlands, floodplains, and other natural areas. Using these base maps, comprehensive on-site investigations were conducted to identify all major habitats on each property, including differing types of wetlands, woodlands, and other regulated areas. The boundary, type, character, quality, functional values, and potential threats within each habitat were documented.

Assessing the White property in October 2014

During field evaluations, special attention was paid to threats such as invasive species, neighbor encroachment, erosion/sedimentation, public misuse, and overall habitat degradation. In most instances, GPS waypoints were collected at observed locations of non-native infestations, the exceptions being in locations where invasive shrubs such as buckthorn or honeysuckle dominated a large area (generally >1 acre). Most threats were the result of invasive vegetation, primarily Phragmites, reed canary grass, narrow-leaf cattail, buckthorn, honeysuckle, multiflora rose, autumn olive, privet, Oriental bittersweet, barberry, garlic mustard, and/or thistle. Using the results of the field evaluations, individual work plans were developed for each site. A description of each Greenspace property and the associated work plans are presented in Section V of this report.

Clinton River bank erosion near City municipal offices

PROJECT PRIORITIZATION

Rather than addressing issues broadly based on each site, it was determined that each threat or activity, itself, needed to be evaluated on a case-by-case basis in an attempt to develop a specific action plan (or project) that was geared towards the specific identified threat or enhancement. This also helped simplify the eventual project prioritization process. For example, using the potential fen community on the White property, it is too vague to state that invasive species control is needed to enhance the on-site fen wetlands. The issue at hand isn't simply "invasives within the wetlands", the issues are the rapid advancement of Phragmites, buckthorn, and barberry into this specific rare community type. Each of these species requires a unique treatment method that needs to take several factors into consideration, including seasonal timing, plant physiology, and the size and densities of the target species in question. Therefore, the act of invasive species control in this area is a separate project for each species.

Potential fen area within the White property

Niswander Environmental developed a unique project prioritization scoring form to address the City's and the GSAB Stewardship Program's goals and objectives. Project prioritization is important to effectively and efficiently utilize limited resources while maximizing expected benefits. The prioritization addresses multiple metrics, including the location, size, and type of the restoration area, the potential for success, the type of restoration activity, the expected ecological benefits, the public benefits/use, and cost to restore or enhance. Each project was rated using the prioritization rating system which assigns a Restoration/Enhancement Value (REV). The REV allows for comparison of all the potential projects to guide the decision making process for final review and approval by the GSAB.

Evaluating vegetation near the Clinton River Trail at Harding

The REV is heavily dependent on cost and public use/visibility, and can be altered by changing either of those variables. For example, installing a new public walking path would increase the REV of all projects near the new path since it would increase public access and visibility. In addition, areas with easy access and high public use, such as the Harding and White Greenspace properties, received more points than more difficult to access, lower visibility parcels such as the Rivercrest and Clear Creek parcels. The rating has no defined value or meaning; for instance, a score of 75 does not indicate that it is three times more important than a project with a score of 25. However, the project with a score of 75 would meet more of the goals and objectives of the GSAB than the project with a 25 score. The prioritization scores do provide a baseline to evaluate the value, or cost-benefit ratio, of a potential project. To see the individual projects and their scores, please refer to the Project Ranking Forms in Appendix A.

IV. MANAGEMENT STRATEGIES

Properly maintaining the Greenspace properties and the Clinton River is crucial to ensure the longevity of these established areas. While it appears that each of the sites would benefit from some form of restoration or enhancement, Niswander Environmental recommends 28 potential projects for consideration. The 23 projects listed in Table 1 below and 5 in Table 2 were selected based on the amount of restoration that could be completed for the price, visibility, and ease/effectiveness of restoration.

Table 1. Selected Priority Greenspace Projects Based on Location

Project	Location	Size (estimated)	Primary Threat	Activity	Timing	Restoration Value (score)
Wet Meadow Enhancement	Harding	~ 1 ac	cattail, willow, buckthorn	Herbicide - foliar and cut/stump, burn	late summer/fall	54
Prairie Restoration	Harding	<5 ac	NA - restoration	Prairie Restoration and eventual burn	any	53
Pond Area Enhancement	Harding	~1 - 2 ac	NA - restoration	Enhance area near pond thru seeding/planting	spring or fall	50
Knotweed Control	Harding	~1 ac	Japanese knotweed	Herbicide - foliar treatments	late spring/early summer	44
Garlic Mustard Control	Harding	~5 ac	garlic mustard	Mechanical - hand pull	late spring	28
UPL Woody Spp. Control	Harding	>10 ac	buckthorn, honeysuckle	Herbicide - cut/stump treatments	late summer/fall/winter	27
Tamarack/Fen Enhancement	White	<5 ac	buckthorn, Phragmites	Herbicide - cut/stump + foliar treatments	late summer/fall	65
Forested Wetland Enhancement	White	~5 ac	buckthorn, honeysuckle and Phragmites	Herbicide - cut/stump + foliar treatments	late summer/fall	43
Swallow Wort Control	White	<0.25 ac	swallow wort	Herbicide - cut/stump treatments	late spring & late summer	42
Barberry Control	White	~2 - 3 ac	Japanese barberry	Herbicide - cut/stump treatments	late summer/fall/winter	30
Scrub-Shrub Wetland Enhancement	White	~5ac	Phragmites, buckthorn	Herbicide - foliar and cut/stump	late summer/fall	26
UPL Woody Spp. Control	White	5-10 ac	buckthorn, honeysuckle	Herbicide - cut/stump treatments	late summer/fall/winter	25
Sediment Control	Cloverport	~300 lf	sedimentation	restore upstream connection to detention	any	46
Bank Restoration	Cloverport	300 - 450 lf	erosion	Streambank Restoration	any	32
Phragmites Control	Cloverport	<1 ac	Phragmites	Herbicide - foliar treatments	fall	28
Garlic Mustard Control	Cloverport	~2 ac	garlic mustard	Mechanical - hand pull	late spring	27
UPL Woody Spp. Control	Cloverport	< 5ac	buckthorn, honeysuckle, bittersweet, rose	Herbicide - cut/stump treatments	late summer/fall/winter	22
UPL Woody Spp. Control	Childress	<5 ac	buckthorn, honeysuckle, bittersweet, rose	Herbicide - cut/stump treatments	late summer/fall/winter	9
Bank Restoration	Rivercrest	~ 200 lf	hard amory removal, soft engineered bank	bank restoration	any	28
UPL Woody Spp. Control	Rivercrest	~2 ac	buckthorn, honeysuckle, bittersweet, rose	Herbicide - cut/stump treatments, burn	late summer/fall/winter	4
PSS Woody Spp. Control	Clear Creek	<5 ac	buckthorn	Herbicide - cut/stump treatments, burn	late summer/fall/winter	31
Phragmites Control	Clear Creek	~2 ac	Phragmites	Herbicide - foliar treatments	fall	13
UPL Woody Spp. Control	Clear Creek	5 - 10 ac	buckthorn, honeysuckle, olive, bittersweet, privet	Herbicide - cut/stump treatments	late summer/fall/winter	6

Table 2. Selected Priority Clinton River Projects Based on Location

Project	Location	Priority	Primary Threat	Activity	Timing	Restoration Value
Yates Stream Restoration (CR-25)	Yates Roadside Park	High	Severe Bank Erosion	Stream Restoration	any	40
Avon Stream Restoration (CR-16)	Avon Natural Area	Moderate	Steep Bank Erosion	Stream Restoration	any	29
Avon Stream Restoration (CR-17)	Avon Natural Area	Moderate	Steep Bank Erosion	Stream Restoration	any	27
Riverbend Stream Restoration (CR-7)	Riverbend Park	Moderate	Steep Bank Erosion	Stream Restoration	any	26
Bloomer Slope Stabilization (CR-24)	Bloomer Park	Moderate	Bank Erosion	Slope Stabilization	any	23

Most of the recommended projects presented in Table 1 involve invasive species control as a means of enhancing a specific habitat type (***i.e.***, upland forest, scrub-shrub wetland, fen, etc.). When conducting stewardship activities, it is important to realize that seeds can often be introduced to an area on boots, clothing, and equipment; therefore, it is imperative that the contractors or volunteers conducting the work be vigilant about cleaning prior to entering a natural area.

The following is a description of the two primary management methods recommended for these areas, herbicide treatments and prescribed fire.

HERBICIDE TREATMENT

Herbicide is an important tool in effective management of invasive plants. Most non-native, invasive plants in Michigan are perennials, which are quick to establish due to their strong root structure (rhizomes) and runner capabilities. Herbicide applications, when conducted properly and at the correct time of the target species' life cycle, offer the best means of control. The herbicides recommended in this Long-Term Management Plan are systemic, meaning the chemical attacks the roots and does so without disturbing the soil, which often leads to an increased chance for reinvasion or erosion.

Woody species control at Riverbend Park

Treatment techniques vary depending on the target species, its size and density, and the time of year. Glyphosate (***i.e***., Rodeo®, AquaNeat®, or RoundUp Pro®) has proven to be an effective herbicide in treating a number of herbaceous species, including Phragmites, reed canary grass, thistle, clover, burdock, and many others. A combination of glyphosate and imazapyr (***i.e***., Habitat®) is effective in controlling non-native Phragmites if applied in the late summer or early fall. Finally, it has been our experience that a triclopyr-based herbicide such as Renovate® or Garlon 3A® successfully controls

spotted knapweed, teasel, and emerging or young woody species. In each case, a surfactant such as Cygnet Plus® will be added to the solution at the recommended rate for best results.

In general, woody species such as buckthorn, honeysuckle, multiflora rose, and autumn olive will be removed using the cut-stump method, which calls for these shrubs to be cut at the base and immediately treated with a triclopyr-based herbicide such as Renovate® or Garlon 3A®. It should be noted that these species cannot be removed using this method during the spring, however, when sap is flowing upward to the stems and buds. Therefore, to remove woody invasive shrubs, cut-stump treatments will be conducted annually in the late summer, fall, and/or winter.

PRESCRIBED BURN

Natural areas needs to undergo periodic disturbance such as burning, grazing, haying, or mowing in order to prevent cool season grasses, shrubs, and trees from becoming established. The use of prescribed burns is perhaps the most effective, economic, and valuable method to control undesirable vegetation. Historically, prairies and meadows were maintained through fire occurring naturally or set by indigenous people. Fire prevents the growth of shrubs and trees while setting back succession to the grassland stage.

Prescribed burns also prevent invasive cool-season grasses from becoming established since they are not adapted to withstand fire like many of the prairie species currently present within several of the Greenspace properties. Fire burns the dead plant material that lies above the ground surface and allows the high-quality nutrients from the dead plants to return to the soil. These nutrients fortify the deep roots of the prairie vegetation where the plant will re-sprout in late spring. Rotating controlled burns is the best long-term management of meadows, as it is the natural process that ensures healthy regeneration of prairie species. Burning the several of these areas every 2-3 years will maintain the healthiest stands. Niswander Environmental recommends that several areas be burned over the next 10^{+} years to promote native vegetation.

Prescribed burns restored prairie areas in Wayne County, and conditions three months following the burn

V. MANAGEMENT PLANS

Successful long-term management relies upon baseline site assessments, identification of potential concerns, and individual project prioritization. Management of these Greenspace properties will be guided by the individual Management Plans on the following pages, which will serve three primary purposes. First, it establishes an annual work plan for projects on each site that emphasizes the unique attributes of each property while addressing any ecological concerns that may occur (invasive species, sedimentation and erosion, etc.). Individual management projects have been identified and prioritized based on ecological factors, expected success from stewardship, and public funding benefits. Individual work plans for these projects will be implemented each year. Secondly, the Plan provides a short-term (5-year) implementation plan that focuses on preservation of high quality areas, enhancement of degraded areas, and continued monitoring. Finally, the Plan identifies long-term (10^{+}-year) goals that provide specific guidance for development, stewardship, public use, education & interpretation, and operations & management for each Greenspace property. Annual work plans will be adapted with any newly identified issues that may arise. As mentioned, the overall goal of the long-term Management Plan is to preserve and maintain high quality areas, allow for continued enhancement of degraded areas, implement new restoration (***i.e.***, wetland, woodland, or prairie creation), and provide education/interpretation opportunities for the public so they feel a sense of community involvement and ownership.

Site Specific Management Plans for each property have been developed, and are detailed in the remainder of this Section. The Plans describe the existing site conditions and unique attributes of each property, a long-term management strategy, and management priorities with specific potential projects that could be implemented based on their GSAB Project Prioritization Score.

This Management Plan is intended to be used as a supplement to the City's Master Plan, and describes ecological issues within the City's Greenspace properties and the Clinton River corridor. This Management Plan does not identify infrastructure developments or needs, revenue generating projects, historic or cultural resource references, or potential recreational use opportunities such as trail development, fishing piers, kayak launches, nature centers, mountain bike paths, interpretative plans, etc.

EXISTING CONDITIONS

The Harding site is a 26.8-acre, primarily forested property that is located in the northeast quadrant of Avon Road and Livernois Road, south of Harding Avenue (Figure 3; Appendix B). Harding Avenue constitutes the northern boundary, with the Clinton River Trail demarcating the southern boundary. Rolling topography and historic management practices have resulted in a collection of diverse plant communities and excellent interspersion in terms of plant density, horizontal and vertical complexity, and the abundance of different plant species. The site contains upland hardwood forest of varying age classes and densities, pine groves, old field habitat, a small pond, and forested wetland. In addition, a small wet meadow is located south of the Clinton River Trail (on-site, north of the Clinton River), comprising the southeastern corner of the site.

Forested sections of the Harding property are characterized as upland hardwood, evergreen, and bottomland hardwood. A trail network transects much of the property and receives regular foot traffic. The upland hardwood portions of the site contain an assortment of mature canopy trees and younger second growth trees such as ash, cottonwood, maple (primarily red and sugar), shagbark hickory, black walnut, hop hornbeam, black cherry, oak, elm, and basswood. Non-native invasive shrubs and vines are abundant throughout these sections of forest, particularly tartarian honeysuckle, autumn olive, Oriental bittersweet, and common buckthorn, as depicted in the photos below. These species reproduce rapidly and in many sections of the property are forming dense monocultures that are impacting trail access and use, and decreasing the ecological integrity of the site. In addition, Oriental bittersweet is a climbing, twiny woody vine that is forming large, dense masses in open canopies, threatening the health of a number of mature trees.

Honeysuckle, bittersweet, and buckthorn (above) dominate much of the upland forest on the Harding property.

Upland Forests

Despite the heavy presence of white-tailed deer, the understory within the upland forested areas is thriving in most areas (that aren't yet completely dominated by invasive shrubs). Higher quality native species such as trillium, mayapple, jack-in-the-pulpit, Solomon's seal, wild geranium, and wood violet are common throughout the upland forested areas. However, there are a number of herbaceous non-native plants threatening the diversity of the woodlots, including garlic mustard, dame's rocket, periwinkle, various clovers, and Japanese knotweed. To maintain the floristic quality of the forest, a plan should be developed and implemented to control the expansion of these invasive species.

Garlic mustard infestation in the northwestern portion of the site.

Japanese knotweed (left) populations are currently isolated to a few areas and with proper management can be eradicated.

Pine Groves

Unlike the hardwood portions of the site, the pine groves on the property are less diverse and are dominated by non-native Scotch pine, although sapling oaks and maples are present as well. The understory within these stands generally lacks vegetation with the exception of garlic mustard, Virginia creeper, poison ivy, honeysuckle, buckthorn, and various upland grasses.

Forested Floodplain Wetlands

Most of the wetland present on the property, with the exception of the wet meadow and pond, is forested floodplain that is adjacent to the Clinton River. The floodplain forests are generally dominated by mature trees such as box elder, green ash, cottonwood, silver maple, red maple, black willow, swamp white oak, and elm. In addition, the understory consists of saplings and herbaceous plants such as skunk cabbage, sensitive fern, marsh fern, sedge, swamp agrimony, and jewelweed. Phragmites is present in small populations at the edge of several of these forested areas. Most of the forested wetlands on the site are seasonally inundated (***i.e.*** flooded in the spring) and are classified as vernal pools, which are vital to maintaining an abundant and diverse amphibian community (***photo left***). Since the wetlands are directly connected to the Clinton River, they play a major role in retaining flood water, trapping sediments, and recharging groundwater which all maintain the water quality of the river.

Old Field Habitat

Scattered amongst the various forested communities are several openings that are generally dominated by upland grasses and forbs. Old field, which primarily consists of meadow with individual shrubs distributed throughout, serves as important habitat for a variety of wildlife, particularly songbirds and rodents, and the predatory birds and mammals that rely on them as a source of food. In addition, old fields create valuable edge habitat required by a number of wildlife species. Most of the old field habitat present at the Harding property consists of bluegrass, spotted knapweed, Queen Anne's lace, and other non-native upland grasses and forbs, but also harbors remnant native prairie species such as milkweed, butterfly weed, pasture rose, bee balm, switchgrass, and a variety of asters and goldenrods. These species were observed in small numbers, but it suggests that these areas were once native prairie habitats. These areas, along with a 1-acre section of lawn along Harding Avenue, are prime candidates for native prairie restoration.

Old field openings within the forested areas of the Harding property offer high potential for successful prairie restoration

Open Water Pond

A shallow, 1.5-acre pond is located in the eastern section of the property, just north of the Clinton River Trail. This pond is home to a variety of frogs, turtles and aquatic invertebrates, as well as sunfish and bass. Fallen logs and other woody structures within the pond provide loafing areas for turtles and waterfowl. With the amount of frogs, tadpoles, aquatic insects, and small fish observed, the pond also provides excellent hunting opportunities for great blue herons, egrets, and green herons. The pond itself contains a large amount of algae and muskgrass, which indicates that the pond water is significantly influenced by groundwater inflows. The areas immediately surrounding the pond are of moderately low quality due to the abundance of autumn olive, honeysuckle, buckthorn, and cool season upland grasses. However, with the implementation of an invasive species control plan and native plantings, the pond edge could easily be enhancement to a native upland prairie that could be a site amenity since it is located within a highly visible area along the Clinton River Trail.

Wet Meadow Habitat

A remnant wet meadow community is present along the south side of the Clinton River Trail, in the southeast corner of the property. This area was evaluated by Niswander Environmental in 2010 (***inset***) and was described as being high quality due to its diversity, unique vegetation, and possible status as a fen or southern wet meadow (both of which are rare natural community types). During that assessment, a number of high quality wetland species were observed, including angelica, crested oval sedge, lakebank sedge, water sedge, beaked sedge, wood reed, small lady's slipper orchid, seedbox, ninebark, golden ragwort, swamp buttercup, swamp rose, mountain blue eyed grass, golden alexanders, joe-pye weed, and meadow parsnip. Woody species such as willow were present at that time, but in small amounts. Over the past five years, however, undesirable species such as willow, glossy buckthorn, and narrow-leaved cattail have invaded this area and are rapidly crowding out the higher quality native species. A number of the higher quality species remain, albeit in much smaller numbers, but immediate action to control the invasive species to restore the native plant community is highly recommended. Reducing woody species and invasive narrow-leaved cattail will allow the sedges and native forbs to again establish.

The former wet meadow, now a scrub-shrub wetland

LONG-TERM MANAGEMENT STRATEGY

The Harding site is a prized natural resource to the City due to its ecological quality, plant and animal diversity, and large size. The different ecosystems within the property offer significant habitat to a variety of plants and wildlife, and the property itself offers an excellent opportunity for passive recreation in the form of hiking, biking, bird watching, and nature study. Furthermore, the sheer size of contiguous open space it offers, especially in conjunction with the nearby Rivercrest, Childress, and Cloverport parcels and the Clinton River corridor, is priceless to an urban community such as Rochester Hills. The unique features of this site remain under immediate threat from invasive species, which will require strategic and diligent stewardship to ensure the long-term viability and expansion of these important natural resources on the site. A primary stewardship goal should be the implementation of management activities that focus on invasive species control, habitat enhancement, and prairie restoration.

MANAGEMENT PRIORITIES AND PROJECTS

Based on the goals and objectives of the Green Space Advisory Board (GSAB) to ensure the long-term sustainability and the ecological integrity of the Harding property, Niswander Environmental reviewed each habitat type, determined existing and potential threats, and evaluated opportunities for enhancement/restoration. Using this information, a list of six (6) management projects was developed. Each project was scored and ranked using the GSAB Project Prioritization worksheet (Appendix A). Below is a description of each project, the project rank as compared to other projects for the Harding Property, and a long-term implementation plan.

PRIORITY 1 (TOP PRIORITY)

TITLE: WET MEADOW RESTORATION AND ENHANCEMENT

GSAB Project Prioritization Score = 54

Description

The wet meadow/potential fen area in the southeastern portion of the property (Figure 3a; Appendix B) was, up until recently, a high quality wetland with the potential for being classified as a fen due to the hydrological characteristics and the uncommon and unique plants that were observed in 2010. Since 2010, there has been a significant invasion of this area by woody plants and narrow-leaved cattail, which has significantly reduced the plant diversity with only a few pockets of high quality habitat remaining in the wetland. To maintain the natural diverse herbaceous plant community present in the wet meadow, woody plant management is necessary as without it, natural ecological succession will allow the woody plants to completely dominate the site over the next few years, choking out and eliminating the herbaceous plant community. Historically these types of habitats were naturally managed through regular fires that suppressed the woody plants and allowed the herbaceous plants to flourish. With the removal of natural fires from the landscape, woody plant invasion is one of the major threats to these natural communities. In lieu of burning, Niswander Environmental recommends that management activities be undertaken to reduce and control woody plants and invasive narrow-leaved cattail in the wet meadow allowing the native herbaceous vegetation to return.

Species of Concern

Willows, narrow-leaved cattail, and glossy buckthorn are the most common and immediate threats to this meadow, and enhancement of this area should be considered a high priority. Although willow is native and typically not considered a threat, there is currently an abundance of this species within the wetland, and it is shading out desirable sedges and forbs. In addition, the non-native glossy buckthorn and narrow-leaved cattail are significant threats to the native plant community.

Management Recommendations

Niswander Environmental recommends management activities be undertaken to control and reduce the woody and invasive species populations within the wet meadow area. Based upon the presence of an intact functioning ecological wetland system, management techniques must be selected to minimize any impacts to non-target native species and to strike a balance between the ecological impacts and economic feasibility. Based on our experience, we believe that this can be accomplished by using very selective

herbicide treatment techniques such as cut and treat stump treatment for the woody plants and hand wand application for the cattails. It is expected that species such as sedge, jewelweed, rice cutgrass, and sensitive fern will be the first species to re-emerge following herbicide treatment, with the higher quality species mentioned previously re-sprouting in the coming years. Monitoring and follow-up treatments will be required to ensure the woody plants do not re-establish. The following is a recommended timeline that should be implemented to ensure a successful restoration and enhancement of this wet meadow.

Years 1 and 2:

- Foliar broadcast treatment of narrow-leaved cattail using an aquatic-safe, glyphosate-based herbicide such as AquaNeat® or Rodeo® at a 2% concentration. In areas where the cattail has not formed a monoculture, foliar spot treatments are recommended. Activities should occur in mid-to-late summer.

- Cut-stump treatment of willow, glossy buckthorn, and any other non-desirable woody tree or shrub using an aquatic-safe, triclopyr-based herbicide such as Garlon 3A® or Renovate® at a concentration of 27% active ingredient. The plants should be cleanly cut near ground level, and the herbicide should be applied soon after to the freshly exposed stem and bark. This activity should occur in late summer or fall, but can also be conducted in winter if conditions are not sub-freezing. There is significant opportunity for volunteers to cut woody plants and to construct strategically placed brush piles on the edge of the wet meadow. A qualified licensed pesticide applicator must work closely with the volunteers to ensure immediate application of herbicide after cutting.

Years 3 – 5:

- Foliar spot treat narrow-leaved cattail using the methods described above. It is expected that most treatments will involve treating small populations or even individual stems. Hand-wicking at a concentration of 5% active ingredient may be necessary to avoid collateral damage to non-target and rare species.

- Cut-stump treatment of woody species as necessary. It is expected that glossy buckthorn in particular will re-sprout since its fruit is long-lived in the soil, and opening canopies will expose these to sunlight. In instances where seedlings are common, hand pulling may be the most effective method to avoid impacts to non-target species.

Years 6 – 10^{+}:

- Monitor the wet meadow area annually, evaluate any existing or new issues, and implement the above mentioned control measures at the appropriate time if warranted.

PRIORITY 2
TITLE: PRAIRIE RESTORAITON
GSAB Project Prioritization Score = 53

Description

There are three areas of old field and/or lawn totaling roughly 3 acres on the Harding site that could be restored to prairie in an economic fashion (Figure 3b; Appendix B). With the exception of the lawn, these areas were likely once prairie since remnant prairie species were observed in small numbers. It is anticipated that these areas could be used for educational opportunities since they are highly visible and located along an existing footpath, at a trailhead on Harding Avenue, and along the heavily utilized Clinton River Trail. Although a few native species are present, a vast majority of the vegetation present consists of non-native, cool season grasses such as bluegrass and fescue.

Prairies are important for a variety of wildlife since they offer critical nesting, feeding, and breeding habitat, as well as providing shelter and opportunities for brood rearing. Prairie vegetation encourages infiltration of rainwater, groundwater recharge, and nutrient enrichment and can be aesthetically pleasing with different species flowering throughout the entire growing season. Pheasant, turkey, woodcock, and migratory songbirds use prairie habitat for nesting and to raise their young as they provide an abundance of insects that supply young with food. Deer and rabbits will also use these areas for spring and summer browse, as birthing sites, and as bedding areas. Rodents were commonly observed using these areas during the site visits in 2010 and 2015, and these in turn provide a valuable source of food for hawks, owls, fox, coyotes, and snakes. Periodic disturbance (***i.e.***, mowing, selective cutting, burning, etc.) is a key management tool to prevent eventual succession from field to a forested community. Properly planned management techniques and stewardship can enhance the remaining on-site old field habitat for wildlife.

Prairie restoration in Oakland County, four years after seeding

Management Recommendations

Prairie restoration involves the transformation of one habitat type to another, in this case converting old field and lawn to native upland prairie. Additionally, prairie restoration is an activity that requires patience since it often takes three or more years for prairie vegetation to become fully established. The following steps should be implemented for a successful prairie restoration:

Restoration:

- Cut-stump treatment of all woody species except valuable trees such as oak or hickory (if present). This location offers opportunities for volunteers to cut woody plants and to construct strategically placed brush piles on the edge of the prairie. A qualified licensed pesticide applicator must work closely with the volunteers to ensure immediate application of herbicide after cutting.

- Foliar broadcast treat all vegetation with a glyphosate-based herbicide at a concentration of 2%. This should occur in early spring (April to early-May) before wildlife begin nesting. Brush-hog the areas 2-3 weeks following application to limit wildlife usage.

- Foliar broadcast treat the entire area a second time approximately 3-4 weeks after the first application to prevent re-emergence of non-native grass species.

- Install native prairie seed no later than June 15, or after October 1, using a no-till drill to avoid soil disturbance and to ensure proper seed application. If volunteers are available, seeding can be done by hand. If hand broadcasting, a harrow rake can be used after seeding to improve seed soil contact.

Establishment and Maintenance:
After initial seeding/planting, the sites need to undergo periodic disturbance such as burning, grazing, haying, or mowing in order to prevent cool season grasses and undesirable trees and shrubs from becoming established. Although controlled rotational burning is the best long-term method to manage prairie stands, mowing is also a highly effective management tool and can be used as a substitute for controlled burns. Each management method will be done on a rotational basis. This will result in a diverse stand of many heights and textures.

Year 1:

- Mow all vegetation to a height of 6-8 inches up to three times throughout the first growing season, before and after birds have nested and fledglings have left the nest (prior to April 15 and after July 15).

- Do not pull weeds or early successional tree seedlings (***i.e.***, ash, cottonwood, etc.) as this may damage the native seedlings as they try to become established.

- Non-native species can be spot-treated with Roundup® as necessary, and undesirable woody vegetation can be treated via cut-stump method.

Year 2:

- Mow once in early spring (prior to April 1) to a height of 6-8 inches.

- Mow again prior to weeds going to seed (typically between July 15 – August 1). Mow at a height of no less than 8 inches.

- Non-native can be spot-treated with Roundup® as necessary, and undesirable woody vegetation can be treated via cut-stump method.

Year 3:
- Mow once in early spring (prior to April 1) to a height of 6-8 inches.
- Non-native plants can be spot-treated with Roundup® as necessary, and undesirable woody vegetation can be treated via cut-stump method or hand-pulled if applicable.

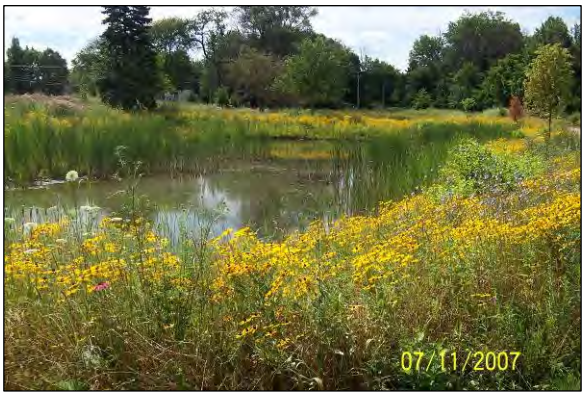
Years 4 – 10^{+}:
- Burn and mow rotation begins in Year 4. Rotate between prescribed burn and mowing (8" height) annually. Burns can be conducted in early spring (prior to May 1) or after the growing season (late-October – November). Burning at different seasons can promote different species, so it does not have to be conducted at the same time of year.

- Continue to monitor for non-native or invasive vegetation and treat accordingly

PRIORITY 3
TITLE: POND AREA ENHANCEMENT PRAIRIE RESTORATION
GSAB Project Prioritization Score = 50

Description

A small pond sits in the eastern portion of the Harding property, along a footpath and just north of the Clinton River Trail (Figure 3c; Appendix B). The area surrounding the pond is relatively small (1-2 acres), but offers excellent potential for enrichment due to its high visibility and the presence of invasive honeysuckle, autumn olive, buckthorn, and non-native grasses and forbs. Enhancing the pond buffer is cost-effective and could dramatically improve the immediate area through invasive species control and seeding and planting. Similar to the prairie restoration, this area could be readily showcased because of its location. Interpretive signage promoting pond life, along with benches and secluded viewing shelters could be installed to enhance educational opportunities.



Before and after photo depicting a pond area enhancement/prairie restoration at Country Club Village development in Rochester Hills. Prairie restorations typically require at least three growing seasons to fully establish

Management Recommendations

Enhancement:

- Remove undesirable trees and invasive shrubs from the areas along the footpath and Trail via cut-stump methods. Because of easy access, this is an excellent opportunity for volunteers to cut woody plants and to construct strategically placed brush piles on the edge of the pond or in the newly created buffer area. A qualified licensed pesticide applicator must work closely with the volunteers to ensure immediate application of herbicide after cutting.

- Since a majority of the herbaceous vegetation consists of non-native forbs and grasses, chemically treat these areas with glyphosate (Round-Up®) up to three during the growing season prior to seed/plant installation.

- Once undesirable vegetation has been controlled, install native trees and shrubs along with a native upland seed mix in the fall (October or November). Flowering understory trees and shrubs such as redbud, serviceberry, nannyberry, and chokeberry could be installed to supplement larger trees such as oak or hickory. Unique, showy wildflowers such as coneflower, sunflower, ironweed, aster, milkweed, and ironweed should be included in the native seed mix to promote pollinating insects. This area (along with the restored prairie areas) could be submitted to the Monarch Watch Program to further increase public involvement, educational opportunities, and regional recognition. Seeding and planting can be done using volunteers if available.

- If nuisance aquatic weeds and algae are persistent, herbicide applications will be conducted using chelated or compound copper solutions (***i.e.***, Cutrine Plus, Algae Defense, etc.). Aeration may be necessary to prevent oxygen depletion.

The pond area at the Harding site in 2010 (top) and in 2015 (bottom)

PRIORITY 4
TITLE: JAPANESE KNOTWEED CONTROL
GSAB Project Prioritization Score = 44

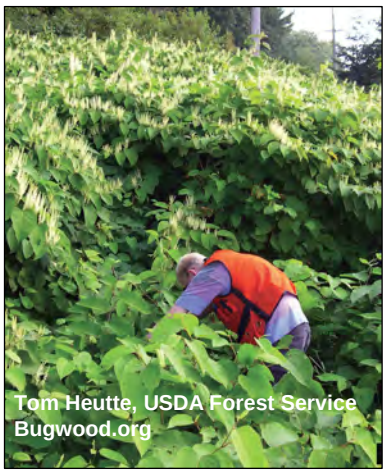
Description & Species of Concern

Japanese knotweed is not yet a common occurrence in this part of Michigan, but it is a highly aggressive herbaceous plant that not only reduces biodiversity, but also has the ability to damage structures and roads as well as clog drainages due to its rhizomes. Japanese knotweed typically forms tall, dense monocultures. This plant outcompetes native plants through limiting available sunlight (creating a canopy), altering the nutrient cycle, and allelopathy (the ability to release inhibiting chemicals to suppress growth of a different species).

Japanese knotweed populations were observed in forested areas between the River Bend Road trailhead and Harding Avenue (Figure 3d; Appendix B). This is relatively uncommon since they prefer sunny openings, but control of this species is nonetheless critical to suppress advancement.

Management Recommendations

Due to the nature of the root structure, Japanese knotweed (***photos below***) must be controlled chemically for best results. It is difficult to fully control, even with herbicides, so annual monitoring and treatment will be necessary. Imazapyr is the best known herbicide to effectively treat Japanese knotweed, but it is not appropriate in this case. Imazapyr is persistent in the soil and has the ability to attack adjacent, intertwining roots, thus killing nearby trees and shrubs. In a forested setting, this is not recommended. Although glyphosate is not the most effective herbicide for this species, it is the most appropriate given the conditions at the Harding property.



Years 1 – 4:

- Monitor the spread of Japanese knotweed by surveying the populations with GPS.

- Foliar broadcast a glyphosate-based herbicide such as Round-Up to leaves and stems in late summer when the plant is actively flowering. If the plants rebound, cut the stems near the base and apply herbicide into the hollow roots.

Years 5 – 10+:

- Monitor known Japanese knotweed populations and search for others. GPS any new infestations.

- If the plants continue to rebound, physically dig the root masses and treat soil with glyphosate in late summer. Remove all cuttings from site and dispose of properly. Continue annual treatments.

PRIORITY 5
TITLE: GARLIC MUSTARD CONTROL
GSAB Project Prioritization Score = 28

Description & Species of Concern

Garlic mustard is a dominant understory plant that, like many invasives, can rapidly establish and out-compete native vegetation. It is often one of the first species to emerge in the spring, giving it a head start on establishing new territory. Furthermore, it is allopathic and exudes an antifungal chemical into the soil that disrupts associations between mycorrhizal fungi and native plants, thereby suppressing native plant growth. Each plant is capable of producing thousands of seeds.

The most effective method of control is hand pulling. This is obviously labor-intensive and not cost-effective, but due to the ease of identification and removal, it offers an excellent opportunity for volunteers. Many organizations successfully utilize volunteers for pulling garlic mustard with tremendous success since the plant is easily pulled. A small group of people can remove large amounts within a few hours, and their progress is evident from year to year. The plant is a biennial, and seeds often lay dormant in the soil for several years. Because of this, annual monitoring and work days are necessary.

Management Recommendations

Garlic mustard is distributed throughout the Harding property, primarily in wooded areas (particularly in the south and west [Figure 3e; Appendix B]). It is assumed that it will take at least five years to control the mustard populations on the site, depending on the number of volunteer work crews that can be deployed.

Garlic mustard infestation in the southern portion of the Harding site in 2015

Garlic mustard intermixed with Dame's rocket, present in the western forested areas

Years 1 – 2:

- Monitor the spread of garlic mustard by surveying the populations with GPS. Provide volunteers with a pdf map that can be used with their smartphone GPS to locate assigned populations.

- Hand-pull all stems of garlic mustard from the base, with care to remove the entire root system to prevent re-sprouts. Bag all parts of plant for removal to a landfill. Removal should occur in early spring (April/May).

Years 3 – 10^{+}:

- Continue to annually monitor the known infestations, and survey for other populations.

- Utilize volunteer crews to hand-pull and bag garlic mustard each spring until eradicated.

PRIORITY 6
TITLE: UPLAND WOODY SPECIES CONTROL
GSAB Project Prioritization Score = 27

Description

Much of the understory vegetation within the Harding property is non-native, comprised of honeysuckle, buckthorn, autumn olive, multiflora rose, European privet, and Oriental bittersweet. These shrubs often form tall, dense monocultures where they shade out understory vegetation, reduce native tree/shrub regeneration, and prohibit wildlife movement.

Cut-stump treatments are the preferred method for control of invasive woody shrubs

Species of Concern

Non-native buckthorn, honeysuckle, privet, rose, and bittersweet are serious threats to natural communities, where they can suppress native vegetation. These shrubs provide attractive and abundant fruit that are readily eaten by birds, and the extended productivity of the fruits allow them to be dispersed throughout the summer and fall. Once an infestation of becomes too widespread, complete eradication becomes nearly impossible or impractical. If the infestation can be contained, slowed down, or maintained within acceptable levels, long-term control may be warranted. Successful control of well-established infestations requires an integrated, multi-year approach using multiple techniques.

Management Recommendations

While controlling these species is important, the sheer size (> 10 ac) and cost of woody species removal at the Harding property is daunting and may not be financially prudent. Rather, Niswander Environmental recommends avoiding large, dense monocultures (at least initially), and focusing on smaller, more manageable areas that are either located in higher quality portions of forest or along footpaths where branches pose a potential safety risk to users.

Years 1 and 2:

- Begin control efforts in highest quality areas and those along footpaths and trails.

- Cut-stump treatment of all woody shrubs in the work zone using a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

- Coordinate with Parks and Forestry to chip and haul woody shrubs off-site

Cut-stump treatment of glossy buckthorn and honeysuckle along streambank in Oakland County, winter 2014

Years 3 – 5:

- Monitor previously treated areas, and continue with treatments as necessary. It is likely that hand-pulling of seedlings or spot-torching will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments.

Years 6 – 10^{+}:

- Continue to evaluate previously treated areas (including the expanded work zones), and continue with treatments as necessary.

- Utilize volunteers in new work zones to cut and drag shrubs for chipping, while contractors continue to apply herbicide.

Non-native honeysuckle

EXISTING CONDITIONS

The 48.38-acre White parcel was obtained by the City in December 2014 (Figure 4; Appendix B). This high quality wooded property is the largest piece of green space acquired in the City's history, and offers excellent connectivity to the Clinton River riparian corridor and the adjacent Riverbend Park property. The property features rolling terrain, rock outcroppings, mature hardwood forest, and restorable wetland habitat that is home to deer, turkey, coyote, fox, woodcock, beaver, and other wildlife not typically seen in urban settings.

The White property features high quality natural features and exhibits locally rare and unique vegetation such as tamarack (above)

High quality natural features on the White property are present, but are threatened by invasive vegetation such as glossy buckthorn, barberry, and non-native Phragmites. Evidence suggests that portions of this site may have once been a rare prairie fen natural community, and areas immediately adjacent to the Clinton River are classified as floodplain forest and southern hardwood swamp.

The Clinton River that divides the White parcel from Riverbend Park to the south is clear and swift in this section, with deep pools and woody debris that offers excellent habitat for fish and macroinvertebrates.

Wetland

The wetland system present on the White property consists of several wetland types, including rich tamarack swamp, floodplain forest, and scrub-shrub wetland. It is likely that portions, and possibly most, of the tamarack swamp (Figure 4a; Appendix B) was likely a prairie fen natural community in the recent past, but is being overtaken by Phragmites, cattail, and glossy buckthorn. Despite the abundance of these species, much of this area consists of tamarack and lakebank sedge. However, remnant associate fen plants such as shrubby cinquefoil, golden ragwort, poison sumac, tussock sedge, broad-leaved wooly sedge, slender sedge, fen star sedge, swamp goldenrod, Ohio goldenrod, yellow-eyed grass, joe pye weed, Bebb's willow, mountain mint, marsh fern, meadowsweet, and ninebark are also present. This area features cold groundwater-fed springs, several small rivulets, and a narrow creek at the margin of a steep end moraine ridge, all of which

The tamarack swamp located in the southern portion of the property exhibits numerous fen characteristics

typically characterize a prairie fen. The soil structure within the swamp consists of deep organic muck, but soils in the potential fen area are marly and likely calcerous.

Areas along the Clinton River are classified as forested floodplain wetland, but also exhibit characteristics of a southern hardwood swamp community, both of which are similar in community structure and plant diversity. This area (Figure 4b; Appendix B) is subject to periodic flooding, which can affect the overall species composition in the immediate area from year to year. Mature canopy trees along the river include red maple, elm, silver maple, swamp white oak, musclewood, and basswood, while much of the understory consists of sedge, nettle, skunk cabbage, wood reed, fowl manna grass, and aster. Areas immediately adjacent to the river contain an abundance of reed canary grass, with swamp aster, garlic mustard, glossy buckthorn, thistle, hawthorn, multiflora rose, and dame's rocket also present. The drier sandy, silty soils in this area are very different from those in the adjacent tamarack swamp, resulting in a mixture of both wetland and upland species (mesic). Floodplain areas such as this are seasonally inundated and function as important natural sponges, trapping sediments and other pollutants during flood events.

Forested floodplain wetland in the southern portion of the White property

The remainder of the on-site wetland (in the north) consists of scrub-shrub habitat, and is generally of low quality since it is dominated almost exclusively by a dense layer of invasive glossy buckthorn and Phragmites. The buckthorn and Phragmites in the north appears to be advancing into the higher quality areas to the south, so control is warranted to prevent further encroachment.

Upland Forest

Mature upland forest comprises approximately 45% of the White property (Figure 4; Appendix B). Unlike many urban forests, which often exhibit a dense understory of saplings, vines, and invasive shrubs, the woodlands on the White parcel are generally open due to the size/age of the trees and the high deer population. The most common species found on the site include cherry, red maple, sugar maple, red oak, white oak, and hickory. The sparse understory is comprised of various woodland sedges, jack-in-the pulpit, and mayapple, and generally lacks invasive plants in most areas. Pockets of garlic mustard, privet, and multiflora rose exist sporadically throughout the upland forest, but are not seen as a serious threat to the quality of this landscape. Regardless, they should be treated before they become an issue.

Much of the White property consists of mature upland forest on hilly terrain

Although most of the forest is of high quality, there are several areas that need immediate attention. Japanese barberry poses a significant risk to not only the remaining upland forest, but also to the tamarack swamp. This non-native shrub was introduced from Asia as an ornamental but has escaped into oak forests and caused significant damage to many of the woodlots in southeast Michigan. It is compact and low growing, allowing lower branches to root and establish large, impenetrable colonies that quickly shade out native herbaceous species. Barberry is a prevalent and serious threat in one portion of the property, where it has already overtaken approximately 1.5 acres of mature forest. This infestation occurs along a creek at the edge of the tamarack swamp, and many barberry were observed growing in the muck soils of this wetland, which is uncommon but alarming.

Japanese barberry poses a serious threat to both the upland forested areas and the high quality tamarack swamp

In addition to the barberry that threatens the quality of this site, there is a small infestation of swallow wort. This twining vine is highly invasive and can overtake a forested ecosystem rapidly because it thrives and sun or shade, and can survive in wetland or upland habitat. Approximately 50-75 plants were observed by Niswander Environmental in September 2015, and these were subsequently hand-pulled to prevent newly forming seed pods from opening. In general, however, hand pulling is not as effective as chemical control. Annual monitoring and herbicide treatments will be necessary to eradicate this species from the site.

Swallow wort (left) was first observed on the White property in September 2015, growing near a wetland in the northwest portion of the site

LONG-TERM MANAGEMENT STRATEGY

The White parcel is the most valuable greenspace property in Rochester Hills due to its size, connectivity with the Clinton River and adjoining Riverbend Park, and its ecological significance. Although it may not yet receive as much public use as other Greenspace properties, it is a valuable resource for the public. Several unofficial walking trails extend from three access points from neighboring subdivisions, but they eventually fade into the wetlands and forest. If these trails could be formalized and maintained to a degree, the property would likely receive more use from the public, and education opportunities highlighting the significance of the on-site natural features could be presented throughout interpretive signage.

Long-term stewardship strategies should focus on enhancing the existing wetland, particularly the tamarack swamp area and associated remnant fen community. This can be completed through invasive species control of Phragmites and non-native woody shrubs. Secondly, even though a majority of the upland portions of the property generally lack invasive species, plants such as barberry, buckthorn, and swallow wort need to be controlled before they become a serious issue.

MANAGEMENT PRIORITIES AND PROJECTS

Niswander Environmental has thoroughly assessed the White parcel, having mapped each habitat type, determined existing and potential threats, and evaluated opportunities for enhancement/restoration. Using this information, a list of six (6) management projects was developed. Each project was scored and ranked using the GSAB Project Prioritization worksheet (Appendix A). Below is a description of each project, the project rank as compared to other projects for the Harding Property, and a long-term implementation plan.

PRIORITY 1 (TOP PRIORITY)

TITLE: REMNANT FEN AND TAMARACK SWAMP ENHANCEMENT

GSAB Project Prioritization Score = 65

Description

Wetland comprises over half of the White parcel. Within the wetland portion of the site lies a high quality rich tamarack swamp, which is home to a diverse array of unique and locally rare plant species. Rich tamarack swamps are characterized by an open canopy of tamarack with a dense and diverse collection of sedges, forbs, and shrubs in the understory. The approximately 4-acre tamarack swamp (Figure 4a; Appendix B) also contains several areas that exhibit locally rare plants and other characteristics commonly associated with a prairie fen natural community, which is considered a “vulnerable” natural community type based on its restricted range, relatively few occurrences, and recent declines due to development.

Species of Concern

Glossy buckthorn and Phragmites are abundant within the wetland in general, and common within the tamarack swamp and potential fen areas within the swamp. At the edge of this zone, Japanese barberry is also a threat, although this species typically does not survive in wetland habitats.

Management Recommendations

Based on the quality of this rich tamarack swamp and potential remnant fen area, strategic invasive species control is warranted. Rather than foliar broadcasting herbicide on glossy buckthorn and Phragmites, a more selective treatment approach is necessary Niswander Environmental recommends techniques such as cut-stump treatments for buckthorn and to some degree barberry, and hand wicking and/or spot treatment of herbicide on Phragmites. Where Phragmites comprises more than 90% of the plant material, foliar broadcast applications are acceptable if drift can be minimized. The following is a recommended timeline that should be implemented to ensure a successful enhancement of this high quality natural community.

Selective use of herbicides is required in the tamarack swamp

Years 1 and 2:

- Foliar spot and hand wicking treatment of Phragmites using an aquatic-safe, glyphosate-based herbicide such as AquaNeat® or Rodeo® at a 5% concentration. In areas where the Phragmites has formed a monoculture (>90%), foliar broadcast treatments are recommended. Activities should occur in mid-to-late summer. The use of imazapyr is prohibited in this sensitive area.

- Cut-stump treatment of glossy buckthorn, Japanese barberry, any other non-desirable woody tree or shrub using an aquatic-safe, triclopyr-based herbicide such as Garlon 3A® or Renovate® at a concentration of 27% active ingredient. The plants should be cleanly cut near ground level, and the herbicide should be applied soon after to the freshly exposed stem and bark. This activity should occur in late summer or fall, but can also be conducted in winter if conditions are not sub-freezing. Efforts should focus on the highest quality areas first (begin at interior of remnant fen and work out). Special precautions should be taken to clean boots, clothing, and tools prior to entry into this area.

Years 3 – 5:

- Foliar spot treat Phragmites using the methods described above. It is expected that most treatments will involve treating small populations or even individual stems. Hand-wicking at a concentration of 5% active ingredient will be the best method to avoid collateral damage to non-target and rare species.

- Cut-stump treatment of woody species as necessary. It is expected that glossy buckthorn in particular will re-sprout since its fruit is long-lived in the soil, and opening canopies will expose these to sunlight. In instances where seedlings are common, hand pulling may be the most effective method to avoid impacts to non-target species.

Years 6 – 10^{+}:

- Monitor the rich tamarack swamp and potential fen areas annually, evaluate any existing or new issues, and implement the above mentioned control measures at the appropriate time if warranted.

PRIORITY 2
TITLE: FORESTED WETLAND ENHANCEMENT
GSAB Project Prioritization Score = 43

Description

The entire southern boundary of the White property as it hugs the Clinton River consists of forested floodplain wetland (Figure 4b; Appendix B). Portions of this wetland are somewhat mesic in nature and open, while others areas are densely vegetated and very wet throughout the year. Floodplains in southeast Michigan typically contain invasive species because along with sediment, they collect seeds from upstream sources. Therefore, invasive species in floodplain areas are typically difficult to eradicate due to a constant influx of off-site seed.

Species of Concern

There are a number of threats to the floodplain areas of the White parcel. In some areas, reed canary grass is the dominant species, while in others Phragmites is abundant. Shrubs such as buckthorn, honeysuckle, multiflora rose, and autumn olive are present as well.

Management Recommendations

Complete eradication of invasive vegetation within the floodplain is not possible. Additionally, there are a number of species that are present in varying amounts. Therefore, Niswander Environmental recommends an approach that focuses on treatment methods based on timing rather than attacking individual species. Woody species are generally removed via cut-stump methods in the summer, fall, and winter, while treatment of herbaceous species is dependent on an individual species' life cycle. To effectively enhance the forested wetland areas of this site, Niswander Environmental believes that several work days should occur each season, with actual work depending on the target species at that particular time.

Forested floodplain located along the Clinton River on the White parcel

The following is a recommended timeline to conduct invasive species control in the forested floodplain wetland.

Years 1 – 5:

- Herbaceous species should be the focus in the spring of each year. Species such as garlic mustard and dame's rocket can be hand-pulled beginning in May, while the first round of foliar treatments targeting reed canary grass can be completed at this time as well. Individual Canada thistle plants can be spot treated with glyphosate. All work should be completed prior to seed set.

Reed canary grass in the forested floodplain of the White property

- Summer activities should focus on treating woody invasive shrubs such as buckthorn, rose, privet, olive, barberry, and honeysuckle using cut-stump methods. The second round of foliar herbicide treatments should be conducted in July on reed canary grass, since new sprouts will be emerging following the spring applications. A third and final round of treatment to reduce reed canary grass should be conducted by early September, with a focus on treating newly emerging plants or those missed previously.

- Cut-stump treatments of woody species can continue through the fall. Patches of Phragmites should be treated from late-August through September using a glyphosate-based herbicide only, as imazapyr may inadvertently impact surrounding trees. Phragmites treatments in other portions of the site should be conducted at this time as well.

- Continue cut-stump treatments of woody species through the winter, but avoid treating on days where the temperature is below freezing. Winter treatments should end by early March. Seasonal treatment cycles should begin again the following May.

PRIORITY 3
TITLE: SWALLOW WORT CONTROL
GSAB Project Prioritization Score = 42

Description and Species of Concern

A small population of invasive swallow wort was first observed in September 2015, in the northwest portion of the White property (Figure 4c; Appendix B). This plant was found growing at the base of a slope, near the wetland/upland interface. Although only a few dozen plants were present, this species has the ability to spread rapidly both horizontally and vertically, and tends to become more vigorous and productive as the population increases. This potential project scored relatively high on the GSAB Project Prioritization form (Appendix A) because it would be very quick and cost effective to treat in its current state. Should this plant be left to flourish, it will become a labor-intensive and costly species to eradicate.

Management Recommendations

Due to the fact that this species was caught early, has a small population, and was hand-pulled already prior to setting seed, it is expected that the swallow wort can be eradicated in three years. Studies show that a multi-year effort is required to exhaust the seedbank, even if a population is minor.

The following is a recommended timeline to control swallow wort.

Years 1- 3:

- Survey the known population of swallow wort, and search the area for new infestations.
- Chemically treat the plants twice annually, in June and August, with a glyphosate-based herbicide.
- Remove and bag all seed pods, roots, and root crowns

Years 4^+:

- Continue monitoring the site annually. If new populations are observed, take action to control. Hand pulling is not typically a long-term alternative, but should be done to prevent seeding if chemicals are not available or if found after the herbicide treatment window.
- If warranted, continue spot treating twice annually with glyphosate

PRIORITY 4

TITLE: BARBERRY CONTROL

GSAB Project Prioritization Score = 30

Description and Species of Concern

Japanese barberry is locally abundant in one area of the White parcel (Figure 4d; Appendix B), and is sporadic in other areas. This species spreads rapidly, and can be physically difficult to control due to its sharp spines.

Management Recommendations

Japanese barberry comprises approximately 1.5acres on the White parcel

Cut-stump treatment is the most effective method to control barberry while minimizing impacts to non-target plants, but is likely not the most efficient treatment method in this setting due to the dense colonies on this property. Isolated individuals can be removed via cut-stump methods or through digging, but foliar treatments may be warranted for the larger infestations. Niswander Environmental has had varying degrees of success treating shrubs via foliar spraying, but recommends this method the first year because it can be completed in one day, and it may be just as an effective treatment as cut-stump. It is estimated that removing this species via cut-stump methods or digging would take a team of 4 people several weeks. The use of volunteers is not recommended due to this shrub's sharp spines.

The following is a recommended timeline to control Japanese barberry from the White property.

Year 1:

- Foliar broadcast treat large infestations of barberry in early spring or late fall using a glyphosate-based herbicide. Barberry is one of the first plants to emerge from winter dormancy and one of the last to lose its leaves in the fall, so foliar treatments may not impact non-target species as much if conducted at these times of the year. Barberry is also considered to be a somewhat weaker plant than other woody species that can sometimes tolerate herbicide applications, so foliar treatments may be highly effective.

- Cut-stump treat or hand pull/dig smaller individual barberry plants in summer or fall. If hand pulling or digging, be sure to tamp the disturbed soil back in place. When performing cut-stump treatments, use a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

- Closely monitor the success rate of the foliar treatments at the end of the year

Year 2:

- Determine the effectiveness of the previous years' foliar treatment. Depending on the rate of success, employ a similar treatment plan (foliar broadcast) or start cut-stump treatments (27% triclopyr) beginning along the edge of the tamarack swamp in the summer and fall. If cut-stump methods are used, ensure that all stems are treated with herbicide since barberry sprouts vigorously if cut and left untreated.

- Coordinate with Parks and Forestry to chip and haul barberry off-site

Years 3 – 5:

- Monitor previously treated areas, and continue with treatments as necessary. It is likely that hand-pulling of seedlings or spot-torching will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments.

Years 6 – 10^{+}

- Continue to evaluate previously treated areas (including the expanded work zones), and continue with treatments as necessary.

Japanese barberry in the central portion of the site

PRIORITY 5
TITLE: UPLAND WOODY SPECIES CONTROL
GSAB Project Prioritization Score: = 25

Description

The upland wooded portions of the White property are generally open and contain only isolated patches of invasive woody species, primarily young glossy buckthorn, honeysuckle, and autumn olive. Other invasive woody species such as multiflora rose and privet are present as well, but not in large numbers. A description of the serious Japanese barberry issue is discussed under Priority 4 on the previous pages.

Species of Concern

Non-native buckthorn, honeysuckle, and autumn olive are serious threats to forested environments, where they can suppress native vegetation. These shrubs have the tendency to form tall, dense monocultures where they shade out understory vegetation, reduce native tree/shrub regeneration, and eventually prohibit travel for wildlife and park users. This level of infestation is not yet present on the White parcel, at least not in the upland forest; regardless, spot treatments should be conducted to ensure that these species do not advance further.

Management Recommendations

There are very few wooded upland areas where buckthorn, honeysuckle, and autumn olive are currently a significant threat (some of these species, however, are prevalent in wetland areas). Although controlling these species is necessary, primary efforts should begin in the highest quality portions of the site (tamarack swamp and floodplain) rather than the upland forest.

The following is a recommended timeline to control upland woody invasive shrubs from the White property.

Years 1 and 2:

- Begin control efforts in highest quality wooded areas.

- Cut-stump treatment of all woody shrubs in the work zone using a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

- Coordinate with Parks and Forestry to chip and haul woody shrubs off-site

Years 3 – 5^{+}:

- Monitor previously treated areas, and continue with treatments as necessary. It is likely that hand-pulling of seedlings or spot-torching will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments. Utilize volunteers in new work zones to cut and drag shrubs for chipping, while contractors continue to apply herbicide.

PRIORITY 6
TITLE: SCRUB-SHRUB WETLAND ENHANCEMENT
GSAB Project Prioritization Score: = 26

Description

Approximately 14 acres of low-quality scrub-shrub wetland is present in the northern portion of the White property (Figure 4e; Appendix B). Unlike other wetland habitats on the site, this area is dominated almost exclusively by Phragmites, while much of the perimeter consists of glossy buckthorn. Control of these species was detailed on previous pages under Priority 1 (Remnant Fen and Tamarack Swamp Enhancement) and Priority 2 (Forested Wetland Enhancement); however, these two habitat types were highlighted as separate projects because they are of significantly higher quality than the scrub-shrub wetland, and under immediate threat from encroachment. The scrub-shrub wetland has very few native species in the interior, and will likely require years of effort to restore.

Species of Concern

Phragmites has completely overtaken most of the scrub-shrub wetland in the north, and appears to be advancing south along the banks of the Clinton River into high quality natural communities. Glossy buckthorn is not as serious a threat as Phragmites because it does not spread as fast, but is the dominant shrub in this portion of the wetland. It too is dense in areas and is common in the tamarack swamp and forested floodplain.

Phragmites has formed a tall, dense monoculture in the northern sections of the White parcel

Management Recommendations

Due to on-site conditions, access into this area will be difficult with off-road vehicles, and may be impossible. If that is the case, the Phragmites will have to be treated with backpack sprayers, which is time consuming, labor-intensive, and costly. Areas of glossy buckthorn should be controlled using cut-stump methods.

The following is a recommended timeline to enhance the scrub-shrub wetland areas in the northern portion of the White parcel.

Year 1:

- Broadcast foliar treat Phragmites beginning in late-August through September using a 2% solution of glyphosate. Begin in areas where Phragmites abuts higher quality wetland areas such as the tamarack swamp or floodplain forest, and work back from that point. Phragmites in this area is a tall, dense monoculture which could be effectively treated with a boom sprayer if access with an Argo or ATV is possible. If the use of vehicles is impractical or impossible, the chemicals will be applied with backpack sprayers.

- Cut-stump treatment of glossy buckthorn and all other invasive woody shrubs in the scrub-shrub wetland using a 27% solution of triclopyr-based herbicide to prevent re-sprouting. The plants should be cleanly cut near ground level, and the herbicide should be applied soon after to the freshly exposed stem and bark. This activity should occur in late summer or fall, but can also be conducted in winter if conditions are not sub-freezing. Begin in higher quality wetland areas and work towards upland. Special precautions should be taken to clean boots, clothing, and tools prior to entry into this area.

- Coordinate with Parks and Forestry to chip and haul woody shrubs off-site

Years 2 - 5:

- Continue foliar spot treatment of Phragmites, likely using backpack sprayers. Applications should occur beginning in mid-to-late summer through the end of September.

- Continue cut-stump treatment of glossy buckthorn and any other invasive woody species within the scrub-shrub wetland. It is likely that hand-pulling of seedlings or spot-torching will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments. Utilize volunteers in new work zones to cut and drag shrubs for chipping, while contractors continue to apply herbicide.

Years 6 – 10^{+}:

- With a Phragmites infestation of this size and density, it is likely that control will be necessary for greater than five years. Monitor the scrub-shrub wetland area annually, evaluate any existing or new issues, and implement the above mentioned control measures at the appropriate time if warranted.

- If individual clumps or stems of Phragmites persist, consider hand-wicking with a 5% solution of imazapyr and glyphosate. If this method is utilized, ensure that dripping is avoided, especially near the tamarack swamp and forested floodplain areas.

- Continue to monitor and treat new buckthorn sprouts.

Phragmites and buckthorn near the northern boundary of the tamarack swamp in October 2014

EXISTING CONDITIONS

The Cloverport site (Figure 5; Appendix B), ranked as a Priority 1 Natural Area and purchased in 2009, offers high quality upland and bottomland forest, with significant opportunity for restoration of the nature features on the site. Located along the rolling and often steep banks of the Clinton River, the 7.42-acre Cloverport property is a significant natural feature due in part to the functions and values it provides as open space, native plant diversity, and its aesthetic value for users of the Clinton River. Rich woodlands, such as those found on this site, are considered important ecosystems since they provide wildlife habitat, critical habitat linkages, visual buffers, and improved air quality. In addition, the forested floodplain wetlands are also of particular importance due to their ability to trap silt and sediment, filter pollutants, and slowly release floodwater.

The Clinton River in this section of the City is clear, fast moving, and offers excellent aquatic habitat for fish and macroinvertebrates in the form of submergent cover, riffle habitat, pools, and varying substrates. The Cloverport site features over 1,000 linear feet of river frontage and offers an excellent natural riparian buffer while performing critical functions that benefit both the river and surrounding residential areas. Despite these attributes, portions of the site also contribute to the river's sedimentation issues due to erosion caused by runoff from adjacent property and significant bank and cliff erosion on the site. In addition to the excessive runoff that causes silt buildup after most storm events, the higher banks on the property are severely eroded and in need of stabilization.

The Cloverport site is wooded and rolling, and provides an important buffer to the Clinton River

Upland Forest

A majority of the property exhibits an impressive assortment of hardwood trees of varying size, age class, and density, and the rolling nature of this site enhances its natural beauty. However, there are also significant areas of dense, non-native shrubs and forbs, particularly honeysuckle and garlic mustard.

The predominant canopy vegetation is red oak, white oak, black maple, and sugar maple, but a number of other species such as shagbark hickory, red maple, silver maple, elm, black walnut, hop hornbeam, cottonwood, basswood, and black cherry are also common throughout. The understory vegetation varies considerably in terms of type, species composition, and density. Shrub species such as witch hazel, muslcewood, hop hornbeam, and sapling trees are abundant, and spring wildflowers such as trillium, mayapple, jack-in-the-pulpit, wood anemone, wild geranium, bloodroot, solomon's seal, and early meadow rue are present in large numbers. In addition to these higher-quality shrubs and wildflowers, however, is the presence of invasive plants such as honeysuckle, garlic mustard, Phragmites, dame's rocket, Oriental bittersweet, tartarian honeysuckle, periwinkle, lily-of-the-valley, and pachysandra.

Native wildflowers such as trillium are common throughout the Cloverport property

Forested Floodplain Wetland

The forested floodplain wetland located along the banks of the Clinton River in the southwestern sections of the property has the potential to be high quality if not for the presence of excessive silt entering and depositing in this area, which also appears to have caused an abundance of Phragmites to become established. This area was evaluated in 2010, when it was noted that this floodplain wetland offered a diverse variety of trees, shrubs, grasses, sedges, and forbs. While this still holds true to some degree, this wetland is now largely degraded due to the amount of honeysuckle and Phragmites, coupled with significant inputs of silt from a commercial development south of the site. Many of the willow, cottonwood, oak, and elm trees that were present just five years ago are now dead due to excessive silt buildup, and the amount of forbs and sedges have diminished noticeably as well. The development is located at a higher elevation and silt travels down gullies and settles into the wetland below, creating large patches of unvegetated soil. In addition, this silt deposition has the ability to enter the river during any precipitation event, causing further sedimentation and pollution downstream.

Considerable siltation is threatening the quality of the on-site floodplain forest and the Clinton River

LONG-TERM MANAGEMENT STRATEGY

Restoration efforts to enhance the natural beauty of this Greenspace property should focus on removal of invasive understory species such as garlic mustard, Phragmites, Oriental bittersweet, and honeysuckle. Additionally, restoration efforts need to focus on preventing erosion and siltation that is negatively impacting the Clinton River. Retrofitting an upstream detention basin, stabilizing an eroding gully, and removing the existing silt deposits that are discharging to the Clinton River need to be top priorities, as does repairing the severely eroded banks that continue to fail and slump into the river.

Views facing downstream of the severely eroding banks along the Clinton River at the Cloverport site

MANAGEMENT PRIORITIES AND PROJECTS

Niswander Environmental has identified five (5) potential projects for the Cloverport property, two of which relate to erosion and sedimentation control (Appendix A). The following is a description of the issues to be addressed as well as a long-term management plan for each:

PRIORITY 1 (TOP PRIORITY)

TITLE: SEDIMENT CONTROL AND CREEK BANK STABILIZATION

GSAB Project Prioritization Score = 46

Description

Sediment and erosion are significant issues facing the Cloverport property. A detention pond associated with a commercial property south of this site (upslope) is actively discharging stormwater into an intermittent creek that flows down gradient into and through the Cloverport site before eventually outletting into the Clinton River. This discharge is causing severe erosion to the banks and slopes along this creek, which is resulting in a substantial sediment plume in the forested floodplain wetland located in the western portion of the site, along the Clinton River (Figure 5a; Appendix B). Additionally, Phragmites surrounding the detention pond is likely contributing seed to the newly established population in the floodplain area.

Management Recommendations

This potential project scored high due to a number of factors, including:

- Restoration involves not only the Greenspace property but also adjacent properties, an intermittent creek, and the Clinton River
- Restoration activities can be completed in one year with little follow-up monitoring or maintenance
- Restoration will improve upland, wetland, and riverine habitats, and will involve the removal of invasive plants such as Phragmites
- Restoration can likely be completed using grant funds

Stormwater discharging from a commercial detention pond upslope from the Cloverport property is causing substantial erosion and sedimentation into floodplain wetlands and the Clinton River

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

Year 1:

- Preliminary Assessments: conduct creek and erosion gulley surveys, calculate the discharge rate of water in the creek and leaving the detention pond, and map the extent of sedimentation that has entered and has been deposited on the site.

- Design a restoration plan that restores the stream channel using natural channel design principals, address slope stabilization, discharge rates, and determine potential options for removing existing sediment from the forested floodplain wetland area.

- Apply for grant funding and obtain necessary permits to conduct the work.

Year 2:

- Implement restoration work based on approved design.

- Install scour chains and bank pins to monitor bank stability from year to year. Establish permanent cross sections to monitor channel characteristics.

Years 3 – 6:

- Monitor the success of the project by surveying restored stream, evaluating new cross sectional survey data, assessing the amount of scour and erosion

PRIORITY 2
TITLE: CLOVERPORT PROPERTY SEVERE STREAMBANK AND SLOPE EROSION (CR-22 on Sheets 1 and 2)
GSAB Project Prioritization Score = 32

Description

River systems are dynamic, with ever changing patterns, flow rates, and profiles. Under natural circumstances over time, a healthy river can balance a sediment load by effectively transporting it downstream and depositing it in areas that can accept it. In these situations, erosion is typically minimal. In urban areas, however, where humans have altered flow rates through creation of impervious surfaces, commercial and residential development, destruction of vegetated buffers, issues such as bank erosion and sediment deposition can destabilize the natural balance between erosion and deposition causing bank failures and channel migration. This is especially evident in areas with sandy soils (such as Cloverport) that have minimal binding capabilities, allowing small disturbances to become significant problems and resulting in the loss of large portions of the river bank and the eventual formation of sheer cliffs (***above***).

Management Recommendations

Roughly 180 feet of Clinton River streambank as it flows along the northern and western boundaries of the Cloverport property is failing due to the lateral migration of the stream channel (Figure 5b and Sheets 1 and 2; Appendix B). Unfortunately, this location has significant topographic relief and the channel migration has formed a 30^{+} feet sheer cliff that is causing massive failure of the entire hillside with the recent loss of several large mature trees. Bank and hillside stabilization techniques (a combination of brush layers and straw wattles; see example photo ***right***) as well as installation of instream structures are necessary to reduce stream velocities and to reduce the bank stress while increasing the structural integrity of this bank and hillside. Although the size of the bank and hillside failure is significant, careful planning using natural channel design techniques can stop the channel migration by removing the erosion forces from the sandy hillside and directing the erosive flows back to the middle of the stream channel. Using natural channel design techniques, we would reduce bank slopes, stabilize the bank using natural materials, and install in-stream structures to divert flow to the middle of the channel reducing sheer stress on the banks and slope. Once the channel is stabilized and the erosive flows are moved away from the bank, the hillslope can be stabilized by using a combination of erosion control measures and vegetation plantings.

Steep slope stabilization techniques include brush layering and the use of wattles

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

Year 1:

- Conduct river surveys on this section and a reference river reach.
- Conduct hillside survey.
- Develop an appropriate plan using natural channel design techniques to restore the river bank, as well as installation of in-stream structures to direct flows to the middle of the stream channel. The restoration plan will address slope stabilization and stream discharge rates as well.
- Design a hillside restoration plan
- Apply for grant funding for project and obtain necessary permits to conduct the work.

Year 2:

- Implement restoration work based on approved design.

- Install scour chains and bank pins to monitor bank stability from year to year. Establish permanent cross sections to monitor channel characteristics.

Year 3+:

- Monitor restoration by surveying restored stream and hillside and make corrective actions as needed.

Steep slope stabilization in Canada, similar to conditions present at Cloverport. Severely steeped banks are cut back and terraced (left). Terraced landings are seeded and installed with live brush layers and wattles. Within several months, the slopes begin to vegetate (middle). Within 2 years, it is expected that the banks will be vegetated and stable (right).

PRIORITY 3
TITLE: PHRAGMITES CONTROL
GSAB Project Prioritization Score = 28

Description & Species of Concern

Until recently, Phragmites was not viewed as a serious issue at Cloverport. As discussed, Phragmites is likely advancing into the floodplain areas in the western portion of the site from the detention basin upslope from the property. Currently, there is approximately 0.25 acres of tall, dense Phragmites in this area (Figure 5c; Appendix B), and this will likely increase dramatically throughout the floodplain within a few years if it is not controlled.

The population of Phragmites at the Cloverport site has increased to roughly ¼ of an acre in the forested floodplain.

Management Recommendations

The following is a recommended timeline that should be implemented to manage Phragmites at this site:

Year 1:

- Chemially treat stand of Phragmites with an aquatic-safe, glyphosate-based herbicide such as Rodeo® or AquaNeat® at a 2% concentration in late summer or fall (late August thru the end of September), once plant is tasseling and is directing nutrients into its roots

Years 2 - 4:

- Monitor the area in early summer to determine the appropriate treatment method

- Chemically spot treat remaining Phragmites with glyphosate in late summer or fall

Years 5^{+}:

- Monitor the area each summer to determine the appropriate treatment method, if necessary

- If warranted, introduce a secondary chemical while spot treating remaining Phragmites. A combination of two herbicides causes an added stress to the population of Phragmites, thus preventing it from adapting to the treatment program. A combination of imazapyr (***i.e.,*** Habitat®) and glyphosate is more potent than glyphosate itself, and appears to be especially effective on stands of Phragmites that have plateaued after several years of treatment using only glyphosate. This combination of herbicides is generally used (if necessary) once stem densities are low enough to allow for adequate control through hand wicking only, since imazapyr is a very potent chemical that can kill nearby trees and other vegetation if not used properly.

PRIORITY 4
TITLE: GARLIC MUSTARD CONTROL
GSAB Project Prioritization Score = 27

Description & Species of Concern

Garlic mustard is a dominant understory plant that, like many invasives, can rapidly establish and outcompete native vegetation. It is often one of the first species to emerge in the spring, giving it a head start on establishing new territory. Furthermore, it is allopathic and exudes an antifungal chemical into the soil that disrupts associations between mycorrhizal fungi and native plants, thereby suppressing native plant growth. Each plant is capable of producing thousands of seeds.

Management Recommendations

The most effective method of control is hand pulling. This is obviously labor-intensive and not cost-effective, but due to the ease of identification and removal, it offers an excellent opportunity for volunteers. The plant is a biennial, and seeds often lay dormant in the soil for several years. Because of this, annual monitoring and treatments are necessary.

Garlic mustard is distributed throughout the Cloverport property, primarily in wooded areas in the western portion of the site (Figure 5d; Appendix B). It is assumed that it will take at least five years to control the mustard populations on the site, depending on the number of volunteer work crews that can be deployed.

Years 1 – 2:

- Monitor the spread of garlic mustard by surveying the populations with GPS.

- Hand-pull all stems of garlic mustard from the base, with care to remove the entire root system to prevent re-sprouts. Bag all parts of plant for removal. Removal should occur in early spring (April/May)

Years 3 – 10^{+}:

- Continue to annually monitor the known infestations, and survey for other populations.

- Utilize volunteer crews to hand-pull and bag garlic mustard each spring until eradicated.

PRIORITY 5
TITLE: UPLAND WOODY SPECIES CONTROL
GSAB Project Prioritization Score = 22

Description & Species of Concern

Although much of the understory at the Cloverport site is native, there are areas where invasive shrubs such as honeysuckle, buckthorn, Oriental bittersweet, and multiflora rose are common, particularly in the south and west. In general, very few areas on this property are completely dominated by invasive shrubs, but this could change if left untreated. These non-native species tend to advance rapidly into areas and can form tall, dense stands. As previously mentioned, once an infestation becomes too widespread, complete eradication becomes nearly impossible or impractical. The current infestation has not yet reached this size (most are less than 4 feet tall), so managing woody species within Cloverport is viable.

Management Recommendations

Niswander Environmental recommends an annual treatment schedule to ensure success. The floodplain forest in the southwest is the largest infestation and is the most difficult to reach; therefore, treatments should begin in this location. Most of the honeysuckle in this area is tall and dense. As the densest stands are thinned over the course of several years, volunteers could be utilized both in the floodplain areas and near the site access at the end of Cloverport Avenue.

Years 1 and 2:

- Begin control efforts in highest quality areas (floodplain) and those along footpaths and trails.

- Cut-stump treatment of all woody shrubs in the work zone using a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

- Coordinate with Parks and Forestry to chip and haul woody shrubs off-site.

Years 3 – 5:

- Monitor previously treated areas, and continue with treatments as necessary. It is likely that hand-pulling of seedlings or spot-torching will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments.

Years 6 – 10^{+}

- Continue to evaluate previously treated areas (including the expanded work zones), and continue with treatments as necessary.

- Utilize volunteers in new work zones to cut and drag shrubs for chipping, while contractors continue to apply herbicide. Volunteer parties should be kept in low numbers or encouraged to carpool since parking may be an issue.

Invasive honeysuckle is relatively common in certain areas of the Cloverport property

EXISTING CONDITIONS

The Childress site, located along Childress Avenue (north of Cloverport Avenue), is a 5.3-acre, primarily upland hardwood forest with a small amount of forested wetland at the toe-of-slope. The southern limits of the site are bound by Childress Road and numerous residential properties, while the western end abuts the Cloverport property (Figure 6; Appendix B). The land immediately north of the site is vacant and primarily consists of forested wetland. A majority of this property is steeply sloped and features several deep gullies that transport precipitation and overland flow north towards the forested wetland, and eventually to the adjacent Clinton River, which passes along the northwestern tip of the site.

Steep slopes are common throughout the wooded Childress property

Upland Forest

Mature hardwood trees such as maple, walnut, hop hornbeam, cherry, oak and basswood dominate the canopy on the upland slopes of the Childress site, while woody species such as musclewood, witch hazel, cherry and young hornbeam are common in the understory. Although there are large areas where very little vegetation is present, as is often the case in more mature woodlands, the herbaceous understory vegetation is fairly diverse. Spring wildflowers such as wood anemone, trout lily, Cananda mayflower, mayapple, and wild geranium are present in considerable quantities, especially in the lower elevations. The southwestern portion of the site, which is relatively flat, is dense in areas and of moderately low quality due to the abundance of non-native forbs and shrubs such as garlic mustard, honeysuckle, common privet, barberry, Oriental bittersweet, and common buckthorn. These species reproduce rapidly and in many cases will form dense monocultures. Several higher quality plant species such as flowering dogwood, Indian grass, bloodroot, and early meadow rue are also present on site.

The Childress site is dominated by maple, oak, cherry, walnut, and basswood.

Forested Wetland

The small forested wetland located at the toe-of-slope contains primarily wetland forbs and sedges, but extends beyond the property limits where it becomes a significant natural feature as it buffers the Clinton River. Species such as box elder, maple, elm, agrimony, jewelweed, avens, goldenrod, and sedges are common within the on-site portions of the wetland.

Forested wetland is present between the toe-of-slope and the adjacent Clinton River

LONG-TERM MANAGEMENT STRATEGY

Portions of the Childress site are disturbed as exhibited by the presence of man-made debris such as scrap metal, concrete, glass, bottles/cans, lawn clippings, and household furnishings scattered throughout, especially along the southern portions of the site near Childress Road, and within the steep gullies. Restoration efforts should concentrate on removal of artificial debris and control of exotic species, particularly honeysuckle. Although this site is not particularly significant in terms of vegetative quality, it is an important parcel to the City in that it offers additional greenspace and a habitat linkage to surrounding properties such as the larger Cloverport site to the west. Preservation and stewardship of the Childress property will not only protect its steep slopes and associated natural features from erosion and further degradation, but will also continue to serve as a critical natural buffer to the Clinton River.

MANAGEMENT PRIORITIES AND PROJECTS

Niswander Environmental has identified one (1) potential project, based on the goals and objectives for the GSAB, for the Childress property (Appendix A). The cleanup of scrap and debris is a potential project for community volunteers, but is not included within the scope of this document.

The following is a description of the issue to be addressed as well as its long-term management plan:

PRIORITY 1

TITLE: UPLAND WOODY SPECIES CONTROL

GSAB Project Prioritization Score = 9

Description

There are portions of the Childress property that lack vegetation in the understory, particularly along the steep slopes that lead down to the Clinton River. In other areas, however, non-native honeysuckle, buckthorn, common privet, and Oriental bittersweet are common. Oriental bittersweet is a woody vine that has a highly attractive fruit. This results in mammals and birds eating the fruit, which then excrete the seeds in different locations allowing this non-native to spread rapidly. In addition, honeysuckle, buckthorn, and privet also have attractive fruit to birds and mammals.

With restoration efforts focused on woody species control, this site has the potential to become a key breeding area for a variety of amphibians. Amphibians use vernal pools to breed, and some species then travel through the forest to higher, drier ground to overwinter. Dense thickets of invasive shrubs often prevent this natural phenomenon from occurring. This site provides both adequate overwintering habitat as well as the wooded wetland habitat that is essential for breeding. Removing the highly invasive woody shrubs will allow for continued animal passage, and will also aid in preventing the spread of these species into adjacent properties.

Management Recommendations

The most effective method of treatment for non-native woody species is cut-stump method using herbicide. This can be very labor intensive, but can usually provide a good opportunity for community involvement. However, this site has rough terrain, steep slopes, and deep gullies may make conditions unsafe for most volunteer groups. The terrain and lack of accessibility also makes removal of the cut debris difficult and time consuming. While controlling these species is important, the size of the site and cost of shrub removal in this Greenspace may not be financially prudent. Because of these factors, treatment at this site is considered a low priority overall when compared to potential projects at other Greenspace properties.

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

Years 1 and 2:

- Begin control efforts in highest quality upland areas.

- Cut-stump treatment of all woody shrubs in the work zone using a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

Years 3 – 5:

- Monitor previously treated areas, and continue with treatments as necessary. It is likely that hand-pulling of seedlings will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments.

Years 6 – 10^{+}

- Continue to evaluate previously treated areas (including the expanded work zones), and continue with treatments as necessary.

EXISTING CONDITIONS

The Rivercrest site is a 1.74-acre property located at the highly visible northeast corner of Livernois Road and Avon Road (Figure 7; Appendix B). The Clinton River, which is armored with concrete and riprap in this section, creates the eastern property boundary as it flows under Avon Road. This Priority 1 Natural Area is generally comprised of upland old field habitat and scrub-shrub wetland. The southern portion of the property is open, with a small cattail wetland along the river surrounded by a variety of upland grasses and forbs. This small wetland is a result of a stormwater outfall from the roads. Heading north, the property becomes densely vegetated with non-native shrubs before "opening up" into a scrub-shrub wetland.

Autumn olive growing in upland old field, cattail marsh, and hard armory leading under the Avon Road Bridge.

Despite its size and lack of public access, the site offers a small haven for wildlife since it lies along the banks of the Clinton River. Recent beaver and muskrat activity was observed in both 2010 and 2015, and the site is home to deer, rabbit, waterfowl, and turkey. The property also offers excellent potential foraging and roost habitat for bats, considering the amount of standing dead trees and the open river corridor.

Upland Old Field

The upland old field component of the site is generally of low quality and is dominated by non-native forbs and shrubs such as garlic mustard, honeysuckle, autumn olive, and buckthorn. Despite the presence of these non-native species, a diverse native understory of spring wildflowers such as wild geranium, marsh marigold, solomon's seal, and early meadow rue are relatively common.

Scrub-Shrub Wetland

Although the on-site wetland is characterized as scrub-shrub, it does include mature trees, an emergent opening, and pockets of standing water. The wetland is moderately high quality, and is an important natural feature in terms of the functions and values it provides. Unlike many urbanized wetlands that become degraded by surrounding development practices, this area is very diverse for its size and features a variety of quality wetland species such as sedge, joe-pye weed, marsh marigold, tamarack, swamp aster, swamp rose, and burreed.

Beaver activity in the northern portion of the Rivercrest site.

LONG TERM MANAGEMENT STRATEGY

Scrub-shrub wetland

Even though the Rivercrest site contains considerable non-native vegetation, especially within the upland old field, the property offers greenspace connectivity, valuable wildlife habitat, and harbors a significant wetland features directly adjacent to the Clinton River, providing a critical riparian buffer. There is strong potential for habitat restoration if woody invasive shrubs such as autumn olive, honeysuckle, and buckthorn can be removed and replanted with native trees and shrubs. Removing these non-native species would greatly increase the quality of this site and increase the biological diversity.

MANAGEMENT PRIORITIES AND PROJECTS

Niswander Environmental has identified two (2) potential projects for the Rivercrest property (Appendix A). The following is a description of the issues to be addressed as well as a long-term management plan for each:

PRIORITY 1

TITLE: NATURAL SHORELINE RESTORATION

GSAB Project Prioritization Score = 28

Description

Portions of the Clinton River shoreline on the Rivercrest property are currently lined with concrete slabs and riprap forming a hard armored shoreline (Figure 7a; Appendix B). Hard armoring of river shorelines has been shown to have significant impacts to the upstream and downstream shorelines as water flow deflects off the concrete, redirecting erosive forces downstream. In addition, the concrete slabs look unnatural and may be aesthetically displeasing for river users. The use of "softer" shoreline stabilization methods has become more popular to restore the natural connectivity of the shoreline to improve fish and wildlife habitat as well as natural stream channel functions.

Management Recommendations

Restoration of the natural shoreline and re-establishing habitat connectivity between the river and adjacent wetlands on the site is the top management priority for this property. This can be accomplished through the removal of the concrete slabs and installing softer "bio-engineering" techniques. Although access with equipment may be challenging on this site, this project would offer opportunities for volunteers to install coconut fiber coir logs, shrubs and wildflower plantings, and the placement of small riprap. Also, volunteers could monitor and maintain the plantings by weeding and trimming until the site is fully functioning.

Year 1:

- Survey the extent of the hard armoring, design bio-engineered shoreline, and obtain necessary permits from the MDEQ.

Year 2:

- Remove hard armoring and install bio-engineered shoreline.

- Reseed and replant the new shoreline with appropriate native shrubs and wildflowers that will aid in stabilizing the banks.

Years 3 – 5:

- Monitor project annually and conduct maintenance as needed. Utilize volunteers for weeding or supplemental seeding/planting.

PRIORITY 2
TITLE: WOODY SPECIES CONTROL
GSAB Project Prioritization Score = 4

Description

The upland old field portion of Rivercerst has the potential to be a higher quality area if not for the abundance of non-native woody species. Because this site is in a highly visible and trafficked area, it is important to remove the invasive shrubs that are starting to encroach into the higher quality scrub-shrub wetland area which buffers the river. This feature helps with flood retention, groundwater recharge, and erosion control.

Species of Concern

Invasive shrubs such as autumn olive, buckthorn and honeysuckle are immediate threats to this site. If the species are not properly managed, they will dominate the site and advance further into the wetland. All three of these woody shrubs tend to grow into dense thickets that displace native plants, lower species diversity, and create issues for traveling wildlife. Additionally, there is evidence that these species can alter ecosystems by adding nitrogen to the soil, which destroys beneficial fungi and leaves bare soil in the process. These bare soils, in turn, act as a perfect agent for further seed germination of these species.

Cut-stump treatment to remove woody invasive shrubs such as buckthorn

Management Recommendations

With a site of this size, non-native shrubs have the potential to overtake the native plant community rather quickly. Employing an aggressive control plan through cut-stump treatments is an effective means to manage the non-native shrubs. Installing native plant species to supplement the area may be a practical solution in this instance following the treatments. The following is a recommended timeline that should be implemented to ensure a successful restoration and enhancement of the site.

Years 1 and 2:

- Begin control efforts in highest quality areas (scrub-shrub wetland perimeter) or highest visibility areas (Figure 7b; Appendix B), focusing on large fruit-bearing plants first.

- Cut-stump treatment of all woody shrubs in the work zone using a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

- Coordinate with Parks and Forestry to chip and haul woody shrubs off-site

Years 3 – 5:

- Monitor previously treated areas, and continue with treatments as necessary. Expand work zone as necessary. It is likely that hand-pulling of seedlings will be necessary in many areas since seeds can remain in the seed bank for several years.

- Consider supplementing areas with a native seed mix and/or bare-root plantings, especially in high visibility areas nearest the intersection of Livernois and Avon Roads.

Years 6 – 10^{+}:

- Continue to evaluate previously treated areas, and continue with treatments as necessary.

- Utilize volunteers in new work zones to cut and drag shrubs for chipping, while contractors continue to apply herbicide. This may be difficult due to terrain and lack of access, but it should be at least considered.

- Consider prescribed burns if this site fails to rebound from herbicide treatments. Burns may also help stimulate native seed.

EXISTING CONDITIONS

Niswander Environmental first assessed the Clear Creek property, then known as the Sheldon-Mead parcel, in 2009. At that time, the site consisted of 39 acres of woodlands, wetlands, and old field habitat. It was identified as a Priority 1 natural area in the aforementioned Natural Features Inventory. In the past several years, portions of the site have been developed into a residential subdivision known as Clear Creek, named for the clean, narrow tributary to Stony Creek that flows through the property. Today, the remaining natural area at the Clear Creek site is approximately 23.68 acres in size, and consists of four individual parcels of dedicated open space containing important wetlands and surrounding forest and scrubland habitat (Figure 8; Appendix B).

This site is part of the Stony Creek riparian corridor and provides valuable water quality benefits. This property provides unique natural features, several ecosystem types, and high interspersion in the form of woodlands, wetlands, a creek, and successional scrubland. It also is a link to other natural areas to the north, south, and west, and provides a critical buffer for Clear Creek.

Wetlands

Each of the four parcels contain wetland ecosystems, and all offer a significant natural buffer to Clear Creek in addition to excellent wildlife habitat, flood retention, groundwater recharge, and sediment and pollutant filtering which is crucial in maintaining the high quality of nearby Stony Creek. A small marsh is present on the south side of Mead Road in the northern portion of the site (***left***), which was likely historically connected to a larger emergent wetland system located on the north side of the road in Oakland Township. Portions along the road and boardwalk are dominated by cattail and contain patches of Phragmites, but other areas of this wetland contain higher quality species such as lakebank sedge, tussock sedge, rice cutgrass, skunk cabbage, swamp milkweed, sensitive fern, and iris (***below***). This wetland appears to be permanently inundated, and provides excellent breeding habitat for amphibians and insects, which in turn provide a valuable food source for predators.

Marsh habitat in the northern portion of the Clear Creek site, south of Mead Road

Another marsh is present in a small parcel along Sheldon Road, just south of Mead Road. This wetland is dominated by cattail, but features a diverse perimeter of sensitive fern, sedge, rush, willow, elm, and skunk

cabbage. Although the interior of the marsh is not particularly diverse, it remains under threat from glossy buckthorn that is common in the surrounding forest.

Two high quality southern wet meadows are found on the Clear Creek site as well; one near the curve on Traceky Drive, and another along the south side of this road. Southern wet meadows, otherwise known as sedge meadows, typically form a transition zone between aquatic communities and uplands. These groundwater-fed ecosystems are increasingly rare in developed communities and are particularly important for the water quality functions they provide, including the trapping of sediments, the assimilation of nutrients, and the retention of floodwater.

Two sedge meadows are located within the Clear Creek property. Sedge meadows are often dominated by tussock sedge, which is the most abundant species found in each of these wetland areas.

Scrub-shrub wetland

Several moderately high quality scrub-shrub wetlands are also present on the Clear Creek site, but are under immediate threat from invasive honeysuckle and glossy buckthorn. These diverse wetlands contain emergent species such as sedge, cattail, fern, water hemlock, rice cutgrass, and skunk cabbage, but also contain numerous woody species such as willow, dogwood, elm, meadowsweet, viburnum, and ninebark. Clear Creek flows through these scrub-shrub wetlands, making them essential buffers in maintaining the quality of this watercourse. Unfortunately, these wetlands are surrounded by woodlands and scrubland, dominated by invasive glossy buckthorn

and honeysuckle. Glossy buckthorn in particular has the capability to survive in saturated conditions, so it is imperative that these species be removed to prevent further encroachment into these valuable wetland resources. The scrub-shrub wetland along Sheldon Road, between Placid Court and Clear Creek Drive, is of particular importance but is under immediate threat from glossy buckthorn.

Several restored wetlands (***i.e.***, mitigation wetlands) are present on the Clear Creek property as well. These restored wetlands, located in the eastern portion of the site, south of Traceky Drive, provide wildlife habitat for reptiles, amphibians, and a variety of birds. These mitigation sites, however, contain an abundance of non-native Phragmites and narrow-leaved cattail. Areas surrounding these sites are of low quality and are dominated by invasive buckthorn, honeysuckle, autumn olive, Oriental bittersweet, and multiflora rose. Native trees and shrubs such as elm, pine, maple, and cherry are present as well, but the invasive shrubs are far more prevalent.

A scrub-shrub wetland north of Clear Creek Drive is under threat from buckthorn

Finally, an open-water wetland is located in the western portion of the Clear Creek site, along Sheldon Road, north of Placid Court. This wetland is located in a wooded area that is dominated by invasive shrubs, and an area of Phragmites is present to the east. The pond itself appears to be shallow and mucky, with a perimeter of sedge, willow, and buckthorn. Water smartweed is present in large amounts, extending beyond the top of the water. This area is home to ducks, turtles, and frogs, but no fish were observed.

A small pond sits within a woodland along Sheldon Road

Woodlands and Scrubland

Woodlands are considered important ecosystems, especially within developed communities like Rochester Hills, since they provide wildlife habitat, critical habitat linkages, visual buffers, and improved air quality. There is technically more scrubland than woodland on the Clear Creek site. Scrubland is essentially young woodland that is dominated by shrubs and saplings rather than mature trees. Unfortunately, most of the scrubland is of low quality and is dominated by dense thickets of invasive honeysuckle and buckthorn. True woodlands are present, however, and they provide a continuous green corridor with adjacent properties to the north, south, and west. Species commonly observed within the woodlands include cherry, oak, elm, maple, cottonwood, and ash. It should be noted, though, that species richness usually declines significantly in woodlands dominated by non-native shrubs.

Glossy buckthorn dominates much of the Clear Creek site

LONG TERM MANAGEMENT STRATEGY

The Clear Creek property is located within a rapidly expanding subdivision, with little public access and no trails at this time. It offers wildlife habitat and much needed open space and connectivity to surrounding areas, but in general the site is comprised primarily of invasive species. For these reasons, management activities at this site are considered a somewhat low priority when compared to higher public-use Greenspace properties such as Harding and White. Effectively removing buckthorn, honeysuckle, and all other invasive shrubs is costly, labor-intensive, and impractical; the overall chance of success is relatively low. Regardless, there is a definite need for stewardship at Clear Creek, especially management activities involving the suppression of invasive shrubs and Phragmites that are advancing into higher quality onsite sedge meadows and scrub-shrub wetlands that buffer Clear Creek.

Niswander Environmental has identified three (3) potential projects for the Clear Creek property (Appendix A). The following is a description of the issues to be addressed as well as a long-term management plan for each:

PRIORITY 1 (TOP PRIORITY)

TITLE: SCRUB-SHRUB WETLAND AND SEDGE MEADOW ENHANCEMENT

GSAB Project Prioritization Score = 31

Description

There are two sedge meadow areas and two higher quality scrub-shrub wetlands located on the Clear Creek site that are being threatened by non-native shrubs, especially glossy buckthorn (Figure 8a; Appendix B). These areas are diverse and feature a number of plant species that are relatively uncommon in developed communities, including meadowsweet, tussock sedge, mountain mint, ninebark, arrowwood viburnum, turtlehead, lobelia, bottle gentian, big bluestem, and marsh marigold. Open portions of the scrub-shrub wetland contained prairie species, suggesting that this area may have once been considered a wet prairie. Due to their unique features and imperiled status, Niswander Environmental recommends that these areas receive top priority over any other stewardship activities at this site.

Portions of the scrub-shrub wetland exhibit wet prairie species

Species of Concern

Glossy buckthorn is the biggest threat to the higher quality wetland areas on the Clear Creek site. Unlike common buckthorn, olive, and honeysuckle, which are true upland plants, glossy buckthorn can withstand periodic inundation and prolonged saturated conditions. This species is usually the first shrub to emerge from dormancy in the spring, giving its long-lived seeds a chance to establish before native plants begin to grow.

Management Recommendations

Niswander Environmental recommends an annual treatment plan to suppress glossy buckthorn and prevent it from further advancement into the sedge meadow and higher quality scrub-shrub wetland areas. Cut-stump treatment activities should occur annually to ensure successful enhancement of these habitats.

The following is a recommended timeline that should be implemented.

Years 1 and 2:

- Cut-stump treatment of glossy buckthorn and any other non-desirable woody tree or shrub using an aquatic-safe, triclopyr-based herbicide such as Garlon 3A® or Renovate® at a concentration of 27% active ingredient. The plants should be cleanly cut near ground level, and the herbicide should be applied soon after to the freshly exposed stem and bark. This activity should occur in late summer or fall, but can also be conducted in winter if conditions are above freezing. Focus should begin at the interior of the meadow or scrub-shrub areas, working out towards the perimeter when possible. Lower quality scrub-shrub wetlands should not be included in this project at this time.

Years 3 – 5:

- Cut-stump treatment of woody species as necessary. It is expected that glossy buckthorn in particular will re-sprout since its fruit is long-lived in the soil, and opening canopies will expose these to sunlight. In instances where seedlings are common, hand pulling may be the most effective method to avoid impacts to non-target species.

Years 6 – 10^{+}:

- Monitor the sedge meadow and higher quality scrub-shrub wetland areas annually, evaluate any existing or new issues, and implement the above mentioned control measures at the appropriate time if warranted.

- Consider the possibility of prescribed burns after restoration to stimulate native seed bank and promote wet prairie species.

- Utilize volunteers to collect native seed from this particular site to disperse onto other Greenspace properties

Open sedge meadow and scrub-shrub wetland areas on the Clear Creek property

PRIORITY 2
TITLE: PHRAGMITES CONTROL
GSAB Project Prioritization Score = 13

Description and Species of Concern

Phragmites is present in thirteen (13) isolated pockets throughout the Clear Creek site, generally in wetland areas, disturbed areas, and/or at stormwater outfalls (Figure 8b; Appendix B). Most of the patches are relatively small, but range in size from a few hundred square feet up to roughly ¾ of an acre.

Management Recommendations

Annual treatment is necessary to control Phragmites. With several small stands located at outfalls, the potential for this species to spread to other areas, both on-site and off-site, is high unless they are successfully controlled. Small patches located along boardwalks and roads can be treated with backpack sprayers, while other stands that are present within woodlots will require machinery such as Argos or ATV's for treatment.

The following is a recommended timeline that should be implemented to manage Phragmites at this site:

Year 1:

- Chemially treat stands of Phragmites with an aquatic-safe, glyphosate-based herbicide such as Rodeo® or AquaNeat® in late summer or fall (late August thru the end of September), once plant is tasseling and is directing nutrients into its roots.

Years 2 - 4:

- Monitor the area in early summer to determine the appropriate treatment method

- Chemically spot treat remaining Phragmites with glyphosate in late summer or fall

Years 5^{+}:

- Monitor the area in early summer to determine the appropriate treatment method

- If necessary, introduce a secondary chemical while spot treating remaining Phragmites. A combination of two herbicides causes an added stress to the population of Phragmites, thus preventing it from adapting to the treatment program. A combination of imazapyr (***i.e.,*** Habitat®) and glyphosate is more potent than glyphosate itself, and appears to be especially effective on stands of Phragmites that have plateaued after several years of treatment using only glyphosate. This combination of herbicides is generally used (if necessary) once stem densities are low enough to allow for adequate control through hand wicking only, since imazapyr is a very potent chemical that can kill nearby trees and other vegetation if not used properly.

PRIORITY 3
TITLE: UPLAND WOODY SPECIES CONTROL
GSAB Project Prioritization Score = 6

Description and Species of Concern

Much of the remaining upland at the Clear Creek property is comprised of invasive, non-native shrubs such as glossy buckthorn, honeysuckle, and autumn olive, and other species such as Oriental bittersweet, privet, barberry, and multiflora rose are present as well in smaller populations. Due to the sheer amount of existing invasive vegetation, coupled with a lack of native plants in these areas and the estimated low chance of long-term success, it is not economically feasible or prudent to make woody species control a high priority. As previously noted, when these species reach a certain level of dominance, no other species can grow. Removing the buckthorn and honeysuckle from monotypic areas will simply result in the next generation of these species establishing. It is a cycle that will produce little success, but will require significant costs and effort. Additionally, because of the terrain, fallen woody debris, and other hazards associated with these stands, this work is not conducive for volunteers.

Management Recommendations

At this time, Niswander Environmental feels that stewardship activities at Clear Creek should focus on enhancing the higher quality wetland areas through control of glossy buckthorn and Phragmites. Preventing these species from further encroachment is a manageable issue that can result in a successful and sustainable project. In the future, however, there may be a need to control the woody invasives at this site. If and when that is to occur, Niswander Environmental recommends the following timeline:

A dense thicket of buckthorn and honeysuckle surround Clear Creek

Years 1 - 5:

- Cut-stump treatment of all woody shrubs in upland areas using a 27% solution of triclopyr-based herbicide to prevent re-sprouting.

- Coordinate with Parks and Forestry to chip and haul woody shrubs off-site

- Monitor previously treated areas, and continue with treatments as necessary. It is likely that hand-pulling of seedlings or spot-torching will be necessary in many areas since seeds can remain in the seed bank for several years.

- Expand existing work zones, targeting large, fruit-bearing plants first for cut-stump treatments.

Years 6 – 10^{+}

- Continue to evaluate previously treated areas (including the expanded work zones), and continue with treatments as necessary.

- Once invasive shrubs are eliminated from a given zone, consider replanting higher visibility areas with woody species such as oak, maple, dogwood, viburnum, redbud, chokeberry, serviceberry, and other important native plants.

EXISTING CONDITIONS

The Clinton River flows through the heart of the City of Rochester Hills with more than 6 miles of river within the City limits. The river offers extraordinary recreational, scenic, and natural resource benefits to the citizens of the river, fueling significant economic activity for the surrounding areas. With its prime location and numerous public access points, the river is enjoyed by many users for a variety of activities including a fishing, paddling, wading, swimming, nature viewing, etc. The portion of the Clinton River that is within the City is clear, fast moving, often sinuous, and offers excellent aquatic habitat for fish and macroinvertebrates in the form of submergent cover, riffle habitat, pools, and varying substrates. Within the City, the river remains in mostly a natural state while flowing through a variety of settings from mature forest to residential and commercial areas. However portions of the river have been degraded by poor management and in some cases poor land use (e.g., hard armoring of shorelines, uncontrolled stormwater inputs, and historic developments). Many opportunities to restore and improve the river exist.

Failing hard armory along the banks of the Clinton River

There are many watershed-wide restoration efforts occurring within the Clinton River. Some of these multi-agency efforts include evaluating and improving base flow conditions and cold water conservation. In addition, these same agencies have undertaken a Woody Debris Management program in recent years. Niswander Environmental's evaluation of the river as it runs thru the City is intended to supplement these these larger scale, watershed-wide restoration goals by focusing on streambank instability on City-owned or controlled properties. Specifically, Niswander Environmental's evaluations and recommendations are specific to addressing streambank erosion on these sites.

Niswander Environmental assessed the entire river corridor within the City limits with a specific focus on City-owned or controlled properties. Twenty-five (25) potential projects were identified and evaluated along the river (Sheet 1); however, only six (6) occur on City-owned or controlled properties (Sheet 2). The assessments identified specific threats to river function, such as eroding shorelines and slopes, and restoring hard armored shorelines to natural conditions. Several potential projects were identified to improve and restore the river corridor, such as stopping on-going erosion of the stream banks and steep slopes adjacent to the shoreline (which are resulting in accelerated stream channel migration, causing erosion and lower water quality in the river). Using natural channel design techniques, many of the erosion issues can be resolved and the stream restored resulting in improved water quality, fish habitat, and recreational use.

Stream Restoration

Restoration efforts to enhance the natural beauty of the Clinton River should focus on repairing areas of identified and significant bank erosion and channel migration. Implementing stream restoration using natural channel design techniques will have a significant reduction on the amount of sediment being

introduced into the Clinton River via bank and bed erosion. Stream restoration will be accomplished by reducing the slope on failing banks, constructing bankfull shelves, installing toe wood, and/or placing in-stream structures to promote proper flow patterns and sediment movement. The appropriate technique will be selected based on site specific circumstances and the level of bank erosion and stream channel migration at each location. Using natural channel design techniques requires that each project be surveyed for comparison to natural reference sections of the same or similar river reach. The design will then mimic the conditions of the reference section to ensure long term stability of the river.

LONG-TERM MANAGEMENT STRATEGY

Niswander Environmental will utilize a natural channel design approach to reduce streambank erosion and sediment loads in most of the projects listed below, which will result in long-term stabilization. The stream channel dimensions will be redesigned to restore the river to a more stable form based on local reference reach data. Structures made of natural materials will be constructed to deflect higher velocity flow toward the center of the channel, further reducing near-bank shear stress and minimizing erosion. Conservation practices will include installation of grade control structures, rock veins, and wood mattresses; development of bankfull benches; and re-establishing riparian areas.

In addition, removing hard armoring (e.g., vertical steel seawall and concrete slabs) and restoring the shorelines using natural materials (e.g., natural field stone, native plantings, and bio-degradable materials) to restore the natural function of the stream will continue to improve the stream function and water quality.

MANAGEMENT PRIORITIES AND PROJECTS

Niswander Environmental has identified six (6) potential projects on City-owned or controlled properties along the Clinton River, all of which relate to ongoing severe erosion of the stream banks and adjacent slopes. Stream restoration on a portion of the Cloverport property was previously discussed. Each of the remaining 5 sites was evaluated using the GSAB project prioritization tool described in this Management Plan. The following is a description of the issues to be addressed as well as a long-term management plan for each:

PRIORITY 1 (TOP PRIORITY)

TITLE: YATES PROPERTY STREAM RESTORATION (CR-25 on Sheets 1 and 2)

GSAB Project Prioritization Score = 40

Description

Sedimentation and erosion are significant issues facing the Clinton River on the Yates Cider Mill Property. With significant use by the public and uncontrolled public access and historic manipulation of the stream channel, approximately 1,000 feet of streambank has some level of erosion and the channel has migrated and is causing significant loss of land, threatening the public trail way that extends from the Cider Mill.

Significant bank erosion at the Yates Cider Mill property has led to portions of the trail being closed until restoration activities can repair the river

Several efforts to patch the erosion issues at the Yates property have occurred with the placement of rocks and boulders. These piecemeal approaches on a river of this size are almost always prone to failure, or these efforts simply transfer the problem by moving the erosion issue upstream or downstream (which appears to be the case in this section of the river). A properly designed and implemented natural channel design project will address the ongoing erosion and bring long-term stability to the river on this property. The new channel design will result in locating the river away from severely eroding banks and eliminating artificially abrupt and sharp turns in the river channel along this reach.

Management Recommendations

This potential project scored high due to a number of factors, including:

- Repairing an area of the river with significant bank erosion that impacts the public trailway
- High public use and access to the river.
- Restoration will improve upland, wetland, and riverine habitats.
- Restoration can be completed within a few years.
- Restoration can likely be completed using grant funds

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

Year 1:

- Work with the City, Shelby Township, property owner, and the Clinton River Watershed Council to best leverage funding opportunities.

- Conduct river surveys on this section and a reference river reach.

- Develop a restoration plan using natural channel design techniques to restore river banks and the installation of in-stream structures to direct flows to the historic stream channel.

- Develop a public access plan that limits access to only certain areas along this stream reach. Integrate access points into natural channel design (e.g., placement of boulder/limestone steps).

- Apply for necessary permits.

Year 2:
- Install natural channel design structures to stabilize the stream banks and redirect flow to the middle of the channel.

Year 3+:
- Monitor the banks and stream structures, make corrections as needed.

PRIORITIES 2 AND 3
TITLE: AVON NATURE STUDY AREA STREAM RESTORATION (CR-16 and CR-17 on Sheets 1 and 2)
GSAB Project Prioritization Scores = 27 and 29 respectively

Description

The Avon Nature Study Area consists of over 100 acres of forest that provides a scenic overlook of the Clinton River. The river in this section of the City is clear, swift, and somewhat shallow, but during high flow events is scouring its banks. Despite several successful efforts to stabilize the banks in recent years, roughly 200 linear feet of the riverbank within this area continues to erode, not only leading to sedimentation of the river, but also potentially unsafe conditions for visitors using the Highlands Trail network.

The banks of the Clinton River in portions of the Avon Nature Study Area are eroding near trails and overlook areas

Management Recommendations

Streambank restoration techniques are necessary to stabilize the banks of the Clinton River in these failing areas, and in-stream structures such as cross vanes are necessary to divert flow away from the banks. The goal of this restoration is to restore channel function, provide short-term protection that promotes natural long-term stability, and to create fish habitat. The installation of toe wood provides the opportunity to add stability, habitat, and streambank protection in this reach. Toe wood techniques involve creating a bankfull bench consisting of tree stumps, logs, and root wads that are imbedded into the failing slope. The bench is then lined with live cuttings (***i.e.***, dogwood, willows, etc), covered with topsoil, and seeded. This principal is applicable for this situation, and will result in a restored channel dimension, the protection and stabilization of a vulnerable bank, and additional aquatic habitat.

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

Year 1:

- Conduct river surveys on this section and a reference river reach.
- Develop a restoration plan to address the failing river banks and how to direct flow away from the eroded areas.
- Apply for grant funding for project and obtain necessary permits to conduct the work

Year 2:

- Install in-stream structures to redirect flow to the middle of the channel.
- Restore the failing banks using toe wood technique described above.

Year 3+

- Monitor the banks and stream structures, make corrections as needed.

PRIORITY 4
TITLE: RIVERBEND PARK STREAM RESTORATION (CR-7 on Sheets 1 and 2)
GSAB Project Prioritization Score = 26

Description

The Clinton River as it flows between the White Property and Riverbend Park is clear and mostly shallow, but features several deep pools, riffles, and ample woody debris that offers excellent aquatic habitat for fish. Near the northwest corner of Riverbend Park, a high bank (~12') continues to erode, causing trees and sediment to fall into the river below. The banks have become fairly steep over time, and both bank repairs and stream restoration are necessary to re-establish stable conditions.

High banks along Riverbend Park are failing, leading to woody debris and sedimentation

Management Recommendations

Niswander Environmental recommends utilization of standard bioengineering techniques such as terracing and installation of instream structures to restore this reach of stream. Terracing in this situation involves pulling back roughly 100 feet of the high bank to create a gentler slope, installing brush layers/wattles along

the terraced benches, backfilling with soil, and seeding the entire newly constructed bank. In order to direct water away from the repaired bank, Niswander Environmental recommends installation of rock vanes to reduce bank stress and keep flow in the center of the channel.

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

Year 1:

- Conduct river survey on this section and a reference river reach. There are a number of areas along the Clinton River similar to the conditions present at Riverbend Park, so a reference reach may already be available through the Clinton River Watershed Council or Oakland County Drain Commission.

- Develop a restoration plan to address the failing river bank and how to direct flow away from the eroded areas.

- Apply for grant funding for project and obtain necessary permits to conduct the work

Year 2:

- Install in-stream structures to redirect flow to the middle of the channel.

- Restore the failing banks using terracing technique described above.

Year 3^{+}:

- Monitor the banks and stream structures, make corrections as needed.

Examples of bank terracing (left) to repair a steep eroding bank, and vane arm (above) to redirect water back to the center of the channel

PRIORITY 5
TITLE: BLOOMER PARK SLOPE STABILIZATION (CR-24 on Sheets 1 and 2)
GSAB Project Prioritization Score = 23

Description

Approximately 70 linear feet of 12-foot high streambank is failing along the Clinton River as it flows along the northern edge of Bloomer Park. The banks at this curve of the river are scoured, and produce a significant amount of sediment through erosion during high flow events.

Management Recommendations

Slope stabilization techniques are required to prevent further erosion on this bank. Pending a formal survey of this reach, it appears that the toe could be stabilized with toe rock (riprap) using natural field stone (as opposed to concrete), and live staked with willow and dogwoods that will establish rapidly. The banks will need to be pulled back to create a bankfull shelf, where the slopes can then be stabilized with native seed. Depending on the stream survey, instream structures such as vane arms may be necessary to redirect flow away from the bank.

Example of toe rock along restored streambank in Ann Arbor

The following is a recommended timeline that should be implemented to ensure a successful restoration project.

The scoured banks along Bloomer Park will require toe rock and the creation of a bankfull shelf to prevent further erosion

Year 1:

- Conduct river survey on this section and a reference river reach.
- Develop a restoration plan to address the scoured bank and possibly how to direct flow away from the eroded areas.
- Apply for grant funding for project and obtain necessary permits to conduct the work

Year 2:

- Restore the failing banks using toe rock and through construction of a bankfull shelf.
- Install in-stream structures to redirect flow to the middle of the channel if deemed necessary.

Year 3^{+}:

- Monitor the banks and stream structures, make corrections as needed.

Appendix A

Project Prioritization Tool
Scoring Forms

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
54

Project Name: Harding Wet Meadow Enhancement

Project Location: see Figure 3a

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**2**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**7**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**1**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**4**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts. ea*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts. ea*	
Other_____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**3**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**48**

Public Benefit Analysis

a. Public Benefits (Score One, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**9**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*20,000.00*
2. 3-year Operations and Maintenance Costs (O&M)	*$*	*60,000.00*
(B) Estimated Total Cost of Project	$	80,000.00

Public Benefit Ranking	**112.50**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***54***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
53

Project Name: Harding Prairie Restoration

Project Location: see Figure 3b

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**4**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts. ea*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts. ea*	
Other _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.(includes direct donation, property, labor, materials, etc.)	100%	*12 pts.*	**0**
	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**44**

Public Benefit Analysis

a. Public Benefits (Score One, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**9**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Construction and Design	*$*	*50,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*25,000.00*
(B) Estimated Total Cost of Project	$	75,000.00

Public Benefit Ranking	**120.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***53***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
50

Project Name: Harding Pond Area Enhancement

Project Location: see Figure 3c

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**3**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**4**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**2**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**50**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**9**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*15,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*75,000.00*
(B) Estimated Total Cost of Project	$	90,000.00

Public Benefit Ranking	**100.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***50***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
44

Project Name: Harding Japanese Knotweed Control

Project Location: see Figure 3d

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**38**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. First Year Implementation	*$*	*10,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*50,000.00*
(B) Estimated Total Cost of Project	$	60,000.00

Public Benefit Ranking	**116.67**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***44***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
28

Project Name: Harding Garlic Mustard Control

Project Location: see Figure 3e

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	9
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	3
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	5
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	3
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	5
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	1
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	5
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**36**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*15,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*75,000.00*
(B) Estimated Total Cost of Project	$	90,000.00

Public Benefit Ranking	**77.78**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***28***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
27

Project Name: Harding Woody Species Control

Project Location: see Figure 3

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**10**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**1**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**5**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**6**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**48**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*25,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*100,000.00*
(B) Estimated Total Cost of Project	$	125,000.00

Public Benefit Ranking	**56.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***27***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
65

Project Name: ***White Fen and Tamarack Swamp Enhancement***

Project Location: see Figure 4a

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**8**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**3**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**56**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*50,000.00*
(B) Estimated Total Cost of Project	$	60,000.00

Public Benefit Ranking	**116.67**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***65***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
43

Project Name: White Forested Wetland Enhancement

Project Location: see Figure 4b

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**7**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**5**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**6**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**52**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*75,000.00*
(B) Estimated Total Cost of Project	$	85,000.00

Public Benefit Ranking	**82.35**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***43***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
42

Project Name: White Swallow Wort Control

Project Location: see Figure 4c

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**1**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**1**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: swallowort	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**25**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**5**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*5,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*25,000.00*
(B) Estimated Total Cost of Project	$	30,000.00

Public Benefit Ranking	**166.67**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***42***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
30

Project Name: White Parcel Barberry Control

Project Location: see Figure 4d

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**1**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**37**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*75,000.00*
(B) Estimated Total Cost of Project	$	85,000.00

Public Benefit Ranking	**82.35**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***30***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
26

Project Name: White Scrub-Shrub Wetland Enhancement

Project Location: see Figure 4e

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**5**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**4**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**41**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*100,000.00*
(B) Estimated Total Cost of Project	$	110,000.00

Public Benefit Ranking	**63.64**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***26***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
25

Project Name: White Woody Species Control

Project Location: see Figure 4

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**7**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**1**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**12**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**5**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**6**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**45**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	$	*25,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	$	*100,000.00*
(B) Estimated Total Cost of Project	$	125,000.00

Public Benefit Ranking	**56.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***25***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
46

Project Name: Cloverport Sediment Control

Project Location: see Figure 5a

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**17**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**12**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**3**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**7**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**5**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**6**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**9**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**94**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**5**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*100,000.00*
2. 3-year Operations and Maintenance Costs (O&M)	*$*	*3,000.00*
(B) Estimated Total Cost of Project	$	103,000.00

Public Benefit Ranking	**48.54**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***46***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
32

Project Name: Cloverport Bank Stabilization

Project Location: see Figure 5b

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**14**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**3**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**12**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**7**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**7**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**3**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**4**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

4. Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**9**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**92**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*200,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	-
(B) Estimated Total Cost of Project	$	200,000.00

Public Benefit Ranking	**35.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***32***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
28

Project Name: Cloverport Phragmites Control

Project Location: see Figure 5c

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**2**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**1**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**28**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*5,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*25,000.00*
(B) Estimated Total Cost of Project	$	30,000.00

Public Benefit Ranking	**100.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***28***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
27

Project Name: Cloverport Garlic Mustard Control

Project Location: see Figure 5d

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

Criteria	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Criteria	Value	Score
Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

Criteria	Value	Score
≥ 10 acres	*10 pts.*	**3**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Criteria	Value	Score
Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Criteria	Value	Score
Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Criteria	Value	Score
Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

Criteria	Value	Score
20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: Garlic Mustard	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**32**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*25,000.00*
(B) Estimated Total Cost of Project	$	35,000.00

Public Benefit Ranking	**85.71**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***27***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
22

Project Name: Cloverport Woody Species Control

Project Location: see Figure 5

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

Criteria	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Criteria	Value	Score
Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

Criteria	Value	Score
≥ 10 acres	*10 pts.*	**5**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Criteria	Value	Score
Restoration can be accomplished in 1 year	*10 pts.*	**1**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Criteria	Value	Score
Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**12**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Criteria	Value	Score
Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

Criteria	Value	Score
20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**4**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**49**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**5**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*100,000.00*
(B) Estimated Total Cost of Project	$	110,000.00

Public Benefit Ranking	**45.45**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***22***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
9

Project Name: Childress Woody Species Control

Project Location: see Figure 6

Criteria

Value **Score**

Metric 1: Restoration Location and Type

a. Location (score all that apply)

Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**3**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**0**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**6**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**32**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*10,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*100,000.00*
(B) Estimated Total Cost of Project	$	110,000.00

Public Benefit Ranking	**27.27**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***9***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
28

Project Name: ***Rivercrest Hard Armory Removal/Bank Restoration***

Project Address: see Figure 7a

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**14**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**1**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**1**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**5**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**1**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**2**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Restoration_____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**55**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*50,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*10,000.00*
(B) Estimated Total Cost of Project	$	60,000.00

Public Benefit Ranking	**50.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***28***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
4

Project Name: Rivercrest Woody Species Control

Project Location: see Figure 7b

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**3**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**1**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**1**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**6**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Tree Planting	*2 pts.*	
	Other _____	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**38**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**1**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*15,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*75,000.00*
(B) Estimated Total Cost of Project	$	90,000.00

Public Benefit Ranking	**11.11**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***4***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
31

Project Name: ***Clear Creek PSS and Sedge Meadow Enhancement***

Project Location: see Figure 8a

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**10**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**7**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**5**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**6**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**52**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*8,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*42,000.00*
(B) Estimated Total Cost of Project	$	50,000.00

Public Benefit Ranking	**60.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***31***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
13

Project Name: Clear Creek Phragmites Control

Project Location: see Figure 8b

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**9**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**3**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**3**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**3**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**7**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**3**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**2**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**32**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**1**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*5,000.00*
2. 5-year Operations and Maintenance Costs (O&M)	*$*	*20,000.00*
(B) Estimated Total Cost of Project	$	25,000.00

Public Benefit Ranking	**40.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***13***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
6

Project Name: ***Clear Creek Woody Species Control (upland)***

Project Location: see Figure 8

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

Criteria	Value	Score
Greenspace Property	*9 pts.*	9
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Criteria	Value	Score
Habitat Restoration	*7 pts.*	10
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

Criteria	Value	Score
≥ 10 acres	*10 pts.*	10
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Criteria	Value	Score
Restoration can be accomplished in 1 year	*10 pts.*	1
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Criteria	Value	Score
Wetland Restoration (expanding or creating new wetland)	*9 pts.*	5
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Criteria	Value	Score
Wildlife Habitat Improvements	*1 pts.*	2
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

Criteria	Value	Score
20+ acre	*7 pts.*	5
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**10**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**0**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**0**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**0**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**0**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**52**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*25,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	*250,000.00*
(B) Estimated Total Cost of Project	$	275,000.00

Public Benefit Ranking	**10.91**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***6***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
40

Project Name: Yates Property Stream Restoration (CR-25)

Project Location: see Sheets 1 and 2

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**15**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**2**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**4**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**7**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**7**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**3**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**6**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**9**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**89**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**9**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*200,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	-
(B) Estimated Total Cost of Project	$	200,000.00

Public Benefit Ranking	**45.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***40***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
29

Project Name: ***Avon Nature Area Stream Restoration (CR-17)***

Project Location: see Sheets 1 and 2

Criteria

Value **Score**

Metric 1: Restoration Location and Type

a. Location (score all that apply)

Greenspace Property	*9 pts.*	**12**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**1**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**5**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**5**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**1**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**4**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**6**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**72**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*175,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	-
(B) Estimated Total Cost of Project	$	175,000.00

Public Benefit Ranking	**40.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***29***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
27

Project Name: ***Avon Nature Area Stream Restoration (CR-16)***

Project Location: see Sheets 1 and 2

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**12**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**1**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**3**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**3**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**1**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**4**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**3**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**6**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**68**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*175,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	-
(B) Estimated Total Cost of Project	$	175,000.00

Public Benefit Ranking	**40.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***27***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
26

Project Name: Riverbend Park Stream Restoration (CR-7)

Project Location: see Sheets 1 and 2

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

	Value	Score
Greenspace Property	*9 pts.*	**12**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

≥ 10 acres	*10 pts.*	**1**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**3**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**3**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**1**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**4**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**6**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**65**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**7**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*175,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	-
(B) Estimated Total Cost of Project	$	175,000.00

Public Benefit Ranking	**40.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***26***

City of Rochester Hills

Restoration Project Ranking

Restoration/Enhancement Value
23

Project Name: Bloomer Park Stream Restoration (CR-24)

Project Location: see Sheets 1 and 2

Criteria

Metric 1: Restoration Location and Type

a. Location (score all that apply)

Criteria	Value	Score
Greenspace Property	*9 pts.*	**12**
Park Property	*7 pts.*	
Clinton River	*5 pts.*	
Property Adjacent to Green Space or Park Properties where restoration work would support projects on GS and Park Properties	*3 pts.*	
Non-Green Space or Park Property (e.g., next to a river, along a public road, etc.)	*1 pts.*	

b. Restoration Type (score all that apply)

Criteria	Value	Score
Habitat Restoration	*7 pts.*	**12**
Erosion/Sediment Control	*5 pts.*	
Invasive Species Control	*3 pts.*	

Metric 2: Restoration Size and Timeline

a. Restoration Size (score one)

Criteria	Value	Score
≥ 10 acres	*10 pts.*	**1**
5 to <10 acres	*7 pts.*	
2 to <5 acres	*5 pts.*	
1 to <2 acres	*3 pts.*	
1/4 to <1 acres	*2 pts.*	
less than 1/4 acre	*1 pts.*	

b. Ecological Restoration Type (score one)

Criteria	Value	Score
Restoration can be accomplished in 1 year	*10 pts.*	**10**
Restoration can be accomplished in 1-3 years	*7 pts.*	
Restoration can be accomplished within 3-10 years	*3 pts.*	
Restoration may not be possible within 10 years	*1 pts.*	

Metric 3: Expected Benefits

Metric 3a: Restoration Benefits

1. Restoration Type (score all that apply)

Criteria	Value	Score
Wetland Restoration (expanding or creating new wetland)	*9 pts.*	**5**
Wetland Enhancement (improving existing wetland)	*7 pts.*	
Other Property (e.g., upland) Restoration Activities	*5 pts.*	
BMP Enhancements (e.g., buffer strips, stormwater treatment, etc.)	*5 pts.*	

2. Increased Benefits (score all that apply)

Criteria	Value	Score
Wildlife Habitat Improvements	*1 pts.*	**2**
Fish Habitat Improvements	*1 pts.*	
Floodwater Storage	*1 pts.*	
Stormwater Storage	*1 pts.*	
Improves Public Use/Visibility	*1 pts.*	

Metric 3b: Restoration Activities

1. Invasive Plant Treatment Area (score one)

Criteria	Value	Score
20+ acre	*7 pts.*	**0**
5-20 acre	*5 pts.*	
1.0-4.9 acre	*3 pts.*	
<1 acre	*1 pts.*	

2. Invasive Plant Species to be Treated (score all that apply, additional species may be added)

Phragmites australis	*2 pts.*	**0**
Reed Canary Grass	*2 pts.*	
Woody Species (Buckthorns, honeysuckles, rose, bittersweet, barberry, privet, etc - 2 pt ea)	*2 pts.*	
Herbaceous Species (Japanese knotweed, garlic mustard, purple loosestrife, invasive cattail, etc - 2 pt ea)	*2 pts.*	
Other: _____	*2 pts.*	

3. MDEQ Potential Wetland Restoration Maps (choose the one covering the largest area of the site)

High (mapped as historic wetland and hydric soils)	*3 pts.*	**0**
Medium (mapped as hydric soils only)	*2 pts.*	
Low (mapped as historic wetland only)	*1 pts.*	
Not Mapped (may be existing wetland)	*1 pts.*	

4. Installation of Structures to Stabilize Stream Channels (score one)

Linear Feet of Streambed Stabilized	*300+ ft.*	*7 pts.*	**0**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

5. Installation of Structures to Prevent/Stop Bank Erosion (score one)

Linear Feet of Streambank Stabilized	*300+ ft.*	*7 pts.*	**3**
	100-300 ft.	*5 pts.*	
	<100 ft.	*3 pts.*	

6. Floodplain Reconnection (score one)

Two-Stage Ditch Construction	*200+ ft.*	*5 pts.*	**0**
	100-200 ft.	*3 pts.*	
	1-100 ft.	*1 pts.*	

7. Best Management Practices (score one)

Acreage Treated using BMP Practices	*3.0+ acres*	*7 pts.*	**1**
	1.0-3.0 acres	*5 pts.*	
	0.5-0.99 acres	*3 pts.*	
	<0.5 acres	*1 pts.*	

8. Developed BMP Types (score all that apply)

BMPs to be Implemented	Retention/Sedimentation Basin	*4 pts.*	**2**
(long term maintenance will be required)	Detention/Sedimentation Basin	*2 pts.*	
	Rain Garden/Bioswale	*2 pts*	
	Buffer Strip (10' min.)	*2 pts.*	
	Tree Planting	*2 pts.*	
	Other Bank Stabilization	*Pts. as assigned*	

9. Water Quality Treatment (score one)

Stormwater Treatment	Treat greater than first 1/2" OR more than 90% of storms	*6 pts.*	**0**
	Treat first 1/2" of runoff OR runoff from 90% of storms	*3 pts.*	

10. Water Quantity Management (score one)

Runoff Volume Management (for a 2yr, 24-hour storm)	Post-construction runoff volume = 0 (stormwater does not leave site)	*6 pts.*	**6**
	Post-construction runoff volume < Pre-construction runoff volume	*4 pts.*	
	Post-construction runoff volume = pre-construction runoff volume	*2 pts.*	

Metric 4: Public Funding Benefits

a. Education Opportunities (score one)

Will the site be used for future demonstration/education?	*3 pts.*	**0**

b. Funding Benefits (score one)

Matching dollars/resources from Grants, Landowner, donations, etc.	100%	*12 pts.*	**3**
(includes direct donation, property, labor, materials, etc.)	50-99%	*9 pts.*	
	25-49%	*6 pts.*	
	<25%	*3 pts.*	

TOTAL SCORE	**57**

Public Benefit Analysis

a. Public Benefits (Score one, or score two and average)

(A) Public Visibilty/Use	HIGH (existing maintained trails, parkland, heavy use)	*9 pts.*	**3**
	MODERATE (open to the public, rustic trails, moderate use)	*5 pts.*	
	LOW (not easily accessible and/or low user numbers)	*1 pts.*	

b. Costs

1. Implementation Year 1	*$*	*75,000.00*
2. 10-year Operations and Maintenance Costs (O&M)	*$*	-
(B) Estimated Total Cost of Project	$	75,000.00

Public Benefit Ranking	**40.00**

Restoration/Enhancement Value	**Total Score x Public Benefit**	***23***

Appendix B

Figures

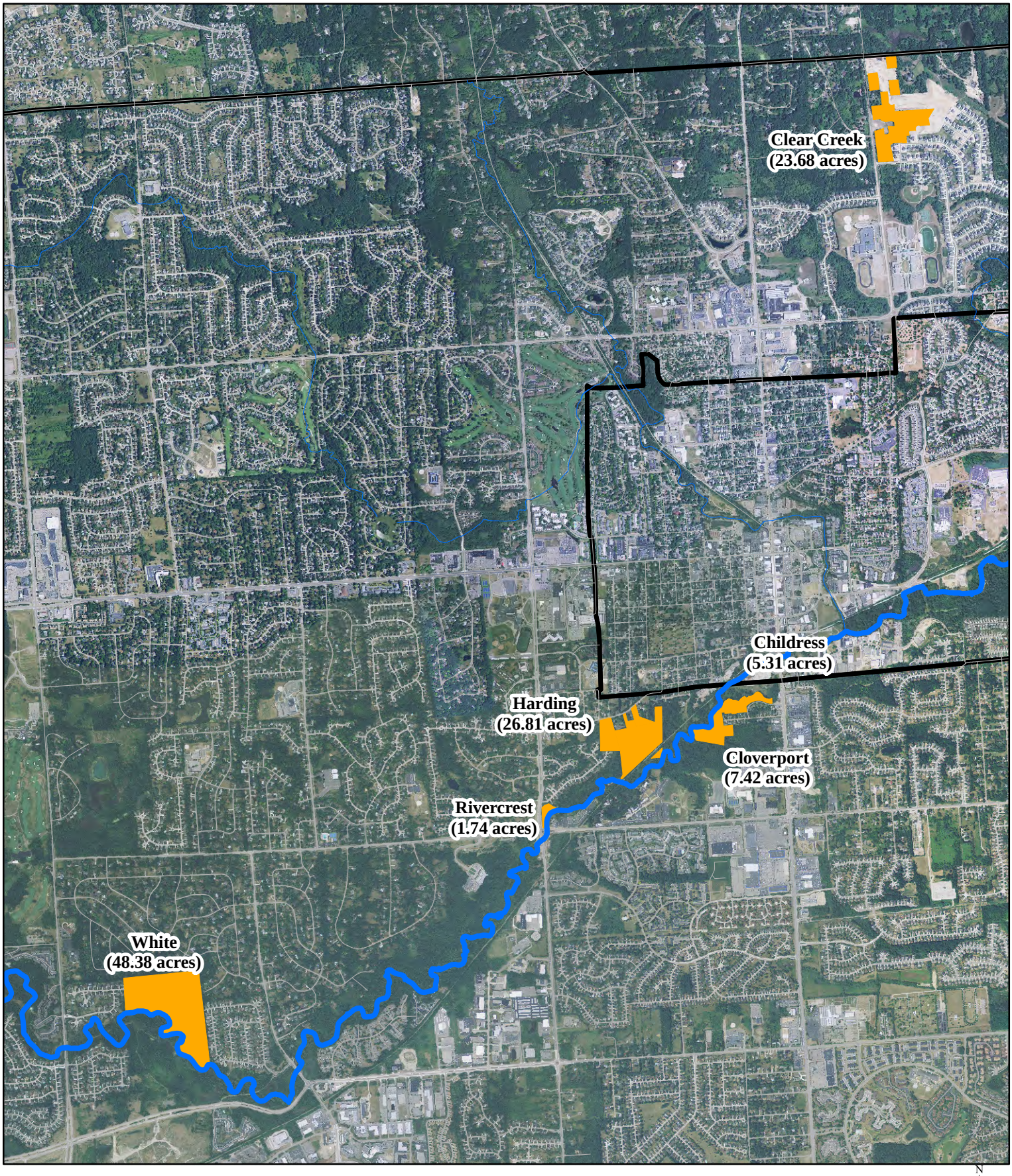


Figure 1. Greenspace Properties Location Map

NE 1386 Rochester Hills Stewardship Project
Client: City of Rochester Hills
Rochester Hills, Oakland, Co., MI
Source: MiGDL and Rochester Hills GIS
Habitat Assessments: May - July 2015
Map Created: September 21, 2015

NISWANDER ENVIRONMENTAL
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810.225.0539 *office* | 810.225.0653 *fax*

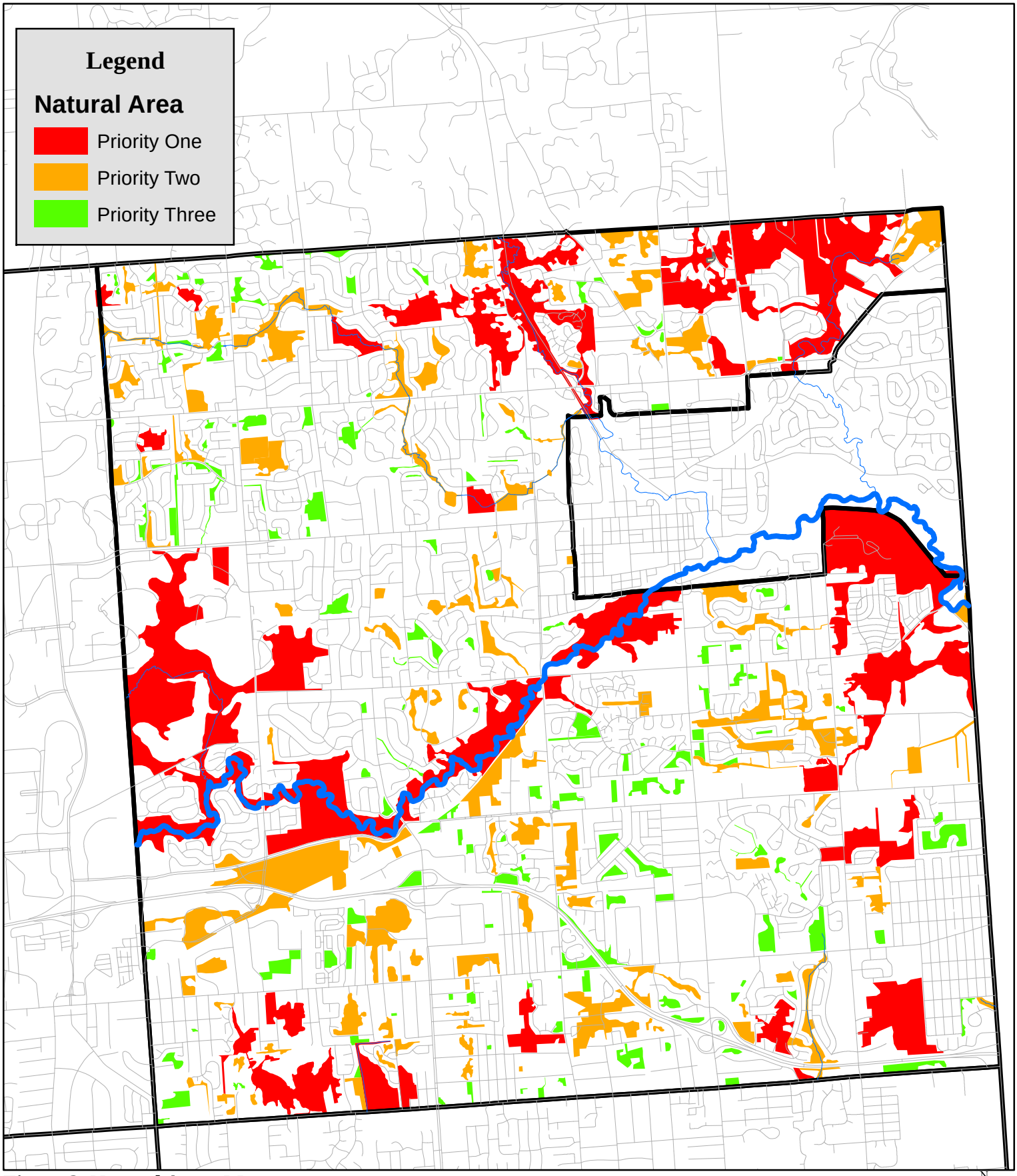

Figure 2. Natural Areas Map

NE 1386 Rochester Hills Stewardship Project
Client: City of Rochester Hills
City of Rochester Hills, Oakland, Co., MI
Source: MiGDL and Rochester Hills GIS
Natural Features Inventory: 2004
Map Created: September 21, 2015

1 0 1 Miles

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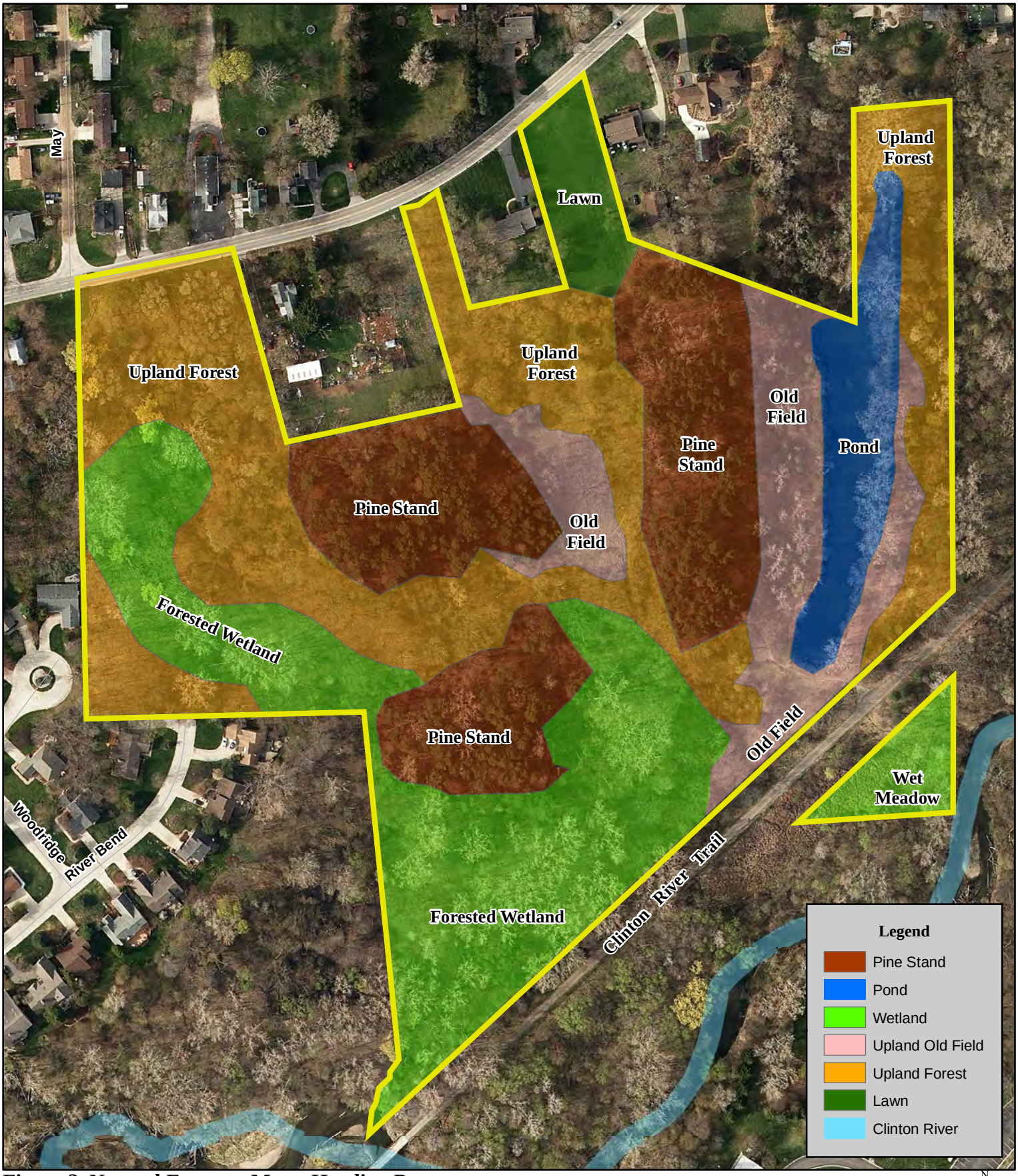

Figure 3. Natural Features Map - Harding Property

NE 1386 Rochester Hills Stewardship Project
26.81-acre Harding Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 26, 2015
Map Created: September 21, 2015

200 0 200
Feet

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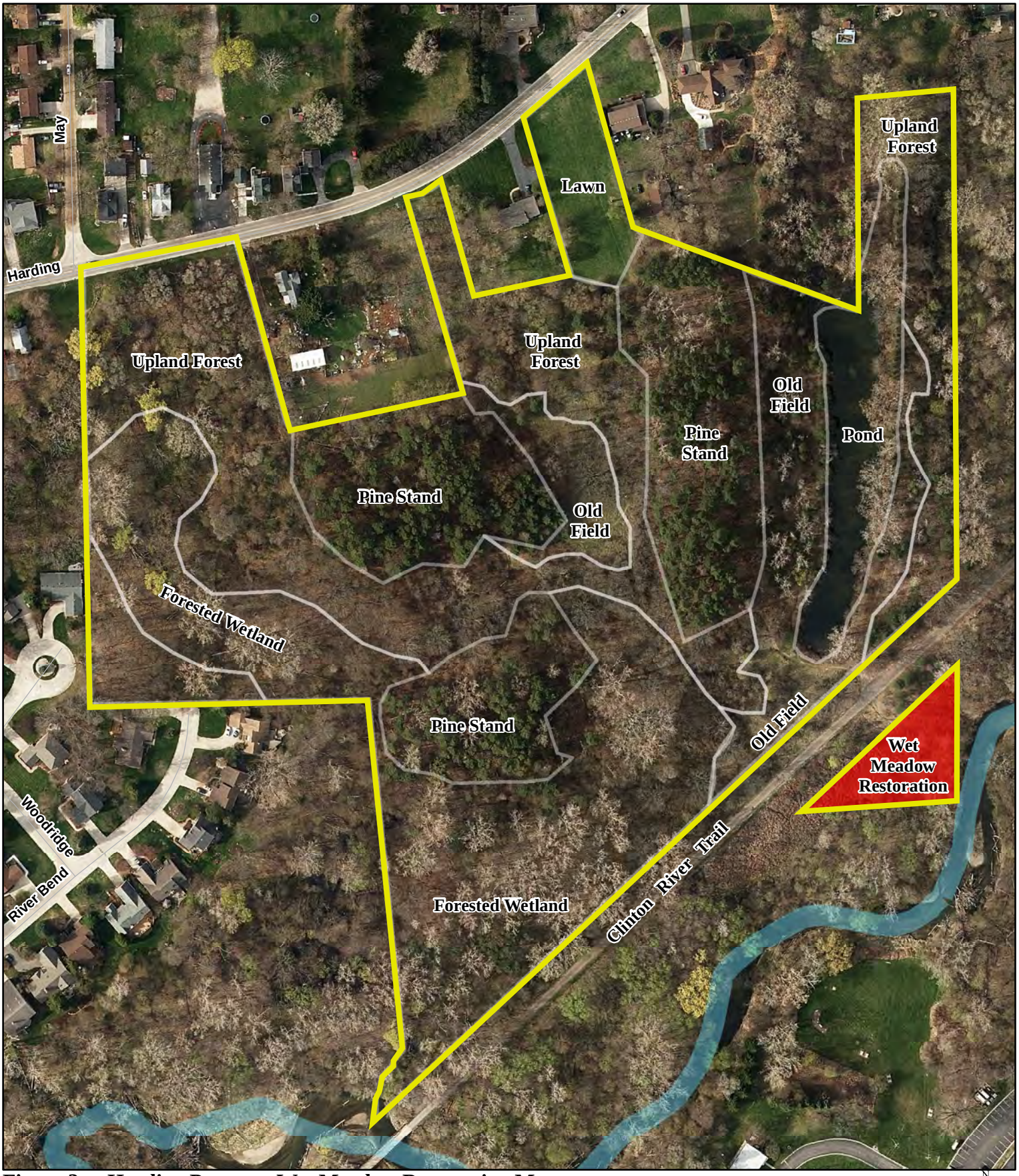

Figure 3a - Harding Property Wet Meadow Restoration Map

NE 1386 Rochester Hills Stewardship Project
26.81-acre Harding Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 26, 2015
Map Created: September 21, 2015

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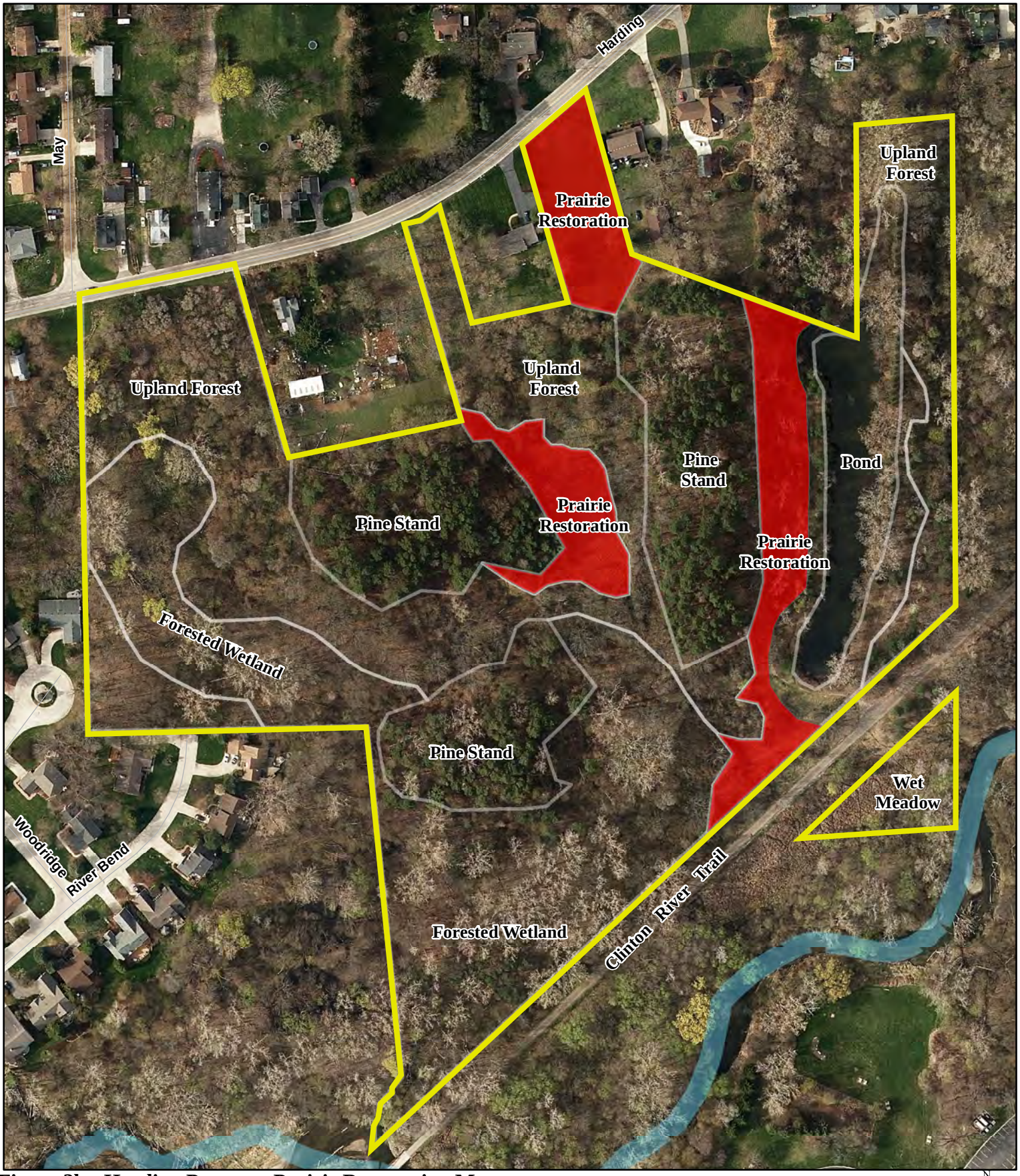

Figure 3b - Harding Property Prairie Restoration Map

NE 1386 Rochester Hills Stewardship Project
26.81-acre Harding Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 26, 2015
Map Created: September 21, 2015

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Figure 3c - Harding Property Pond Area Enhancement Map

NE 1386 Rochester Hills Stewardship Project
26.81-acre Harding Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 26, 2015
Map Created: September 21, 2015

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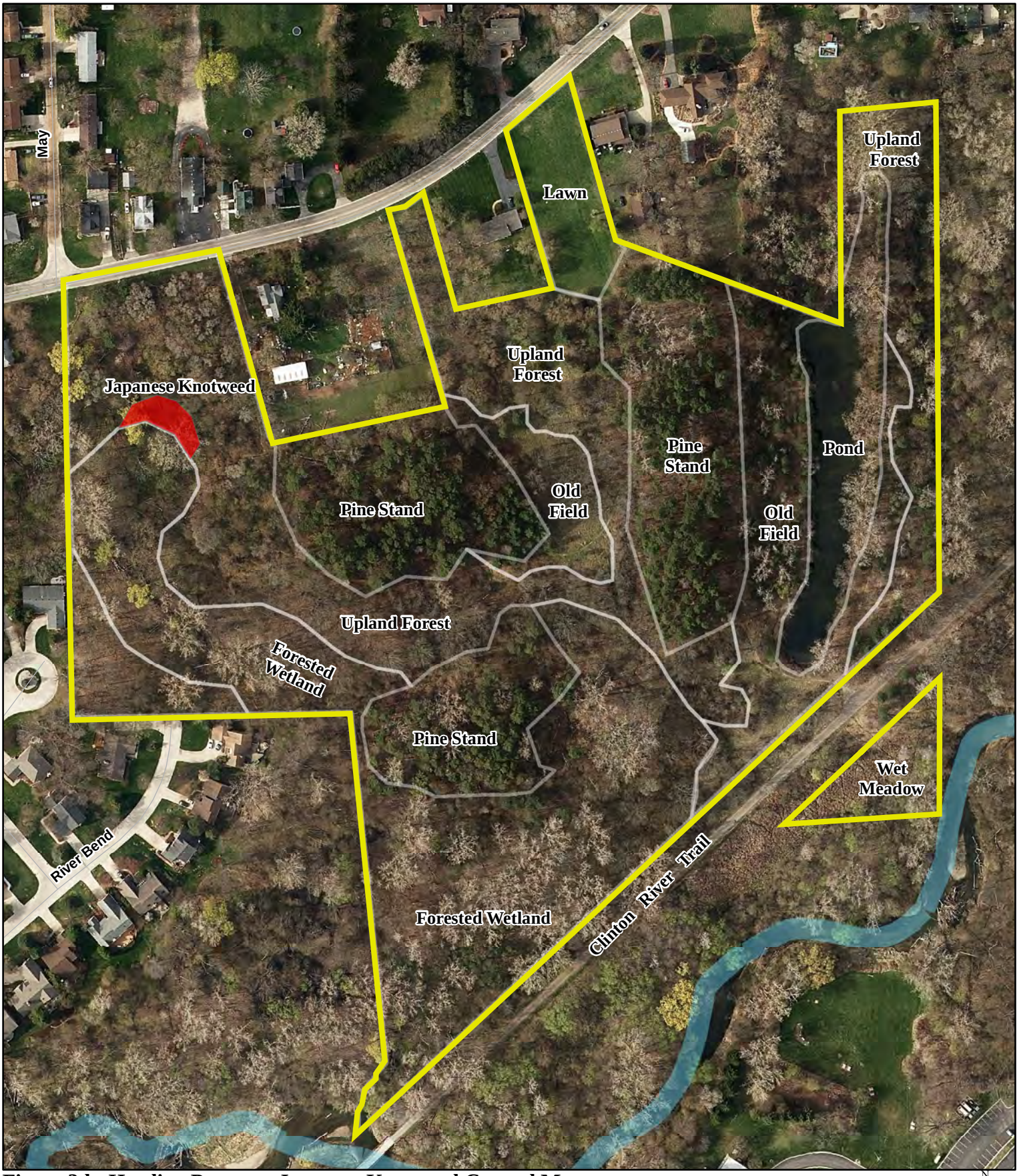

Figure 3d - Harding Property Japanese Knotweed Control Map

NE 1386 Rochester Hills Stewardship Project
26.81-acre Harding Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 26, 2015
Map Created: September 21, 2015

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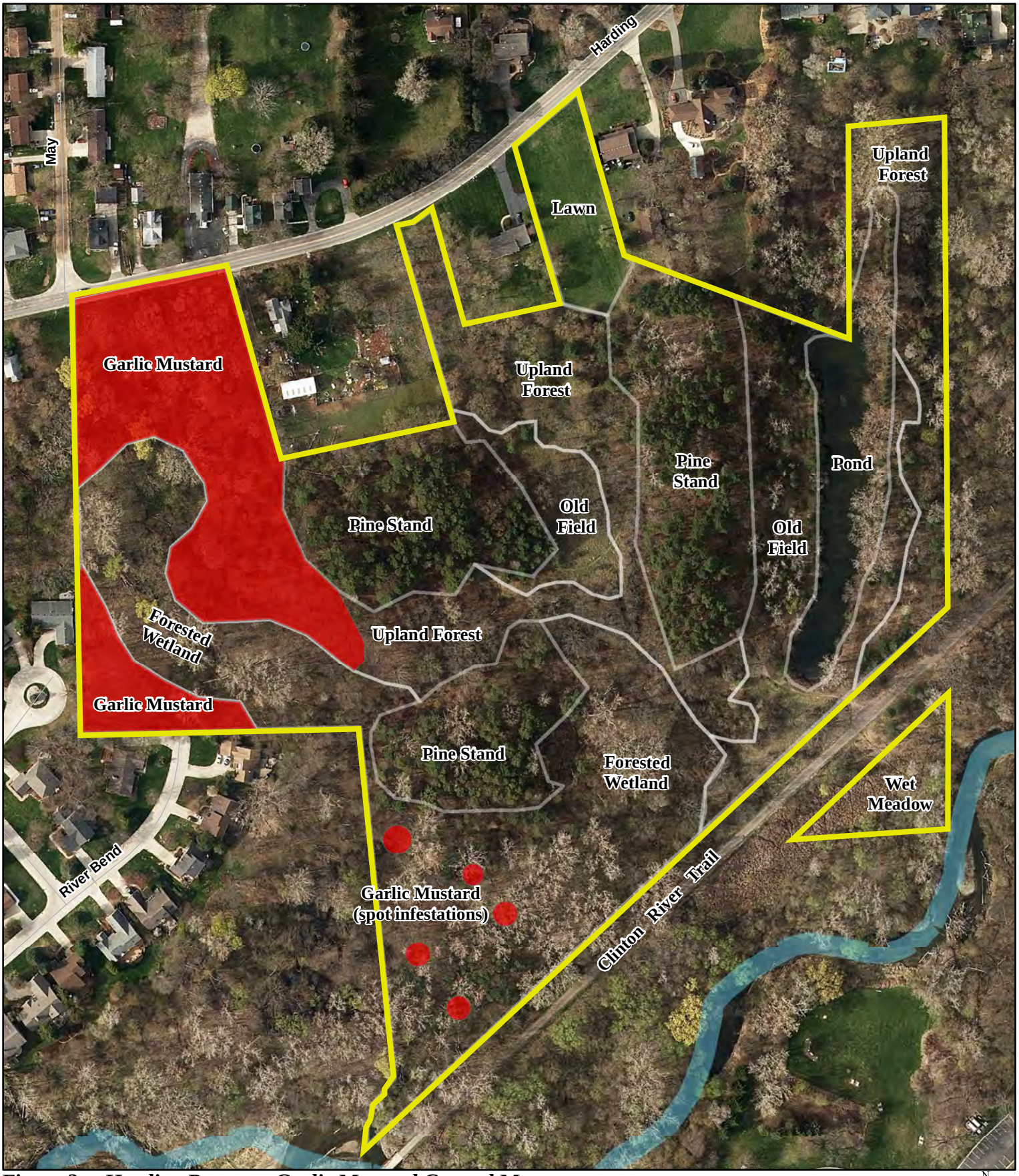

Figure 3e - Harding Property Garlic Mustard Control Map

NE 1386 Rochester Hills Stewardship Project
26.81-acre Harding Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 26, 2015
Map Created: September 21, 2015

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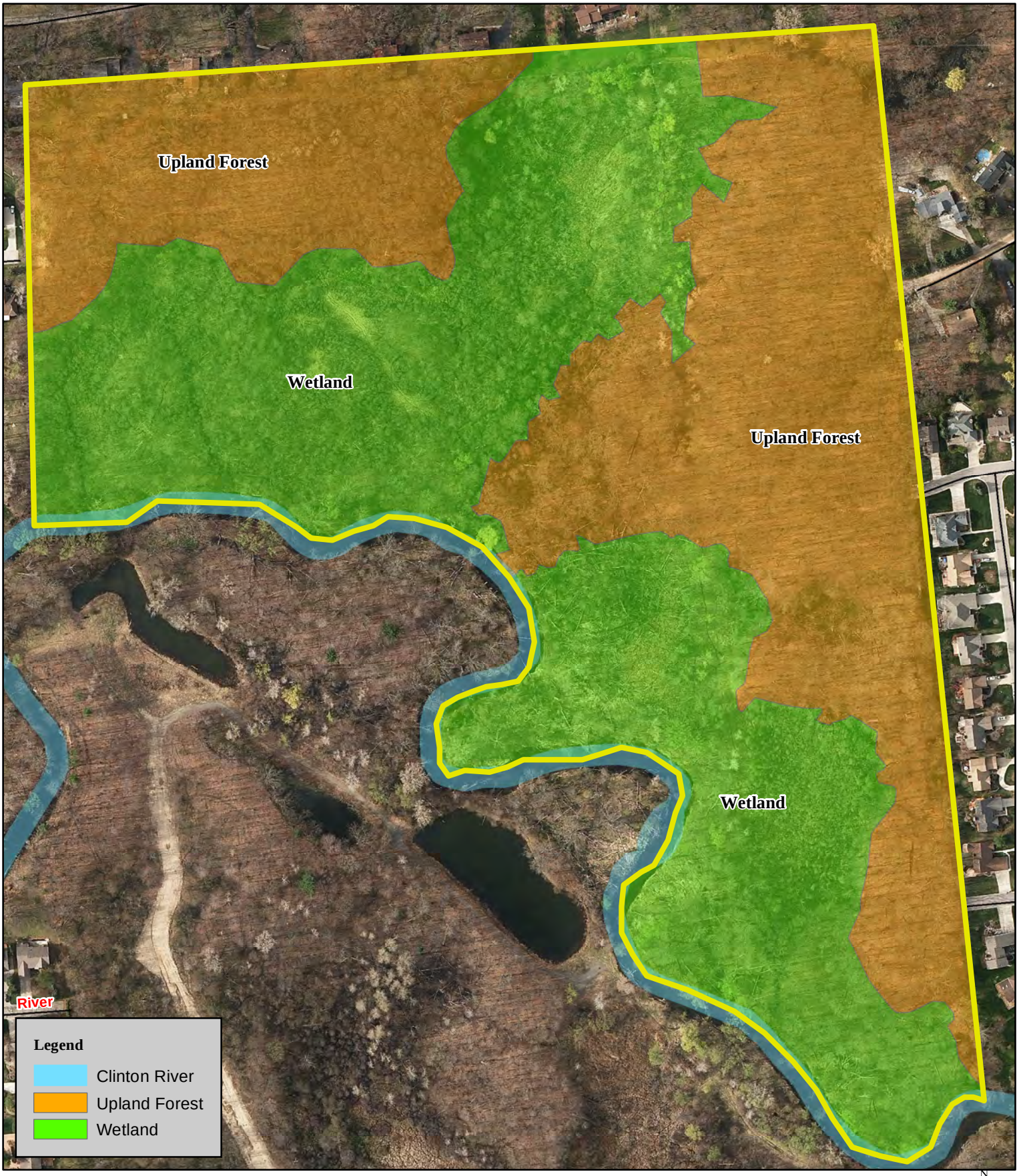

Figure 4. Natural Features Map - White Property

NE 1386 Rochester Hills Stewardship Project
48.38-acre White Property
Section 20 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 22, 2015
Map Created: September 23, 2015

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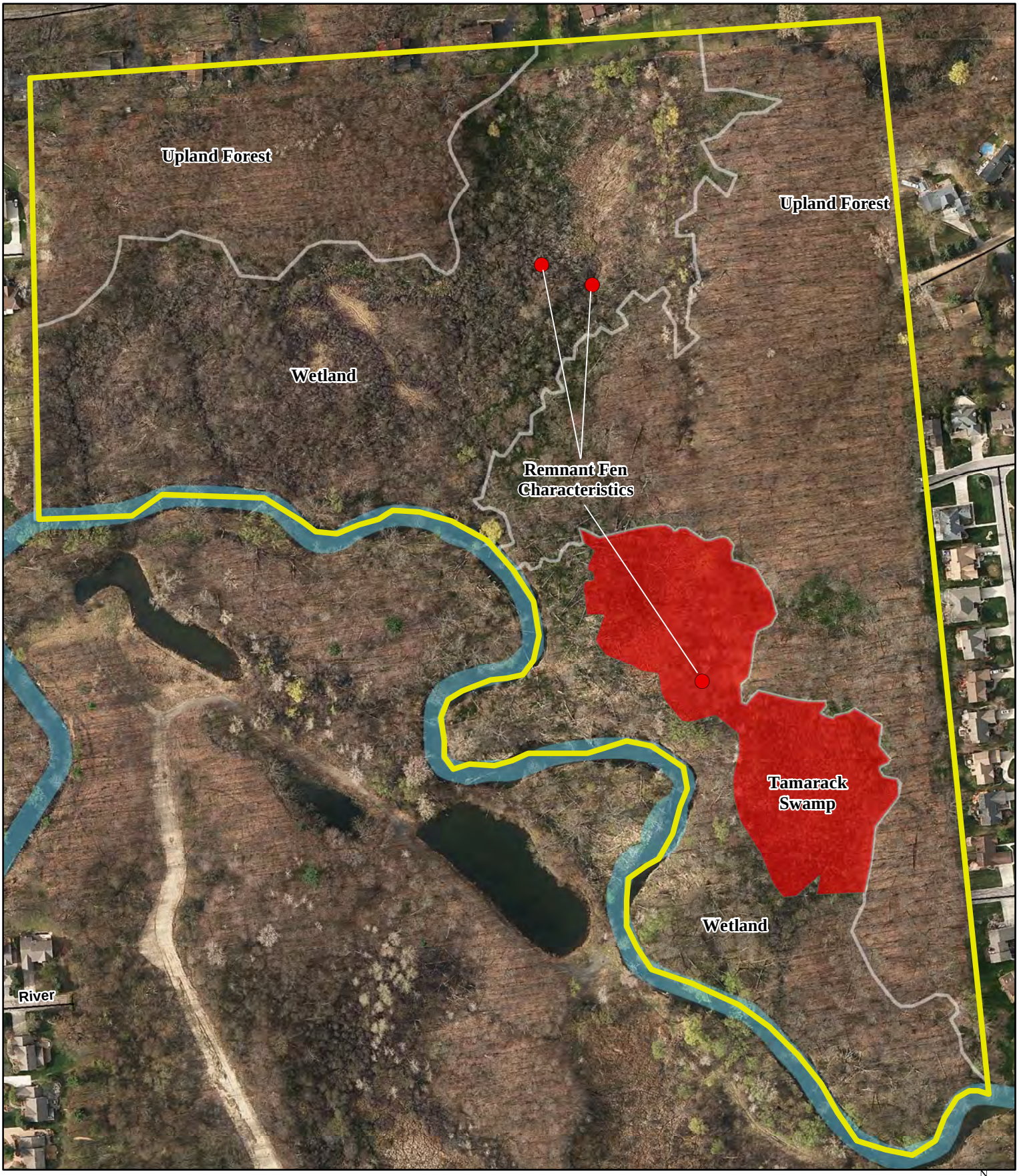

Figure 4a - White Property Remnant Fen and Tamarack Swamp Enhancement Map

NE 1386 Rochester Hills Stewardship Project
48.38-acre White Property
Section 20 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 22, 2015
Map Created: September 23, 2015

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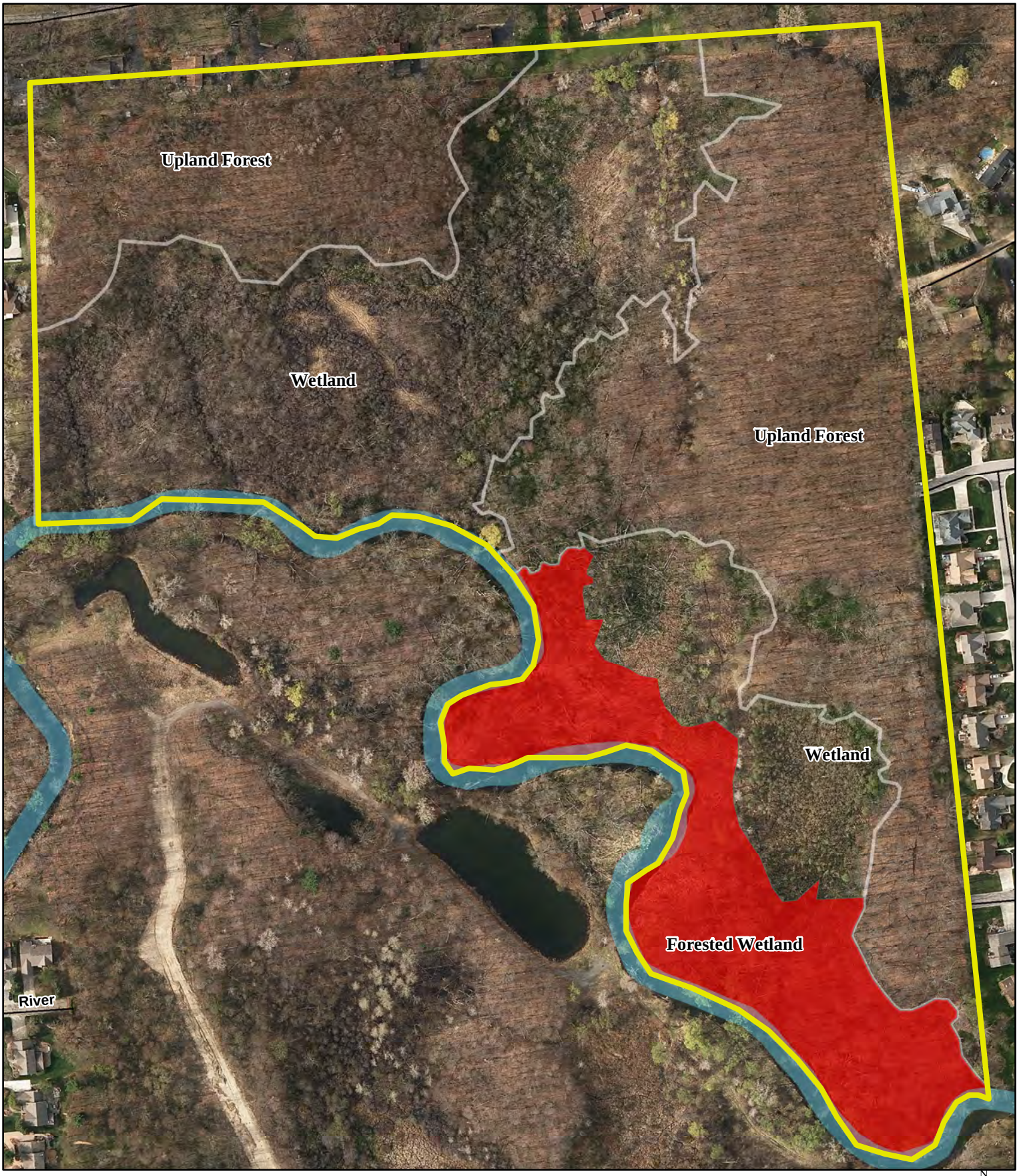

Figure 4b - White Property Forested Wetland Enhancement Map

NE 1386 Rochester Hills Stewardship Project
48.38-acre White Property
Section 20 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 22, 2015
Map Created: September 23, 2015

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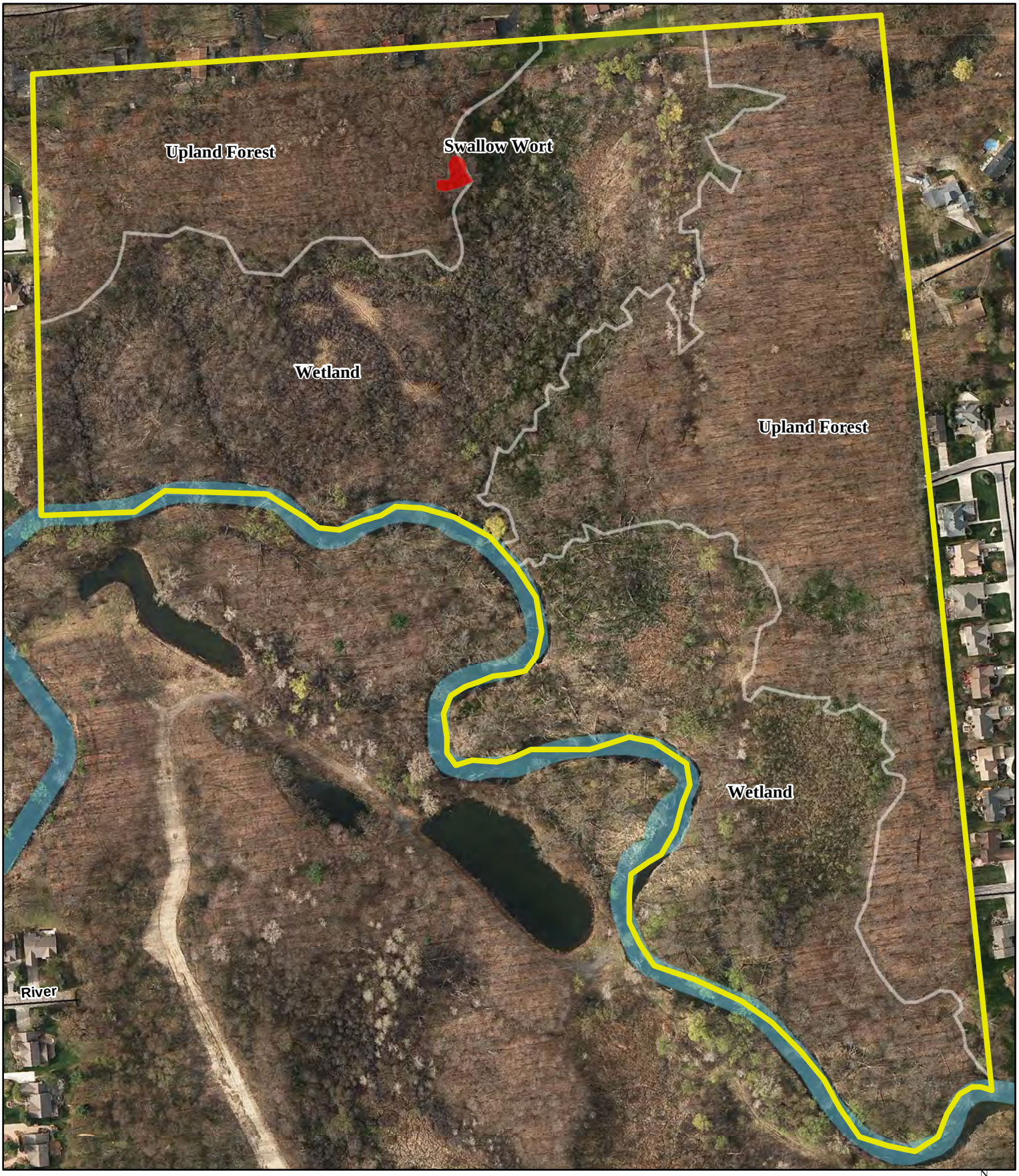

Figure 4c - White Property Swallow Wort Control Map

NE 1386 Rochester Hills Stewardship Project
48.38-acre White Property
Section 20 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 22, 2015
Map Created: September 23, 2015

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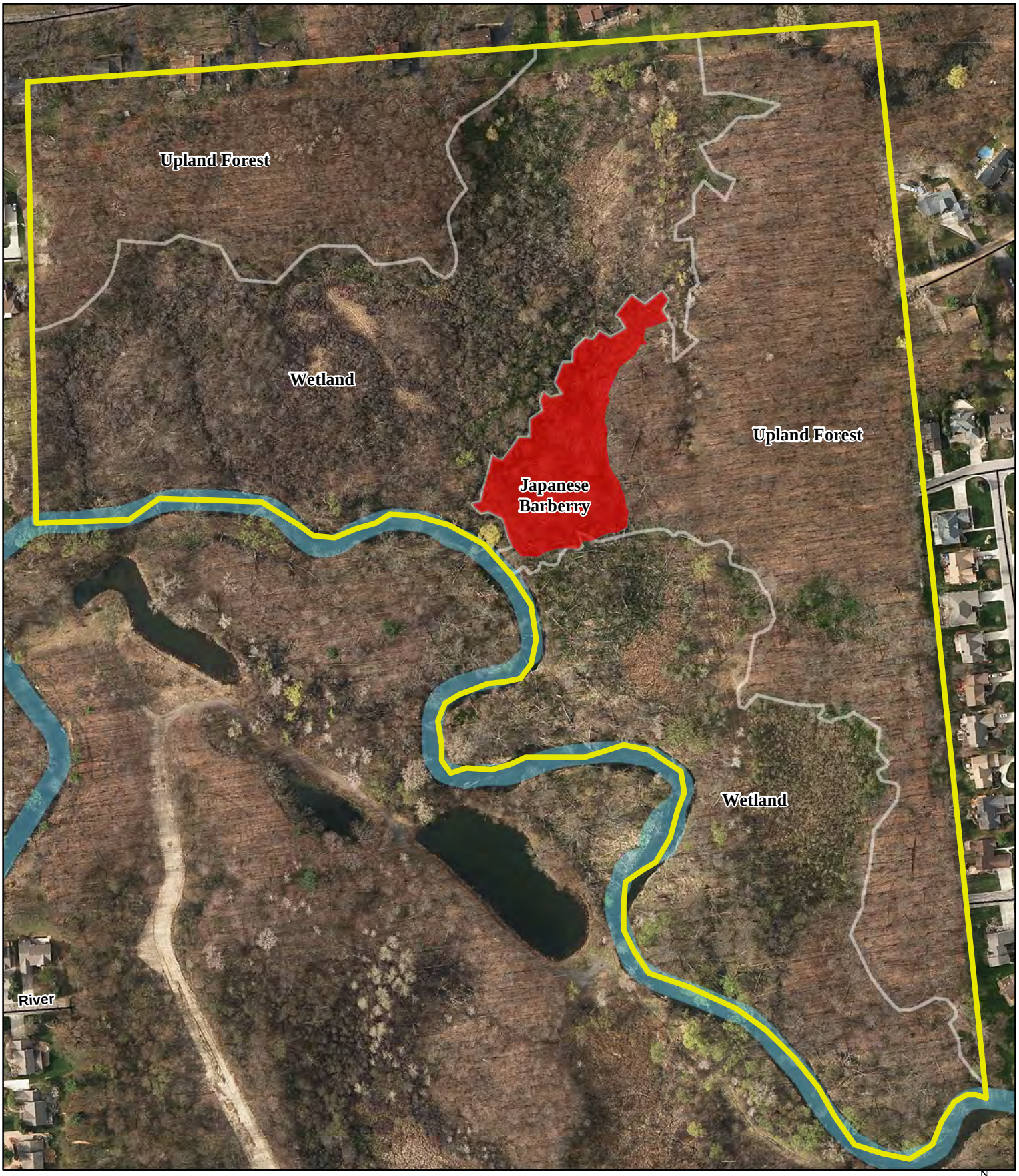

Figure 4d - White Property Barberry Control Map

NE 1386 Rochester Hills Stewardship Project
48.38-acre White Property
Section 20 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 22, 2015
Map Created: September 23, 2015

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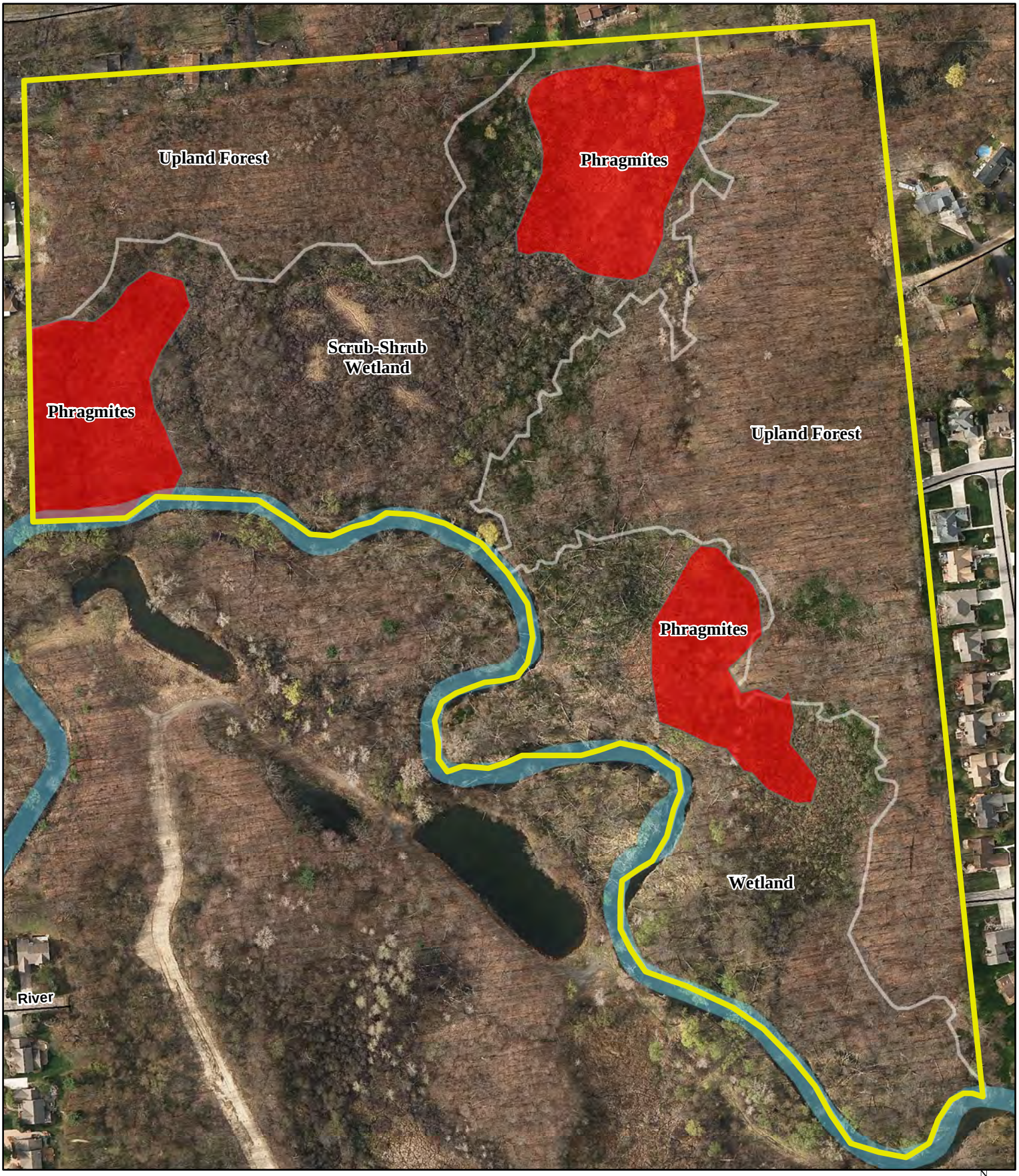

Figure 4e - White Property Scrub-Shrub Wetland Enhancement Map

NE 1386 Rochester Hills Stewardship Project
48.38-acre White Property
Section 20 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 22, 2015
Map Created: September 23, 2015

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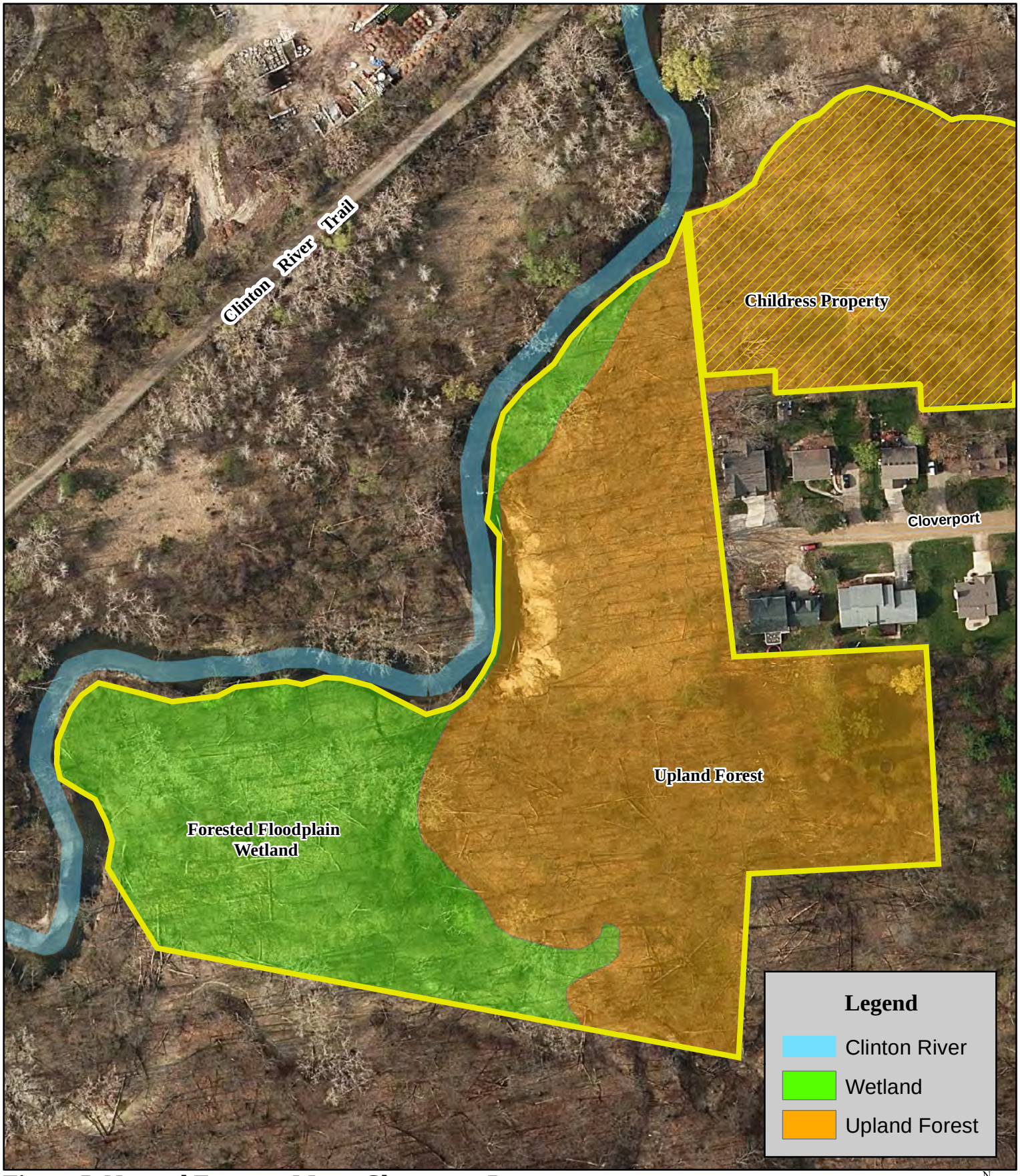

Figure 5. Natural Features Map - Cloverport Property

NE 1386 Rochester Hills Stewardship Project
7.42-acre Cloverport Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

100 0 100 Feet

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Figure 5a - Cloverport Property Sediment Control Map

NE 1386 Rochester Hills Stewardship Project
7.42-acre Cloverport Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

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Figure 5b - Cloverport Property Bank Restoration Map

NE 1386 Rochester Hills Stewardship Project
7.42-acre Cloverport Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

100 0 100
Feet

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Figure 5c - Cloverport Property Phragmites Control Map

NE 1386 Rochester Hills Stewardship Project
7.42-acre Cloverport Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

100 0 100
Feet

N W E S

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Figure 5d - Cloverport Property Garlic Mustard Control Map

NE 1386 Rochester Hills Stewardship Project
7.42-acre Cloverport Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

100 0 100 Feet

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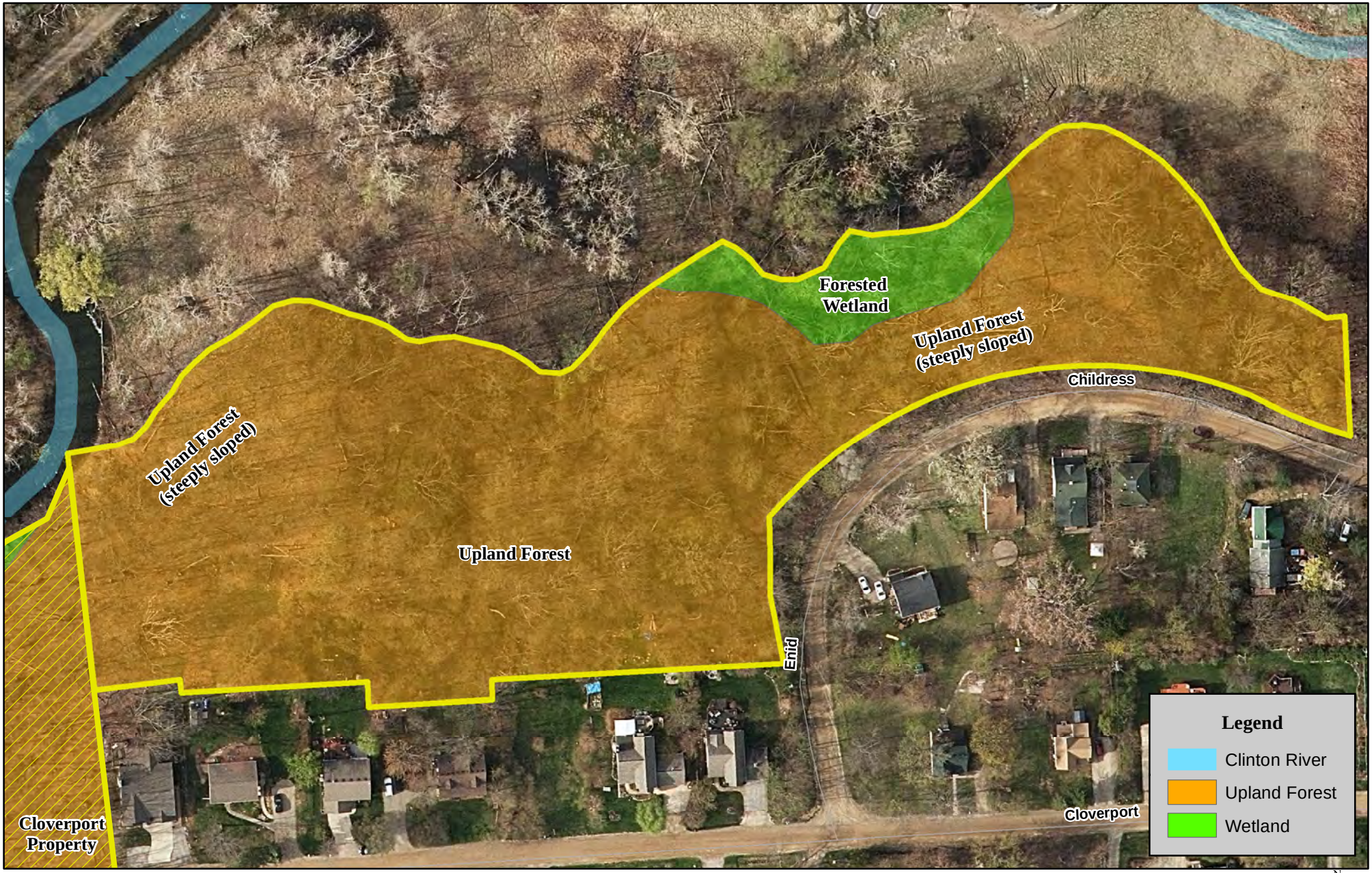

Figure 6. Natural Features Map - Childress Property

NE 1386 City of Rochester Hills Stewardship Project
5.31-acre Childress Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 21, 2015

100 0 100 Feet

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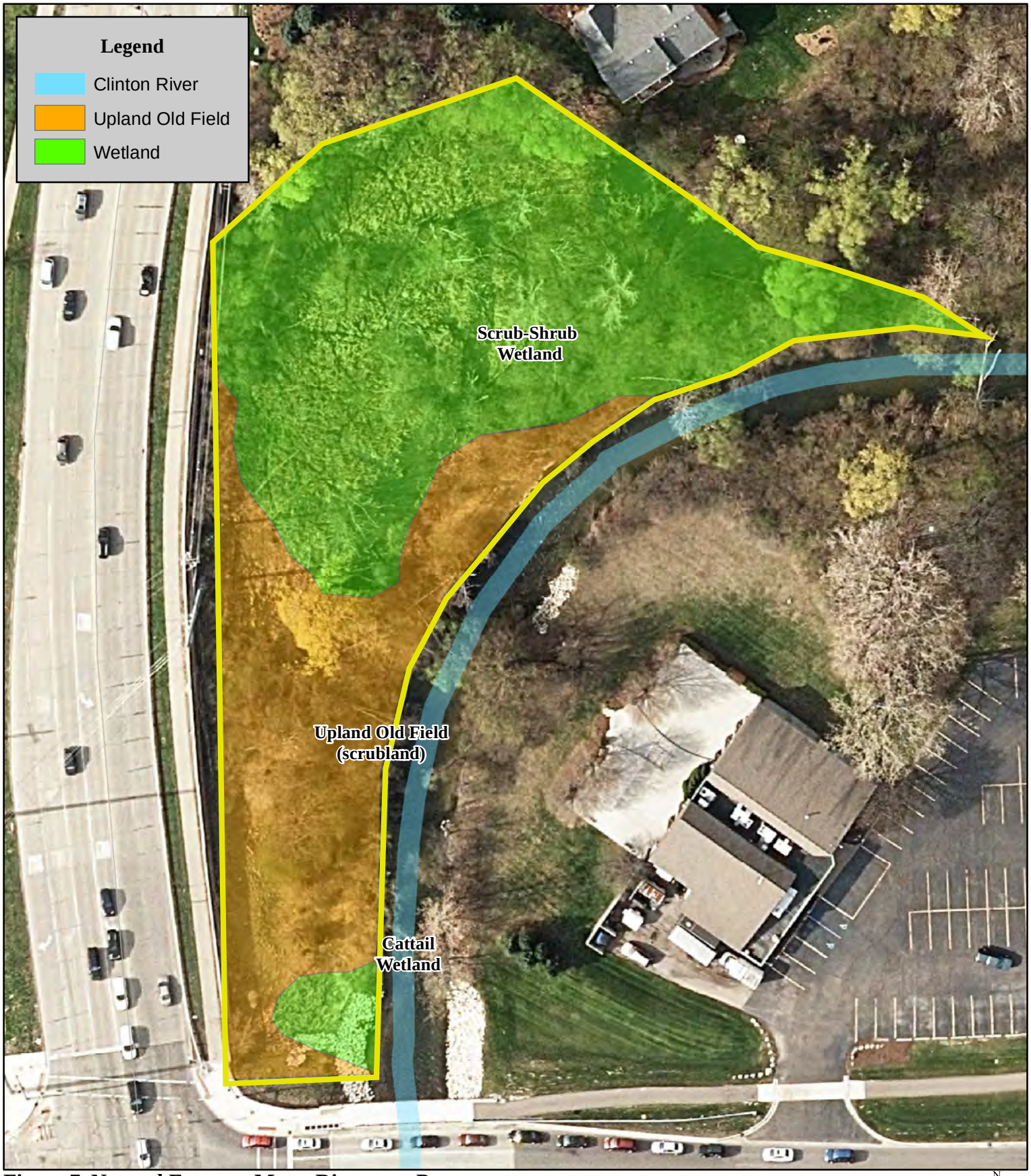

Figure 7. Natural Features Map - Rivercrest Property

NE 1386 City of Rochester Hills Stewardship Project
1.74-acre Rivercrest Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

50 0 50 Feet

N W E S

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Figure 7a - Rivercrest Property Shoreline Restoration Map

NE 1386 City of Rochester Hills Stewardship Project
1.74-acre Rivercrest Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

40 0 40
Feet

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Figure 7b - Rivercrest Property Woody Species Control Map

NE 1386 City of Rochester Hills Stewardship Project
1.74-acre Rivercrest Property
Section 15 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 12, 2015
Map Created: September 22, 2015

50 0 50
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Figure 8. Natural Features Map - Clear Creek Parcels

NE 1386 City of Rochester Hills Stewardship Project
23.68 Acre Clear Creek Parcels
Section 2 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 7, 2015
Map Created: September 24, 2015

250 0 250 Feet

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Figure 8a - Scrub-Shrub Wetland and Sedge Meadow Enhancement Map

NE 1386 City of Rochester Hills Stewardship Project
23.68 Acre Clear Creek Parcels
Section 2 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 7, 2015
Map Created: September 24, 2015

200 0 200
Feet

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Figure 8b - Clear Creek Parcels Phragmites Control Map

NE 1386 City of Rochester Hills Stewardship Project
23.68 Acre Clear Creek Parcels
Section 2 of Rochester Hills, Oakland, Co., MI
Source: Rochester Hills GIS Dept
Habitat Asessment: May 7, 2015
Map Created: September 24, 2015

250 0 250 Feet

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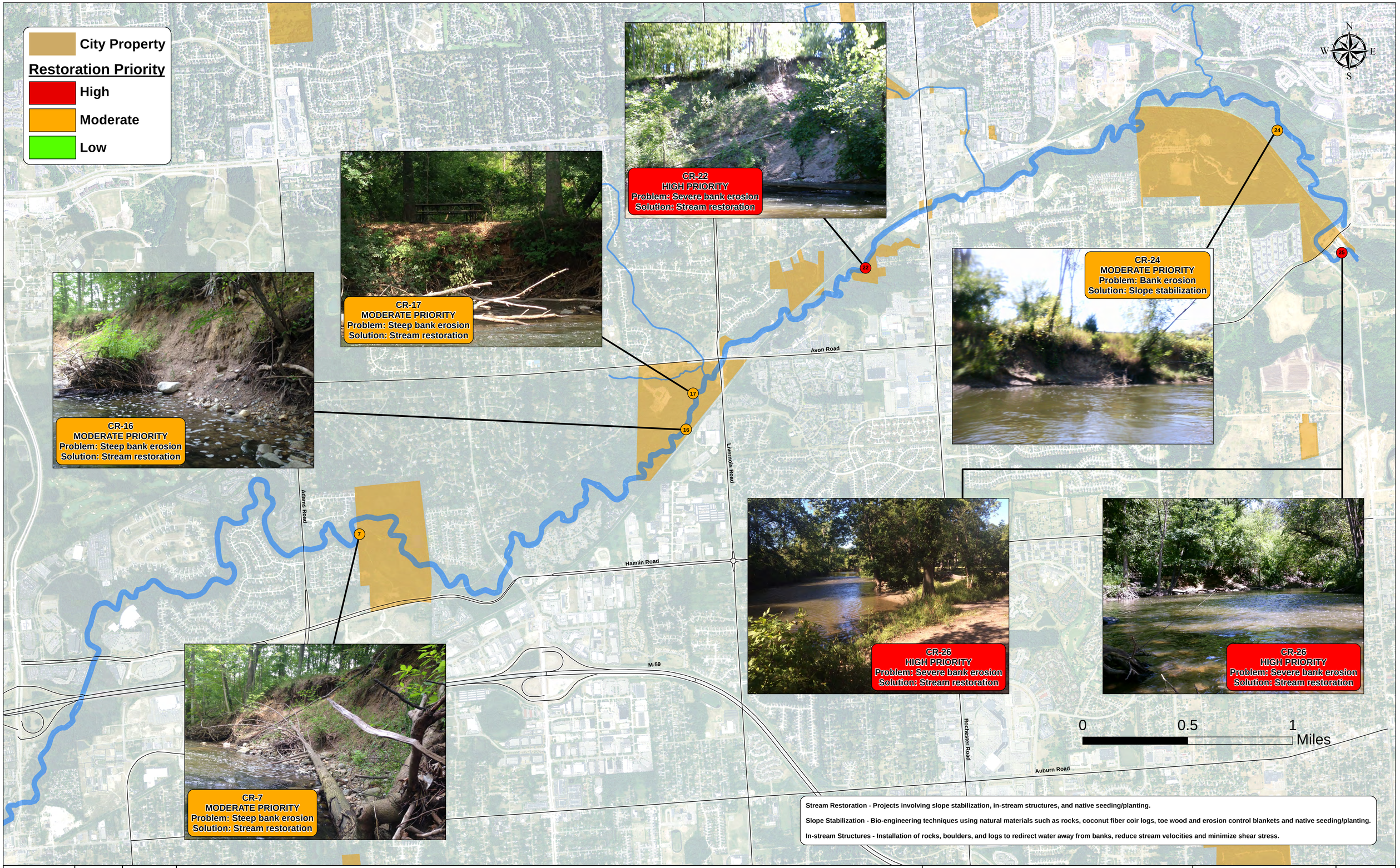
Stream Restoration - Projects involving slope stabilization, in-stream structures, and native seeding/planting.

Slope Stabilization - Bio-engineering techniques using natural materials such as rocks, coconut fiber coir logs, toe wood and erosion control blankets and native seeding/planting.

In-stream Structures - Installation of rocks, boulders, and logs to redirect water away from banks, reduce stream velocities and minimize shear stress.

Job No: NE 1386	Drawn: TJS 8-25-15	Revisions: TJS 9-22-15	**Clinton River Assessment** Natural Features Stewardship Program City of Rochester Hills, Oakland County, Michigan	Client: City of Rochester Hills Consultant: Niswander Environmental	NISWANDER ENVIRONMENTAL 9936 MALTBY ROAD, BRIGHTON, MI 48116 PHONE: 810.225.0559 FAX: 810.225.0653	1 OF 2



Stream Restoration - Projects involving slope stabilization, in-stream structures, and native seeding/planting.

Slope Stabilization - Bio-engineering techniques using natural materials such as rocks, coconut fiber coir logs, toe wood and erosion control blankets and native seeding/planting.

In-stream Structures - Installation of rocks, boulders, and logs to redirect water away from banks, reduce stream velocities and minimize shear stress.

Job No: NE 1386	Drawn: TJS 8-25-15	Revisions: TJS 9-22-15	**Clinton River Assessment** Sites on City Property Natural Features Stewardship Program City of Rochester Hills, Oakland County, Michigan	Client: City of Rochester Hills Consultant: Niswander Environmental	NISWANDER ENVIRONMENTAL 9936 MALTBY ROAD, BRIGHTON, MI 48116 PHONE: 810.225.0539 FAX: 810.225.0653	2 OF 2