Mississippi River Greenway

Natural Resources Management Plan

Prepared for
Dakota County Parks, Minnesota

Prepared by
Friends of the Mississippi River
St. Paul, Minnesota
May 2025

This Natural Resources Management Plan has been reviewed and approved by:

[APPROVAL AUTHORITY]

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This document can be changed only by written agreement by both Dakota County Parks and Friends of the Mississippi River.

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EXECUTIVE SUMMARY

This Natural Resources Management Plan presents the site analysis and recommended land management activities for the Mississippi River Greenway (MRG) in Dakota County, Minnesota. This document was drafted by Friends of the Mississippi River (FMR) in 2024-2025 and is based on documentation of site characteristics, including natural resource and community access priorities, issues, and corrective actions. These actions reflect community values regarding the MRG's unique features. Protection of the MRG as a natural area spurs restoration and improvement of access for the health and well-being of the community. This Natural Resources Management Plan provides a framework for those goals, including recommended ecological restoration and public use enhancement activities, timing and costs for those activities, long-term management objectives, and funding opportunities.

Lands adjacent to the MRG face threats and pressures related to habitat loss and fragmentation, invasive species, development pressure, uses that are incompatible with habitat protection, and climate change. These threats are meaningful even if they only affect certain aspects of the site, as the greenway and its connected natural area nodes can be considered a contiguous habitat. As a result, taking no action will ultimately result in the degradation of the system.

PURPOSE OF THE NATURAL RESOURCE MANAGEMENT PLAN

The purpose of this Natural Resource Management Plan (NRMP) is to describe the existing natural resource conditions of the land within the Mississippi River Greenway and the natural resource goals for the land in consideration of all external influences such as ownership, other uses of the properties, and adjacent land uses. The NRMP includes information on the Greenway's location; historic, existing, and adjacent land use; bedrock and surficial geology; soils; topography; hydrology, including groundwater and surface water; historic and existing vegetation cover, presence of noxious and invasive plants; land cover; past and present ecological impacts from fire, disease, wildlife, and climate change; plant community assessment; wildlife, and target vegetation communities, including management priorities, methods, a five-year workplan, and a long-term workplan. The NRMP also includes plant community restoration recommendations, a restoration process, schedule, and cost estimates.

Natural Resource Management Agreements (Management Agreements) are developed in conjunction with the NRMP, and each include: a workplan for implementing jointly agreed-upon natural resource activities and priorities, the respective roles and responsibilities of the landowners (Dakota County, cities, school districts, private entities), project schedules, cost estimates and funding/in-kind sources.

The status of any approved activity under any Management Agreement will be monitored and assessed as part of routine ecological monitoring of the restored or enhanced areas by County staff, as allowed by the Management Agreement. The NRMP will be reviewed and updated every five years, or as needed to maintain its relevancy.

VISION

Dakota County approaches conserving Natural Resources within the County with the following Vision Statement in mind: "The water, vegetation, and wildlife of Dakota County Parks and Greenways will be managed to conserve biodiversity, restore native habitats, improve public benefits, and achieve resilience and regionally outstanding quality, now and for future generations (Natural Resources Management System Plan, 2017)." Towards this end, the County has an interest in improving the ecological value of the public lands outside but adjacent to the County's landholdings and easements. Dakota County also sees opportunities to partner with other interested organizations to build larger corridors of conservation land.

APPROACH

The overarching goal is to restore and maintain a diverse native plant community within a site, though this will not always follow a linear progression. Adaptive management, which integrates thought and action into the restoration process, will be the key to continual progress. It can be described as a process that uses evaluation, reflection, and communication to incorporate learning and responsiveness into planning and management.

PLANNING PROCESS

Recommended projects represent priorities put forth by the cities' parks departments and Dakota County Parks staff within their respective jurisdictions. A stakeholder meeting was held with the project team, Dakota County staff, city parks department staff, National Park Service staff, and Mississippi Park Connection staff in October 2024. The product of this meeting was a summary of issues, concerns, and interests related to the management of natural resources within the corridor and how this management would best be implemented in consideration of existing parks master plans, terms of existing easements over privately held property within the corridor, potential for future acquisition in fee or easement, land use history, and knowledge of changing land use patterns. This information, in addition to the Connecting People to the Mississippi River Plan, [link] guided project staff to develop background data and informed their collaboration with additional partners. Individual projects included in the NRMP were guided and vetted by the cities' parks departments. Dakota County completed a final review of each recommendation. The final plan was adopted by the Dakota County Board of Commissioners on _____,2025.

INTRODUCTION

Most of Dakota County's 440,000 residents live in the highly urbanized northern one-third of the County, a rolling landscape bordered by major rivers to the north and east, and dotted with lakes, forests, wetlands, and other natural areas. The southern two-thirds of the County are generally level and open where agriculture is the predominant land use. This portion of the County is dissected by many streams and tributaries and includes the largest tracts of natural areas.

As a result of the county's rich soils, proximity, and easy transportation access to St. Paul and Minneapolis, the combination of agricultural use and development has resulted in the loss of most historic wetlands, prairies, savannas, and upland forests. Many of the remaining natural areas are degraded and fragmented, which make it increasingly difficult for these areas to function as healthy ecosystems. Moreover, many of the remaining natural areas are the most attractive for future residential development. Despite being relatively small and few, some of these natural areas include important plant and animal communities and are prime candidates for conservation. Residential surveys consistently indicate that most community members think it is important that the county has an active role in protecting these areas.

To address the community's concerns over the loss of open space and natural areas throughout the county and to determine how to protect these areas using incentive-based tools, the County Board adopted the "Dakota County Farmland and Natural Area Protection Plan" in 2002. This protection plan identified 36,000 acres of high-quality natural areas as a priority for protection, which overlapped with the nearly 60,000 acres of land eligible for farmland protection. The protection plan identified the following public purposes for protecting natural areas:

- Increase property values and enhance neighborhood appeal
- Provide close-to-home opportunities for people to enjoy and interact with nature
- Provide critical habitat for plants and animals and preserve critical ecological connections between habitat areas
- Provide environmental services, including filtering pollutants from soil and water, reducing soil erosion, and absorbing air pollutants and carbon dioxide
- Provide natural flood control for area streams and rivers by retaining wetlands and vegetated corridors to absorb flood waters.

Community input was used to identify the desired characteristics of natural areas:

- Lands of biological significance
- Lands adjacent to lakes, rivers, and streams to improve water quality
- Lands that provide wildlife habitat

- Lands that provide some level of public access

The Plan found that there were high-quality natural areas worth protecting and identified three primary strategies to protect these areas:

Strategy 1: Protect priority natural areas in eligible areas and corridors using conservation easements and fee title acquisition from willing sellers and donors.
Strategy 2: Work with other agencies through their programs to protect county-priority natural areas.
Strategy 3: Work with owners of large land tracts and agencies to protect natural areas on their properties with conservation easements and Natural Resource Management Plans.

PRIORITY FEATURES AND GOALS

Priority Features are key components identified as requiring management to sustain ecological integrity and build resiliency in the face of Priority Issues. This NRMP will focus on five Priority Features and provide associated management recommendations. The five Priority Features within the MRG include remnant native plant communities, restored native plant communities, viewsheds, natural area recreation opportunities and habitat connectivity. The rationale for selecting these as Priority Features is provided below.

Natural resources management recommendations associated with each Priority Feature incorporate the resource assessment conducted by FMR ecologists, past land use and management activities, the goals and perspectives of land managers, and the community's values for the park. The recommendations stem from general ecological guidelines for these types of landscapes set by the Minnesota Department of Natural Resources (MNDNR) in consideration of native plant communities of Minnesota and address the Priority Issues.

PRIORITY FEATURE 1: REMNANT NATIVE PLANT COMMUNITIES

Along the MRG, pockets of remnant native plant communities are present within protected areas, such as the silver maple floodplain forest at Rock Island Swing Bridge Park, dry sand-gravel prairie at Pine Bend Bluff Scientific and Natural Area, and lands in private ownership, which include a red oak-sugar maple-basswood forest on the Flint Hills Resources property in Rosemount. These designated native plant communities represent the last vestiges of requisite plant species indicative of once vast and intact plant communities and usually exhibit characteristics that have become uncommon or rare to the surrounding area. Even in "restored" areas, it can take decades or centuries to develop the vegetative composition and structure that are found in remnants. Oftentimes they are degraded, but even so, they serve as sentinel sites or references for the restoration of similar habitats.
Priority Management Objectives include:

1) Protection of the remnant native plant communities from development

2) Reintroduction or maintenance of disturbance regimes that promote the persistence of the native plant communities
3) Reduction or elimination of invasive species that threaten the abundance and expansion of the native plant communities
4) Careful collection of seeds from remnant plant populations that do not negatively impact the existing population
5) Reintroduction of native species that may have been lost, by means of a targeted seeding and planting that increase the abundance and resilience of the native plant communities

The primary goals will be to reduce non-native plant cover, expand and increase native vegetation cover, diversity, and habitat structure, re-establish a disturbance regime, and increase habitat for rare features like Species of Greatest Conservation Need (SGCN).

PRIORITY FEATURE 2: RESTORED NATIVE PLANT COMMUNITIES

Dakota County and several municipalities through which the MRG passes have undertaken restoration within parks and other conservation areas. The management and enhancement of these restorations are prioritized to protect significant investments, sustain the sites' long-term habitat value, maintain responsiveness to changing climatic conditions, and utilize these sites as references for future restorations.

Priority Management Objectives include:

1) Protection of the restored plant communities from threats and disruption
2) Reintroduction or maintenance of disturbance regimes that promote the persistence of the restored plant communities
3) Reduction or elimination of invasive species that threaten the abundance and expansion of the restored plant communities
4) Targeted seeding and planting that increase the integrity, abundance and resilience of the native plant communities

The primary goals will be to reduce non-native plant cover, increase native vegetation cover, diversity, and habitat structure, re-establish a disturbance regime, and increase habitat for rare features like Species of Greatest Conservation Need (SGCN).

PRIORITY FEATURE 3: VIEWSHEDS

The Mississippi River is a local, regional and national destination, and the preservation of views of and around the river is key to maintaining visual access. Trail nodes in canopy gaps where miles of river channel can be viewed, high points where rolling prairies can be taken in, and points along the trail that allow people to interact with the river all create significant and lasting memories for trail users. Ongoing management of the trail corridor should prioritize the preservation and addition of viewsheds where practicable.

Priority Management Objectives include:

1) Targeted, responsible, and regular management of vegetation around viewsheds
2) Inspection and repair of damage near viewsheds understanding the potential usership of the areas

PRIORITY FEATURE 4: NATURAL AREA RECREATION OPPORTUNITIES

The MRG's existing signage is consistent in design and is placed at key locations of trail turns and junctions, near trailheads, and at most nodes referenced in this plan. As future trail improvements are made and trail gaps are filled, care should be taken to sustain this level of interpretation and to update online and print trail maps and information. Increasing the community's familiarity with the trail, how to access and use it, and the amenities that are available will increase users and stewardship.

Priority Management Objectives include:

1) Identification of necessary amenity additions and trail improvements
2) Frequent and regular updating of online and print trail maps and information
3) Readily available information about trail maintenance and closures.

PRIORITY FEATURE 5: HABITAT CONNECTIVITY

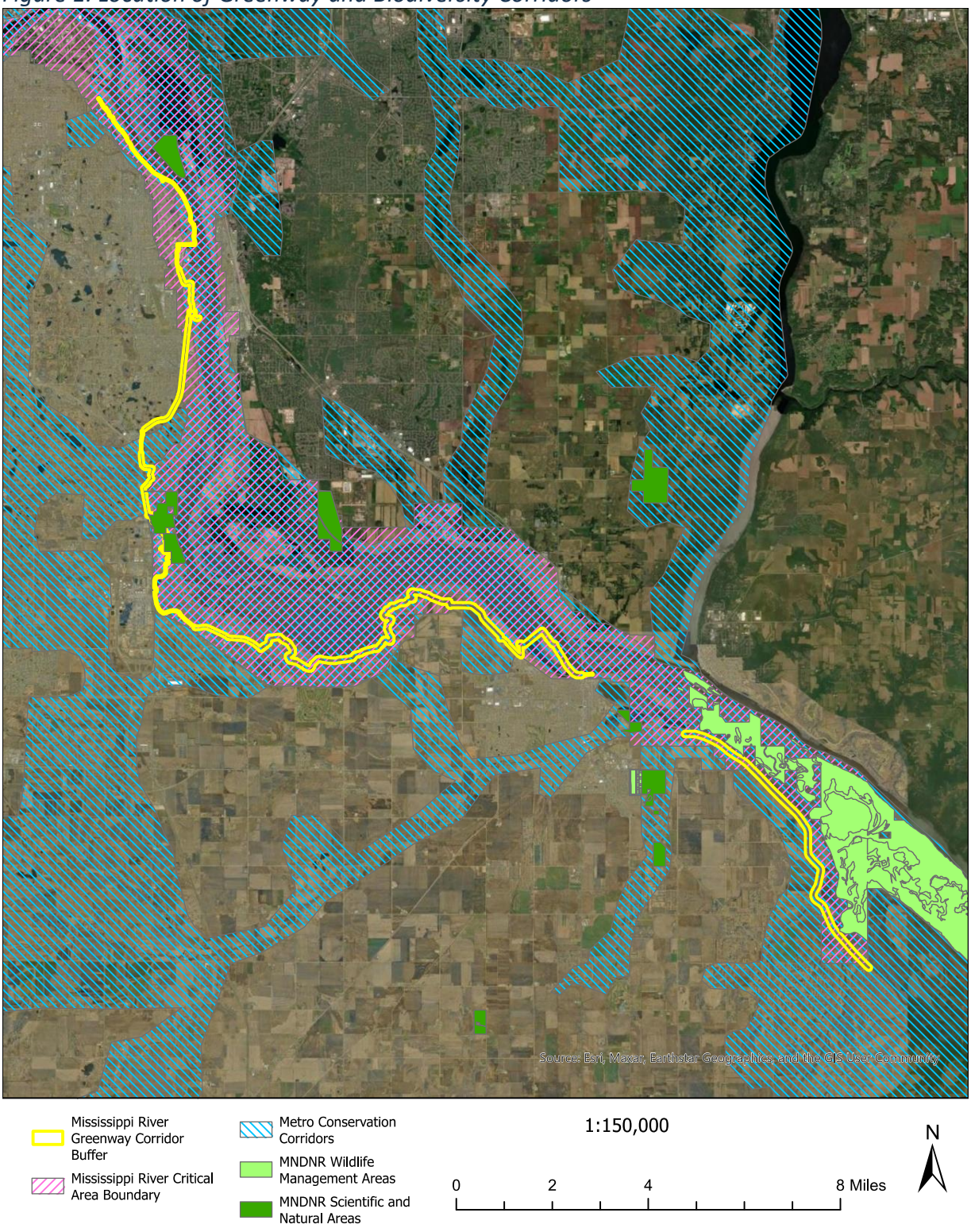
The MRG is within the Mississippi River Flyway, the most used bird migration corridor in North America, with over 325 species using the river's resources to travel with the seasons. Many other species are drawn to the river's bounty on an annual basis, and although the Mississippi is highly urbanized through the Twin Cities, large and small blocks of habitat remain. This habitat is not contiguous, but there are many links in the chain as shown in Figure 1, and some individual areas create very large natural areas, such as the 1,300-acre Pine Bend Bluffs Natural Area.

As nodes within the MRG corridor are restored, this corridor becomes even more robust, supporting species facing population declines due to habitat loss. Throughout this plan, opportunities are identified to fill gaps in the habitat corridor with small and large habitat restoration projects that offer refuge in an otherwise built landscape.

Priority Management Objectives include:

1) Identification of opportunities to restore or enhance open spaces within the MRG corridor
2) Prioritization of restoration projects that link or adjoin existing restored or remnant habitat
3) Management activities that protect and sustain species of greatest conservation need.

Figure 1: Location of Greenway and Biodiversity Corridors



PRIORITY ISSUES

Priority Issues are concerns that pose the greatest risk or threats to the ecological integrity of the site. The fact that, by its very nature, being a long, linear land feature, a greenway has lots of "edge", which makes it vulnerable to invasion by new species, which then often become problematic. The value of this NRMP is to identify opportunities to add larger nodes of habitat that effectively expand the greenway corridor and create significant core habitat. Additionally, being vigilant in monitoring efforts, utilizing volunteers and agency staff, and having volunteers "adopt" sections of the greenway to tend will go further to sustain the habitat created by the corridor.

The issues identified here can be addressed through various management actions over time. If left unmanaged, current conditions will persist or worsen.

PRIORITY ISSUE 1: PRESENCE OF NON-NATIVE, INVASIVE SPECIES

Based on field surveys, species including common buckthorn, Tatarian honeysuckle, black locust, Siberian elm, garlic mustard, crown vetch and reed canary grass are present in many nodes throughout the Greenway. If left unchecked, these populations will expand further and continue to degrade habitat.

Priority Management Objectives include:

1) Early detection of and rapid, comprehensive management of noxious and invasive weed populations
2) Follow-up inspections of previous weedy areas and trailheads where new weeds first become established.

PRIORITY ISSUE 2: ABSENCE, SUPPRESSION, AND POOR REGENERATION OF NATIVE SPECIES

Both restored and remnant native plant communities are present throughout the MRG, but their presence is not continuous throughout the corridor. In some cases, restorations do not represent a full complement of their subject plant communities. Natural regeneration is suppressed and stunted at some nodes because of weed pressure, earthworm infestations, or the lack of prescribed fire.

Priority Management Objectives include:

1) Identification of opportunities for restoration enhancement
2) Follow-up seeding and planting of species appropriate for target native plant communities after invasive plant management.
3) Reintroducing or maintaining prescribed fire regimes in fire-dependent systems.
4) Designating responsibility for managing and tending natural areas, dividing roles and responsibilities among the various city, county, non-profit, and private entities.

PRIORITY ISSUE 3: HISTORY AND PRESENCE OF AN INDUSTRIALIZED LANDSCAPE

The MRG traverses a mostly urban landscape, and the land use in the Greenway corridor within the past century and a half has been industrial. The corridor is highly altered from these uses, meaning that remnants of former roads, railyards, and buildings dot the landscape, and soils have been altered, compacted, and turned over and are now complexes of several original soil types. Existing plant communities reflect these changes, and restoration will need to be responsive to the existing conditions and compatible with future land uses.

Priority Management Objectives include:

1) Developing plant community restoration plans that are suited to altered soil types and incorporating soil decompaction or soil restoration where feasible.
2) Developing restoration plans that are responsive to existing and future land uses.

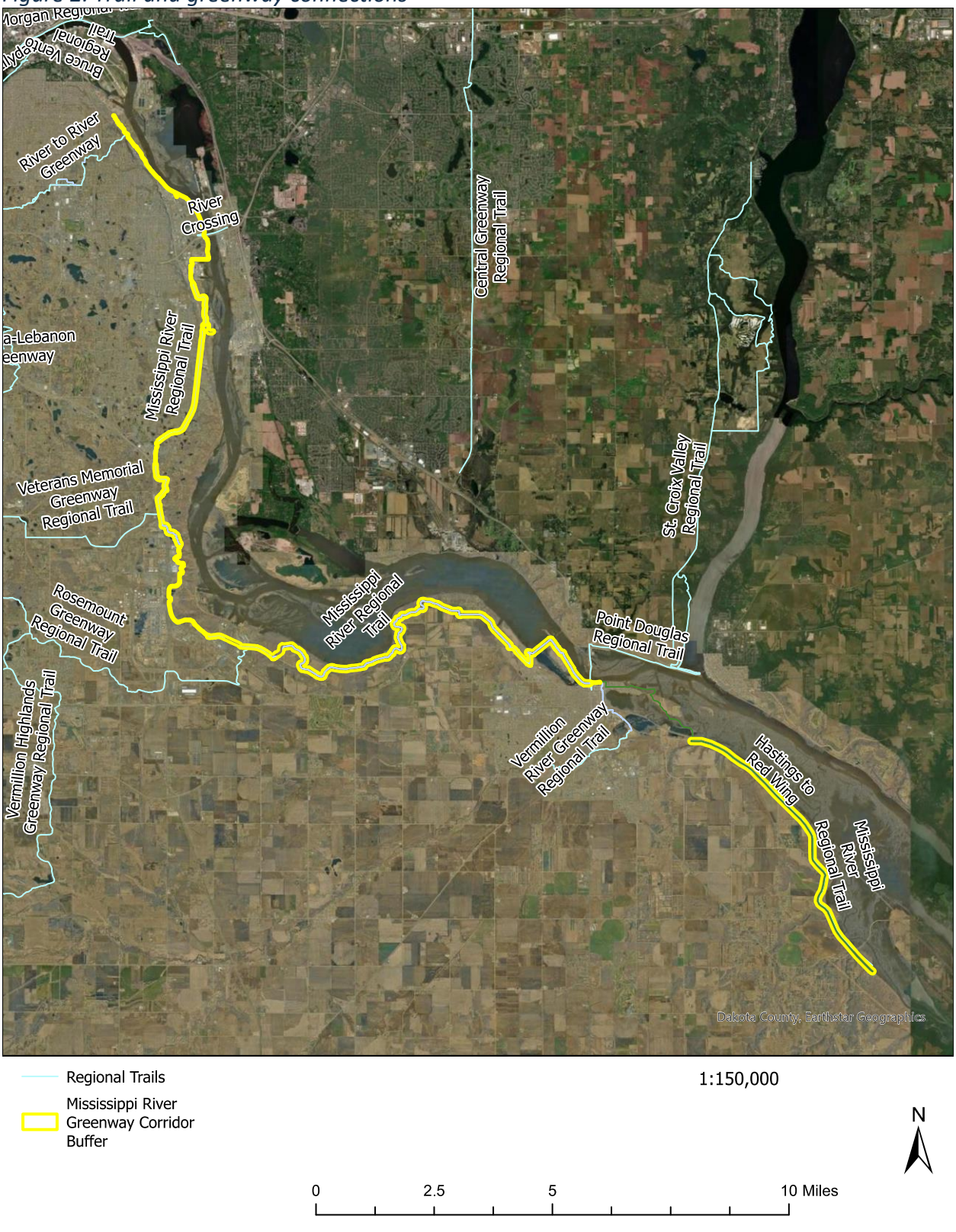
PRIORITY ISSUE 4: MISSISSIPPI RIVER GREENWAY CONNECTION BETWEEN EXISTING AND PLANNED TRAILS

Presently, the MRG connects to several regional trails, including the River to River Greenway, which runs from the Mississippi River at Lilydale east through Mendota Heights and West Saint Paul, to South Saint Paul, and the Veterans Memorial Greenway, which covers an east-west corridor between Eagan, Inver Grove Heights, and Rosemount. The constructed eastern section of the Vermillion River Greenway connects to the MRG in Hastings, and eventually, the Rosemount Greenway will also meet the MRG. The completion of the MRG's "Eastern Extension" will also be a north-south link in the Hastings-to-Red Wing Trail. Advancing these planned greenway connections will inevitably disturb existing habitat and introduce new weed populations with the increased use of trails, but opportunities for enhancing habitat corridors. These trail connections are shown in Figure 2.

Priority Management Objectives include:

1) Dedicated coordination between Dakota County Greenways planning staff and Dakota County Parks staff to ensure that trail corridors are routed with the least possible disturbance to intact and restored habitat.
2) Implementing restoration when opportunities arise and in conjunction with construction of greenway extensions.

Figure 2: Trail and greenway connections



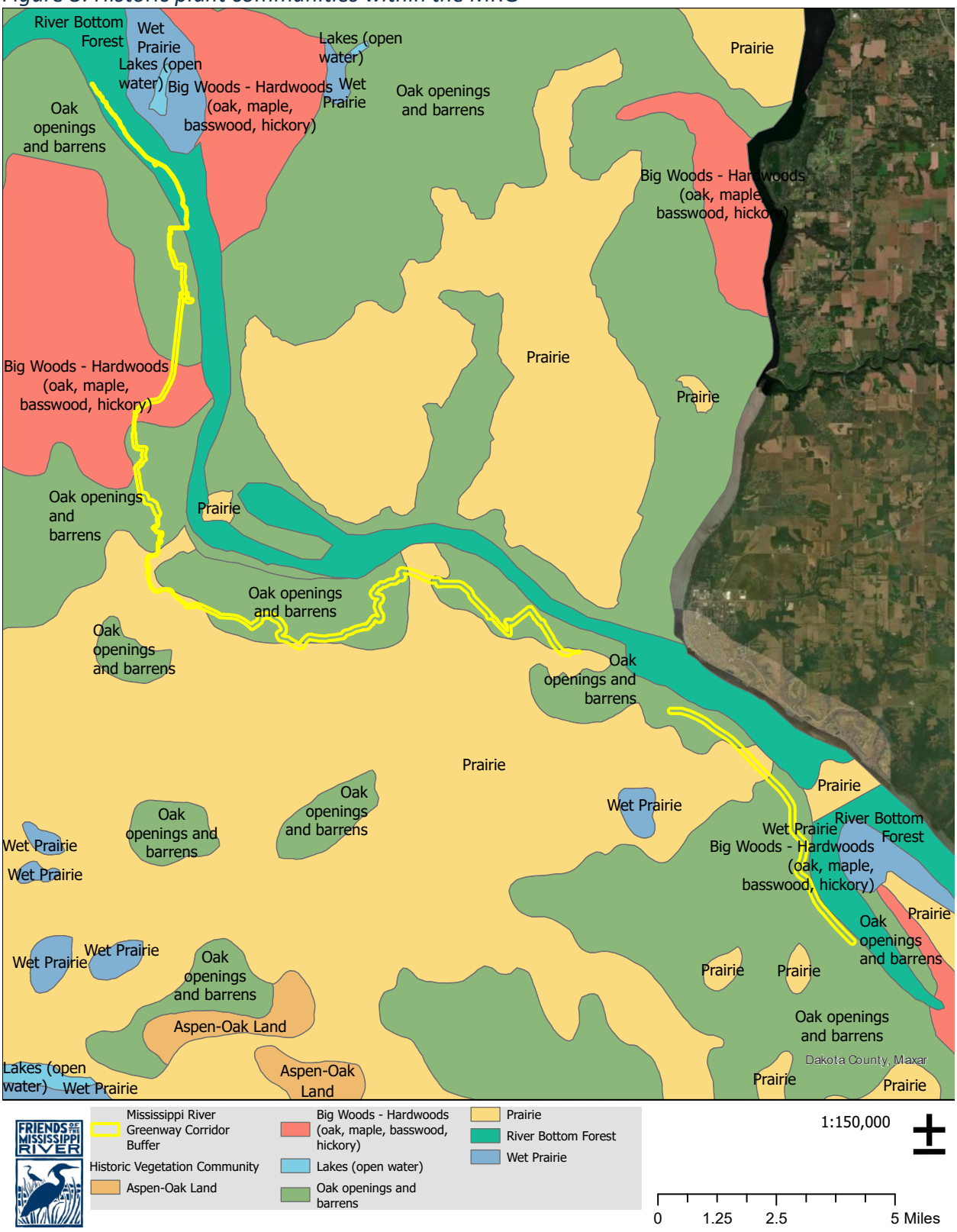
NATURAL HISTORY AND CURRENT CONDITIONS

LANDSCAPE CONTEXT

The MRG's location along the Mississippi River points to a long history of use by Indigenous people as shown by archaeological records of the MN Office of the State Archaeologist of nearby locations on the river. This data indicates the presence of cultural resource sites nearly continuously along the MRG with some areas in the southern section of the greenway having five or more records within a quarter-section. More information, including a general public map, can be found at https://osaportal.gisdata.mn.gov/.

The land cover around the time of the public land survey of Minnesota (1847-1907) was primarily classified as "Oak openings and barrens" with areas of "Prairie" and "Big Woods - Hardwoods" also present (Figure 3).

Figure 3: Historic plant communities within the MRG



The “Oak openings and barrens” cover type is most closely associated with present day oak savannas exhibiting widely spaced bur oaks and a grassy understory (see Figure 4). “Prairie” cover type along the river in the 19th Century would have been blufftop sand-gravel prairie or lower lying, flat mesic prairies with braided stream channels tributary to the Mississippi. “Big Woods - Hardwoods” is most like today’s oak woodlands and forests with oak, maple, and basswood canopies. While the landscape has changed considerably since the late 1800s, these plant communities can be referenced when setting restoration goals and target plant communities.

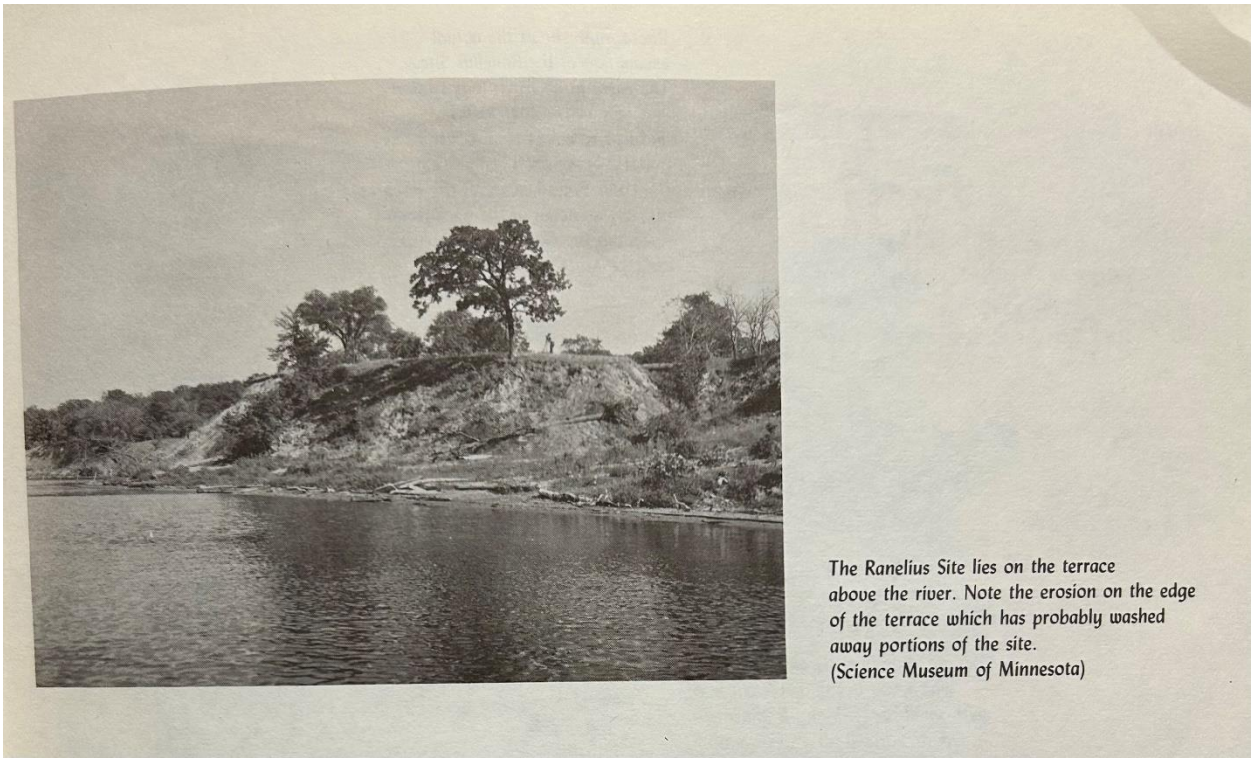


Figure 4: Historic image of Spring Lake Park Reserve. The Ranelius artifact excavation site. Photo taken by Science Museum of Minnesota c. 1953. Evidence that, in the past, the upland areas along the Mississippi River were much more open. Guelcher, Leslie A. (1982), The History of Nininger…More Than Just A Dream, Nininger Chapter of the Dakota County Historical Society

CONNECTIVITY

METRO CONSERVATION CORRIDOR

Except for the MRG section that is shifted away from the Mississippi in Inver Grove Heights and a small section east of Spring Lake Park, the Greenway lies within the Metro Conservation Corridor or MeCC. Started in 2003, the MeCC is a partnership of conservation organizations whose goal is to protect a series of connected corridors throughout the greater Twin Cities area. These corridors provide our communities with open space, wildlife habitat and water quality benefits. With funding from the Environmental Trust Fund as recommended by the Legislative Commission on Minnesota Resources (now the Legislative-Citizens Commission on

Minnesota Resources), the project partners permanently protect and restore ecologically important land in predetermined corridors.

MISSISSIPPI RIVER CORRIDOR CRITICAL AREA

With some small exceptions in Inver Grove Heights, the MRG falls within the Mississippi River Corridor Critical Area (MRCCA). The MRCCA was developed in 1973 to provide coordinated land planning and regulation for the 72-mile stretch of the Mississippi River through the seven-county metropolitan area covering 54,000 acres of land in 30 local jurisdictions. The MRCCA was designated a state critical area in 1976 to protect its natural, cultural and scenic resources. These resources are protected through development standards administered through local government land use plans and zoning ordinances.

The MRCCA contains a diverse mix of residential, commercial, industrial and recreational uses, as well as river-related industry and transportation. Though the river corridor has been extensively developed, many intact and remnant natural areas remain, including bluffs, islands, floodplains, wetlands, riparian zones, and native aquatic and terrestrial flora and fauna. The presence of the MRG within this important corridor offers an additional opportunity to identify lands to protect and restore.

MINNESOTA BIOLOGICAL SURVEY SITES OF BIODIVERSITY SIGNIFICANCE

Once survey work in a geographic region concludes, MNDNR Minnesota Biological Survey (MBS) ecologists assign each site a biodiversity significance rank. These ranks communicate the statewide native biological diversity significance of each site to natural resource professionals, state and local government officials, and the public. The biodiversity ranks help guide conservation and management.

A site's biodiversity significance rank is based on the presence of rare species populations, the size and condition of native plant communities within the site and the landscape context of the site (for example, whether the site is isolated in a landscape dominated by cropland or developed land, or whether it is connected or close to other areas with intact native plant communities).

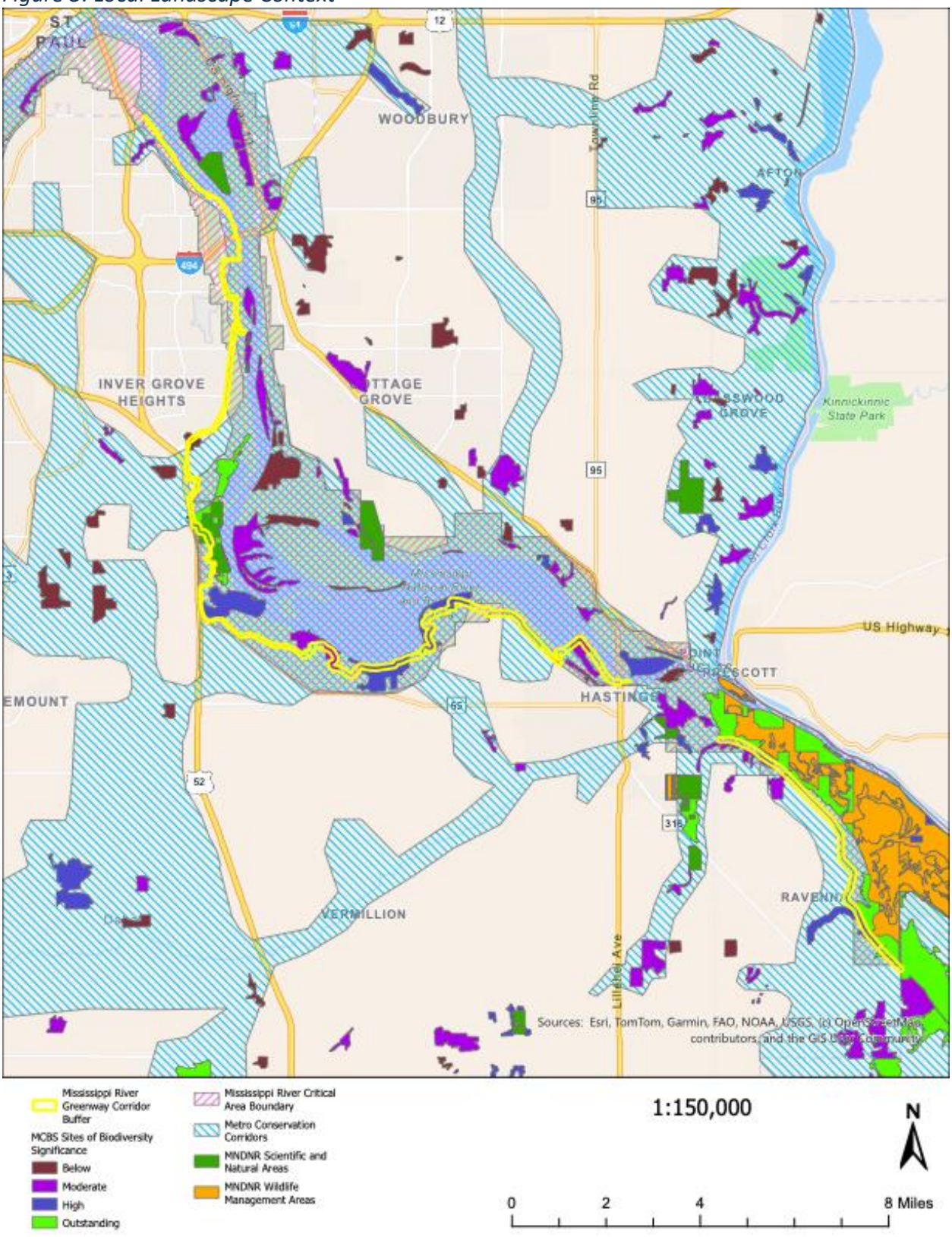
Biodiversity significance within the region of the MRG is shown in Figure 1, and biodiversity significance along the MRG itself is shown in Figure 6.

There are four biodiversity significance ranks, outstanding, high, moderate and below:

- "Outstanding" sites contain the best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional landscapes.
- "High" sites contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or critical functional landscapes.

- "Moderate" sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes with strong potential for recovering native plant communities and characteristic ecological processes.
- "Below" sites lack occurrences of rare species and natural features or do not meet MBS standards for outstanding, high, or moderate rank. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for habitat restoration, or open space.

Figure 5: Local Landscape Context



Historically, the land along the Mississippi River has drawn many generations of people to its resources. Following the last glaciation to this region, around 12,000 years ago, a new landscape emerged in which plant, animal, and human communities sought the river's resources for food and to provide materials for shelter (Minnesota Historical Society, 2008). The river later became an important route for shipping and trade, and these uses are evident on the landscape today with a lock and dam within the MRG corridor at Hastings, as well as a series of dredged pools for transportation. Today, the riverbanks through St. Paul, South St. Paul, and Inver Grove Heights are highly industrialized, with only small open-space parks converted from earlier commercial uses.

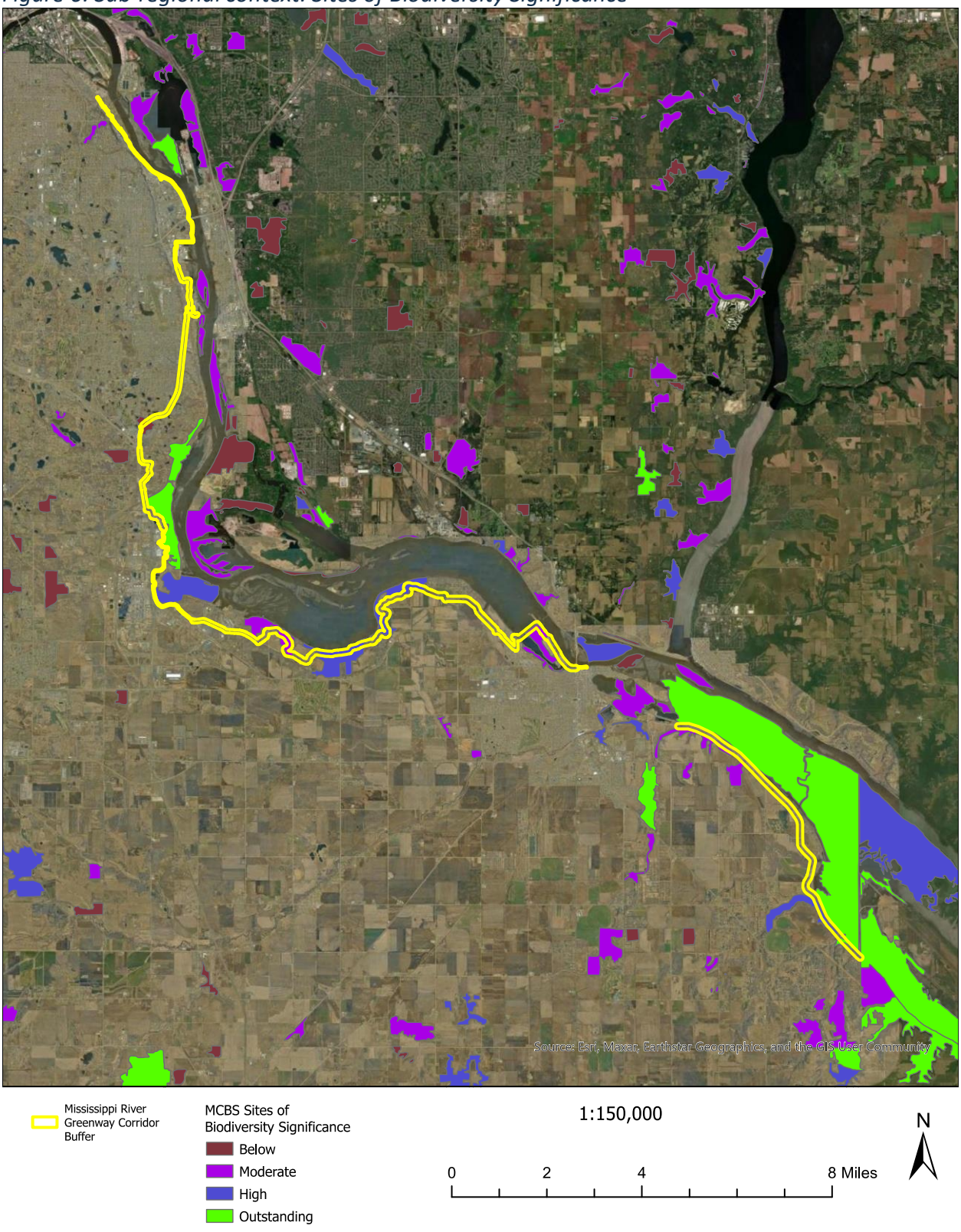
As the Mississippi bends to the east through the cities of Inver Grove Heights and Rosemount, the steep, river bluff topography on the river's right (south) bank protected it from industrialization, resulting in this stretch of the river containing several present-day large natural areas. The Pine Bend Bluffs Natural Area includes a patchwork of public and private lands, including Macalester College's 300-acre Katharine Ordway Natural History Study Area, the 256-acre Pine Bend Bluffs Scientific and Natural Area, and Flint Hills Resources' 700-acre natural area. An additional 1,200 acres of protected and restored habitat at Spring Lake Park Preserve, just downriver, combine to create a significant wildlife corridor in the Twin Cities Metro, as shown in Figure 5.

As the Mississippi River flows towards Lock and Dam No. 2 in Hastings, the river widens, and steep bluffs are replaced by wide floodplains just downstream of the dam. Near the Mississippi's confluence with the Vermillion River downstream of Hastings, several large wetland complexes line the river, and the land use shifts to a mix of agriculture and residential properties.

Driven by the desire to restore and enhance lands connected to the Greenway as it passes through a matrix of commercial, residential and agricultural areas, this plan recommends restoring native plant communities throughout the corridor. Restoration of forest, prairie and oak savanna communities along the Greenway is prioritized as these habitats are among the most needed restoration in the St. Paul Baldwin Plains, Oak Savanna and Blufflands ecological subsections, which are discussed in the following section.

The Greenway corridor is highly valued by the community and as a habitat corridor. This value calls for the thoughtful and comprehensive management of the trail's corridor, vital to its long-term success as a community asset. Investments to build trails to connect existing gaps and improve trailheads are already underway, and future restoration of the lands connected to the trail will only enhance these investments.

Figure 6: Sub-regional context: Sites of Biodiversity Significance



ECOLOGICAL CONTEXT

ECOLOGICAL SUBSECTIONS

The MNDNR and the U.S. Forest Service developed an Ecological Classification System for ecological mapping and landscape classification in Minnesota. These classifications are used to identify, describe, and map progressively smaller areas of land with increasingly uniform ecological features. Provinces are the broadest classifications, followed by sections, followed by subsections. Associations of biotic and environmental factors are used to allow resource managers to consider ecological patterns across many scales and identify areas with similar management opportunities or constraints relative to that scale. The Ecological Classifications occurring within the MRG corridor and shown in Figure 7 are:

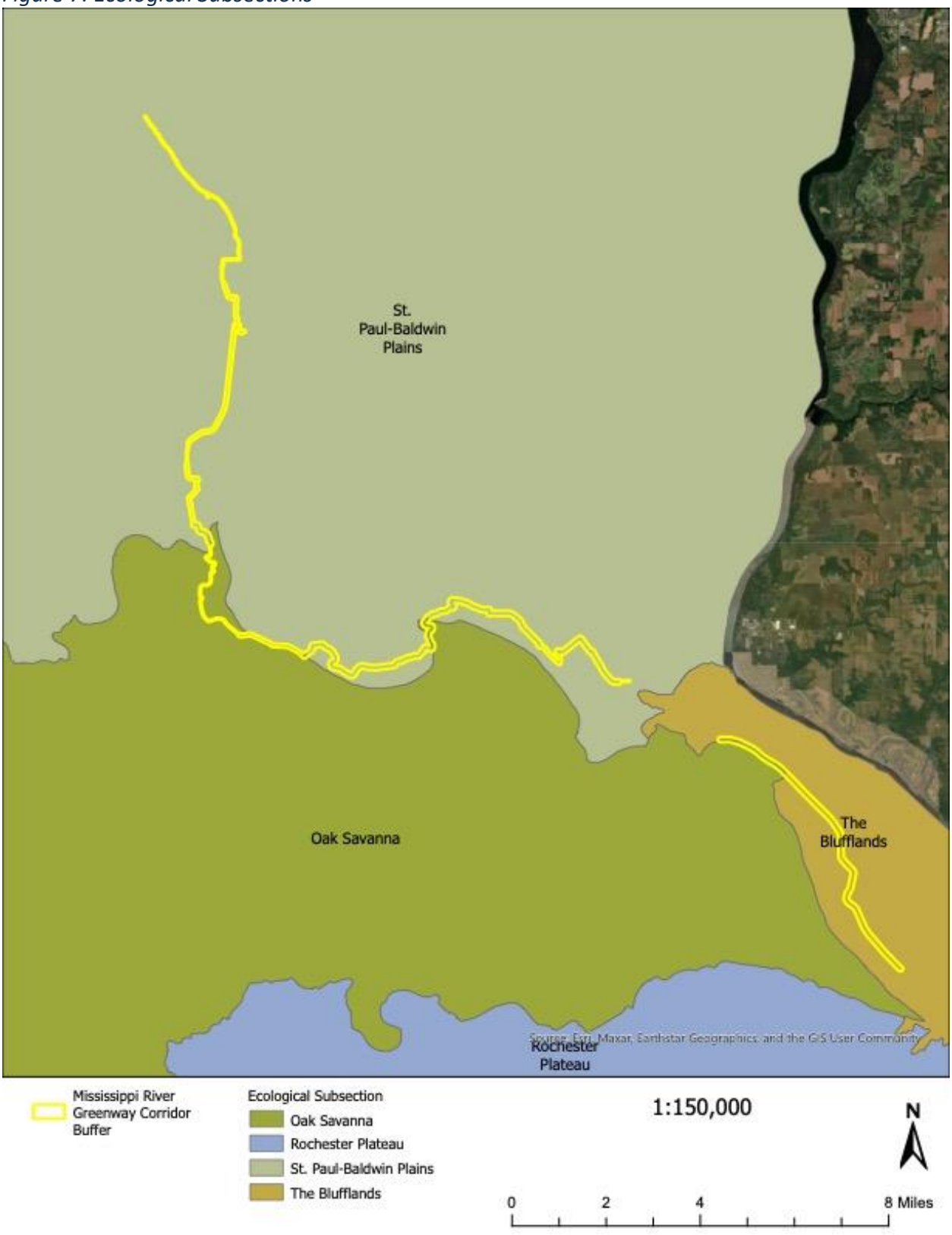
Ecological Province: Eastern Broadleaf Forest Province
Ecological Sections: Minnesota and Northeast Iowa Morainal and Paleozoic Plateau
Ecological Subsections: St. Paul Baldwin Plains, Oak Savanna, The Blufflands

The *St. Paul Baldwin Plains* subsection's northern boundary consists of a Superior Lobe end moraine complex. To the west, terraces associated with the Mississippi River separate the subsection from the Anoka Sand Plain subsection. The southern boundary coincides with the southern edge of the Rosemount Outwash Plain. This small subsection continues into Wisconsin. Although it is topographically low in comparison to other areas in the state, it is dominated by a large moraine and areas of outwash plain. The subsection encompasses part of the metropolitan area and is, as a result, affected by urban development.

The *Oak Savanna* subsection's western boundary consists of a series of end moraines that disrupted the spread of prairie fires from the west but did not provide sufficient protection for hardwood forests to become established. The subsection is bounded on the east by land dominated by hardwood forest. This boundary coincides with an increase in loess thickness. The northern boundary separates the calcareous gray Des Moines lobe glacial from the red Superior lobe glacial till. Much of this subsection is a rolling plain of loess-mantled ridges over sandstone and carbonate bedrock and till. At the southwestern edge of the subsection are moraine ridges. They are a continuation of those present in the Big Woods subsection, but smaller. As a result, fires from the surrounding prairies to the south, west, and east burned the landscape frequently enough to maintain oak opening rather than forest (Albert 1993). Presently, most of the subsection is farmed.

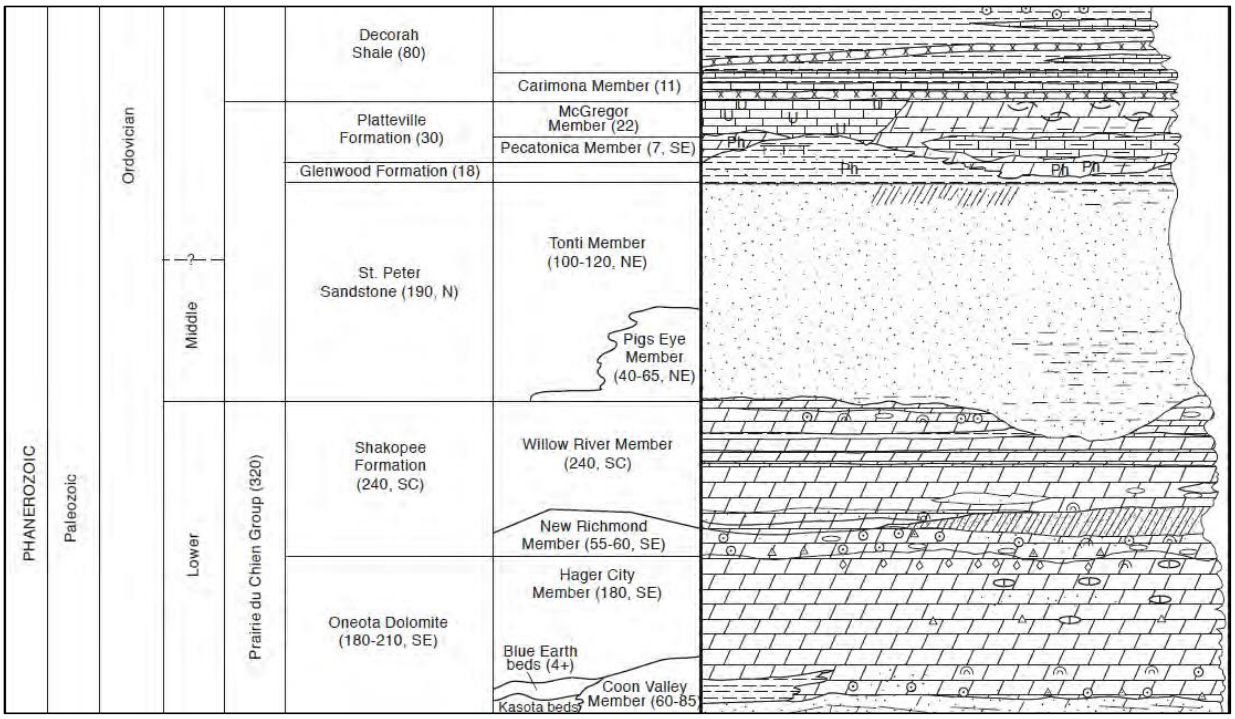
The Blufflands subsection has a complex western boundary, which follows major river valleys. The northern boundary marks the northern extent of loess deposits. There is also a small outwash plain that marks the north boundary. This subsection consists of an old plateau covered by loess (windblown silt), extensively eroded along rivers and streams. It is characterized by highly dissected landscapes associated with major rivers in southeastern Minnesota. River bottom forests grew along major streams and rivers.

Figure 7: Ecological Subsections



GEOLOGY AND GROUNDWATER

Figure 8: Bedrock Geological Strata, Excerpted from Mossler, 2008.



The Decorah Shale is the most recently formed (Upper Ordovician) and highest formation of bedrock within the Mississippi River Greenway corridor (Figure 8), and it is up to 90 feet thick where uneroded. The Platteville and Glenwood Formations within the Upper Ordovician underlie much of the MRG corridor. These layers together can be up to 34 feet thick in the Twin Cities Basin area and consist of limestone (Platteville) and shale (Glenwood). The St. Peter Sandstone formation was deposited during the Middle to Upper Ordovician and consists primarily of fine to medium-sized quartz sand and can act as an aquifer when submerged below the water table. The St. Peter Sandstone forms the bedrock of the lower-elevation regions of the Corridor, including the lower portions of Simon's Ravine. The Decorah, Platteville, Glenwood, and upper part of the St. Peter formations are exposed in outcrops along the Mississippi River in this region. The fine- to very fine-grained Shakopee Dolomite that makes up the majority of the Prairie du Chien Group forms an aquifer due to its capacity for groundwater storage.

Limestone and dolostone are primarily formed through biological and chemical processes in marine environments, while sandstone is formed through the weathering, erosion and deposition of sand particles. The extent of these bedrock types is shown in Figures 13-16. All three rock types can impact groundwater pollution sensitivity due to their ability to facilitate water movement and their potential to interact with pollutants, as shown in Figures 9-12.

Figure 9: Pollution Sensitivity of Near-Surface Materials: MRG South St. Paul

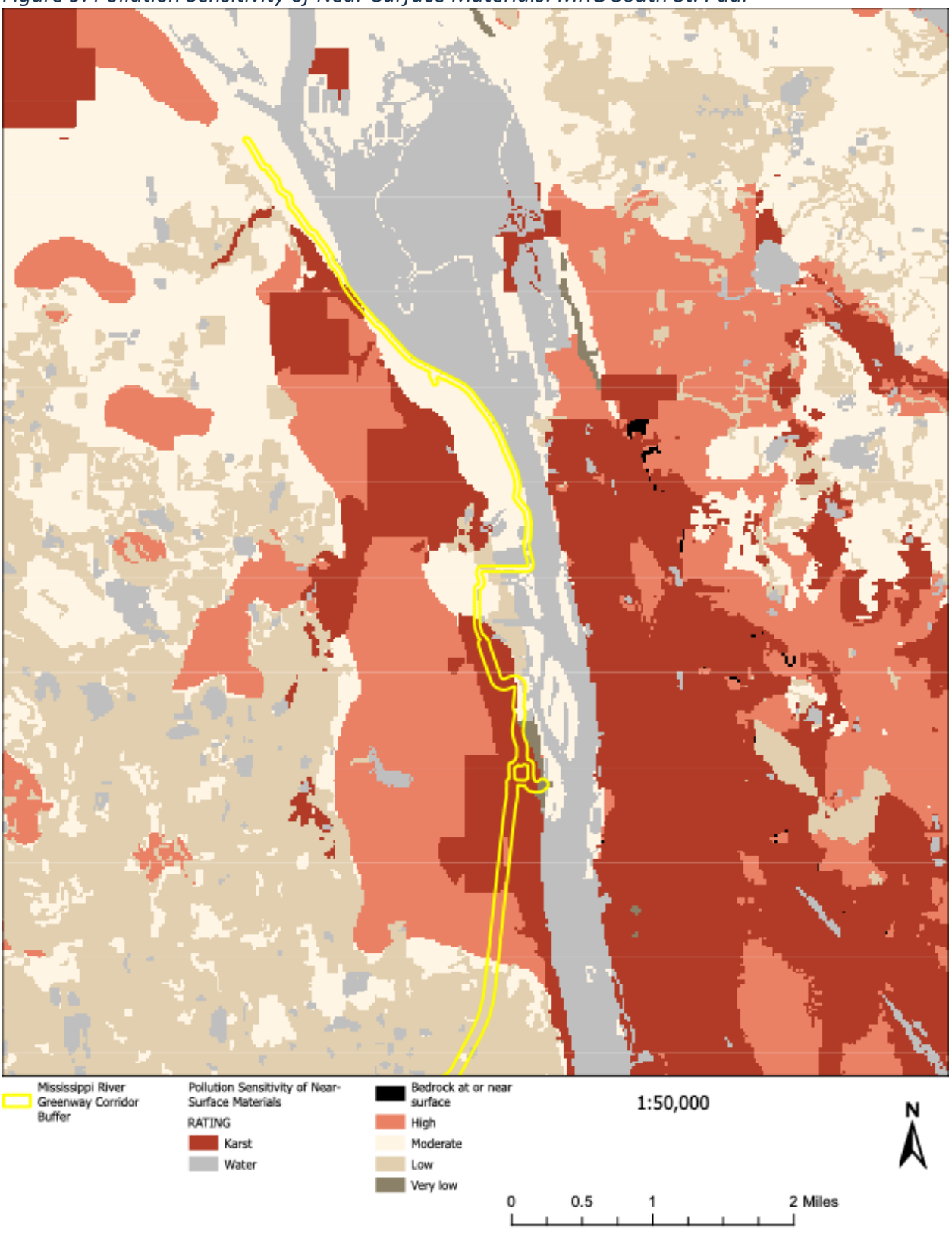


Figure 10: Pollution Sensitivity of Near-Surface Materials: MRG Inver Grove Heights

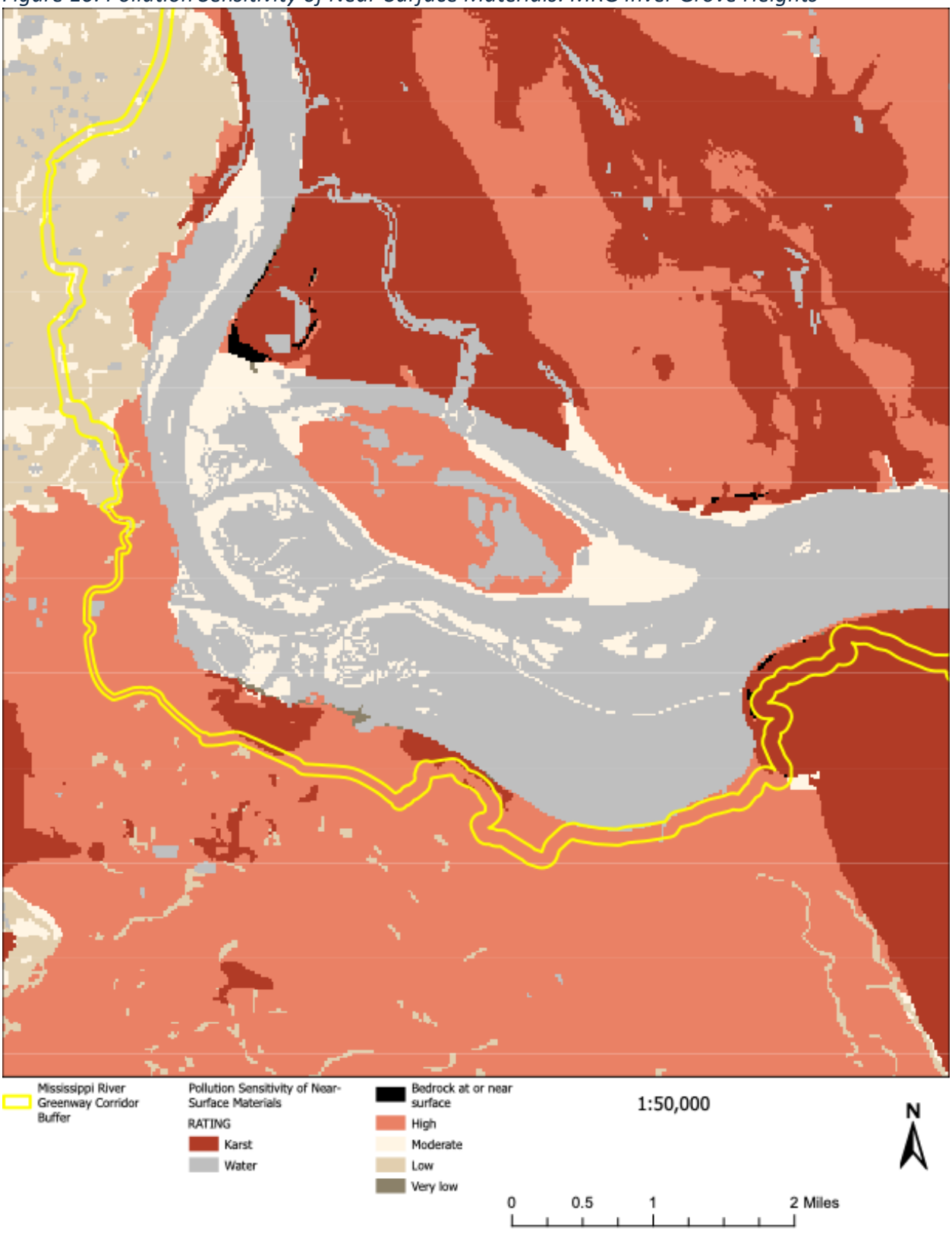


Figure 11: Pollution Sensitivity of Near-Surface Materials: MRG Nininger Twp. & Hastings

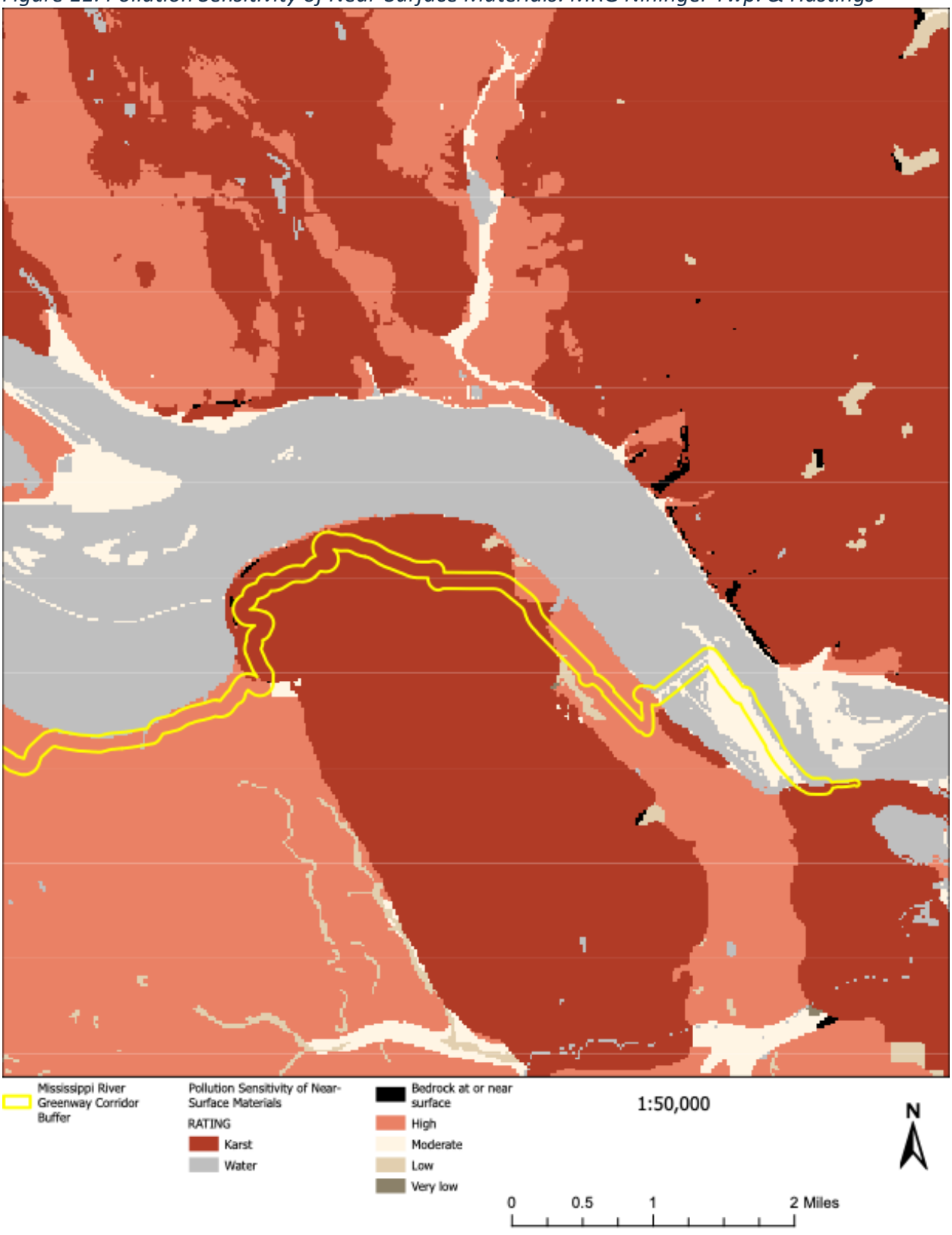
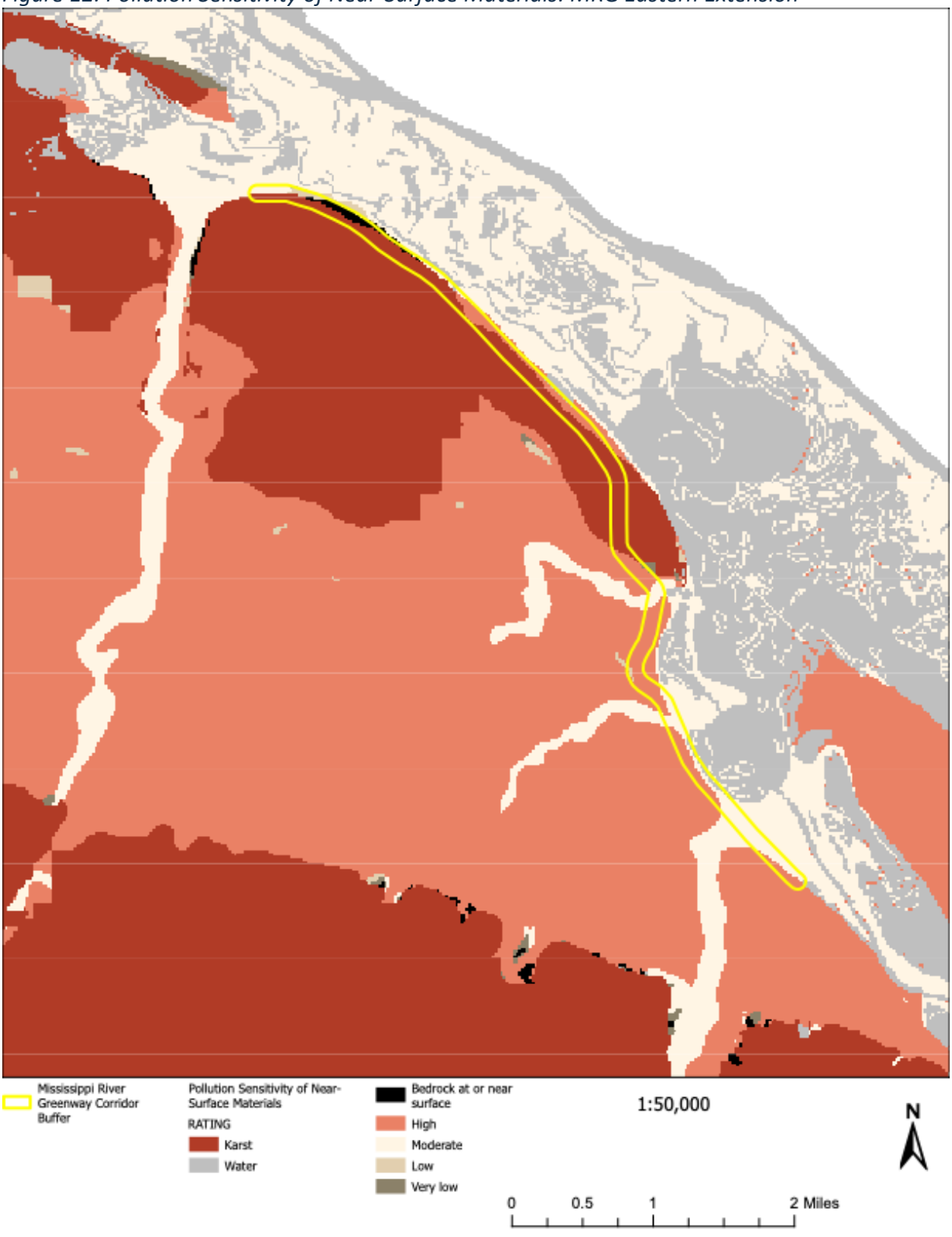


Figure 12: Pollution Sensitivity of Near-Surface Materials: MRG Eastern Extension



This rapid movement can accelerate the transport of pollutants from the surface to groundwater. Limestone and dolostone, particularly, are susceptible to dissolution by acidic water, potentially increasing the concentration of calcium and magnesium in the groundwater. Like those in Inver Grove Heights, stone quarries, as shown in Figure 14, can directly impact groundwater quality by increasing fluoride and salinity.

The MRG traverses several areas of high pollution sensitivity based on the nature of near-surface materials or geomorphic setting. Regarding natural area nodes specifically, Simon's Ravine, Dehrer, Ernster, Riverfront, and Spring Lake Parks, the Mosaic property, and the Eastern Extension of the MRG all have Karst topography, as shown in Figures 9-12. Karst topography is defined as a landscape formed by the dissolution of soluble rocks like limestone, resulting in features like caves, sinkholes, and springs. These channels serve as pathways for water to flow and increase the likelihood of groundwater pollution because of rapid infiltration and movement of contaminants and the lack of natural purification mechanisms, such as a deeper soil profile.

Additionally, Pine Bend Bluffs SNA, the Flint Hills Resources property, and the area near Lake Rebecca are all characterized as having high pollution sensitivity based on the near-surface materials, a shallow depth to bedrock, and sand and gravel aquifers, also shown in Figures 11-12. All these factors increase the vulnerability of groundwater to pollution.

Likewise, knowledge of a site's surficial geology is essential because it influences site characteristics, such as soil type, drainage and position on the landscape, topography, and plant community composition.

Figure 13: Bedrock Geology, MRG South St. Paul

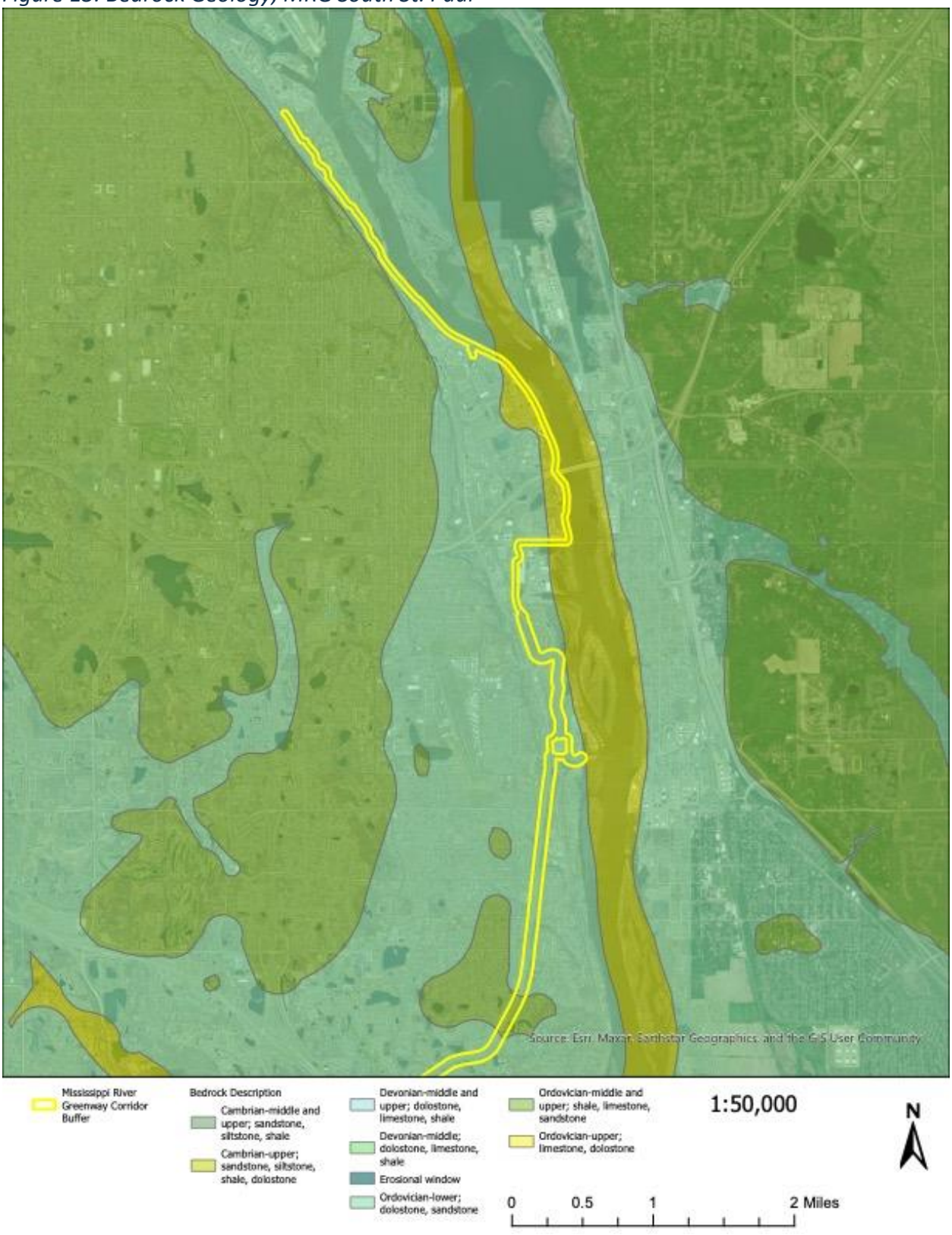


Figure 14: Bedrock Geology, MRG Inver Grove Heights

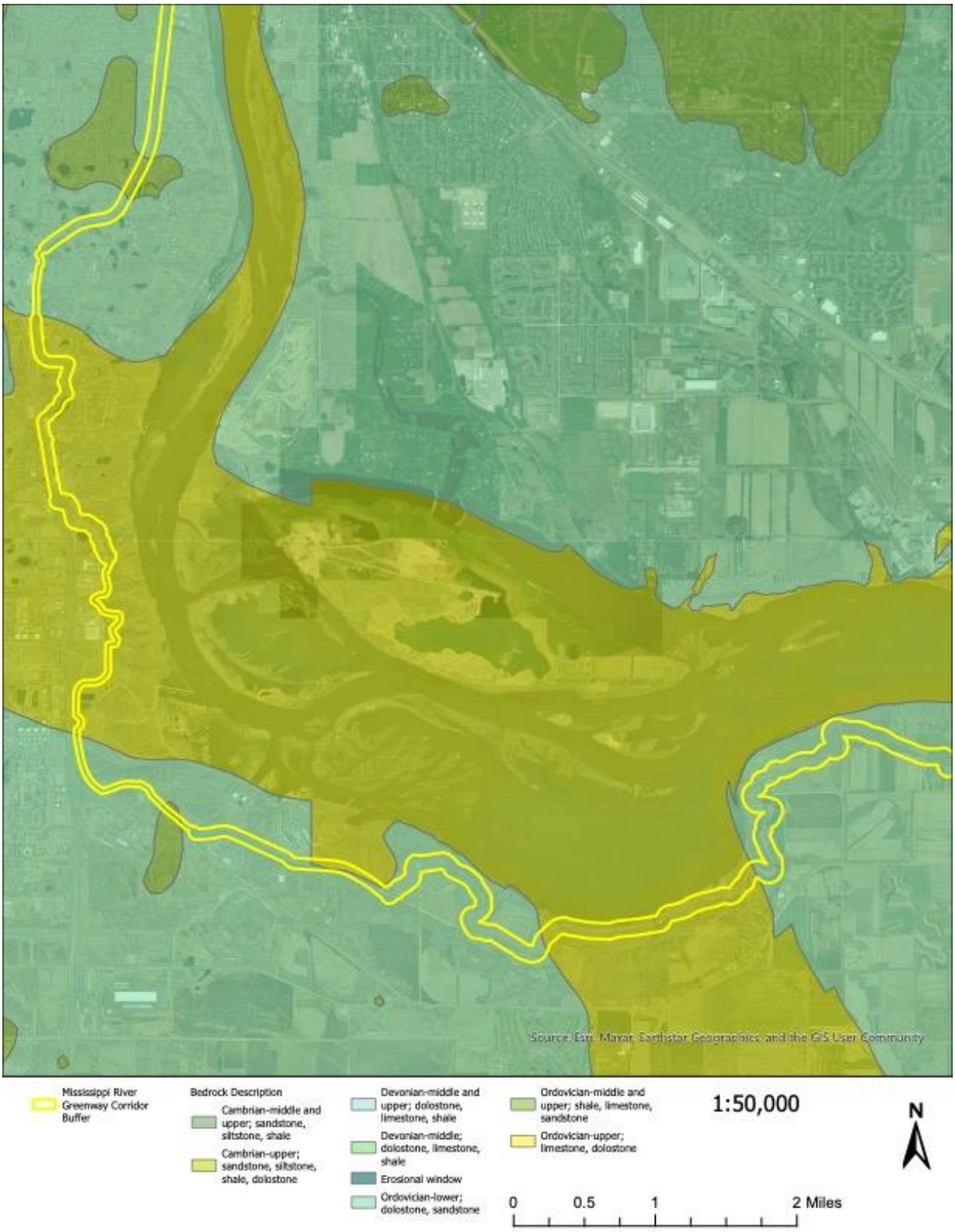


Figure 15: Bedrock Geology, MRG Nininger Twp & Hastings

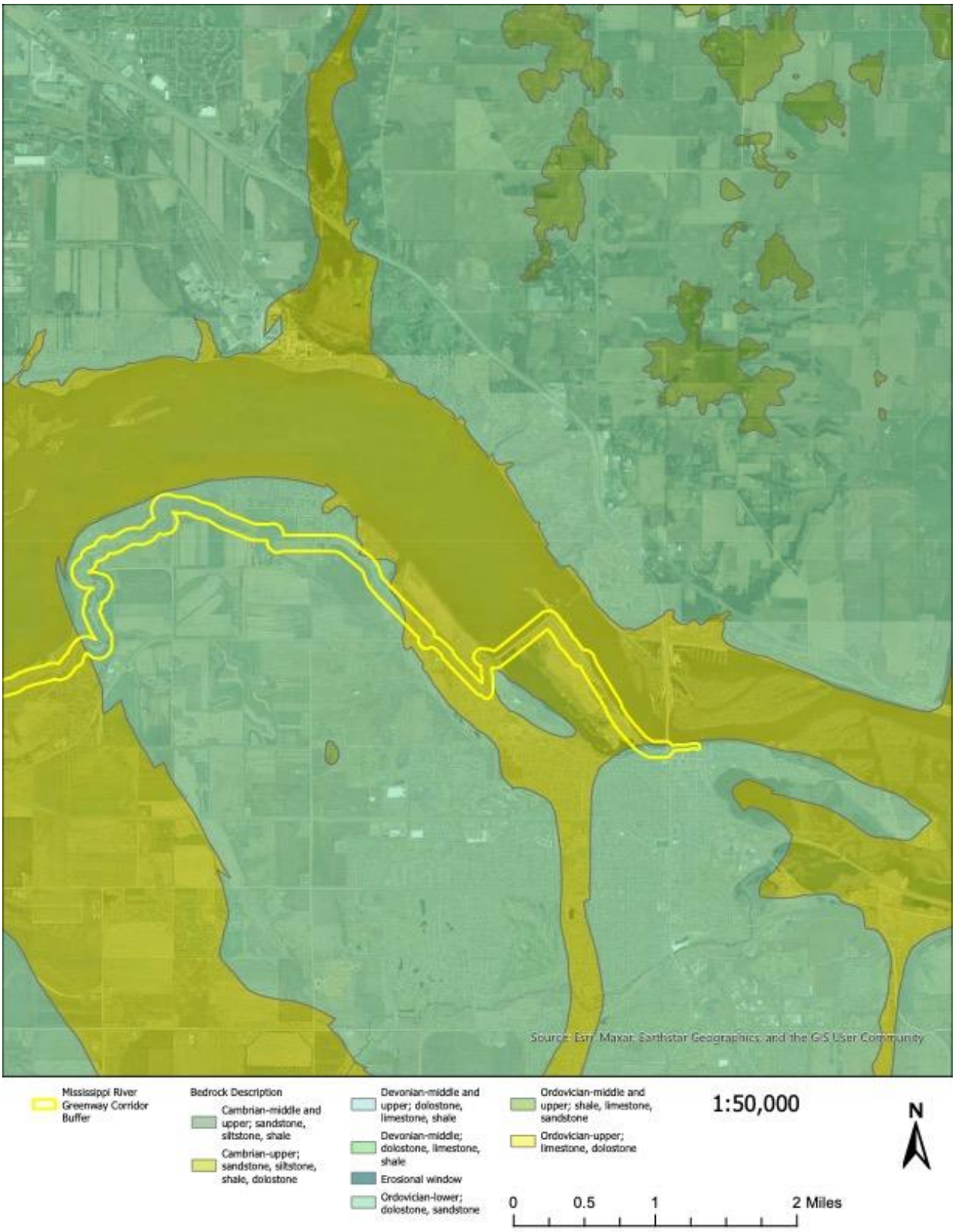


Figure 16: Bedrock Geology MRG, Eastern Extension

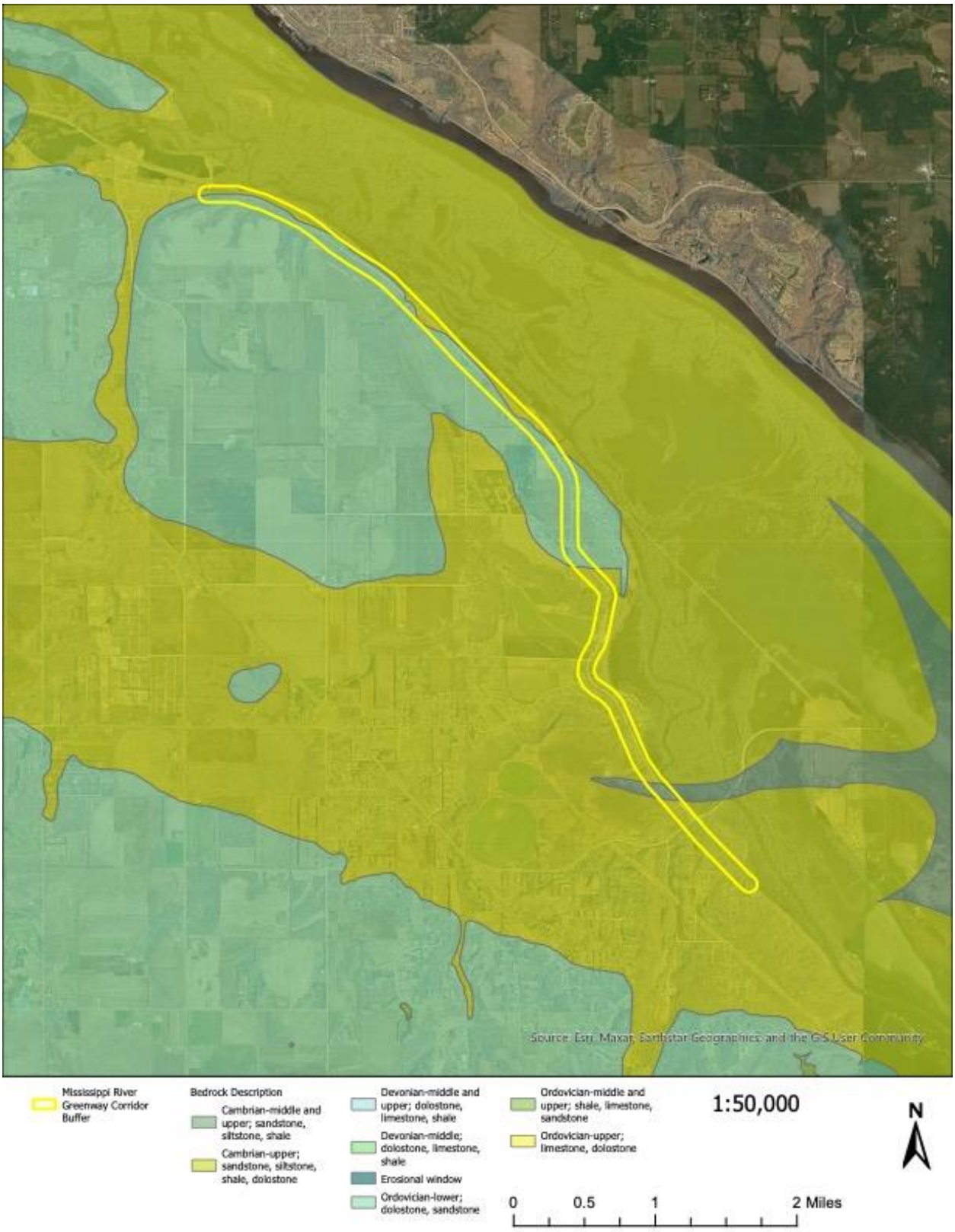


Figure 17: Surficial Geology MRG, South St. Paul

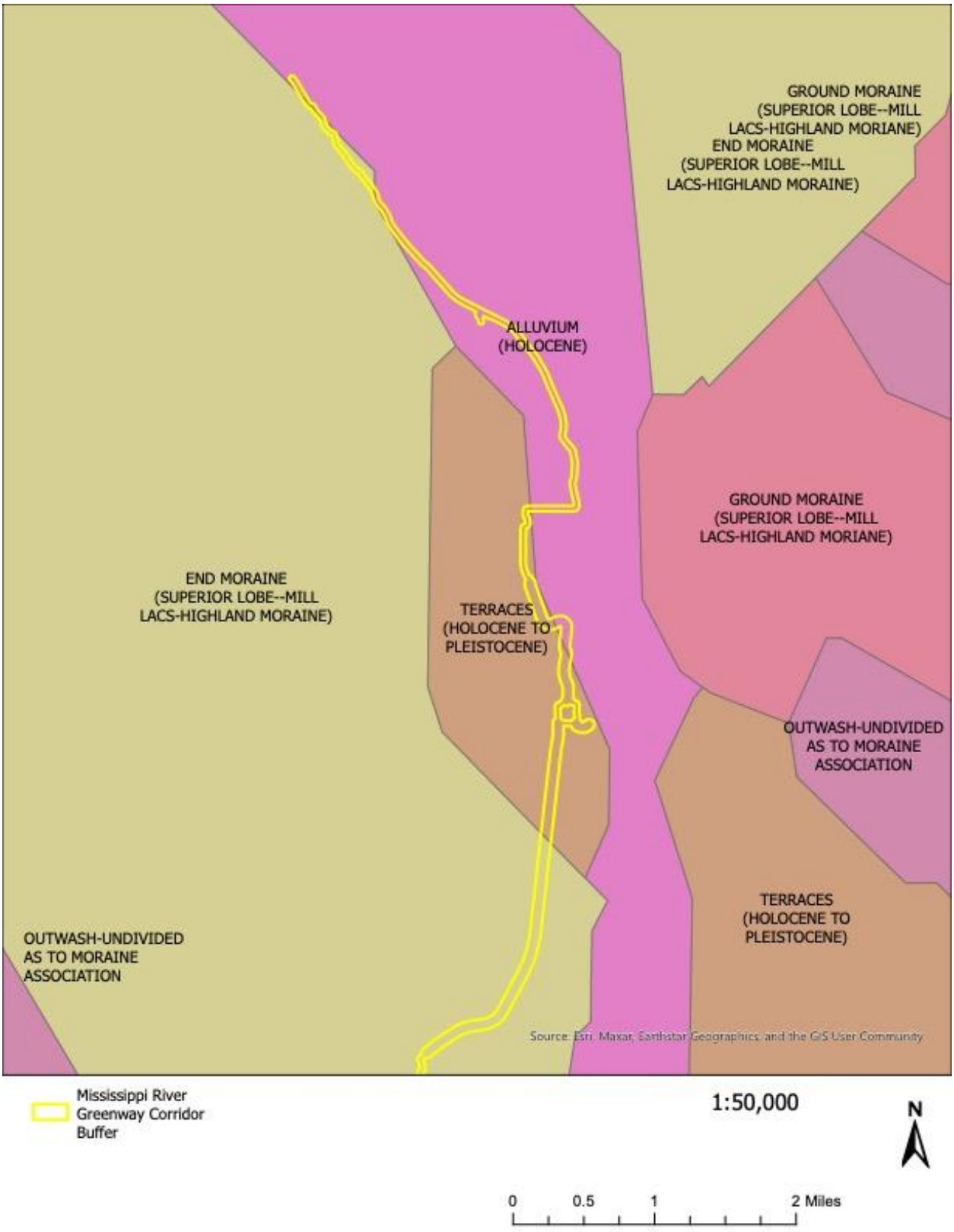


Figure 18: Surficial Geology MRG, Inver Grove Heights

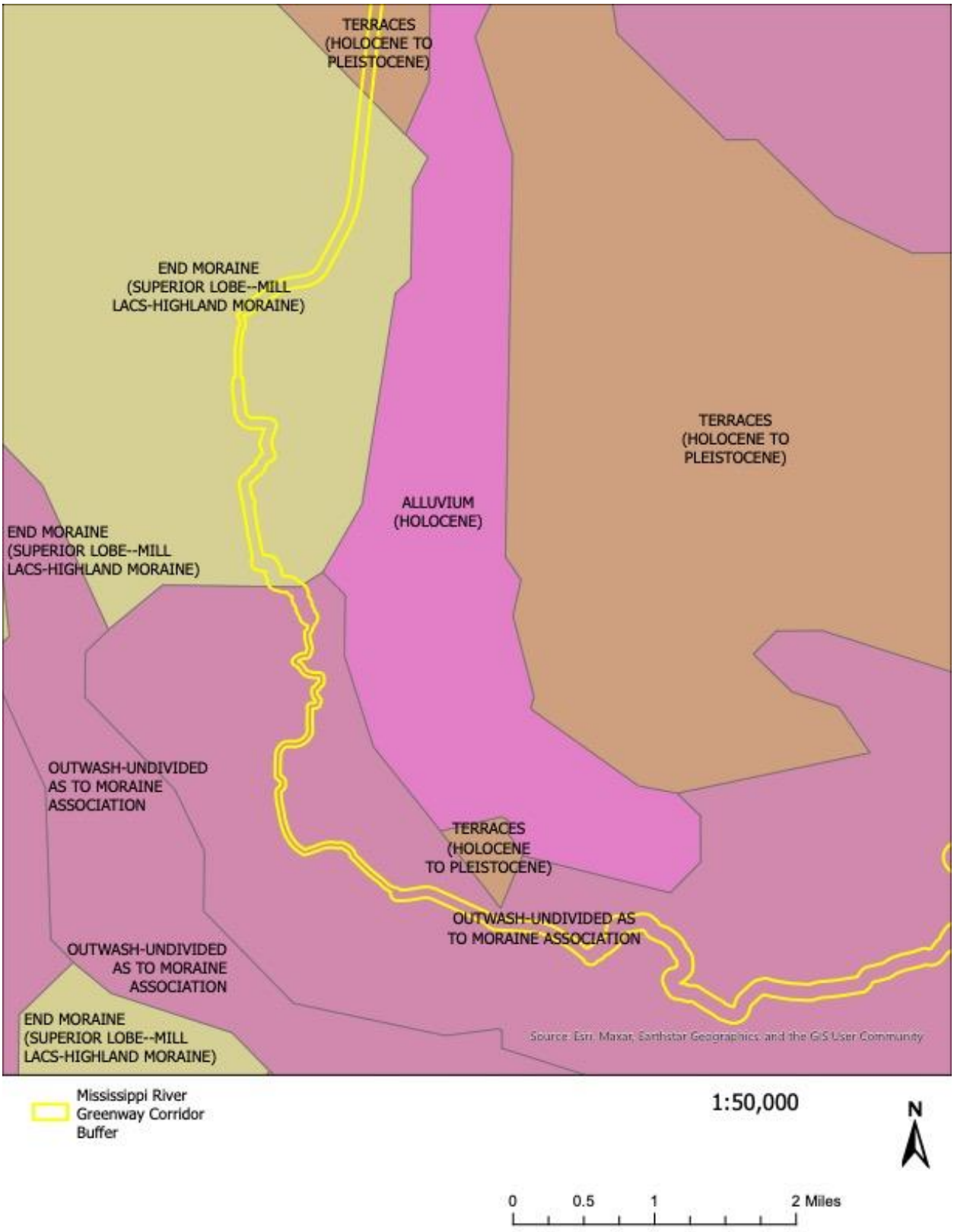


Figure 19: Surficial Geology MRG, Nininger Twp & Hastings

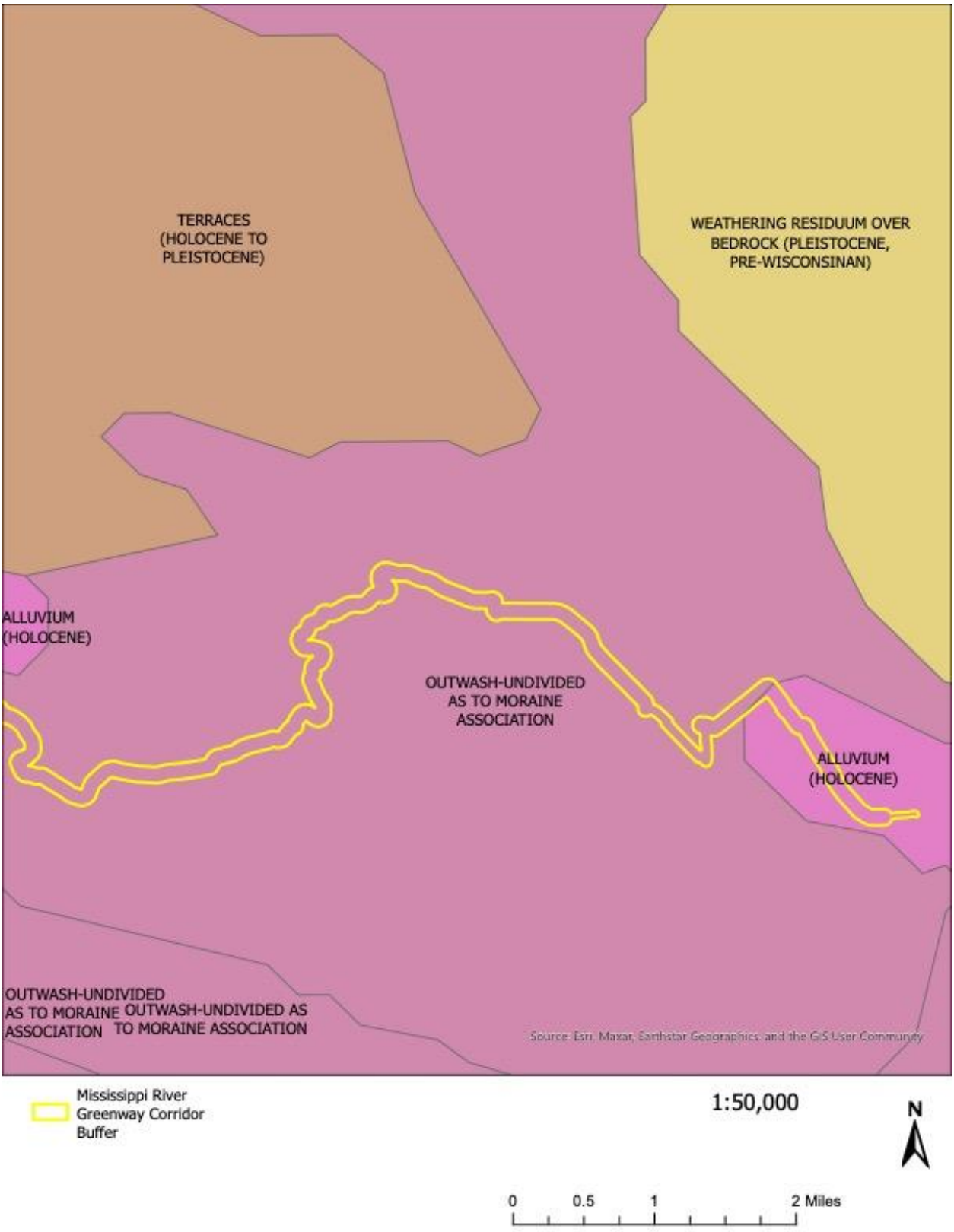
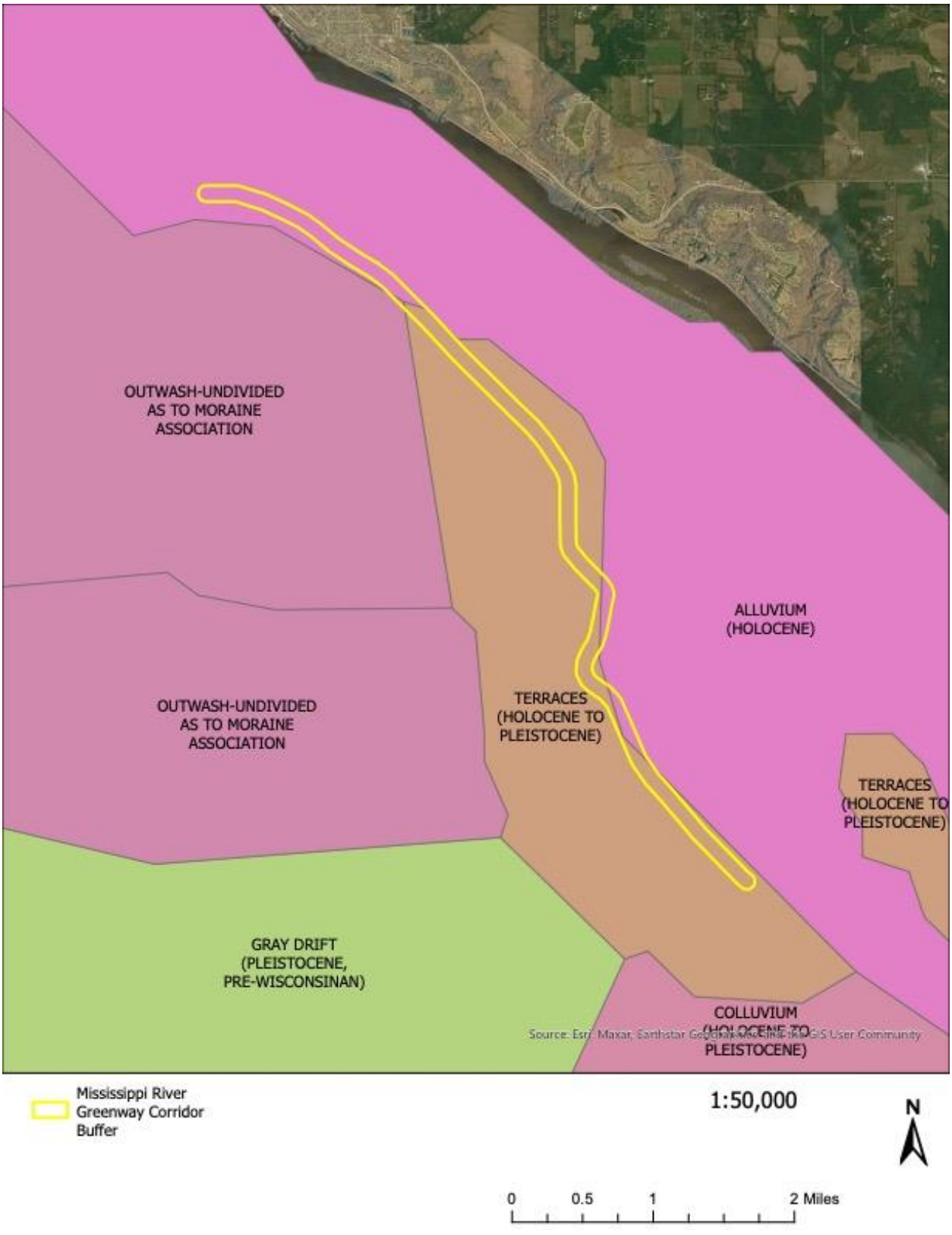


Figure 20: Surficial Geology MRG, Eastern Extension



SOILS

Soils vary considerably across the MRG based on proximity to the river, past land use, and topography. In all, 50 distinct soil types are present within the MRG corridor. The most abundant soil types are loams, loamy sands, and sandy loams. Silt loams are more common near the river, and loams and clay loams are more prevalent at the southern end of the Greenway near the Vermillion River.

The most common soil type within the MRG is Hawick loamy sand, with 20-40% slopes, which is present across 192 acres of the Greenway, and this represents 10.4% of the corridor. These loamy sands are both very deep and excessively drained. They formed in sandy outwash sediments with or without a loamy mantle and are present on outwash plains, stream terraces and glacial moraines. Typically, these soils are used for pasture and hay land or as a source of aggregate or fill, but they historically have supported tallgrass prairie.

Hubbard loamy sand with 1-6% slopes is the next most common. This soil type is present across 156 acres of the MRG, and this represents 8.8% of the corridor. Hubbard loamy sand is a soil type characterized by its sandy texture and formation in glacial outwash areas, especially on outwash plains, valley trains and stream terraces. It's described as very deep and well-drained and formed from sediments of the Late Wisconsin glaciation. Most of these soils are cultivated with irrigated crops, but the native vegetation is tallgrass prairie or oak savanna.

These loamy sands are generally resistant to erosion, but their high rates of permeability can make them susceptible to erosion if found on steep slopes or where vegetation cover is limited.

Wet Udorthents are also common, being found across 148 acres of the MRG, which represents 8.1% of the corridor. These are soils that have been disturbed by human activity, often through cutting and filling. These soils are generally deep to bedrock and have moderately well to excessively drained characteristics. Erosion can occur in Udorthents, especially on slopes, due to sheet erosion.

Soil types present throughout the MRG are further detailed in Appendix B.

SURFACE WATER RESOURCES

RIVERS

The primary surface water resource along the MRG is the Mississippi River, and the river's cultural importance and location guided the creation of the corridor as a greenway. The Mississippi has a long history of industrial use, and its present-day water quality reflects these uses. Along the corridor, the "stream reach" or section of the river adjacent to the MRG is that between the confluence of the St. Croix River to the confluence of the Chippewa River. This reach is impaired for mercury in fish tissue, mercury in the water column, polychlorinated biphenyls in fish tissue, and total suspended solids.

The Vermillion River joins the Mississippi in a braided stream and wetland complex within the Gores Wildlife Management Area, near the southern terminus of the MRG. The Vermillion is both a treasured and a troubled natural resource. Home to high-quality trout fishing and scenic beauty, the effects of human development have degraded the stream. Pollution from failing septic systems, stormwater runoff, and agricultural pesticides and fertilizers is contributing to its impairment. The Vermillion is impaired for fecal coliform, fish index of biological integrity, mercury in fish tissue, and total suspended solids. Furthermore, Lake Rebecca, north of downtown Hastings, also has impairments for mercury in fish tissue and perfluoro-octane sulfonate (PFOS) in fish tissue.

WETLANDS

Based on National Wetland Inventory (NWI) data, several wetland complexes occur within the MRG corridor. Within wetlands surveyed during fieldwork for this NRMP, most have plant communities imperiled by invasive species, and stormwater inputs and associated pollutants have altered their natural hydrology. With increased flood risk due to climate change and a greater extent of impervious surfaces in the Metropolitan Area, protection and restoration of wetlands should be prioritized.

Appendix C lists the presence of wetlands by type as indicated by the NWI within the various nodes of the Greenway and the acreage of those wetlands within the node boundaries. Significant enhancement projects that require wetland delineations can lend further insight to the extent and quality of wetlands throughout the MRG, which can better inform opportunities for enhancement and restoration.

Most wetland plant communities are highly altered due to their vulnerability to invasive species propagules. Further, wetland plant communities can be challenging to restore due to seed availability and the difficulty in establishing vegetation under fluctuating moisture conditions. Still, it is valuable to identify sentinel sites of higher-quality wetlands to reference or from which to collect seed when undertaking restoration.

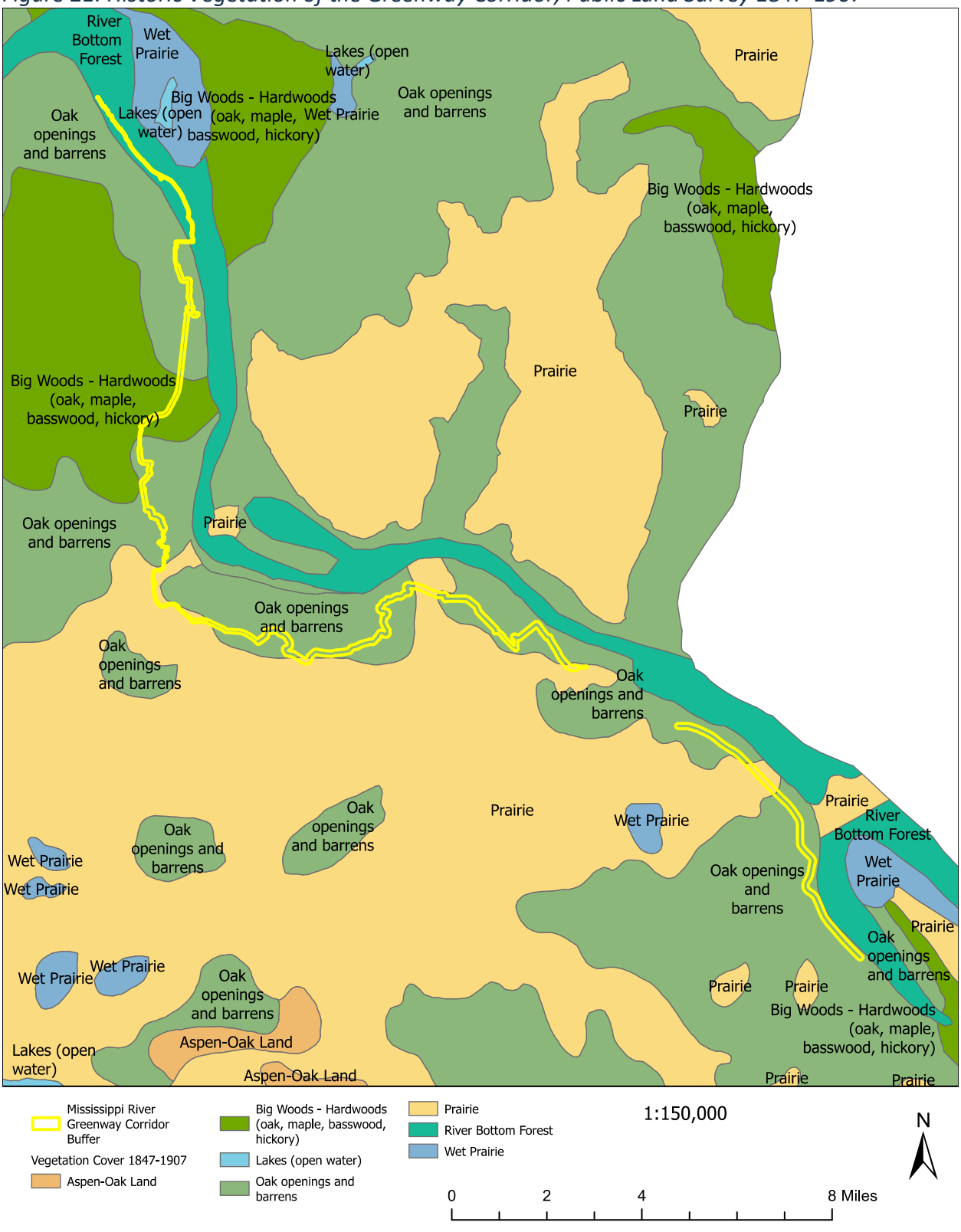
HISTORICAL VEGETATION

The public land survey of Minnesota, compiled between 1848 and 1907, divided vegetation cover into broad categories for future land sale and potential development. Although the purpose of the land survey was to characterize plant communities in relation to human use, this information is useful today as it enhances our understanding of how land cover has changed over the last 150 years.

Much of the land within the MRG corridor was categorized as “oak openings and barrens.” These plant communities are likely analogous to present-day remnant oak savannas along the river’s uplands. In lower-lying areas of the Greenway in South Saint Paul and Inver Grove Heights, a stretch of “River Bottom Forest” was present along the river, and these areas are probably comparable to today’s floodplain and terrace forests. Still, other pockets of the MRG corridor were categorized as “Prairie”, and these areas would have likely had plant

communities similar to mesic to dry prairies but with much higher species diversity than remnant prairies of the present day.

Figure 21: Historic Vegetation of the Greenway Corridor, Public Land Survey 1847-1907



WILDLIFE

PROXIMITY TO MINNESOTA WILDLIFE ACTION PLAN CORRIDOR

Minnesota's Wildlife Action Plan is a partnership-based conservation plan to ensure the long-term health and viability of Minnesota's wildlife with a focus on species that are rare, declining, or vulnerable to decline. Its goal is to enhance opportunities to enjoy Species of Greatest Conservation Need (SGCN) and other wildlife, participate in conservation, and acquire the resources necessary to implement the plan successfully. The Greenway corridor is nearly completely within the MNDNR Wildlife Action Network area, which has identified quality terrestrial and aquatic habitats throughout the state. Large core areas and connections that facilitate species movement will support the biological diversity already present in the network, and significant sections of the MRG are ranked in the "Medium-High" and "High" categories for prioritized conservation. Priority species to protect and restore can be ascertained via site-specific wildlife and vegetation surveys that investigate presence/absence of SGCN.

GREENWAY CORRIDOR VALUE FOR WILDLIFE

Nearly all forms of wildlife depend on rivers for sustenance, especially invertebrates, amphibians, reptiles, and fish. Mammals and birds also benefit greatly from the water, shelter and nutrients provided by rivers, and birds use river corridors, including the Upper Mississippi River, as an important migratory flyway.

Dakota County encompasses a variety of ecological subsections, as noted above. Each subsection contains multiple habitats, an abundance of water resources, and a diverse assemblage of plant communities and wildlife, including Species of Greatest Conservation Need (SGCN) whose populations are rare, declining, or vulnerable to decline in Minnesota.

Table 1 lists relatively common species that are known or likely to occur within the Greenway Corridor. Not all species would be expected at any given site. Presence/absence can depend on multiple factors, including size and shape of habitat and proximity to other habitat types, degree of isolation, and structural and species diversity.

Table 1. Wildlife Species Observed in Dakota County with Statuses. Source: MNDNR.

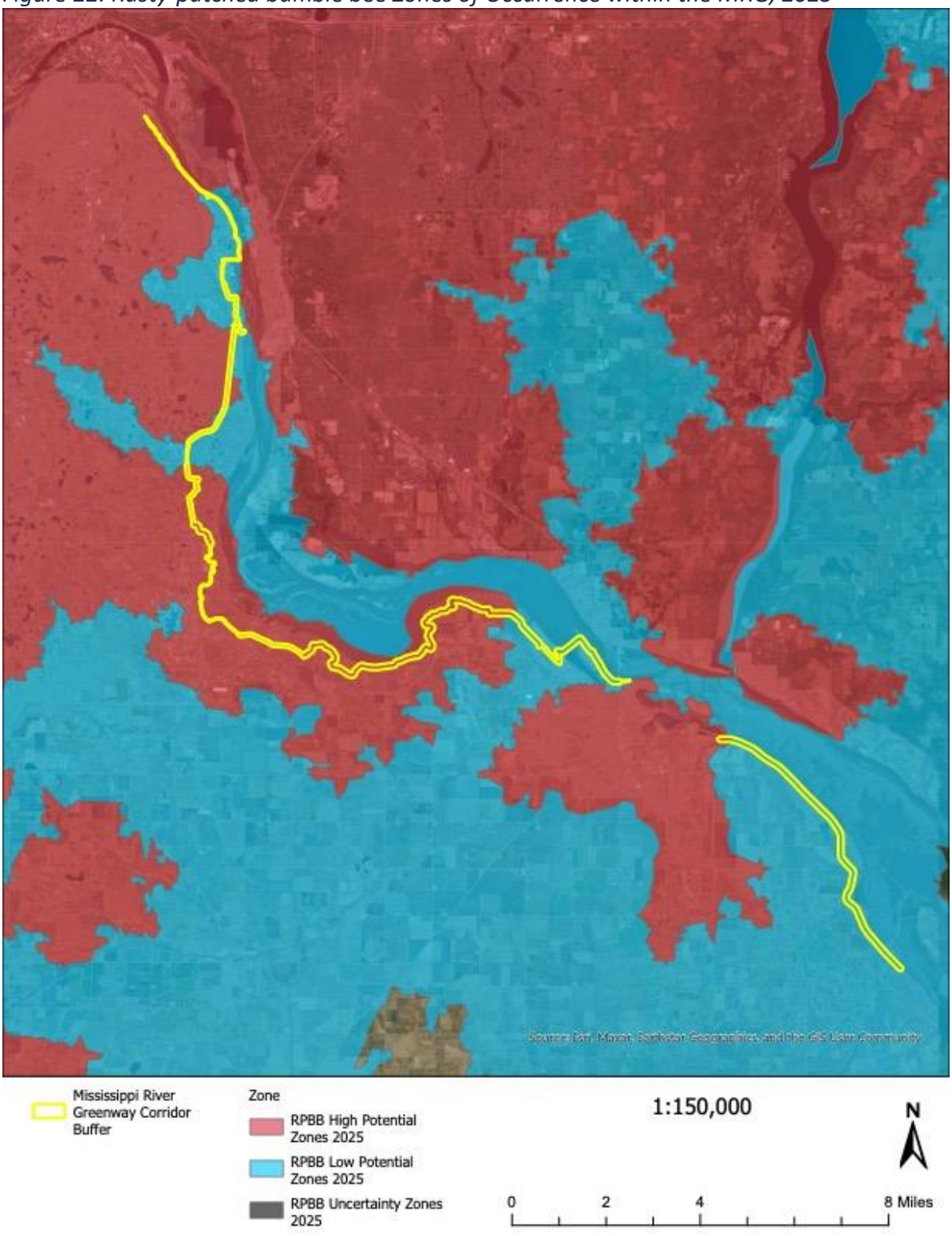
Common Name	*Scientific Name*	Endangered	Threatened	Special Concern	SGCN
Mammals					
American badger	*Taxidea taxus*				X
Big brown bat	*Eptesicu fuscus*				X
Prairie vole	*Microtus ochrogaster*			X	X
Northern long-eared bat	*Myotis septentrionalis*		X (Federal)	X	X
Thirteen-lined ground squirrel	*Ictidomys tridecemlineatus*				
Tri-colored bat	*Perimyotis subflavus*				X
Grassland and Wetland Birds					
American kestrel	*Falco sparverius*				X
Barn swallow	*Hirundo rustica*				
Bell's vireo	*Vireo bellii*				X

Common Name	*Scientific Name*	Endangered	Threatened	Special Concern	SGCN
Chipping sparrow	*Spizella passerina*				
Clay-colored sparrow	*Spizella pallida*				
Dickcissel	*Spiza americana*				X
Eastern bluebird	*Sialia sialis*				
Eastern kingbird	*Tyrannus tyrannus*				
Eastern meadowlark	*Sturnella magna*				X
Field sparrow	*Spizella pusilla*				X
Forster's tern	*Sterna forsteri*				X
Franklin's gull	*Leucophaeus pipixcan*				X
Grasshopper sparrow	*Ammodramus savannarum*				X
Henslow's sparrow	*Ammodramus henslowii*	State			X
Horned grebe	*Podiceps auritus*				X
Horned lark	*Eremophila alpestris*				
Lark sparrow	*Chondestes grammacus*			X	X
Northern rough-winged swallow	*Stelgidopteryx serripennis*				X
Purple martin	*Progne subis*				X
Savannah sparrow	*Passerculus sandwichensis*				
Song sparrow	*Melospiza melodia*				
Tree swallow	*Tachycineta bicolor*				
Virginia rail	*Rallus limicola*				X
Tree Nesting Birds					
Acadian flycatcher	*Empidonax virescens*				X
American goldfinch	*Spinus tristis*				
Baltimore oriole	*Icterus galbula*				
Brown thrasher	*Toxostoma rufum*				X
Cerulean warbler	*Setophaga cerulea*				X
Golden-winged warbler	*Vermivora chrysoptera*				X
Indigo bunting	*Passerina cyanea*				
Orchard oriole	*Icterus spurius*				
Red-headed woodpecker	*Melanerpes erythrocephalus*				X
Red-shouldered hawk	*Buteo lineatus*				X
Ruby-throated hummingbird	*Archilochus colubris*				
Reptiles					
Blanding's turtle	*Emydoidea blandingii*		State		X
Bull snake	*Pituophis catenifer sayi*			X	X
Milk snake	*Lamptopeltis triangulum*				
Plains (western) hognose snake	*Heterodon nasicus*			X	X
Prairie skink	*Plestiodon septentrionalis*				
Smooth green snake	*Opheodrys vernalis*				X
Insects					
Monarch butterfly	*Danaus plexippus*	Federal (Proposed)			X
Rusty-patched bumble bee	*Bombus affinis*	Federal			X

Abbreviations: SE = State Endangered; FE = Federally Endangered; SGCN = Species of Greatest Conservation Need

Of specific note, the federally endangered rusty-patched bumble bee, occurs within the MRG, and much of the Greenway is in the "High Potential Zone" for the rusty-patched bumblebee to occur.

Figure 22: Rusty-patched bumble bee Zones of Occurrence within the MRG, 2025



NATURAL AREA NODES – CURRENT CONDITIONS

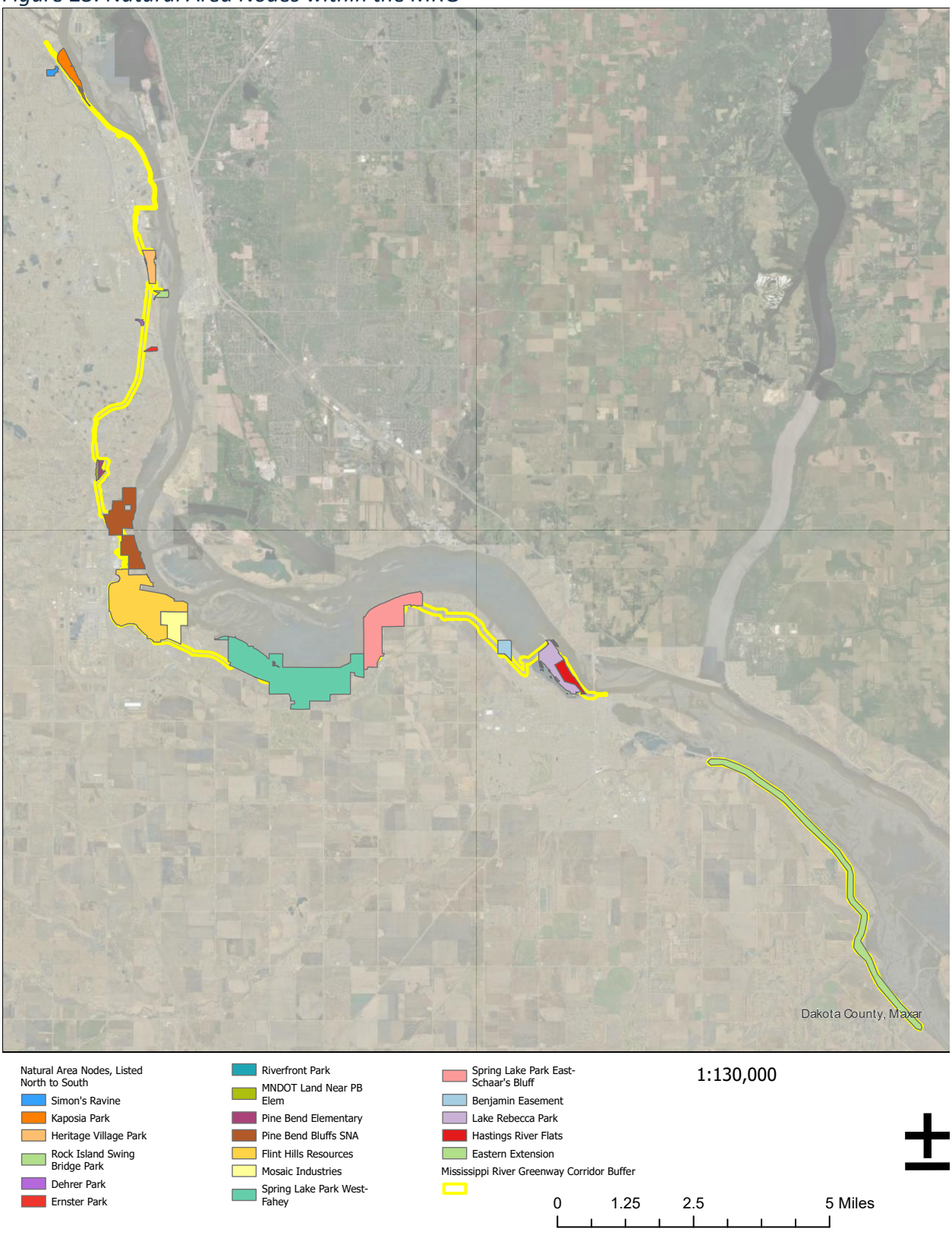
The greenway corridor was divided into 22 natural area nodes, shown in Figure 23, to organize field surveys, and characterization of plant communities was based on 1) the Minnesota Land Cover Classification System (MLCCS); 2) the *Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province,* and 3) fieldwork conducted by FMR ecologists to evaluate land cover in the MRG natural area nodes. Recommendations and prioritization considered realistic restoration goals and Dakota County priorities.

Nodes are listed in the map legend geographically, north to south.

These nodes were selected because they host existing natural areas or parks where opportunities exist to increase habitat. However, trail corridors between these nodes were also surveyed. These 4 trail corridors also became nodes in the development of the NRMP and represent additional opportunities for the creation and expansion of habitat that more fully connect the corridor that the MRG provides.

The “Eastern Extension” refers to the 7-mile addition to the MRG that Dakota County plans to build in the coming years. This extension of the MRG will reach the Goodhue County line.

Figure 23: Natural Area Nodes within the MRG



LAND COVER DATA

This natural resources management plan uses two primary data sets to characterize the property's existing land cover and identify target plant communities for restoration: the Minnesota Department of Natural Resources (MNDNR) Minnesota Land Cover Classification System (MLCCS), which integrates cultural and vegetation features of the landscape into one comprehensive land classification system, and the *Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province* (MNDNR, 2005) which identifies ecological systems and native plant community types in the state based on multiple ecological features such as major climate zones, origin of glacial deposit, and plant composition.

MLCCS consists of five hierarchical levels that are reflected in five-digit classification codes:

Level 1 - General growth patterns (e.g., forest, woodland, shrubland, etc.)

Level 2 - Plant types (e.g., deciduous, coniferous, grasslands, forbs, etc.)

Level 3 - Soil hydrology (e.g., upland, seasonally flooded, saturated, etc.)

Levels 4 & 5 - Plant species composition (e.g., floodplain forest, mesic prairie, etc.)

At the most general level, land cover is divided into either Natural/Semi-Natural cover types or Cultural cover types. The Cultural classification system is designed to identify built-up/vegetation patterns and an area's imperviousness to water infiltration. Maps of MLCCS data by city can be found in Figures 24-27.

Figure 24: MN Land Cover Classifications within 0.5 mi of MRG, South St Paul

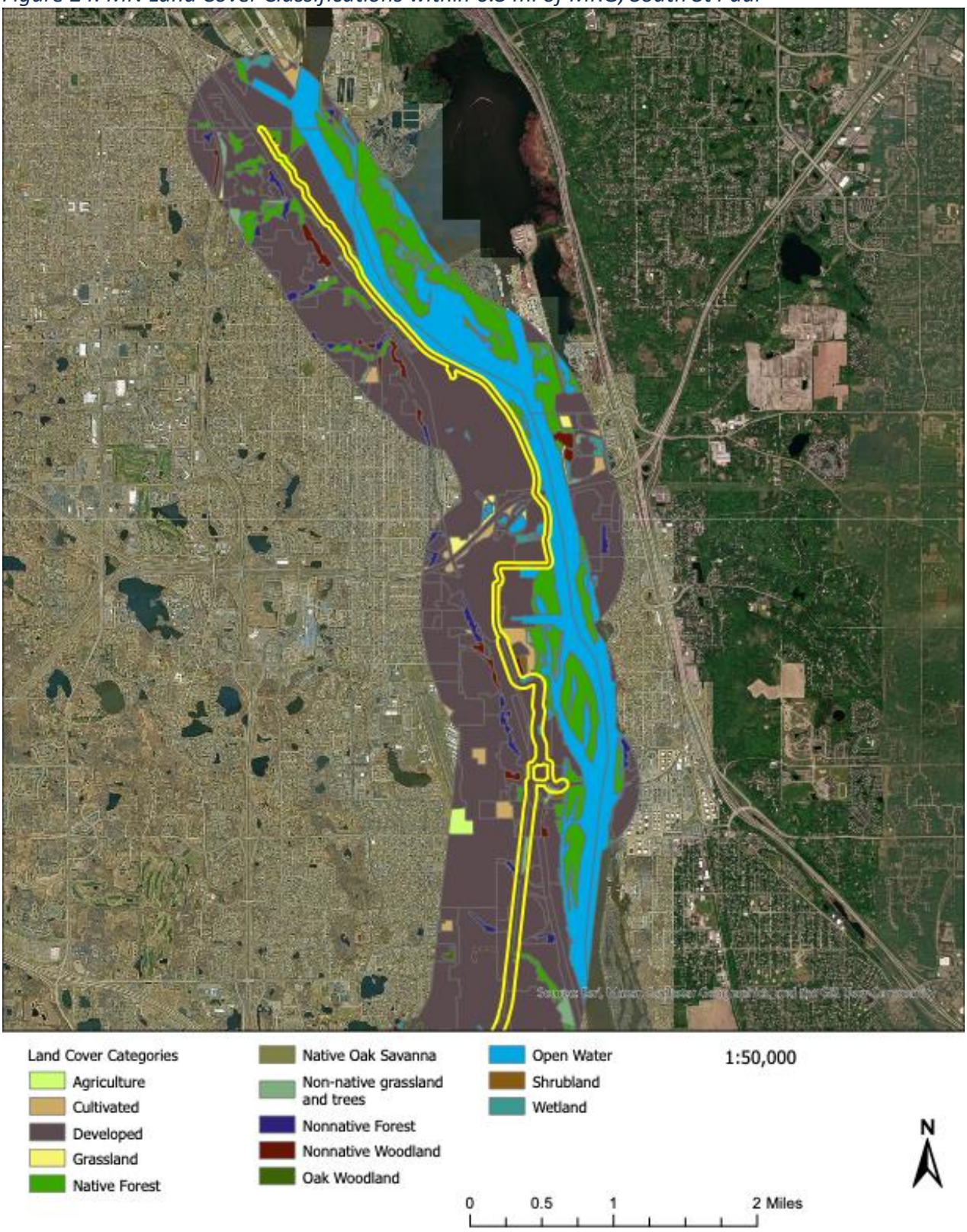


Figure 25: MN Land Cover Classifications within 0.5 mi of MRG, Inver Grove Heights

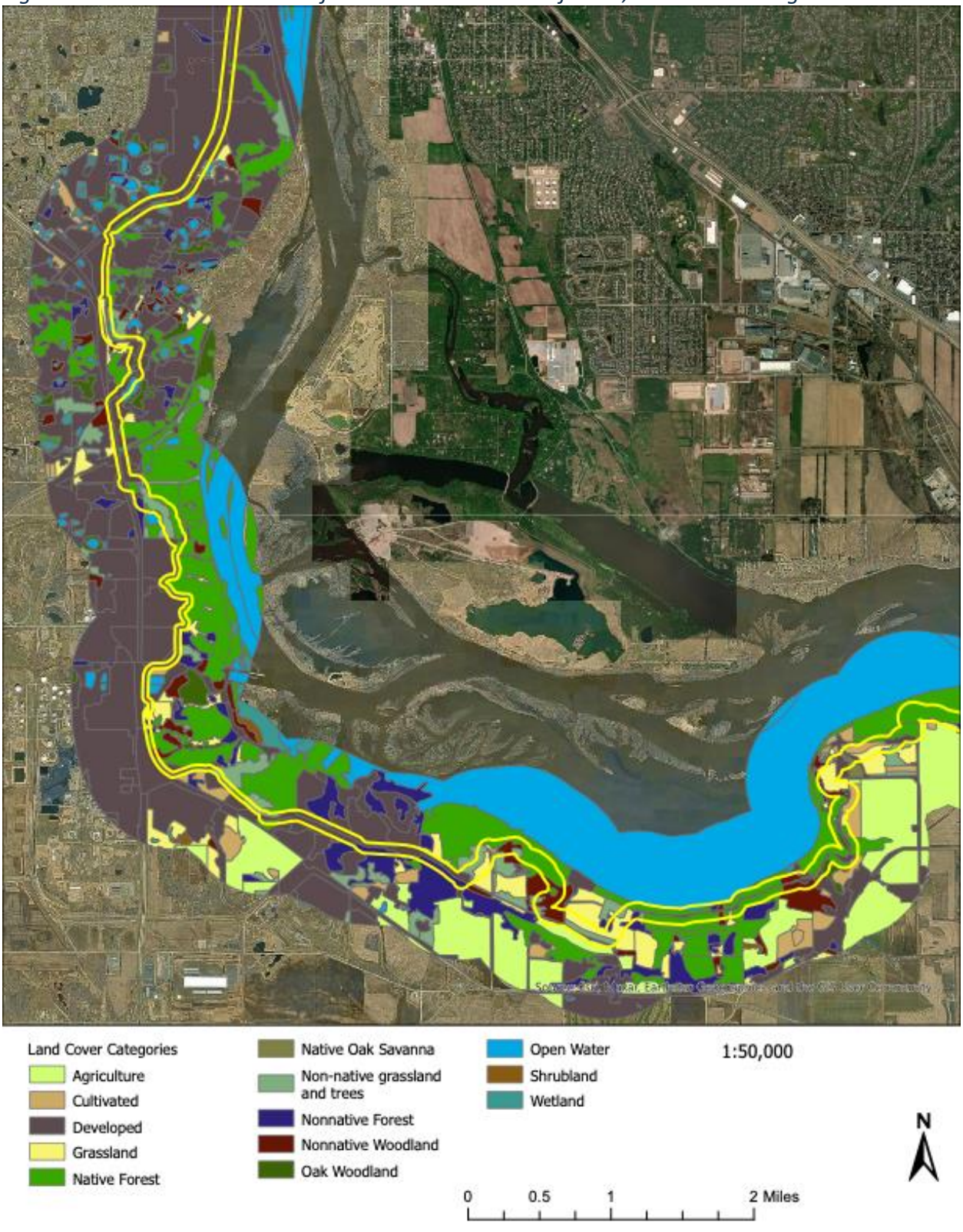


Figure 26: MN Land Cover Classifications within 0.5-mi of MRG, Nininger Twp & Hastings

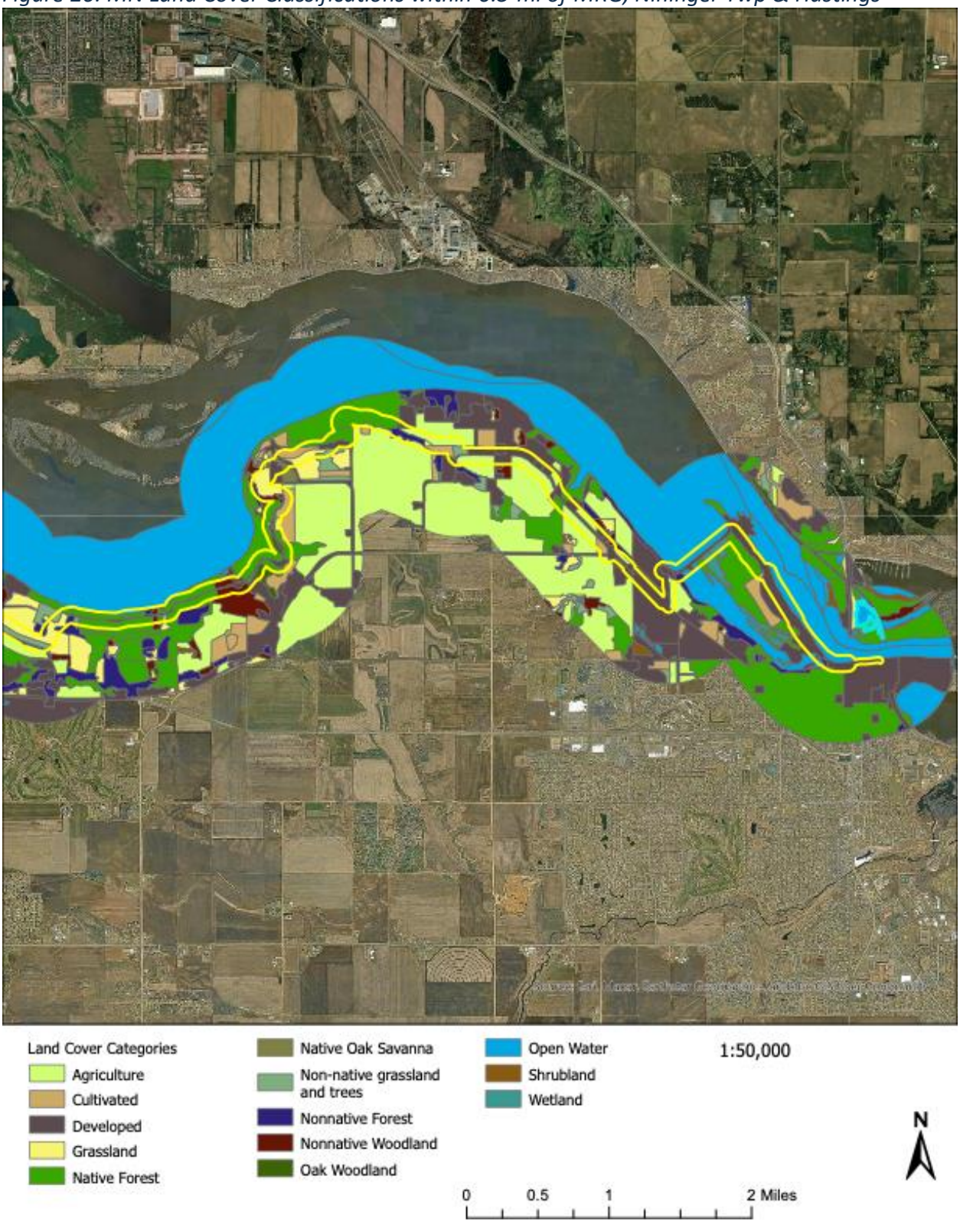
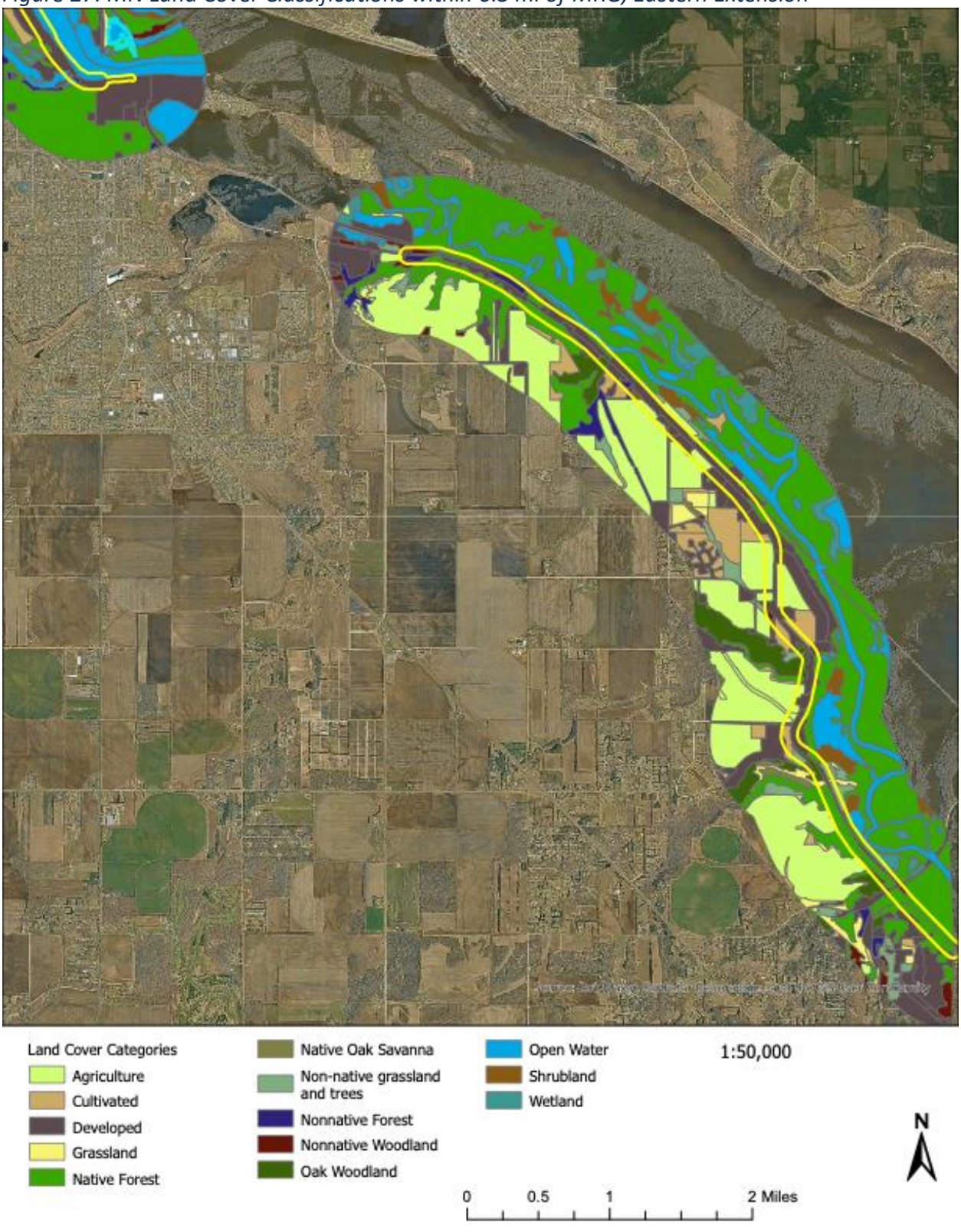


Figure 27: MN Land Cover Classifications within 0.5 mi of MRG, Eastern Extension



METHODS OF INVENTORY AND ASSESSMENT

A natural resources inventory and assessment was conducted by FMR ecologists during the summer and fall of 2024 to determine the existing plant and wildlife communities, identify opportunities for restoration, and develop guidance for long-term community use.
The MRG consists of 22 natural area nodes. An overview of the natural area nodes can be seen in Figure 23. Additionally, see Appendix E for 2024 aerial photographs of each node that show LCCMR and RAISE grants priority areas.

The following section describes each natural area node, including a summary of the current condition and a brief species list. Each unit description also includes a recommended plant community from the MNDNR Native Plant Communities Field Guide, which can be used to guide restoration. These recommendations correspond to the Recommended Native Plant Communities by Site in Table 28. This section also contains representative photos of each natural area node.

The following site-specific factors were considered when determining the target plant communities for restoration: historic conditions, existing conditions, relative effort to derive benefits, and community values. These considerations help to determine the optimal and most suitable goals for the restoration of plant communities within natural areas along the MRG corridor.

NODE 1: NORTH OF KAPOSIA LANDING

CURRENT STATE

Just north of Kaposia Landing, the Mississippi River Greenway follows very closely along the Chicago-Rock Island Railroad Company line and along a flat and degraded deciduous woodland (7.0 acres) owned by the City of South St. Paul. This woodland is dominated by large Siberian elm, with some cottonwood and patches of canopy black locust and scattered buckthorn shrubs. The groundlayer is dominated by creeping Charlie. Metal debris is present at the north end. As very little native cover remains, extensive removal of non-native trees and the debris would be required before restoration, whether with grassland or woodland native species.

Along the Greenway are short, narrow strips of native plantings, which include bergamot, hoary vervain and Virginia wild rye. Beneath the Greenway bridge crossing railroad tracks into Kaposia Landing are small, planted prairie areas on City of South St. Paul property with scattered native species, including bergamot and black-eyed Susan and extensive areas of Canada goldenrod, common burdock and stinging nettle. Continued maintenance of these existing native plantings along the Greenway trail and along the bridge to promote native species could include periodic mowing or burning, and overseeding with native grasses and a diverse forb mix.

Along the Mississippi River, east of this area, is 6.5 acres owned by Barge Channel Road Company. Cottonwoods, silver maple, and Siberian elm were visible at a distance. This area is

close to active industrial areas, and it is likely the understory is degraded. If the landowner were interested in restoring this significant riverfront location, it would warrant evaluation.

Image 1: North of Kaposia Landing forest

Table 2: Notable species observed in Node 1 (North of Kaposia Landing)

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	**Common buckthorn**	**Creeping Charlie**
Eastern cottonwood		Canada goldenrod
Black locust		**Common burdock**
		Stinging nettle
		Wild bergamot
		Black-eyed Susan

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of Siberian elm, black locust, common buckthorn, and common burdock to address Priority Issue 1 (presence of non-native, invasive species).
2) Enhancement of habitat through seeding, planting, and adaptive management to address Priority Issue 2 (absence, suppression, and poor regeneration of native species.

DESIRED FUTURE CONDITION

A reasonable trajectory for the communities in Node 1 is to work towards a B-quality mesic hardwood plant community with reduced cover of non-native/invasive species and increased cover of native trees, shrubs, and woodland understory species. Target communities to consider include several mesic hardwood systems such as Southern Mesic Oak-Basswood Forest (MHs38) or Southern Mesic Maple-Basswood Forest (MHs39). Figure 28 shows target plant communities for restoration in the nodes within South Saint Paul.

The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

In addition to work with South St. Paul through the City County Conservation Collaborative (CCCC) Program, maintenance partnerships with the City to maintain greenway plantings and restore additional natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored.

NODE 2: KAPOSIA LANDING

CURRENT STATE

Kaposia Landing is an 87-acre City of South Saint Paul, located along the Mississippi River and bounded to the north and west by the Chicago Rock Island and Pacific Railroad line. Formerly the demolition landfill Port Crosby, the site has been rehabilitated, including capping the landfill and stabilizing nearly a mile of the Mississippi River shoreline. A clean soil buffer allows for

recreational use of the site, which now hosts extensive programmed spaces, including river overlooks, a 6-acre fenced dog park, a playground, 5 athletic fields, a park building, mowed turf, paved trails, and parking lots. The MRG crosses a bridge into the park and extends south for 0.9 mile along the western boundary, between the turf of the dog park and other mowed areas to the east and along a steep fenced slope along a railway line to the west.

Habitat restoration opportunities at Kaposia Landing and adjacent to the MRG are limited. Little native vegetation exists at Kaposia Landing, and much of the acreage is either programmed or altered. Steep, long slopes on the east and west edges of the park are dominated by a mix of herbaceous species, including stinging nettle, Canada thistle and smooth brome, as well as crown vetch, common burdock and reed canary grass. To the east, along the river, are small areas of Siberian elm, sandbar willow, and a few cottonwood trees. To the west, on the slope between the Greenway and the railroad, cottonwood, silver maple, and box elder are present in small groves at the base of that slope, as well as a few black locust and Siberian elm. Although conversion to native vegetation of either of these extensively degraded slopes would be meaningful habitat improvements, this work would be quite difficult due to limited access, altered soils and a well-established seedbank of invasive and aggressive native species.

On the flat plateau in the center of the park, among loops of paved trails, are grasslands with small lobes and narrow perimeters of native plantings. These grasslands are largely dominated by smooth brome, but small portions have native species, including bergamot, common oxeye, anise hyssop, big bluestem, switchgrass, sideoats grama, bulrush, cattails, blue vervain, and sandbar willow. Invasive species to manage in these planting areas include reed canary grass, crown vetch, and Canada thistle. Converting even larger portions of these grasslands to native mesic or wet prairie would provide greater habitat value in this site.

One opportunity for habitat improvement within the Greenway corridor is the expansion of a small, somewhat formal, native planting at the Robert Piram Regional Trail map site. This planting has some native species, including culver's root and bergamot. Species needing management here include Canada thistle in the planting bed and black locust, which is present just over the fence line at this point along the Greenway trail. A portion of a large, adjoining turf area here could be planted with an upland prairie species mix to expand the native habitat in this highly visible location.

Another opportunity for habitat improvement is at the southern tip of Kaposia Landing, along the narrow stretch of degraded forested riverfront. Eastern cottonwood, silver maple, and Siberian elm form the canopy here, and the groundlayer is mostly bare, likely due to a combination of flooding and off-trail human use. Debris and garbage are present. Patches of common buckthorn are common in the upslope edges of this stretch of forested areas along the Greenway. Woody removal, combined with replanting with climate-adapted floodplain species could be considered in this relatively accessible and actively used riverfront location.

Image 2: Kaposia Landing trail edge

Table 3: Notable species observed in Node 2 (Kaposia Landing)

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	**Common buckthorn**	Culver's root
Sandbar willow		**Canada thistle**
Eastern cottonwood		**Common burdock**
Black locust		Stinging nettle
Silver maple		Wild bergamot

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of Siberian elm, black locust, common buckthorn, Canada thistle, and common burdock to address Priority Issue 1 (presence of non-native, invasive species).
2) Enhancement of habitat through seeding, planting, and adaptive management to address Priority Issue 2 (absence, suppression, and poor regeneration of native species.

DESIRED FUTURE CONDITION

A reasonable trajectory for the communities in Node 2 are to restore areas to dry prairie (UPs13), mesic prairie (UPs23), marsh (MRn93), and terrace forest (FFs59). Figure 28 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

This site presents an opportunity for partnership with South St. Paul through the CCCC Program. In addition, maintenance partnerships with the City to maintain greenway plantings and restore additional natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored.

NODE 3: SIMON'S RAVINE

CURRENT STATE

The Simon's Ravine Trailhead Area (28.7 acres, of which 12.7 were surveyed) is owned and managed by the City of South St. Paul. The trail within Simon's Ravine links the River to River Greenway from the west to the Mississippi River Greenway at Kaposia Landing to the east. Steep wooded slopes extend along a ravine with a retention pond and an underground culvert, flanked by a paved pedestrian trail that extends from along the bridge across Concord Avenue to a tunnel to the northwest in Simon's Ravine.

The south-facing forested slope has a mix of white oak, cottonwood, box elder, and hickory, with some oak wilt evident. In the central portion of this slope, zig-zig goldenrod and wood nettle are common, with bloodroot and wild geranium present. At the two ends of this slope, near and along the retaining wall near the parking lot, and at the tunnel, black locust and common buckthorn dominate.

The steep north-facing side of the ravine is a maple-basswood forest. Here, wild ginger, bloodroot and lady fern are present, but earthworm activity is also evident, with large patches of bare ground and little organic matter visible on the soil surface. On this slope near the park's lawn, black locust and common buckthorn dominate.

The drainage basin's upper edge is shrubby, with many native vines and a mix of native and non-native weedy species, including Japanese hedge parsley and crown vetch. Downslope as the basin widens, wood nettle and creeping Charlie are both common. Along the edges of the pool below the crossing bridge, wood nettle is abundant, and jewelweed and crown vetch are common, with broad-leaf arrowhead in the pool.

In 2020, Dakota County developed the River to River Greenway natural resources management plan, which identified a remnant oak savanna at the western edge of Simon's Ravine. While this area was not surveyed for this NRMP, restoration of the oak savanna is prioritized with county-secured funding (RAISE and LCCMR grants).

Image 3: Simon's Ravine basin and woodland

Table 4: Notable species observed in Node 3 (Simon's Ravine)

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
White oak	**Common buckthorn**	Zig-zag goldenrod
Eastern cottonwood		Wood nettle
Black locust		Bloodroot
Box elder		Wild geranium
Hickory		Wild ginger
		Bloodroot
		Lady fern

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of black locust and common buckthorn to address Priority Issue 1 (presence of non-native, invasive species).
2) Enhancement of habitat through seeding, planting, prescribed burning and adaptive management to address Priority Issue 2 (absence, suppression, and poor regeneration of native species.

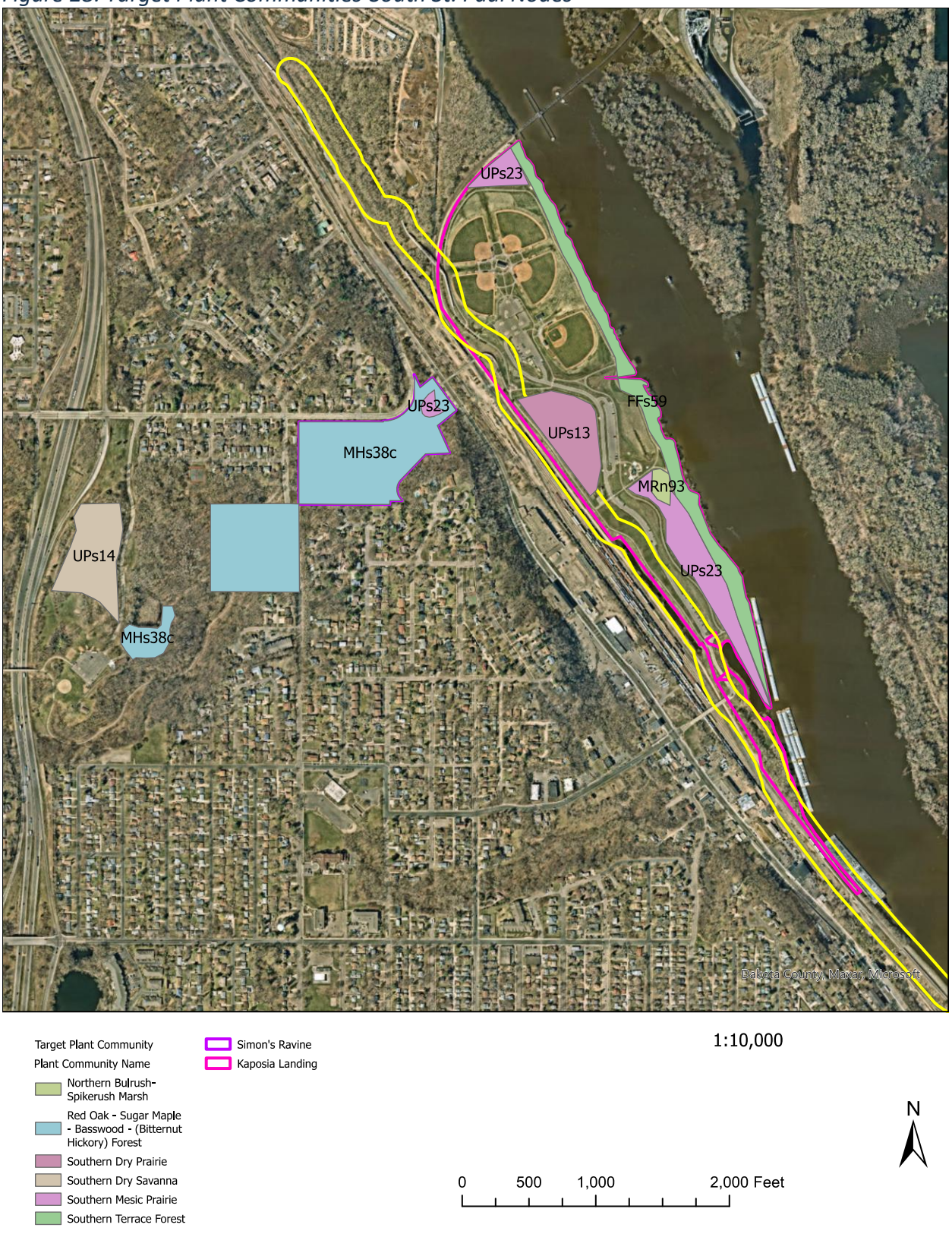
DESIRED FUTURE CONDITION

A reasonable trajectory for the communities in Node 3 is to work towards B-quality mesic hardwood plant communities with reduced cover of black locust and common buckthorn from the two forested slopes and increased cover of native trees, shrubs, and woodland understory species. Target communities to consider include several mesic hardwood systems such as Southern Mesic Oak-Basswood Forest (MHs38) or Southern Mesic Maple-Basswood Forest (MHs39) in the oak forests and Southern Dry-Mesic Oak-Hickory Woodland (FDs38) in the south-facing oak woodlands. At Simon's Ravine, invasive woody and herbaceous species require management, but significant native diversity is already present, particularly in comparison with other highly altered areas along this industrialized stretch of the MRG, making this site a valuable restoration opportunity. Replanting native woody and groundlayer species, including earthworm-resistant herbaceous species in the groundlayer, will also be needed to stabilize the steep slopes long-term. Reducing herbaceous invasive species in the basin and increasing native species there would boost pollinator habitat. Converting turf near Simon's Ravine Trailhead to small pollinator plantings would increase habitat value, decrease mowing, and serve as a community education project.

Figure 28 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

This node presents the opportunity for partnership with South St. Paul through the CCCC Program. In addition, maintenance partnerships with the City to maintain greenway plantings and restore additional natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored.

Figure 28: Target Plant Communities-South St. Paul Nodes



NODE 4: HERITAGE VILLAGE AND ROCK ISLAND SWING BRIDGE PARKS

CURRENT STATE

Heritage Village Park is a 64-acre City of Inver Grove Heights Park that was formerly contaminated railway land. The park consists of large blocks of restored grassland, a few small wet basins, a stretch of floodplain forest and marsh along the Mississippi River, and small areas of wooded and mixed cover. A large, fenced dog park and programmed park space are also present. The MRG winds through the grassland and along two wet basins through the park and then splits into two paths near the south end of the park, heading southwest to Concord Avenue, southeast to Doffing Avenue, and south to Swing Bridge Park.

The City of Inver Grove Heights manages this park. FMR is providing a 2025 update to the site's 2005 management plan, making recommendations for the site's individual work units. A few highlights are shared here, focusing on particular challenges and opportunities immediately along the Greenway.

Much of the Greenway's route in Heritage Village Park is through grassland dominated by big bluestem, golden grass *(Sorghastrum nutans)* and switchgrass. Only small amounts of prairie forbs are present, located mostly along the Greenway's edge.

The Greenway passes a central wet basin composed of a cattail marsh with a narrow perimeter of Canada goldenrod, cup plant, and giant goldenrod, and an adjoining slope has sandbar willow and a small patch of common buckthorn. The rest of the perimeter of the basin is composed of grassland areas that include golden grass, switchgrass and big bluestem, but with varying levels of weediness.

The South St. Paul Rod and Gun Club owns the land beyond the northern boundary of the park. This slope has a few scattered red oaks, Siberian elm, and blue spruce, with a dense cover of absinthium in the ground layer. Converting this area to native grass cover would provide a buffer to complement the grassland restoration underway in Heritage Village Park, if this landowner were interested.

Between Heritage Village and Swing Bridge Parks, the Greenway follows a trail loop around a block of several commercial properties owned by BFI, Inc. The City of Inver Grove Heights owns a portion of the block along Doffing Avenue and includes a stand of native grassland dominated by big bluestem and golden grass. This grassland has been included in past prescribed burns.

Swing Bridge Park is a 35-acre City of Inver Grove Heights Park consisting of a large area of floodplain forest and lowland hardwood forest, prairie and savanna undergoing restoration, steep slopes along a former railroad levee, a very small wet prairie, and a small altered wooded slope along an inlet of the Mississippi River. Developed areas include a parking lot, park building and paved trails. The primary recreational attraction is the historic Swing Bridge along the Mississippi River.

The City of Inver Grove Heights manages this park, and FMR is providing a 2025 update to the park's 2012 management plan, making recommendations for individual work units. A few highlights are shared here, focusing on particular challenges and opportunities immediately along the Greenway.

The MRG corridor includes the western portion of the park, much of which is developed. The managed areas within the corridor include prairie, two steep altered levee slopes, and a wet prairie planting near the park building. Big bluestem, golden grass, and Canada goldenrod are well-established in the prairie, but common buckthorn is present here and, especially on the adjoining south-facing levee slope.

The north-facing levee slope has been undergoing restoration with native prairie species and has patches of bergamot, small amounts of several other native forbs, and just a few grasses, but a mix of invasive herbaceous species, including crown vetch and spotted knapweed, dominates the slope. This is a particularly difficult site due to the steep slopes, north aspect, and altered soils.

The wet prairie has several native species, including sawtooth sunflower and spotted Joe Pye weed, as well as large amounts of Canada goldenrod and very small amounts of purple loosestrife.

The Greenway corridor includes two private properties that adjoin the Park. One of these is an altered deciduous forest to the south of the Greenway. This forest is in a drainage basin, with a canopy of box elder, black locust, and red oak, and a dense understory growth of common buckthorn.

The other private land within the Greenway corridor at Swing Bridge Park is a woody edge on the west end of the park's north boundary, along a short, steep slope of an inlet of the Mississippi River. This private land adjoins parkland to the east, along the same short steep slope, where common buckthorn also dominates.

Image 4: Heritage Village Park trail edge

Image 5: Rock Island Swing Bridge Park trail edge

Table 5: Notable species observed in Node 4 (Heritage Village and Rock Island Swing Bridge Parks).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Box elder Red oak **Black locust**	**Common buckthorn**	Big bluestem Golden grass Switchgrass **Spotted knapweed** **Crown vetch** **Reed canary grass** **Creeping miscanthus** Canada goldenrod Wild bergamot

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of common buckthorn, spotted knapweed and crown vetch to address Priority Issue 1 (presence of invasive species).
2) Enhancement of plant communities through seeding, planting, prescribed burning, and adaptive management to address Priority Issue 2 (poor native species regeneration).

DESIRED FUTURE CONDITION

A reasonable trajectory for the plant communities in Node 4 is to work towards higher quality native plant communities with reduced cover of non-native/invasive species and increased cover of native species as opportunities arise. Target communities to consider include Southern Wet Mesic Hardwood Forest (MHs49) and Southern Terrace Forest (FFs59) in currently wooded areas and Southern Dry Prairie (UPs13) and Southern Mesic Prairie (UPs23) in currently open, prairie areas.

Programmed park space, by nature, includes many cover types. Within Heritage Village Park, significant progress toward the restoration of grassland native plant communities has been made, with some enhancement of these areas needed. However, invasive species dominate in the small basins near the MRG, and more targeted management is needed. A key management task in the grasslands is to limit woody encroachment of Siberian elm and eastern cottonwood and control patches of herbaceous invasives, particularly crown vetch and bird's-foot trefoil. Spot mowing, spot spraying and prescribed fire, followed by overseeding to increase native grass cover in treated areas, is recommended. Overseeding a diverse mix of native forbs, post-fire, in key areas along the MRG will help increase pollinator resources and visual interest for park users. In the wet basins, management is focused on using herbicide to control the various invasive species, including creeping miscanthus, crown vetch, common buckthorn, and others.

Other priorities for management along the Greenway include restoring a small wet basin at the north end of the park where reed canary grass and crown vetch are dominant. The conversion to prairie of two weedy grassland areas near and beneath power poles in the center and southern ends of the park should also be prioritized. Turf adjoining a small native stormwater planting in the park's south end, near the dog park parking lot, could be converted to prairie, reducing mowing requirements, providing pollinator resources and creating visual interest. In the future, forbs could be overseeded, post-burn, along the grassland perimeter to add pollinator resources and create visual interest for Greenway users.

Within Rock Island Swing Bridge Park to the south, key management should target increasing the abundance of native prairie species. This management should include continued prescribed fire, control of invasive species, overseeding and small plantings. For both levee slopes, a mix of rhizomatous and aggressive native forb species, such as prairie sage and prairie coreopsis, should be used for stabilization and better native plant cover. Control of purple loosestrife and Canada goldenrod will allow prairie species here to thrive and spread. Prescribed burning followed by overseeding with a diverse seed mix will help continue to increase diversity. In the wet-mesic and terrace forests of the park that receive flood flows, due diligence should be made to detect new invasive species populations transported to the site during high water events and to manage these in a timely manner. While enhancement seeding can be challenging because new seedlings are likely to be inundated by floodwater, planting deep-rooted plugs and bare-root trees and shrubs with browse protection in the wet forests would boost diversity and improve habitat.

In the wooded areas along the MRG, removal of woody invasive vegetation and restoration with native woody species would be complex, given the total area and the topography, which forms a bowl between two sets of paved trails in the park. However, restoration here, even in phases, would lessen a significant seed source of woody invasive species that are a continued management issue in Swing Bridge Park.

Figure 29 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

Together, these Parks are included in a County CCCC Program and Joint Powers Agreement (JPA) with the City of Inver Grove Heights, and will undergo restoration planned for 2025-2028. Friends of the Mississippi River (FMR) and the County will partner on restoration implementation at the sites. In addition, future maintenance partnerships with the City to maintain greenway plantings and restore additional natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored.

NODE 5: TRAIL SECTION: ROCK ISLAND SWING BRIDGE TO DEHRER PARK

CURRENT STATE

The trail corridor south of Rock Island Swing Bridge Park, extending approximately one-half mile to Dehrer Park, is flanked by mixed residential and commercial properties along Concord Boulevard and four vacant parcels totaling approximately 11 acres owned by the City of Inver Grove Heights Economic Development Authority. The understory of these mixed deciduous woodlands is dominated by buckthorn, and the exposed and disturbed areas of these slopes have a handful of native grassland species and might be considered opportunities for habitat enhancement, but there are barriers. The future use of these parcels is undetermined, and restoration may conflict with or be negated by infrastructure that could be sited on the parcels. In addition, the topography of these parcels drops off significantly toward the east, with an elevation change of nearly 50 feet sloping towards the Mississippi River. Habitat improvements within this stretch of the Greenway are better sited on public land, such as city parks, where future low-impact use is more certain, and this node is therefore deprioritized for restoration and habitat improvement.

A large island just south of Rock Island Swing Bridge Park is privately owned. This presents an opportunity to undertake some level of floodplain forest management if the private landowners could be engaged.

Image 6: Trail edge between Rock Island Swing Bridge Park and Dehrer and Ernster Parks

Table 6: Notable species observed in Node 5 (Rock Island Swing Bridge to Dehrer Park).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Green ash American elm **Siberian elm** **Black locust**	**Common buckthorn** **Tatarian honeysuckle**	**Crown vetch** **Bird's-foot trefoil** **Smooth brome** Big bluestem Little bluestem Wild bergamot

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of Siberian elm, black locust, common buckthorn, Tatarian honeysuckle, crown vetch, bird's-foot trefoil and smooth brome in targeted areas to address Priority Issue 1 (presence of invasive species) as opportunities to arise to improve plant communities and habitat conditions.
2) Potential enhancement of plant communities through seeding, planting, and adaptive management to address Priority Issue 2 (poor native species regeneration) when opportunities arise.

DESIRED FUTURE CONDITION

A reasonable trajectory for the plant communities in Node 5 is to work towards higher quality native plant communities with reduced cover of non-native/invasive species and increased cover of native species as opportunities arise. Target communities to consider include Southern Wet Mesic Hardwood Forest (MHs49) and Southern Terrace Forest (FFs59) in currently wooded areas and Southern Dry Prairie (UPs13) and Southern Mesic Prairie (UPs23) in currently open prairie areas.

Figure 29 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

In addition to work with Inver Grove Heights through the CCCC Program, maintenance partnerships with the City to maintain greenway plantings and restore additional trailside natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored.

NODE 6: DEHRER PARK

CURRENT STATE

Dehrer Park is a City of Inver Grove Heights neighborhood park with approximately 2.3 acres of mown turf/park open space and 2.5 acres of altered/non-native deciduous forest. The mown turf is a wide expanse of grass without other cover types or park amenities. The deciduous forest is within a steep ravine that is part of a larger stormwater conveyance and ravine system east of Dawn Avenue in the 70th Street watershed. A 2005 roadway improvement and drainage project installed riprap and erosion control fabric along the banks of the ravine, which is still present 20 years later. The ravine is a location for both illegal dumping and a former encampment. Understory vegetation is severely lacking in the forested areas with buckthorn and Tatarian honeysuckle creating dense shade. The perimeter of the ravine is dominated by Siberian elm and reed canary grass. Black locust is also present in the overstory, and seedlings are present.

Adjacent land use to the north, west, and south is residential, and Concord Blvd creates the eastern boundary of the park. Two parcels owned by the City of Inver Grove Heights are located to the southwest of Dehrer Park, between the railroad and River Road, each about 4 acres in size. (PID 200110025041 and 20110025030.) This land could be managed to establish native plant communities, thus creating a small habitat corridor and creating a buffer for restoration within Dehrer Park itself.

Image 7. Dehrer Park ravine bottom

Table 7: Notable species observed in Node 6 (Dehrer Park).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Black walnut	Black caps raspberry	**Creeping Charlie**
Siberian elm	**Siberian elm**	**Common burdock**
Bur oak	**Black locust**	**Japanese hedge parsley**
Black locust	**Common buckthorn**	**Crown vetch**
	Tatarian honeysuckle	**Spotted knapweed**
		Garlic mustard

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of common buckthorn, Tatarian honeysuckle, black locust, Siberian elm, and several herbaceous invasive species to address Priority Issue 1 (presence of invasive species).
2) Enhancement of habitat through seeding, planting, and adaptive management to address Priority Issue 2 (poor native species regeneration).
3) Conversion of portions of unused turf areas to native plant community cover, such as midheight mesic prairie, to increase habitat diversity. The use of this open space should be ascertained, which would inform the extent to which the turf areas could be converted to native plant habitat.

DESIRED FUTURE CONDITION

A reasonable trajectory for the altered deciduous forest in Node 6 is to work towards a B-quality mesic hardwood plant community with reduced cover of non-native/invasive species and increased cover of native trees, shrubs, and woodland understory species. A reasonable trajectory in the turf areas is to work towards a mesic prairie with mown trails throughout and to gradually suppress non-native species with targeted management. Target communities to consider for the forested areas include mesic hardwood systems such as Southern Mesic Oak-Basswood Forest (MHs38) or Southern Mesic Maple-Basswood Forest (MHs39). Target communities to consider for the mown areas include Southern Dry Prairie (UPs13) or Southern Mesic Prairie (UPs23).

Figure 29 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

Dehrer Park presents an additional CCCC opportunity with Inver Grove Heights, though its small size points to restoration and maintenance of its natural areas either through City staff, CCMI or other crews, or outside partnerships with NGOs or other entities.

NODE 7: ERNSTER PARK

CURRENT STATE

Ernster Park is a City of Inver Grove Heights neighborhood park with approximately 1.5 acres of mown turf park open space, 4.0 acres of programmed park space, and 1.9 acres of oak forest and naturalized trail edges. The open space and programmed areas appear to be well-used by the community, and this NRMP does not contemplate conversion of those areas to native plant communities. The oak forest that rings the eastern edge of the park and continues down an east-facing slope toward the river is poised for invasive species management, native plant community restoration, and slope stabilization. The shrub layer of the oak forest is dominated by common buckthorn, and the dense shade and soil conditions created by this cover have led to a sparse and weedy herbaceous layer. Social trails traversing the slope in the woodland have exacerbated poor herbaceous vegetation conditions, leading to slope erosion.

Ernster Park and Riverfront Park to its east appear to be the sites of a former channel to or tributary of the Mississippi. The paved road connecting the parks is in a steep ravine, and it can be assumed that water will continue in this flow path over time. This condition emphasizes the importance of slope stabilization and consistent, deep-rooted herbaceous vegetation to prevent erosion and stabilize soils.

The invasive plant, wild parsnip, is present along the trail corridor adjacent to 77th Street E. This plant contains furocoumarins, which can make skin sensitive to light, a condition known as phytophotodermatitis, causing severe burns and blisters. The plants at Ernster Park appeared to have been treated with herbicide in 2024, and this practice should continue to prevent its spread and reduce the threat to people.

Image 8. Ernster Park eroded social trail

Table 8: Notable species observed in Node 7 (Ernster Park).

TREES	SHRUBS, SHRUBBY VINES	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
White oak	**Common buckthorn**	**Motherwort**
Red oak	**Riverbank grape**	**Common buckthorn**
Bur oak		**Common burdock**
		Reed canary grass
		Wild parsnip
		Virginia creeper
		Poison ivy
		Garlic mustard

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Opportunities: manage invasive woody species, establish herbaceous understory, consider the conversion of mown turf to native cover.
2) Reduction or elimination of common buckthorn, Tatarian honeysuckle, black locust, Siberian elm, smooth brome, and several herbaceous invasive species to address Priority Issue 1 (presence of invasive species).
3) Enhancement of habitat through seeding, planting, and adaptive management to address Priority Issue 2 (poor native species regeneration) and stabilize steep slopes.
4) Conversion of portions of trail edges to native plant community cover, such as midheight mesic prairie, to increase habitat diversity.

DESIRED FUTURE CONDITION

A reasonable trajectory for the altered deciduous forest in Node 6 is to work towards a B-quality mesic hardwood plant community with reduced cover of non-native/invasive species and increased cover of native trees, shrubs, and woodland understory species. A reasonable trajectory in the naturalized trail edges is to work towards a mesic prairie in lobes where native plants are established and to gradually suppress non-native species with targeted management. Target communities to consider for the forested areas include mesic hardwood systems such as Southern Mesic Oak-Basswood Forest (MHs38) or Southern Mesic Maple-Basswood Forest (MHs39). Target communities to consider for the trails edges include Southern Dry Prairie (UPs13) or Southern Mesic Prairie (UPs23).

Figure 29 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

Ernster Park presents an additional CCCC opportunity with Inver Grove Heights, though similar to Dehrer Park, its small size points to restoration and maintenance of its natural areas either through City staff, CCMI or other crews, or outside partnerships with NGOs or other entities.

NODE 8: RIVERFRONT PARK

CURRENT STATE

Riverfront Park is a City of Inver Grove Heights neighborhood park with a half-acre of mown turf park open space and programmed space with scattered trees and 4.8 acres of degraded terrace forest. The open space and programmed areas are well-used by the community for picnicking and accessing the river for angling, and conversion of those areas to native plant communities is not contemplated by this NRMP. The degraded terrace forest that sits above the Mississippi River extends for approximately 1,000 feet along the river and across River Road, which bisects the park from north to south. This forest is severely degraded by a very dense buckthorn understory and weedy herbaceous plants such as crown vetch and bird's- foot trefoil. Because this small park attenuates the river's floodwaters, bank stabilization with root wads or similar vegetative armoring should be considered to protect the bank and the park itself from damage during high water periods.

At the north end of the park, the river is well-connected to its floodplain and terrace forest. During a wet summer in 2024, there was evidence of flood flows in the floodplain with both driftwood and smaller debris on the sandy riverbank. A large stormwater outlet is also located within the floodplain at the north end of the park. Although this area is mostly vegetated with mown turf grasses, the topography and surrounding forest appear to provide good flood management.

Just south of this connected floodplain area outside of the programmed areas of the park, the topography changes dramatically, and the river becomes disconnected from its floodplain and terrace forest. The top of the bank drops approximately 22 feet to the river, creating a very steep embankment that high river flows have further undercut. In addition to the bank erosion from moving water, the herbaceous understory vegetation on the top of the bank is lacking, causing additional soil loss. Buckthorn cover and soil degradation by invasive earthworms appear to be the cause of this poor condition. Buckthorn removal and invasive herbaceous species management, followed by shrub planting and seeding, would greatly improve the vegetation condition here and prevent future erosion. False indigo is present on the riverbank within the park and would be an excellent replacement planting after buckthorn removal.

Image 9: Riverfront Park floodplain

Table 9: Notable species observed in Node 8 (Riverfront Park).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
White oak	**Common buckthorn**	Poison ivy
Northern white cedar	Riverbank grape	Common ragweed
American basswood	Common sumac	**Crown vetch**
Bur oak		
Black willow		

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction or elimination of common buckthorn and several herbaceous invasive species to address Priority Issue 1 (presence of invasive species).
2) Enhancement of habitat through seeding, planting, and adaptive management to address Priority Issue 2 (poor native species regeneration). Specifically, planting and

establishing a canopy of eastern cottonwood and various willows would diversify the tree composition and provide improved habitat.

3) Installation of root wads or similar vegetative armoring to protect the riverbank during high water conditions.

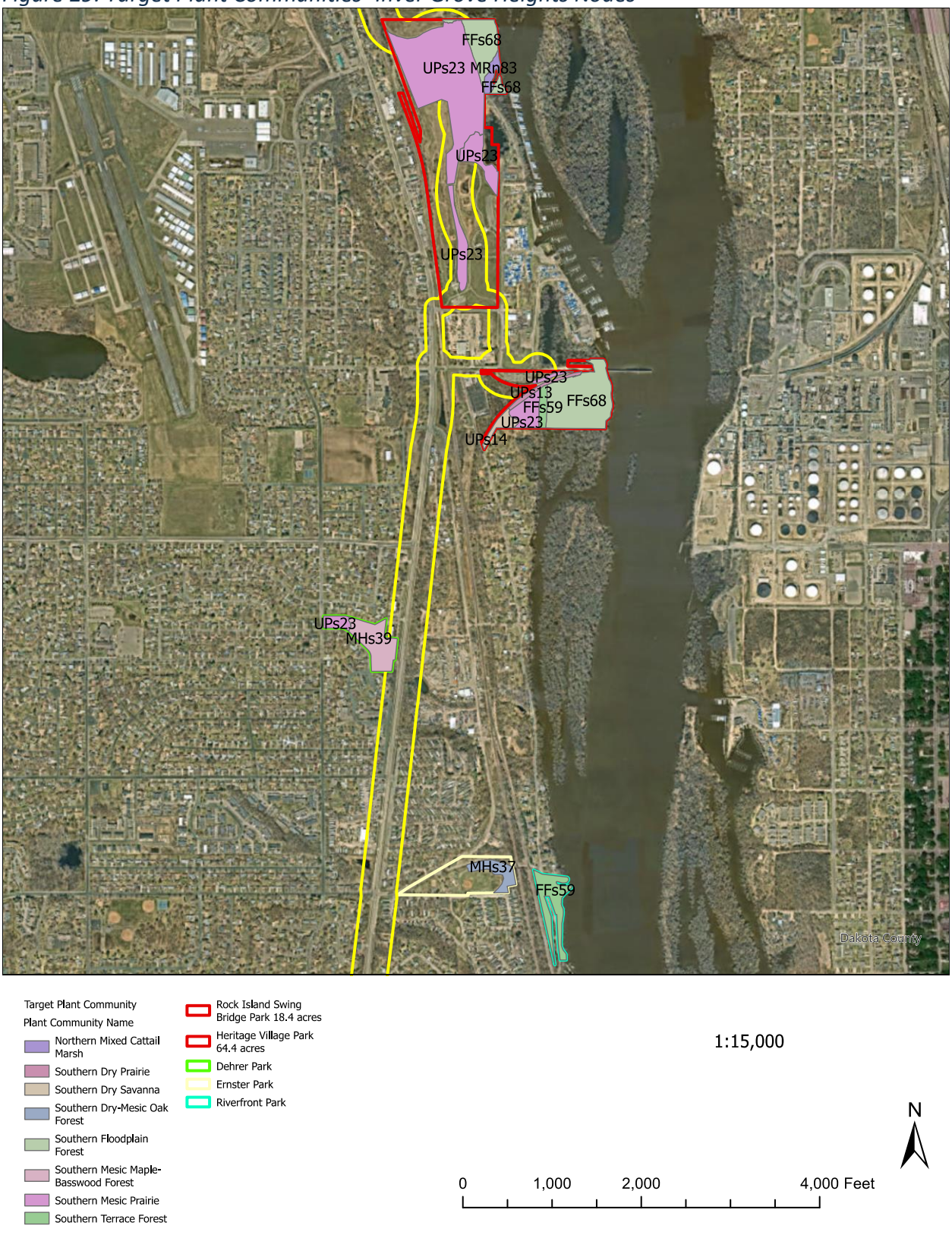
DESIRED FUTURE CONDITION

A reasonable trajectory for the altered deciduous forest in Node 8 is to work towards a B-quality terrace forest plant community with reduced cover of non-native/invasive species and increased cover of native trees, shrubs, and woodland understory species. The target community to consider for Node 8 is Southern Terrace Forest (FFs59).

Figure 29 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

Inver Grove Heights has approached the County about the inclusion of Riverfront Park as a future CCCC site. If it does not meet the CCCC criteria, future maintenance partnerships with the City to maintain greenway plantings and restore additional natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored. In addition, its presence along the river may present opportunities for restoration parnerships with NPS and other NGO entities.

Figure 29: Target Plant Communities- Inver Grove Heights Nodes



NODE 9: TRAIL SECTION: ERNSTER PARK TO PINE BEND BLUFFS SNA

CURRENT STATE

The trail corridor that runs between Ernster Park and Pine Bend Bluffs SNA is highly varied. The northernmost section of the corridor is highly industrialized, with narrow trail edges of mowed turf. Traveling south, the trail enters residential areas where it is co-located on neighborhood sidewalks with grassy boulevards in its corridor. The southernmost section of the MRG in this node is the most naturalized, with road and trail rights-of-way in low- to moderate-quality native cover. These areas were likely seeded with basic but native seed mixes following construction. A pocket of native habitat is present on the Pine Bend Elementary property and within its school forest, and although FMR ecologists only observed the site from the trail, the species observed, including turtlehead, cardinal flower, and white oak, indicate potentially remnant wet meadow and oak woodland plant communities.

Because of the degree of development and the narrow trail corridor south of Ernster Park, there are no meaningful natural resource restoration opportunities for these 2 miles of the MRG. As the trail moves east on Cahill Avenue and runs parallel to U.S. Highway 52 northbound, nearing Pine Bend Elementary School, the corridor is wider. It would support natural areas restoration and enhancement. The road right-of-way, owned and managed by the Minnesota Department of Transportation, has naturalized cover with some native prairie species. Invasive species, such as spotted knapweed, dominate, but the area is significant enough to embark on a conversion to a simple native plant community.

It should be mentioned that at the time of writing this plan, River Heights Park, a nearby city park, was in its third year of prairie/savanna restoration, being managed by FMR. Also, the nearby large site at Macalester College's Catherine Ordway Field Station, an important natural area and core habitat, was not included in this plan since it did not intersect with the MRG.

Access constraints did not allow for a growing season site visit to the Pine Bend Elementary property or the adjacent school forest by FMR ecologists in 2024. However, Dakota County staff were able to visit the site in March 2025 and found good-quality oak savanna or oak woodland habitat, including mature bur, white, and red oaks dominating the canopy and black cherry, quaking aspen, paper birch, honey locust, and black walnut also present. Common buckthorn, Tatarian honeysuckle, gray dogwood, and ash seedlings make up a dense shrub layer, and it is assumed that the site has not had prescribed fire in many years. Once understory invasive species are managed, sight lines would be opened, and the vistas from this location would be quite nice because the school is at a higher vantage point than the surrounding landscape. School staff indicated a high level of interest in restoration and expanding an existing trail network, and this site should be prioritized for future restoration funding.

Image 10: MNDOT land along MRG corridor

Table 10: Notable species observed in Node 9 (Trail section Ernster to Pine Bend Bluffs SNA).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Bur oak	**Common buckthorn**	**Spotted knapweed**
White oak	**Tatarian honeysuckle**	**Smooth brome**
Red oak	Gray dogwood	**Kentucky bluegrass**
Black cherry	Green ash	Big bluestem
Quaking aspen	Missouri gooseberry	Little bluestem
Paper birch	Black caps raspberry	Side oats grama
Honey locust		Turtlehead
White pine		Cardinal flower
Red pine		
Black walnut		

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1. Herbaceous invasive species management and plant community enhancement in the Highway 52 ROW to address Priority Issue 1 (presence of invasive species) and Priority Issue 2 (poor native species regeneration).
2. Management of common buckthorn and Tatarian honeysuckle in the Pine Bend Elementary oak woodland to address Priority Issue 1 (presence of invasive species).
3. Enhancement of oak woodland plant communities in the Pine Bend Elementary woodland through adaptive management, planting, and reintroduction of prescribed fire to address Priority Issue 2 (poor native species regeneration).
4. Engagement of school staff, students, and families to implement restoration on the property that is suitable for volunteers.

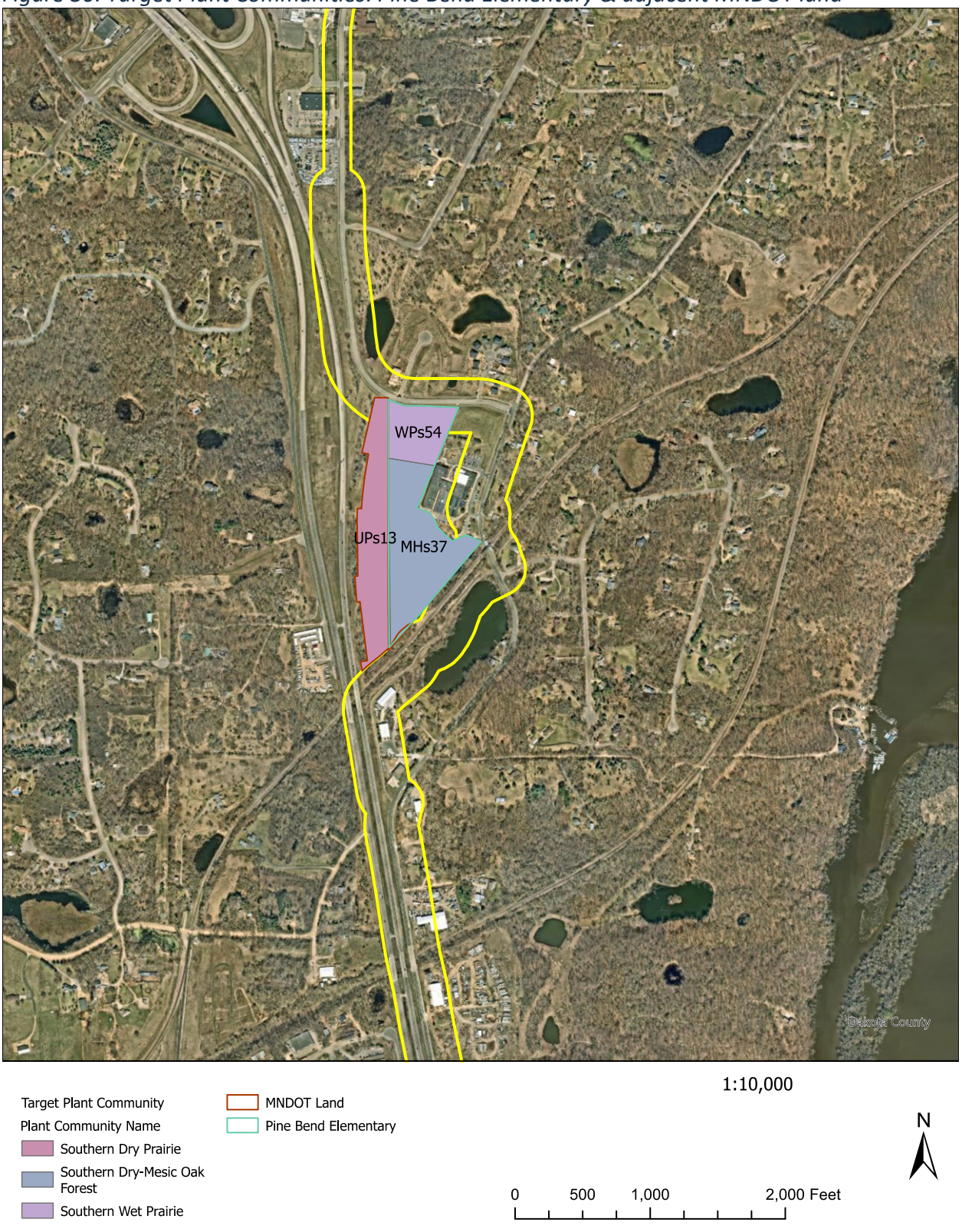
DESIRED FUTURE CONDITION

Improved future conditions in this node are limited to the U.S. Highway 52 ROW and the Pine Bend Elementary property based on opportunities. A reasonable trajectory is to improve the quality of the existing native plant communities through invasive species management, supplemental planting, and prescribed fire. Target plant communities consist of Southern Mesic Prairie (UPs23) and Southern Dry-Mesic Pine-Oak Woodland (FDs27).

Figure 30 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

In addition to the other CCCC sites in the City, future maintenance partnerships with the City to maintain greenway plantings and restore additional natural areas, either through City staff, CCMI or other crews, or greenway cost-share programs, should be explored.

Figure 30: Target Plant Communities: Pine Bend Elementary & adjacent MNDOT land



NODE 10: PINE BEND BLUFFS SCIENTIFIC AND NATURAL AREA (SNA)

CURRENT STATE

The trail corridor runs through Pine Bend Bluffs Scientific and Natural Area (SNA). The entire SNA is 256-acres of public land that is owned by the MNDNR. The corridor is situated on top of the bluff, bisecting a restored mesic prairie, then skirting the parcel boundary between oak woodland to the east and heavy industry to the west. A new trail head building with a parking lot, bathrooms, a drinking fountain, picnic tables, trash cans, and a bike repair station was built in 2017.

There are opportunities to partner with the MNDNR for management and enhancement of natural areas within the trail corridor in three main areas. First, in the mesic restored prairie units. Currently, they are dominated by big bluestem, Indian grass, and brambles. Forbs including rattlesnake master, white wild indigo, and bottle gentian are peppered throughout the area. However, woody encroachment of nonnative invasive species including Tatarian honeysuckle and common buckthorn, as well as quaking aspen, is beginning to establish along the edges. Tree and shrub removal would drastically increase the ability to manage the marginal areas around the restored prairie with prescribed fire.

Second, the stormwater features around the trailhead building have significant populations of invasive species including spotted knapweed, bird's-foot trefoil, and Canada thistle. There is good establishment of native species such as prairie rose, stiff goldenrod, anise hyssop, and little bluestem as well. Continued monitoring and management of invasive species populations in these areas will help prevent their spread into high-quality remnants.

Third, there are higher-quality oak woodlands along the trail corridor south of the SNA. When the trail was put in, the county planted native trees along the corridor, including red oak, ironwood, bitternut hickory, bur oak, and musclewood. Tree tubes were never removed and are now beginning to impede the growth of the established trees. Removal of these tree tubes would ensure this planting continues to succeed.

Image 10: Restored mesic prairie along trail corridor at Pine Bend Bluff SNA.

Table 11: Notable species observed in Node 10 (Pine Bend Bluff SNA).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Red oak	Brambles	Indian grass
Bur oak	Red osier dogwood	Big bluestem
Quaking aspen	Staghorn sumac	Canada goldenrod
Black cherry	**Common buckthorn**	**White snakeroot**
Green ash (dead)	**Tatarian honeysuckle**	**Bird's-foot trefoil**
Boxelder	Quaking aspen (saplings)	**Crown vetch**
	Green ash (saplings)	Yellow coneflower
		Monarda
		Rattlesnake master

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor – see 2013 NRMPs.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Management of Tatarian honeysuckle, common buckthorn, quaking aspen, smooth sumac, red osier dogwood, and other woody encroachment adjacent to mesic prairie to promote Priority Feature 2 (restored native plant communities) and address Priority Issue 1 (presence of invasive species) as opportunities to arise to improve plant communities and habitat conditions.
2) Enhancement of oak woodland plant communities through adaptive management, planting, and removal of old tree protection to promote Priority Feature 1 (remnant native plant communities) and address Priority Issue 2 (poor native species regeneration).

DESIRED FUTURE CONDITION

Nearly all areas in Node 10 are currently native plant communities, aside from infrastructure and utility corridors. A reasonable trajectory is to maintain or improve the quality of the native plant communities. This consists of reducing cover of non-native/invasive species, maintaining a consistent disturbance regime, and increasing cover of native species as opportunities arise. Target plant communities consist of Southern Mesic Prairie (UPs23) and Southern Dry-Mesic Pine-Oak Woodland (FDs27).

Figure 31 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

MNDNR partners with FMR to restore and enhance natural areas at Pine Bend Bluffs SNA. This partnership has been in place since the SNAs protection and FMR has committed to longerm partnership at the site. However, future maintenance partnerships with the DNR and FMR to maintain greenway plantings and restore additional natural areas, either through DNR staff, CCMI or other crews, or greenway cost-share programs, should be explored.

Figure 31: Target Plant Communities- Pine Bend Bluffs SNA

NODE 11: FLINT HILLS RESOURCES

CURRENT STATE

The trail corridor runs adjacent to nearly 450 acres of upland bluffland habitat privately owned by Flint Hills Resources (FHR). Habitat within this node includes restored mesic prairie, restored oak savanna, remnant sand-gravel prairie, and oak woodland. Flint Hills Resources has been funding habitat improvement and management of nearly 200 acres for over 20 years, with plans to expand management to the remaining 250 acres in the next decade. The site in general provides habitat for many species, including the federally endangered rusty patched bumblebee and Minnesota species of greatest conservation need six-lined racerunner. FHR is committed to improving habitat for wildlife and has installed several habitat structures including a chimney swift house, bluebird boxes, and snake hibernaculum.

The trail corridor consists of restored prairie, oak woodland, mowed turf, and impervious areas, including railroad tracks, roads and buildings. Most of the area within the corridor that can be restored has been. The buffer is lined with prairie in most areas. Big bluestem, golden prairie grass *(Sorghastrum nutans),* yellow coneflower, and bee balm are the dominant species. There are several persistent populations of invasive species, including bird's-foot trefoil and spotted knapweed, which are likely spread by mowing. Woody invasive species, including Siberian elm and Tatarian honeysuckle, are also present in pockets unable to be maintained with mowing (i.e., next to fences, in corners). Continued monitoring and management of these populations is important to prevent them from spreading into higher-quality areas outside of the corridor.

There are two areas within the corridor where Dakota County has done some habitat improvements that could be expanded, monitored, and managed. The first is a pavilion area with seating, a bike rack, and a plaque. Mesic prairie surrounds this area, but it could be extended into a small section south of the pavilion that is still located outside of the Flint Hills Resources fence (Image 11). This area is currently a harbor for invasive species, including bull thistle, spotted knapweed, wild parsnip, and bird's-foot trefoil. There are native species intermixed, including yellow coneflower, monarda, and warm-season grasses. Enhancement and management in this area would prevent the spread of invasive species to larger restored prairies on private property within 100 feet of the area.

Second, the corridor runs adjacent to Pine Bend Cemetery (Image 12). There are open-grown bur oaks indicative of historical savanna within the cemetery, but the understory surrounding the perimeter is overgrown with honeysuckle, buckthorn, and other invasive species. Removal of invasive species in this section of the trail corridor would quickly restore oak savanna habitat, which is rare in Minnesota. Exploring a partnership with the PB Cemetery may be beneficial to help protect and restore this spot.

Image 11: Pavilion along greenway bordering Flint Hills Resources. Additional management in this area could be extended south of the pavilion, outside of the private property fence.

Image 12: Pine Bend Bluff Cemetery, as seen from the greenway alongside Flint Hills Resources property. Invasive shrubs dominate the shrub layer underneath bur oak trees.

Table 12: Notable species observed in Node 11 (Flint Hills Resources).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	**Common buckthorn**	Warm season native grasses
Hackberry	**Tatarian honeysuckle**	**Smooth brome**
Bur oak		Canada goldenrod
Cottonwood		Monarda
		Crown vetch
		Yellow coneflower
		Bird's-foot trefoil
		Mowed turf
		White aster
		New England aster

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor boundary.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Adaptive management of invasive species along the trail corridor to keep populations low and prevent spread to higher quality remnant and restored areas outside of the corridor. This supports Priority Features 1 and 2 (remnant and restored native plant communities) and addresses Priority Issue 1 (presence of invasive species).
2) Continued positive coordination with Flint Hills Resources about habitat and amenity improvements within the corridor.

DESIRED FUTURE CONDITION

A reasonable trajectory for the plant communities in Node 11 is to work towards higher quality communities by continuing to manage invasive species. Targets in grassland areas include Southern Mesic Prairie (UPs23), Southern Mesic Savanna (UPs24) and Southern Dry Prairie (UPs13). Targets in woodland areas include Southern Dry-Mesic Oak-Pine Woodland (FDs27). Management should target removal of invasive woody shrubs including Tatarian honeysuckle and common buckthorn, as well as pervasive herbaceous invasive species.

Figure 32 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.
Flint Hills Resources partners with FMR to restore and enhance their Pine Bend Bluffland Property. This partnership has been in place since the 1999 and FMR has committed to longerm

partnership at the site. However, with such a large site, future maintenance partnerships with FHR and FMR to maintain greenway plantings and restore additional natural areas, either through FMR subcontractors, CCMI or other crews, or greenway cost-share programs, should be explored.

Figure 32. Target Plant Communities- Flint Hills Resources

NODE 12: MOSAIC CROP NUTRITION LLC AND ADJACENT PRIVATE LAND

CURRENT STATE

Between the Flint Hills Resource property and the four parcels owned by Mosaic LLC, the trail corridor runs adjacent to a 131-acre parcel of land owned by C.F. Industries. While CFI did not grant access to FMR ecologists for a property evaluation, aerial photography investigation revealed that the property contains large areas of upland and floodplain forest, as well as wetland habitat. Future investigation is warranted to explore the potential for restoration of this property through a management agreement like others between private companies and Friends of the Mississippi River.

Additionally, directly across the trail from the Mosaic property are three privately owned parcels (PIDs: 340200011010, 340200001010, and 340200001010) dominated by what was historically oak savanna habitat, with large bur oaks visible from the trail. Currently, aerial photos reveal a mostly overgrown woodland with some open pockets of grassland. While permission was not given to access these properties, they also hold important potential for conservation and restoration, and easement or fee title sales could be explored with the owners.

The four Mosaic parcels constitute 231.8 acres of facilities and an undeveloped natural area. Habitat within this node consists of altered deciduous woodland, large areas of mowed turfgrass with and without scattered tree cover, afforested historical oak savanna, and high-quality oak forest. It appears that no management activities have taken place on the property other than maintaining a network of trails and removing hazardous trees.

There are several invasive species present in the woodlands on the south side of the trail corridor, including buckthorn, Siberian elm, burdock, bird's-foot trefoil and spotted knapweed, the latter two of which are likely spread by roadside mowing. Many dead, standing green ash are also present within this area, with some close enough to the trail corridor that future removal may be necessary for safety. Continued monitoring and management of these populations is important to prevent them from spreading into higher quality areas outside of the corridor.

Because the trail corridor is outside of the Mosaic property adjacent to Pine Bend Trail and is separated from the property by the road and additional parcels of Union Pacific-owned railroad tracks at the edge of the property, few opportunities to add trailside habitat exist. Some of the roadside ditch along Pine Bend Trail – newly reconstructed in 2024 – presents an opportunity for some simple native grass and wildflower additions, but the small nature of the parcels and ownership by Union Pacific makes this unlikely.

However, the Mosaic property itself holds massive potential for restoration, including a contiguous 10-acre mowed turfgrass unit (prairie), a 15-acre mowed turfgrass unit with scattered trees (savanna), and over 30 acres of high quality mesic oak forest adjacent to Spring

Lake Park Reserve, the latter of which would be an important addition to the reserve if the landowner was open to a donation, easement, or purchase agreement.

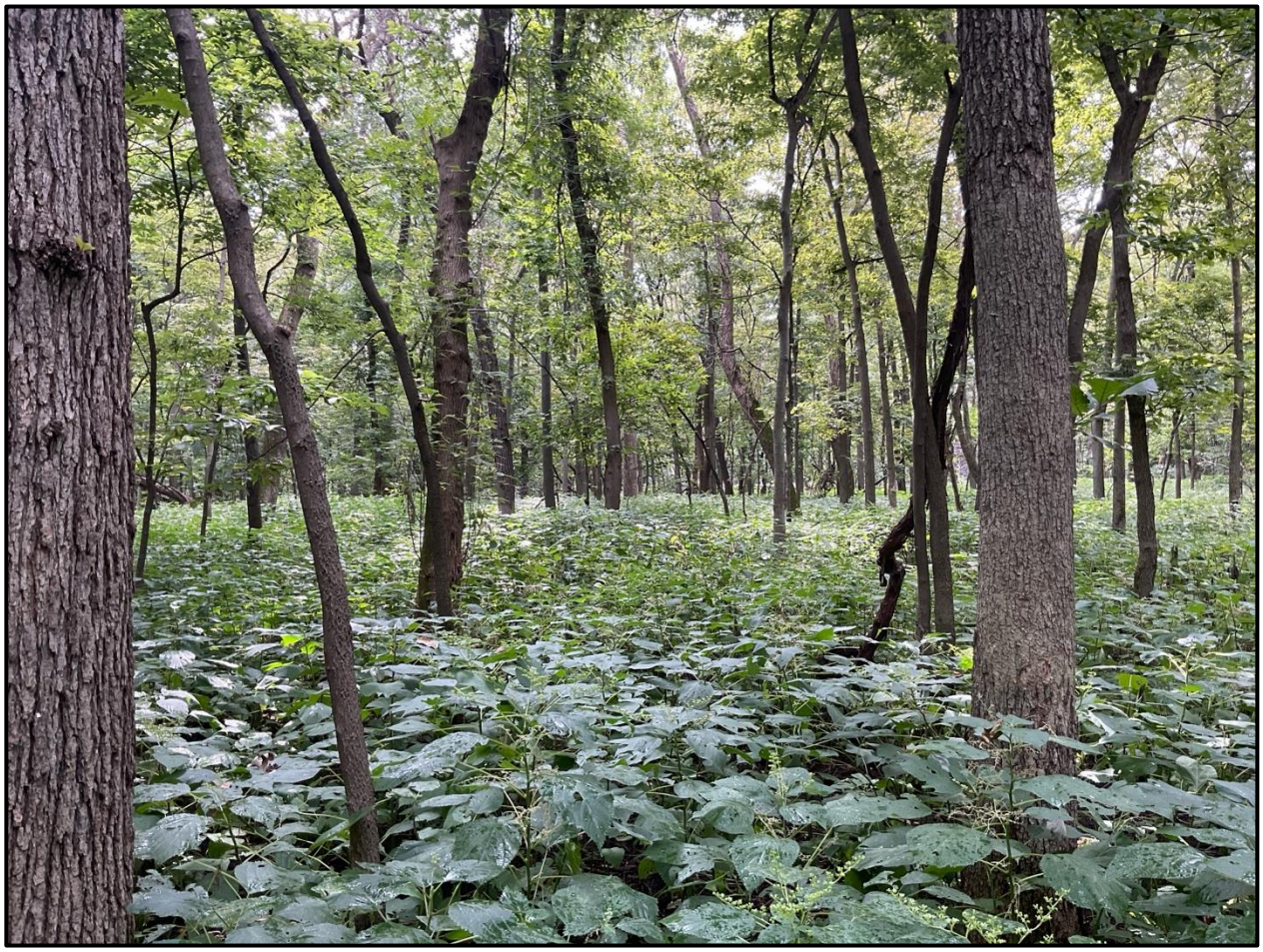


Image 113: Mosaic property woodland

Table 13: Notable species observed in Node 12 (Mosaic).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	**Common buckthorn**	**Smooth brome**
Green ash	**Tatarian honeysuckle**	American bellflower
Hackberry	Missouri gooseberry	Germander
Red Oak	Black raspberry	Lopseed
Bur oak	Elderberry	Wood nettle
Bitternut hickory	Chokecherry	**Crown vetch**
Cottonwood	Prickly ash	**Common burdock**
Basswood		**Garlic mustard**
		Mowed turf

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor boundary.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Adaptive management of invasive species along the trail corridor to keep populations low and prevent spread to higher quality remnant and restored areas outside of the corridor. This supports Priority Features 1 and 2 (remnant and restored native plant communities) and addresses Priority Issue 1 (presence of invasive species).
2) Enhancement of oak woodland plant communities through adaptive management and planting to promote Priority Feature 1 (remnant native plant communities) and address Priority Issue 2 (poor native species regeneration).
3) Coordination with corporate and private landowners about habitat improvements within the corridor, and exploration of potential conservation outcomes.

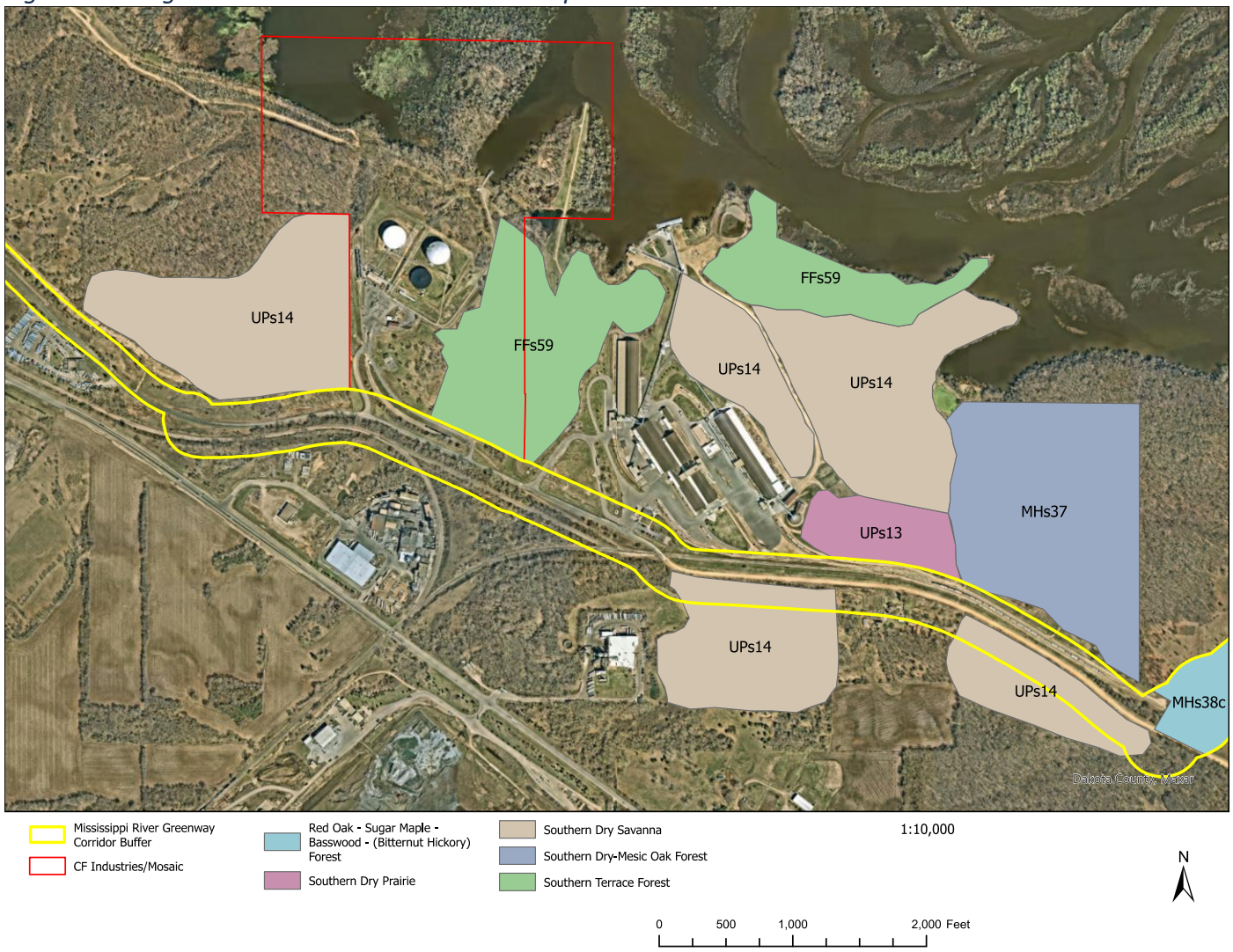
DESIRED FUTURE CONDITION

A reasonable trajectory for the plant communities in Node 12 is to work towards higher quality communities by continuing to manage invasive species. Targets in grassland areas include Southern Mesic Prairie (UPs23), Southern Mesic Savanna (UPs24) and Southern Dry Prairie (UPs13). Targets in woodland areas include Southern Mesic Savanna (UPs24) and Southern Dry-Mesic Oak Forest (MHs37). Management should target removal of invasive woody shrubs and trees including Tatarian honeysuckle, common buckthorn and Siberian elm, as well as pervasive herbaceous invasive species.

The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them. Figure 33 shows target plant communities for restoration in this node.

No current partnerships with Mosaic or adjacent landowners exist. The County should work with private landowners to explore potential easements, and shoul pursue partnerships with Mosaic and CF Industries, which may be facilitated by NGOs like FMR or Great River Greening. Future maintenance partnerships with Mosaic to maintain greenway plantings and restore additional natural areas, either through County or CCMI crews, or through greenway cost-share programs, should be explored.

Figure 33: Target Plant Communities- Mosaic Properties



NODE 13: SPRING LAKE PARK-FAHEY TRAILHEAD

CURRENT STATE

Spring Lake Park Reserve (SLPR), a 1,200-acre Dakota County park, which overlooks the Mississippi River at the eastern end of the county. West of the trailhead at Fahey Avenue, the MRG traverses the western third of SLPR, leading trail users through restored and remnant dry prairie, some of which was recently burned. Both long-bearded hawkweed and hairy puccoon, two somewhat uncommon dry prairie species, are present in the remnant prairie. Several programmed park spaces, such as an archery range and retreat center, are also located within the area. In 2024, a trail connection was under construction to fill a gap between Fahey Avenue and its shared property boundary with The Mosaic Company at the park's western end. The limits of disturbance for trail construction were over 50 feet, with sloping trail edges in some areas. The trail corridor in this section will undergo native vegetative restoration following construction with prairie seed mixes.

An oak forest is present at the northwestern end of the trail corridor where it connects to Pine Bend Trail. This forest is within the portions of Spring Lake Park that the Minnesota County Biological Survey has identified as having high biodiversity significance. In 2024, the forest was observed to have a dense perimeter of common buckthorn and Tatarian honeysuckle. The entire forest was not surveyed for this plan, but based on fieldwork and FMR's past management planning and implementation records, it has been confirmed that the invasive woody cover in this area is densest at the forest's edges. Previous phases of restoration have been completed across the 51-acre woodland, but buckthorn is common on neighboring properties, and reinvasion has occurred. Additional restoration of this unit is planned for 2025-2027 and is detailed in a 2018 management brief developed by FMR ecologists. As such, this area is not prioritized for restoration funding within the context of this NRMP.

Several dead, standing green ash trees are also present within this area, but the trees are well away from the trail corridor so as not to pose an imminent threat. Dakota County's 2018 Emerald Ash Borer (EAB) Management Plan left site-specific management of dying and dead ash trees in natural areas and within greenways to individual planning efforts. However, the plan acknowledged the substantial difficulty, expense and considerable insecticide use of treating all ash within natural areas. This natural area node represents the type of landscape and land use for which the plan recommends allowing natural succession (the loss of non-EAB resistant ash) and natural regeneration unless biological control options become available. As of 2025, biological control by two species of parasitoid wasps has been approved to reduce EAB, but attaining the wasps is a very slow process.

East of the trailhead at Fahey Avenue is Dakota County Park's 150-acre bison range, which in 2025 supported 11 animals. The range is fenced, and the MRG winds through the eight paddocks where the bison are rotated. The range was not surveyed in 2024, but it was observed that the trail corridor was maintained with prescribed fire in September of 2024.

Image 14: Spring Lake Park- Fahey forest with dead ash

Table 14: Notable species observed in Node 13 (Spring Lake Park-Fahey Trailhead).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	**Common buckthorn**	Side oats grama
Common buckthorn	**Siberian elm**	Aromatic aster
Bur oak	**Tatarian honeysuckle**	Stiff sunflower
White oak	Gray dogwood	Giant hyssop
Quaking aspen	Riverbank grape	Big bluestem
Black walnut	Common sumac	Sky blue aster
Hackberry		White wild indigo
Green ash		Canada goldenrod
		Smooth brome
		Bull thistle

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Restoration of areas disturbed by trail construction to native prairie plant communities that create continuous habitat with the existing restored prairie to support Priority Feature 1 (restored native plant communities).
2) Woody invasive species management to eliminate common buckthorn, Siberian elm and Tatarian honeysuckle in the oak woodland to address Priority Issue 1.
3) Enhancement of oak woodland plant communities through adaptive management and planting to promote Priority Feature 1 (remnant native plant communities) and address Priority Issue 2 (poor native species regeneration).
4) Exploring the possibility of reintroducing species such as the regal fritillary and Leonard's skipper butterflies and dung beetles.

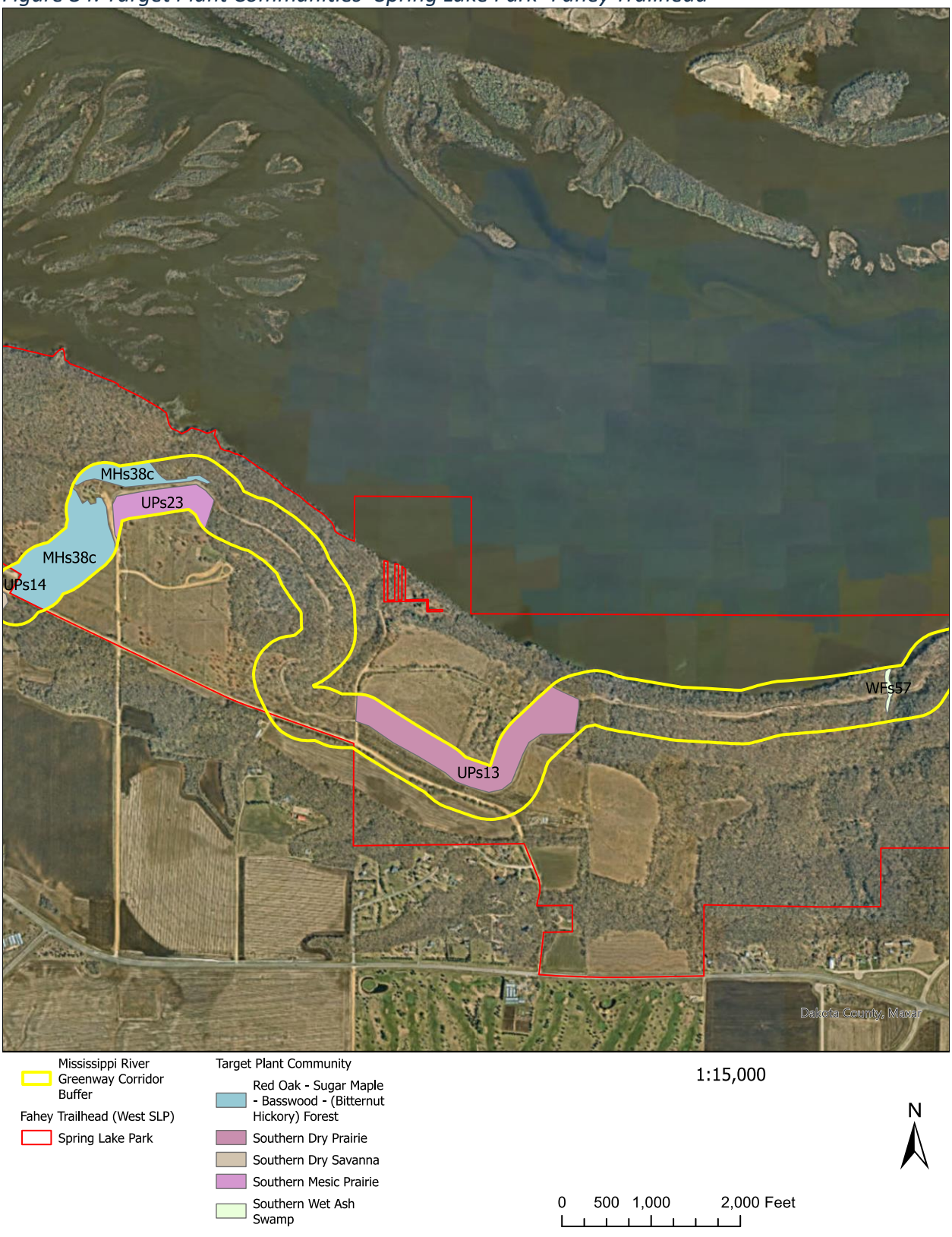
DESIRED FUTURE CONDITION

Target plant communities for this node include Southern Mesic Prairie (UPs23) and Southern Dry Prairie (UPs13) in the restored prairie and trail corridor and Red oak - Sugar maple – Basswood (bitternut hickory) forest (MHs38c) to the north of the trail.

Figure 34 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

The County currently restores habitat at the site using County and State grant funding, and through partnerships with organizations like FMR. Continued partnerships to maintain greenway plantings and restore additional natural areas, either through expanded scope of work or through the application of greenway cost-share programs and funding sources, should be explored.

Figure 34: Target Plant Communities- Spring Lake Park- Fahey Trailhead



NODE 14: SPRING LAKE PARK-SCHAAR'S BLUFF TRAILHEAD

CURRENT STATE

Spring Lake Park Reserve, a 1,200-acre Dakota County park, overlooks the Mississippi River at the eastern end of the county. From the trailhead at Schaar's Bluff, the MRG traverses the eastern two-thirds of Spring Lake Park, leading trail users through oak woodlands and distinct units of prairie undergoing restoration. Moving west from the trailhead, the trail crosses over steep ravines lined with striking limestone bluffs and outcrops. Traversing the trail to the east from the trailhead, users move through a small, restored tallgrass prairie, which has heavy encroachment from Siberian elm. At the park's eastern end, oak woodlands and forests line the trail nearly continuously.

The topography of the landscape to the west of Schaar's Bluff Trailhead may preclude restoration outside of the immediately adjacent trail edges. Here, spotted knapweed has established in the dry sandy soils at the base of the limestone bluffs. Its management will prevent its spread by trail users.

Within the prairies adjacent to the trailhead's programmed spaces, restoration is underway, but additional management is needed if prairie plant communities are to persist. The prairies adjacent to the trail are grass-dominated and lack species diversity. Additionally, the prairies have dense Siberian elm and eastern cottonwood encroachment. The removal of these shrubby and small tree-sized Siberian elm will prevent shading of prairie plants, which leads to further weediness by shade-tolerant species. Reintroduction of fire in these grasslands will also offer an opportunity to interseed forb species to boost diversity and support pollinator populations.

Dakota County Parks staff have noted that following Greenway trail construction, the goal for plant communities was to revegetate with prairie species and to allow for trees to fill in over time, thus reconnecting the forest on both sides of the trail. This explains the current condition of many volunteer trees in this area. This "placeholder" restoration is establishing nicely, and because the trail will permanently disconnect adjacent habitat, it is recommended to maintain the trailside plant community as prairie, which also lends itself to better sightlines. If restoration of woodland or forest plant communities is preferred, this should be undertaken with intention, including planting white oak, quaking aspen and paper birch initially followed by red oak, sugar maple, basswood and ironwood over time as the canopy closes.

The oak woodlands and forests at Spring Lake Park's eastern end are high-quality with low invasive species; common buckthorn is present in a few distinct areas. Perhaps as a result of the low woody invasive species presence, the herbaceous understory is abundant and diverse. Twenty-two native species were cataloged on the trail corridor in July 2024. It's likely that the diversity of these woodlands is even higher, which could be verified when spring ephemeral woodland forbs are flowering.

Several dead, standing green ash are also present within this area, and the trees are primarily well away from the trail corridor so as not to pose an imminent threat. In Dakota County's 2018

Emerald Ash Borer (EAB) Management Plan, site-specific management of dying and dead ash trees in natural areas and within greenways was left to individual planning efforts. However, the plan acknowledged the substantial difficulty, expense and insecticide use required to treat all ash within natural areas. This natural area node represents the type of landscape and land use for which the plan recommends allowing natural succession (the loss of non-EAB resistant ash) and natural regeneration unless biological control options become available. As of 2025, biological control by two species of parasitoid wasps has been approved to reduce EAB, but attaining the wasps is a very slow process.

This node also hosts a black ash seepage swamp below the western trail bridge. Many of the black ash trees in the swamp have been lost to the emerald ash borer (EAB). Special management planning by Dakota County is underway to protect the remaining black ash from complete decimation. Future efforts should focus on targeted treatment of the black ash through insecticides or parasitoid wasps and maintaining soil moisture conditions conducive to the long-term persistence of black ash. Coordination and collaboration with local Indigenous groups should be integral to this work, as black ash is an important species to Native people for their use in furniture making, basketry and canoe construction.

Image 15. Spring Lake Park - restored prairie in bison range

Table 15: Notable species observed in Node 14 (Schaar's Bluff Trailhead).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Eastern cottonwood	**Siberian elm**	**Smooth brome**
Hackberry	Common sumac	Canada goldenrod
Green ash	Prickly ash	**Crown vetch**
Silver maple	Riverbank grape	Jewelweed
White oak	Green ash	**Spotted knapweed**
	Box elder	Wood nettle
	Common buckthorn	Joe Pye weed
	Black walnut	Wild geranium
	Missouri gooseberry	Virginia waterleaf
	Red-osier dogwood	Switchgrass

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Continued restoration and enhancement of prairies near the trailhead, including woody invasive management, prescribed fire, and supplemental seeding to support Priority Feature 1 (restored native plant communities) and address Priority Issue 1 (presence of invasive species).
2) Enhancement of oak woodland plant communities through adaptive management and planting to promote Priority Feature 1 (remnant native plant communities).
3) Targeted restoration of the black ash seepage swamp at the west trail bridge, including collection and storage of black ash seeds for future restoration; protection of moisture regimes in this swamp to support the persistence of black ash, treatment of existing trees to prevent infection by EAB, ongoing research in collaboration with local communities and Indigenous groups. particularly those with traditional knowledge of black ash.
4) Elimination of herbaceous invasive plants occurring within the limestone bluffs to address Priority Issue 1 (presence of invasive species).

DESIRED FUTURE CONDITION

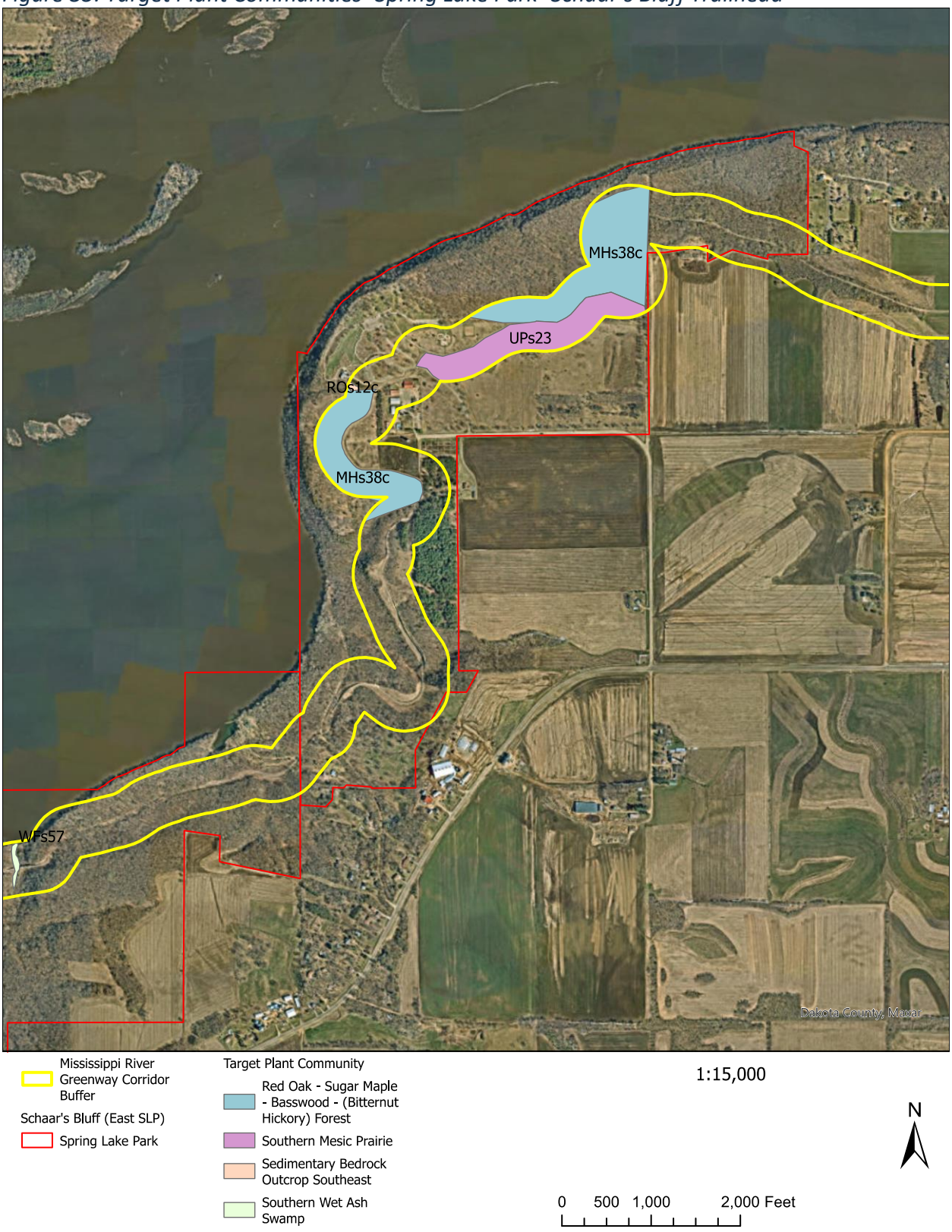
Target plant communities for this node include Southern Mesic Prairie (UPs23) in the restored prairie along the trail corridor and Red Oak - Sugar Maple - Basswood - (Bitternut Hickory)

Forest in the oak woodland at the east end of the park. Opportunities to restore historic bedrock bluff prairies to Sedimentary Bedrock Outcrop Southeast (ROs12c) in this node should also be explored, as only one known bedrock bluff prairie remains south of the Schaar's Bluff Gathering Center. Southern Wet Ash Swamp (WFs57) is targeted for the persistence of a black ash seepage swamp under the west trail bridge.

Figure 35 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

The County currently restores habitat at the site using County and State grant funding, and through partnerships with NGOs. Continued partnerships to expand greenway plantings and restore additional natural areas through the application of greenway cost-share programs and funding sources should be explored.

Figure 35: Target Plant Communities- Spring Lake Park- Schaar's Bluff Trailhead



NODE 15: TRAIL SECTION: SPRING LAKE PARK TO BENJAMIN EASEMENT

CURRENT STATE

A 1-mile stretch of the MRG follows 125th Street East and Lock Boulevard in Nininger Township to the east before reaching the Benjamin property, which is discussed in the following section. In this mile of corridor, the trail is flanked by residential lots and agricultural fields. The trail is very exposed, with little shade or native plant community cover. A wide ditch on 125th Street East has a handful of native species, and a few common native wildflowers, such as Maximilian sunflower, are present at the trail edges along Lock Boulevard. More commonly, the trail edges are weedy, with smooth brome and spotted knapweed being the dominant species.

Invasive species management to reduce or eliminate the spotted knapweed and bird's-foot trefoil would prevent the spread of these species along the trail corridor. Enhancement planting opportunities are limited to the wide ditch on 125th Street, which could support wet prairie species. However, interest by private landowners who farm in this stretch of the MRG to restore portions of their property should be ascertained. Even a wider trailside buffer or restoration in less arable portions of their property would enhance and expand the habitat corridor of the MRG.

To abate the issue of little shade on this section of trail, Dakota County is considering a tree planting along Lock Boulevard in Nininger Township within the existing turf right-of-way.

Image 16. Corridor between Spring Lake Park and the Benjamin easement

Table 16: Notable species observed in Node 15 (Trail Section: Spring Lake Park to Benjamin Easement).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
		Smooth brome Canada goldenrod **Crown vetch** **Spotted knapweed** **Bird's-foot trefoil** **Kentucky bluegrass** **Hairy alyssum** Common ragweed **Giant ragweed**

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Targeted invasive species management to address Priority Issue 1 (presence of invasive species).

DESIRED FUTURE CONDITION

A target plant community for this node is Southern Wet Prairie (WPs54) in the 125th Street ROW.

In this linear trail node, the onus will be on the County to pursue plantings and restore additional natural areas, either through County staff, CCMI or other crews, or greenway cost-share programs.

The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

NODE 16: BENJAMIN EASEMENT

CURRENT STATE

The 32-acre Benjamin Easement is situated adjacent to the trail corridor just North of the City of Hastings. A natural resources management plan for the entire easement was completed in 2024 and restoration implementation is beginning in 2025. Management units and restoration recommendations for this greenway plan reference the easement NRMP. The MRG runs along the southwestern corner of the property, continuing south into the City of Hastings. Within the property, there is a high-quality restored prairie with good native floral diversity. There is an agricultural field in corn/soy rotation and a hay field that is planned to be restored to native mesic and shortgrass prairie. There's a small section of oak woodland and two woodlot units that have been managed for common buckthorn by the landowners. Several open-grown bur oak trees throughout the property indicate a historical savanna.

The 2024 NRMP provides a more in-depth description of current conditions for each unit and implementation prioritization. Restoration implementation will begin in 2025.

Image 17: Hay field unit along the greenway corridor that will be restored to shortgrass prairie.

Table 17: Notable species observed in Node 16 (Benjamin Easement).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	Eastern red cedar	**Japanese hedge parsley**
Bur oak	Staghorn sumac	White snakeroot
Black walnut	**Common buckthorn**	**Smooth brome (mowed)**
Hackberry	**Siberian elm**	**Timothy**
		Alfalfa

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor – see 2024 NRMP.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Restoration of agricultural units to prairie native plant communities to support Priority Feature 1 (restored native plant communities).
2) Enhancement of native plant communities through seeding, planting, prescribed burning, and adaptive management to address Priority Issue 2 (poor native species regeneration).
3) Potential for expansion of the restoration area within the easement across the street from the bike path.

DESIRED FUTURE CONDITION

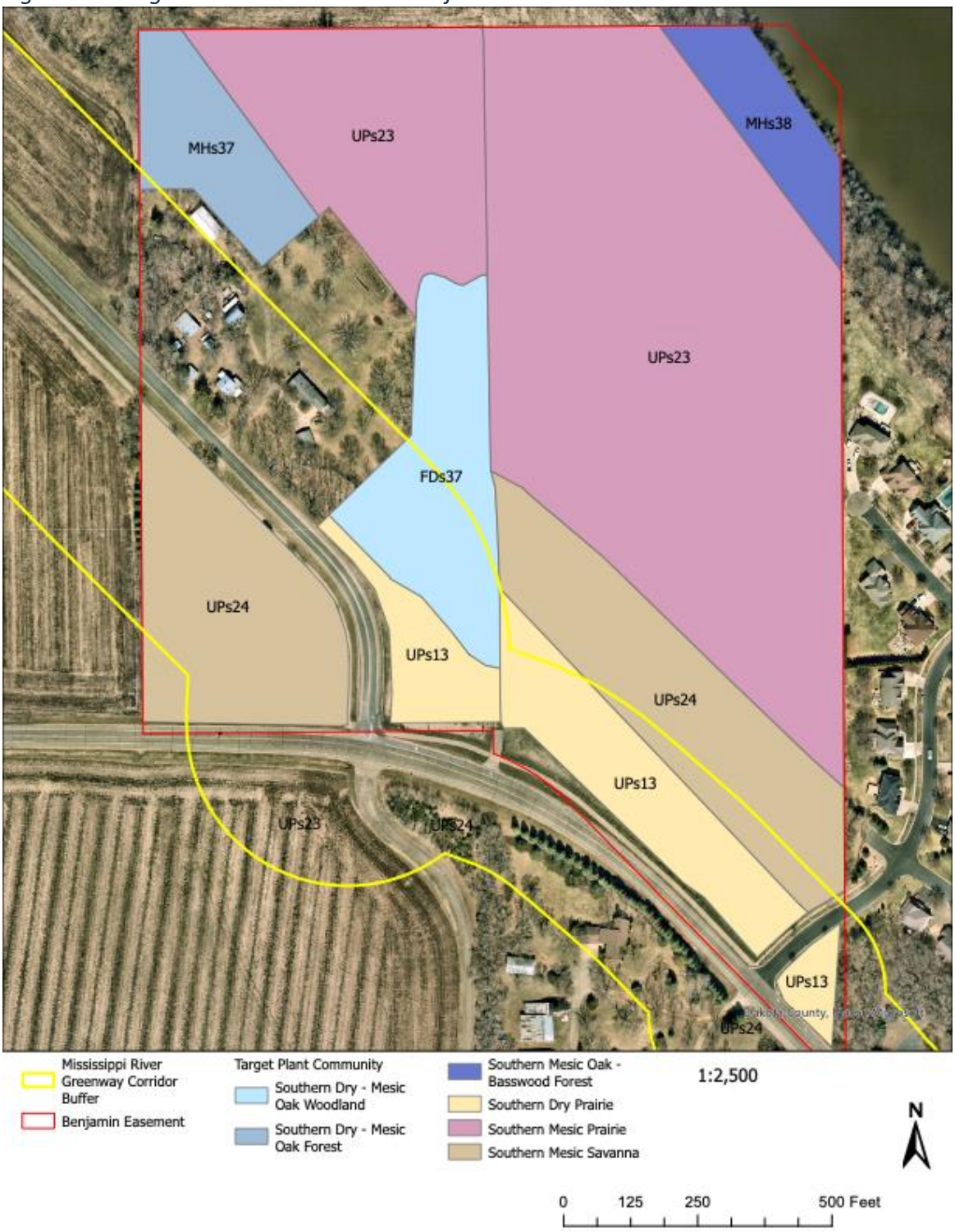
Target plant communities for this easement outlined in the 2024 NRMP include Southern Mesic Prairie (UPs23), Southern Dry Prairie (UPs13), Southern Mesic Savanna (UPs24), Southern Dry-Mesic Oak Woodland (FDs37), Southern Dry Mesic Oak Forest (MHs37), and Southern Mesic Oak-Basswood Forest (MHs38). Restoration and enhancement of units as outlined in the NRMP will result in higher quality habitat with reduced cover of non-native/invasive species and increased cover of native forbs, grasses, trees and shrubs.

Figure 36 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

The Benjamin Easement is currently enrolled as a County easement and will undergo restoration planned for 2025-2028. Friends of the Mississippi River (FMR) and the County will partner on restoration implementation at the site. In addition, future maintenance partnerships with the Benjamin family to maintain habitat and restore additional natural areas, should be

explored, as could maintenance by County staff, CCMI or other crews, or partnerships with additional NGOs.

Figure 36: Target Plant Communities- Benjamin Easement



NODE 17: TRAIL SECTION: BENJAMIN TO LAKE REBECCA PARK

CURRENT STATE

The trail corridor between the Benjamin easement and Lake Rebecca borders a residential neighborhood and pasture before winding down the bluff to the dam. Most of the corridor through this stretch consists of residential lots which do not have high potential for natural resource improvements. Outreach about choosing native species for landscaping could have habitat benefits and improve connectivity between natural areas in this stretch. The area on top of the bluff, right before the greenway curves down the slope, does have habitat potential. Currently, there is a dry stormwater basin planted in native grasses, a small mesic prairie predominantly composed of switchgrass, a degraded woodland dominated by nonnative invasive species, and a small remnant bluff prairie threatened by woody encroachment in this area.

There is an opportunity to open the tree canopy and restore dry bluff prairie in the elbow of the trail corridor. This would create a new viewshed of the river and increase the area of critically imperiled habitat. Mature tree removal is costly, but the benefits could outweigh the expense. Additionally, native plant diversity could be increased in the dry stormwater basin by planting and/or seeding forbs.

Image 18: Dry prairie remnant species are present in the sunny open areas along this slope. Tree thinning would open up the canopy and expand the remnant habitat.

Table 18: Notable species observed in Node 17 (Trail Section: Benjamin to Lake Rebecca Park).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Siberian elm	**Common buckthorn**	**Mowed turf**
Eastern red cedar	Black raspberry	**Smooth brome**
Bur oak	**Siberian elm (saplings)**	Frost aster
Black walnut	Eastern red cedar	Thimbleweed
Hackberry		Little bluestem
Honey locust		Sky blue aster

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Residential outreach about landscaping with native plants to support Priority Feature 5 (habitat connectivity).
2) Enhancement of remnant native plant communities through tree removal, seeding, adaptive management, and reintroduction of disturbance (prescribed burning). This supports Priority Features 1, 2, and 3 (remnant and restored native plant communities, viewsheds).

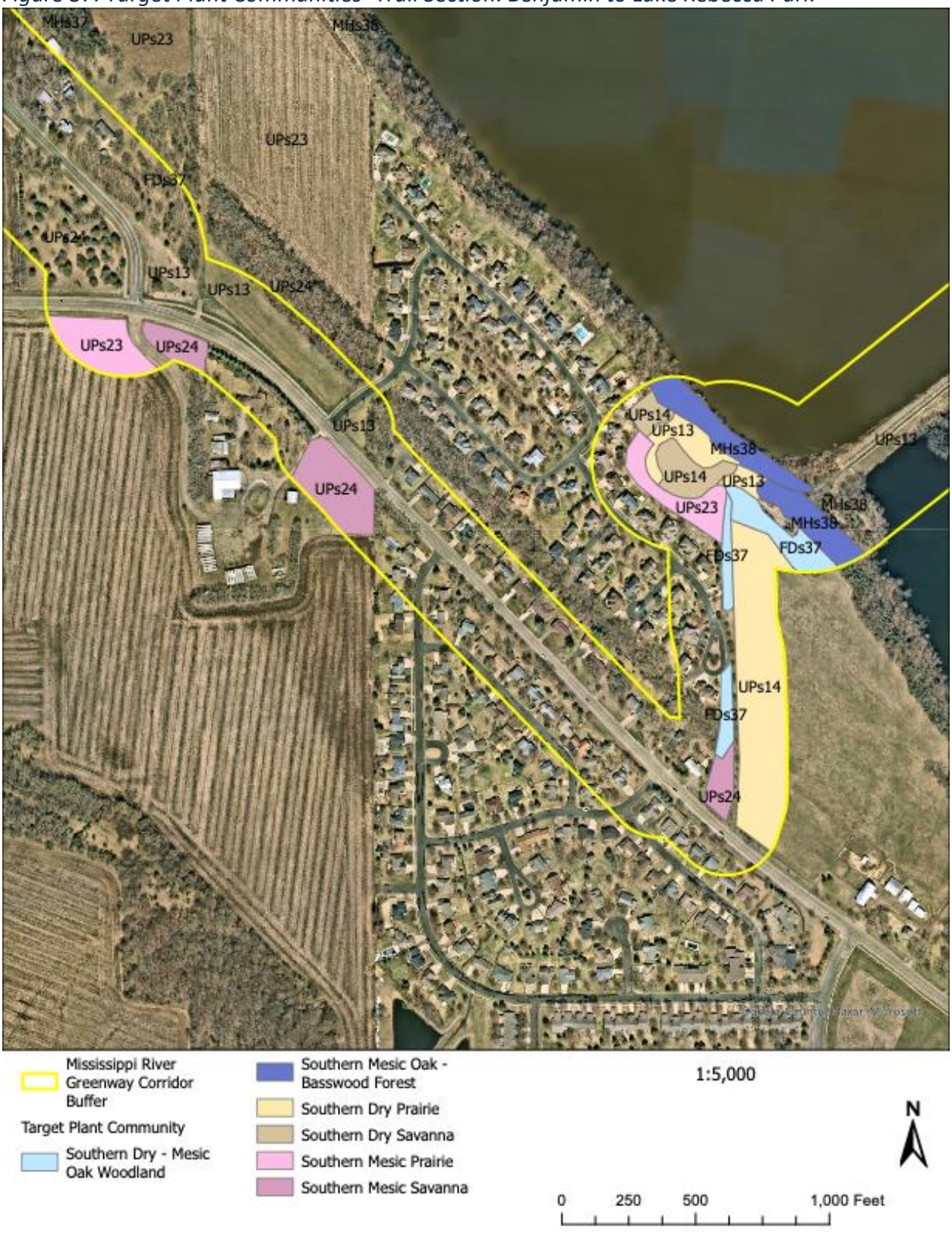
DESIRED FUTURE CONDITION

Native plant community targets vary by topography. On top of the bluff, Southern Dry Prairie (UPs13) or Southern Dry Savanna (UPs23) could be considered. Areas heavily degraded by Siberian elm may not achieve these targets. On the north slope of the bluff adjacent to the river, Southern Mesic Maple-Basswood Forest (MHs39) is a reasonable target.

Figure 37 shows target plant communities for restoration in this node. The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them.

In this trail node, the onus will be on the County to explore and pursue opportunities for plantings and for the restoration of additional natural areas, either through outreach and partnerships with private landowners, or through greenway cost-share programs in partnership with the City of Hastings.

Figure 37: Target Plant Communities- Trail Section: Benjamin to Lake Rebecca Park



NODE 18: LAKE REBECCA PARK

CURRENT STATE

Lake Rebecca Park is situated in the floodplain of the Mississippi River right below the dam. It is approximately 160 acres and is owned by the City of Hastings. A park master plan including a natural resources management plan section for this park was completed in 2024.

The park largely consists of floodplain forest, terrace forest, shallow marsh and deep marsh plant communities. It was managed from 1973-2023 by the U.S. Army Corps of Engineers through a lease with the City of Hastings. Most of the native plant communities within this park are relatively high quality with good native diversity and limited abundance of invasive species. The predominant habitat type is floodplain forest, which is dominated by large diameter cottonwood, basswood, hackberry, boxelder, and bitternut hickory. In the marsh areas, ground cover consists of native sedges and grasses, with some pockets of hybrid cattail and common buckthorn. Common buckthorn has been managed in nearly all areas and is present at low abundance throughout the park. There are two upland areas designated as altered woodland and restored prairie in the 2024 park master plan. These are generally lower quality plant communities, with higher abundance of common buckthorn, smooth brome, and Kentucky bluegrass.

Management units and restoration prioritization for this greenway plan should follow the 2024 park master plan.

Image 19: View of wetland and floodplain forest on the east side of the dam from the greenway.

Table 19: Notable species observed in Node 18 (Lake Rebecca Park).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Cottonwood	**Common buckthorn**	**Smooth brome (mowed)**
Silver maple		**Reed canary grass**
Willow sp.		Phragmites (native)
American elm		**Purple loosestrife**
Basswood		Switchgrass
Boxelder		Hoary vervain
		Whorled milkweed

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor – see 2024 NRMP.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Support habitat restoration efforts prioritized by partner organizations (U.S. Army Corps of Engineers, City of Hastings) to support Priority Feature 1 (remnant native plant communities).
2) Reduction or elimination of common buckthorn in floodplain to address Priority Issue 1 (presence of invasive species).
3) Enhancement of plant communities through seeding, planting, and adaptive management to address Priority Issue 2 (poor native species regeneration).
4) Improvements to recreation amenities as listed in the 2024 NRMP to support Priority Feature 4 (natural area recreation opportunities).

DESIRED FUTURE CONDITION

A reasonable trajectory for the plant communities in Node 18 is to increase native species diversity and continue maintaining invasive species populations as opportunities arise. Target plant communities were defined in the 2024 park master plan. They include Southern Terrace Forest (FFs59), Southern Floodplain Forest (FFs68), Northern Bulrush-Spikerush Marsh (MRn93), Southern Dry-Mesic Oak Woodland (FDs37), Southern Mesic Savanna (UPs24), and Southern Mesic Prairie (UPs23). Figure 38 shows target plant communities for restoration in this node.

A number of partners currently restore and maintain habitat at Lake Rebecca Park, including the City of Hastings, FMR, and the US Army Corps of Engineers. In 2025, the City will complete a large phase of infrastructure and habitat restoration with funding from the Environment and

Natural Resources Trust Fund. Maintenance of these habitat improvements and additional natural area restoration should be explored with all partners.

Figure 38: Target Plant Communities- Lake Rebecca Park

NODE 19: HASTINGS RIVER FLATS

CURRENT STATE

The trail corridor continues south of Lake Rebecca Park through Hastings River Flats, a 30-acre park sandwiched between Lake Rebecca Park and the Mississippi River. It is owned by the City of Hastings. Prior to being a park, this area was owned by Flint Hills Resources and used as a tank farm.

The park is split into two habitat types, which are divided by the Mississippi River Greenway. Most of the park is located south of the greenway and is a restored mesic/wet prairie. Initial restoration occurred in 2003, with scattered management actions completed in the two decades since. Most recently, a prescribed burn and enhancement seeding occurred in the spring of 2024. Currently, the prairie is dominated by non-native species, including smooth brome, timothy, reed canary grass, and common mullein. There are pockets of native warm-season grasses and forbs (namely bee balm). The second habitat type is forested shoreline located on the north side of the Greenway. Overall, this is classified as an altered deciduous forest. The tree canopy is predominantly green ash (dead), boxelder, and Siberian elm. There are areas of bare soil where significant erosion has occurred.

An update to the original natural resources management plan written in 2003 is scheduled to occur in 2025. Management units and future restoration prioritization should reference the updated NRMP.

Image 20: Photo of restored prairie at Hastings River Flats.

Table 20: Notable species observed in Node 19 (Hastings River Flats).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Cottonwood	Willow	**Mowed turf**
Willow sp.	False indigo	Big bluestem
Green ash (dead)	**White mulberry**	Indiangrass
Boxelder		**Timothy**
White mulberry		**Smooth brome**
		Foxtail
		Bee balm

Note: Species in the table are within the greenway corridor. This node has more diversity outside of the corridor – see updated NRMP.
BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

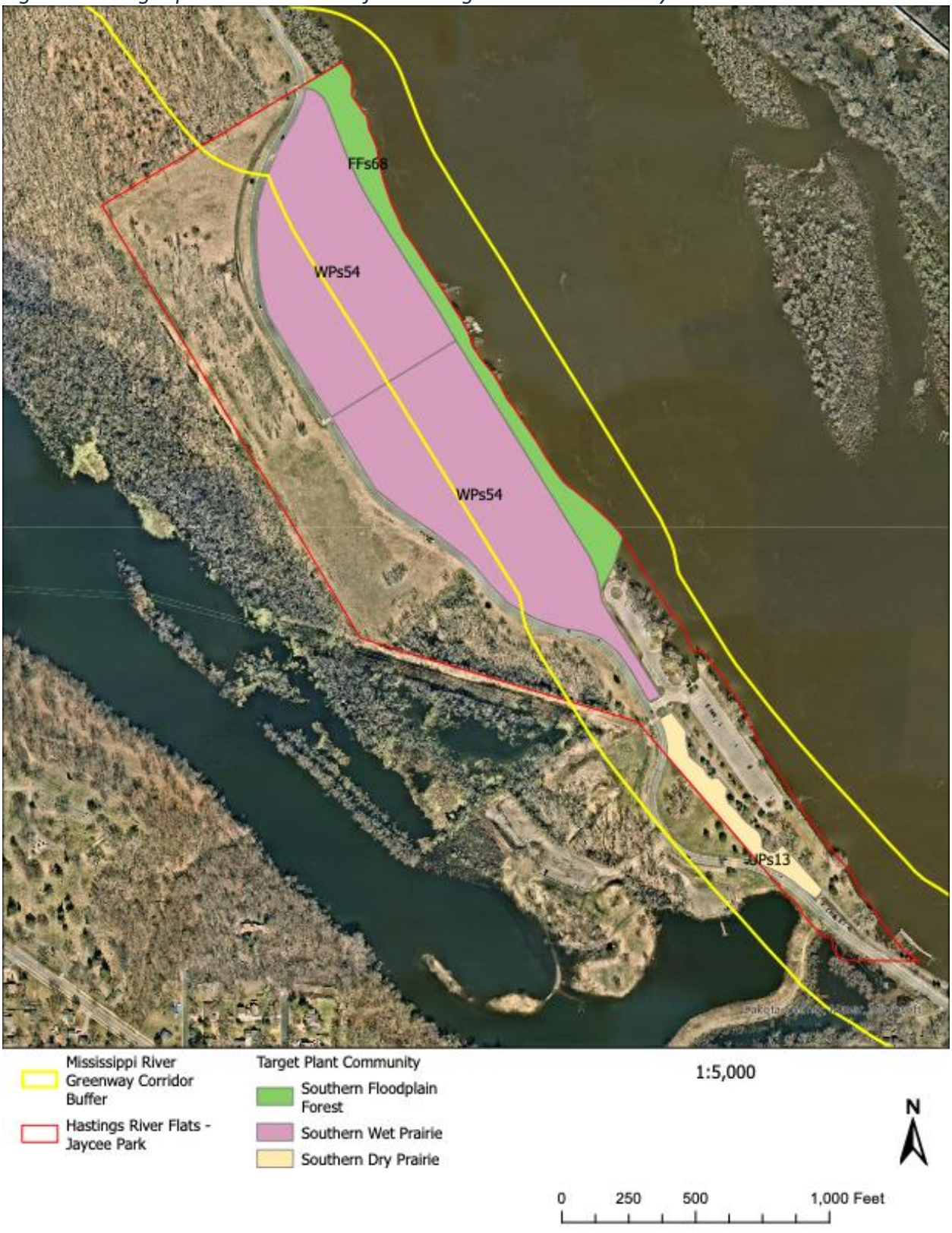
1) Identify potential underlying stressors that could be impacting prairie restoration outcomes, such as soil pollutants/deficiencies, compaction, or low soil fertility to address Priority Issue 3 (history and presence of industrialized landscape).
2) Enhancement of forb diversity and habitat for pollinators through seeding, planting, prescribed burning, and adaptive management to support Priority Feature 1 (restored native plant communities) address Priority Issue 2 (poor native species regeneration).
3) Reduction of erosion along the shoreline by increasing native ground cover through seeding, planting, and adaptive management.

DESIRED FUTURE CONDITION

Enhancing floral resources by increasing native species diversity and reducing erosion are two reasonable goals to work toward as opportunities arise. Both goals will increase the quality of the restored plant communities and their resiliency during severe weather events. Target communities to consider include Southern Mesic Prairie (UPs23), Southern Wet Prairie (WPs54), Southern Mesic Savanna (UPs24), and Southern Terrace Forest (FFs59). Figure 39 shows target plant communities for restoration in this node and the following node.

The City of Hastings partners with FMR on habitat restoration at this park. In 2025, FMR will complete an update to the site's NRMP and in 2026 will implement additional habitat enhancement work. Maintenance of these habitat improvements and additional natural area restoration should be explored with the City and FMR, and could be implemented with greenway cost-share funds.

Figure 39: Target plant communities for Hastings River Flats and Jaycee Park.



NODE 20: JAYCEE PARK

CURRENT STATE

Jaycee Park is the third park owned by the City of Hastings situated between Lake Rebecca and the Mississippi River. The greenway continues south through Jaycee Park into downtown Hastings. This park is packed with amenities, including a parking lot, boat launch, picnic tables and a compost area. A large section of the river shoreline is hard armored with riprap. The greenspace within the park consists of mowed turfgrass and overstory trees. There are large cottonwood trees growing along the river shoreline.

There are limited opportunities for habitat enhancement at this specific park. It is a small park that is maintained for public recreation use. One small portion of the park beneath some powerlines could be converted to prairie, or a no-mow turf option to reduce the amount of mowing needed. Additionally, as park trees die and get removed, native species rather than cultivars could be planted as replacements. Otherwise, habitat improvement projects should be prioritized elsewhere along the greenway.

Image 21: View of the Mississippi River and downtown Hastings from Jaycee Park.

Table 21: Notable species observed in Node 20 (Jaycee Park).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Cottonwood Silver maple **Crab apple** Spruce		**Mowed turf**

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Incorporate native species in landscaping and parking lot islands when current vegetation is damaged or otherwise removed to support Priority Feature 5 (habitat connectivity).
2) Consider turf to prairie conversion under powerlines to improve pollinator habitat and reduce need for mowing to support Priority Feature 5 (habitat connectivity).

DESIRED FUTURE CONDITION

Limited habitat improvements are prioritized for the greenway corridor in this park. Vegetation will largely stay the same as described in the current state section. Opportunities for no-mow conversion could be funded with greenway cost-share dollars and maintained by the City of Hastings. Figure 39 in the previous section shows the location for potential now mow prairie conversion areas.

NODE 21: LEVEE PARK

CURRENT STATE

The greenway corridor runs through Levee Park in downtown Hastings. Levee Park is a community park adjacent to the Mississippi River. It has many amenities for community use, including benches, a picnic shelter, an amphitheater, and a musical playground. The park's greenspace consists of mowed turf, landscaping beds, and a hard-armored shoreline. The park is not considered a habitat, and there are limited areas for improvement within the greenway corridor.

There is one small demonstration prairie planting within the greenway corridor. It is situated on a north-facing slope just north of the American Legion. Currently, it is a mix of prairie species, including monarda, anise hyssop, common milkweed, and yellow coneflower, alongside weedy and invasive species such as crown vetch and giant ragweed. This small prairie is highly visible to the public and has the potential to be an excellent showcase for incorporating pollinator habitat into managed landscapes.

GOALS FOR NODE

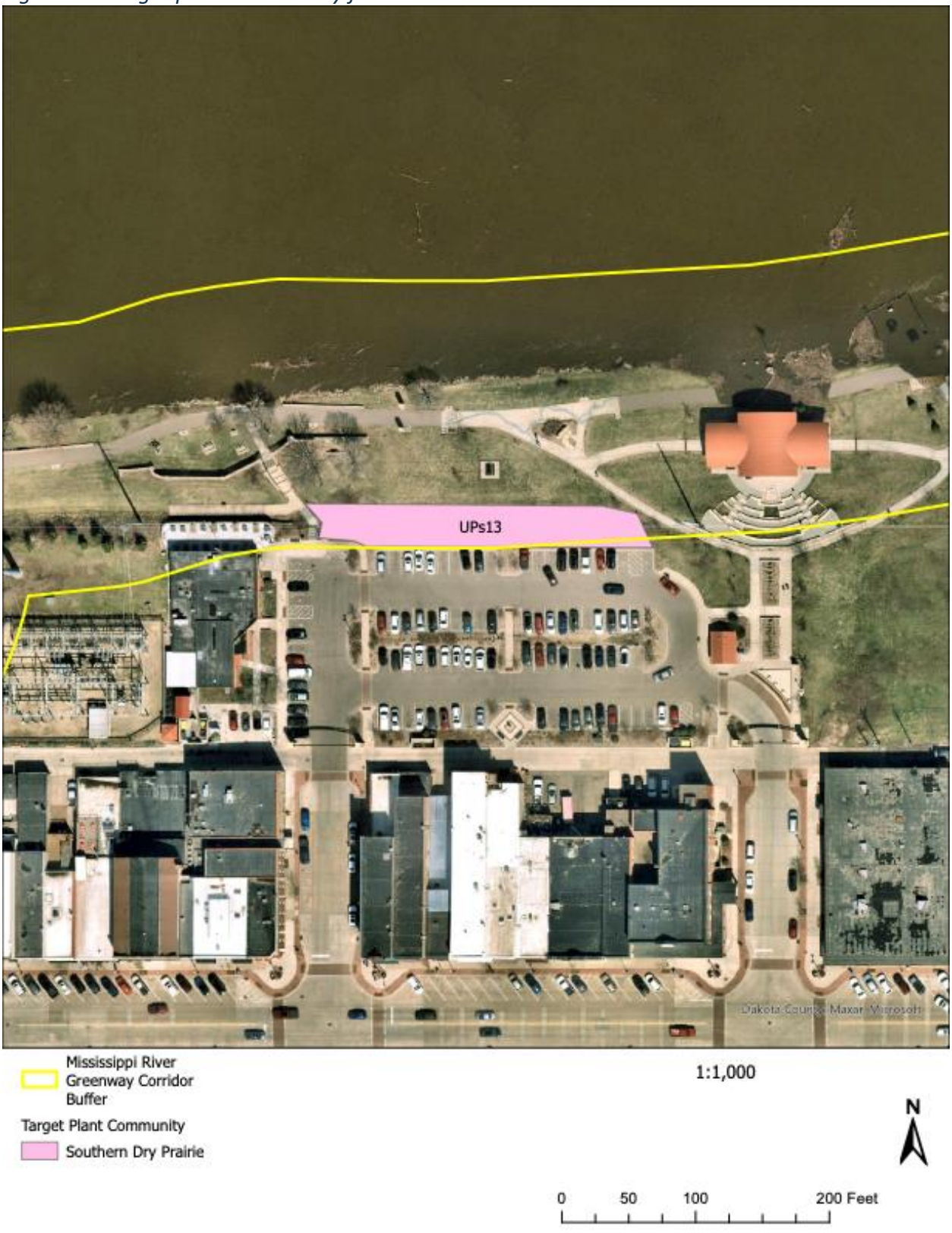
The goals for this unit include:

1) Enhance pollinator planting demonstration area by adaptively managing invasive species and planting plugs of native species to increase diversity and support Priority Features 2 and 5 (restored native plant communities, habitat connectivity) and address Priority Issue 1 (presence of invasive species).
2) Incorporate native species in landscaping when current vegetation is damaged or otherwise removed to support Priority Feature 5 (habitat connectivity).

DESIRED FUTURE CONDITION

Limited habitat improvements are prioritized for the greenway corridor in this park. Southern Mesic Prairie (UPs23) is a reasonable target plant community for the pollinator planting demonstration area. A map of the area is shown in Figure 40. Otherwise, vegetation will largely stay the same as described in the current state section. The City will continue to maintain their prairie planting, though greenway cost-share dollars could help fund that work.

Figure 40: Target plant community for Levee Park



GORES POOL #3 WILDLIFE MANAGEMENT AREA (WMA)

Gores Pool #3 WMA is located just east of the City of Hastings. The MRG corridor does not pass through it, so this area was not assessed as part of this plan. However, it is worth mentioning that Gores Pool #3 WMA is large and consists of predominantly floodplain forests and backwater marshes along both the Mississippi and Vermillion Rivers. It provides important natural area connectivity on the landscape and supports habitat. More information about one section of the WMA can be found in the 2009 NRMP.

NODE 22: EASTERN EXTENSION

CURRENT STATE

At C.P. Adams Park in Hastings, the MRG joins with the Vermillion River Greenway, an east-west trail corridor that follows the Vermillion River for 3 miles in central Dakota County. Beyond this trail junction, the MRG trail has not yet been constructed. Currently, bicyclists use the Ravenna Trail roadway to continue southeast 16 miles, eventually connecting to the Cannon Valley Trail in Goodhue County. The planned section of the MRG continuing from C.P Adams Park to the Goodhue County line is referred to as the "Eastern Extension" in this NRMP.

The 7-mile Eastern Extension traverses several land uses, including large-lot residential properties, agricultural lands, an MNDNR Wildlife Management Area, and two MNDNR Public Water Accesses to the Vermillion River. Anticipating that the MRG will follow the Ravenna Trail ROW, the characterization and opportunities presented here focus on publicly owned lands. Beyond Gores Pool WMA, which is noted in the previous section, the northern end of the Eastern Extension passes by the MNDNR North Vermillion River Public Water Access (PWA). While this 3-acre property is somewhat outside of the MRG corridor, its presence near the trail could translate into its use as a rest stop for trail users or a destination for anglers who arrive by bicycle. The PWA's condition is utilitarian: a long driveway terminating at large parking lot with a boat ramp. The driveway/road to the PWA is lined with large black locust and glossy buckthorn. The property also includes a 1.5-acre floodplain forest to the southeast of the parking lot. In August 2024 after a wet summer, it was apparent that the floodplain had received flood flows from the Vermillion. Only pioneering species such as clearweed, soapwort, and smartweeds were present.

Private properties comprise the bulk of the corridor moving southeast. At the southern terminus of Ravenna Trail, a high-quality, 40-acre wetland complex is present across several private properties on the east side of the road. The wetland is partially fed by springs in the bluffs on the west side of Ravenna Trail through culverts under the road. Dakota County and the City of Hastings undertook a ravine stabilization project on the west side of Ravenna Trail in 2022, and it was identified through that process that the plant communities in these wetlands and seeps are of high quality despite the presence of reed canary grass, hybrid cattail and narrow-leaf bittercress in areas.

Image 22. Floodplain forest near North Vermillion PWA along the MRG Eastern Extension

Table 22: Notable species observed in Node 22 (Eastern Extension).

TREES	SHRUBS	GROUND COVER (WILDFLOWERS, GRASSES, SEDGES, FERNS, VINES)
Eastern cottonwood	Willow	**Narrow-leaf/hybrid cattail**
Willow spp.	False indigo	**Reed canary grass**
Silver maple	Red-osier dogwood	**Narrow-leaf bittercress**
Black locust	**Glossy buckthorn**	Jewelweed
Green ash		Nodding bur-marigold
Boxelder		Dark green bulrush
		Water parsnip

BOLDED: Non-native and/or invasive species

GOALS FOR NODE

The goals for this unit include:

1) Reduction of aggressive, invasive woody species in the corridor (black locust, glossy buckthorn) to address Priority Issue 1 (presence of invasive species).
2) Protection of known high-quality wetland plant communities to support Priority Feature 1 (remnant native plant communities).

DESIRED FUTURE CONDITION

Enhancing floral resources and native species diversity in the floodplains, protecting existing plant communities, and eliminating invasive woody species are three reasonable goals to work toward as opportunities arise. All three goals will increase the quality of habitat in this less developed section of the MRG. Target communities to consider include Southern Floodplain Forest (FFS68) in the floodplains, Southern Seepage Meadow/Carr (WMs92) in the spring-fed wetlands, and Southern Wet-Mesic Hardwood Forest (MHs49) in the surrounding forests.

The Target Plant Communities and Restoration Recommendations section below summarizes target plant communities and management actions to achieve them. Figures 41 and 42 show target plant communities for restoration in this node.

A number of partners currently own land within this stretch and could be engaged when planning habitat improvements along the greenway. Both the City of Hastings and the MNDNR have shown their ability to restore and maintain habitat at nearby sites, either on their own crews or through partnerships. Maintenance of these habitat improvements and additional natural area restoration should be explored with all partners, and could be implemented through greenway cost-share funds.

Figure 41: Target Plant Communities- Eastern Extension North

Figure 42: Target Plant Communities- Eastern Extension-South

LINEAR CORRIDORS BETWEEN NATURAL AREA NODES

Opportunities exist to incorporate smaller amounts of habitat creation within the interstitial areas of narrow land between the nodes. In fact, Natural Area Nodes 5, 9, 15, and 17 are themselves linear areas where the potential for impactful restoration to occur was identified. These linear corridors can link larger habitat blocks and allow for the movement of pollinators, birds and other wildlife.

In identifying additional linear corridors, the best outcomes will be reached where the linear corridor connects significant areas of open space, has minimal impervious surface, lacks fencing or other barriers like railroads that impede wildlife movement, is well-separated from busy roadways, and where restoration will not be disturbed by future infrastructure or development.

Additional opportunities exist along the greenway for this type of habitat creation, and should be pursued when and where there is the capacity in place for longterm maintenance. For example, additional opportunities could be identified by cross-referencing Dakota County highway right-of-way widths adjacent to the MRG, or locations where Dakota County or the various city partners hold ponding easements.

SUMMARY OF INVASIVE SPECIES PRESENCE ALONG GREENWAY

In considering the habitat quality and potential restoration of natural areas, a significant factor in the level of difficulty, cost, likelihood of success, and persistence of habitat is the presence of invasive or introduced species, the spatial extent of the invasive species, and the length of time the site has been affected by invasive species. As such, invasive species management is often the initial consideration in planning and implementing habitat restoration.

Tables 23-27 summarize the presence or understood absence of common invasive species identified within each site and grouped by city. It should also be noted that new invasive species can quickly become established at a site, and frequent inspection and monitoring are necessary to prevent establishment or reinvasion after initial management.

Table 23: Invasive Species Nodes 1-3 (South Saint Paul)

SCIENTIFIC NAME	COMMON NAME	North of Kaposia	Kaposia	Simon's Ravine
Acer ginnala	Amur maple			L
Ambrosia trifida	Giant ragweed			L
Arctium minus	Common burdock	M	M	
Artemesia absinthium	Absinthe wormwood	L	L	
Berteroa incana	Hairy alyssum		M	
Bromus inermis	Smooth brome	M	L	L
Carduus nutans	Musk thistle	L		
Centaurea stoebe micranthos	Spotted knapweed	L	M	
Cirsium arvense	Canada thistle	L	M	
Euphorbia virgata	Leafy spurge	L		
Glechoma hederacea	Creeping Charlie			M
Hypericum perforatum	Common St. John's wort	L		L
Leonurus cardiaca	Motherwort		L	M
Lonicera tatarica morrowii, L. *maackii*	Invasive honeysuckle			L
Lotus corniculatus	Bird's foot trefoil	L	H	
Melilotus albus	White sweet clover	M	M	L
Melilotus officinalis	Yellow sweet clover		L	
Phalaris arundinacea	Reed canary grass	M	M	H
Rhamnus cathartica	Common buckthorn			M
Robinia pseudoacacia	Black locust			M

SCIENTIFIC NAME	COMMON NAME	North of Kaposia	Kaposia	Simon's Ravine
Sisymbrium loesii	Tall hedge mustard	M	M	
Securigera varia	Crown vetch	M	H	M
Torilis japonica	Japanese hedge parsley			M
Ulmus pumila	Siberian elm			L
Verbascum thapsus	Common mullein		L	

Abundance codes: H=High, M=Medium, L=Low

Table 24: Invasive Species Nodes 4-10 (Inver Grove Heights)

SCIENTIFIC NAME	COMMON NAME	Heritage-RI Swing Bridge	Trail: RI Swing Bridge to Dehrer	Dehrer	Ernster	Riverfront	Trail: Riverfront to Pine Bend Bluff SNA	Pine Bend Bluff SNA
Acer ginnala	Amur maple	L						
Alliaria petiolata	Garlic mustard			M	M			L
Ambrosia trifida	Giant ragweed				L			
Arctium minus	Common burdock	L	M	M	H	L	H	L
Artemesia absinthium	Absinthe wormwood	L	M				M	
Berberis thunbergii	Japanese Barberry							
Berteroa incana	Hairy alyssum			L			L	L
Bromus inermis	Smooth brome		L		L		H	M
Carduus nutans	Musk thistle	L						
Celastrus orbiculatus	Round-leaved bittersweet					L		
Centaurea stoebe micranthos	Spotted knapweed	L	M	M		L	H	L
Cirsium arvense	Canada thistle	L			L		L	
Cirsium vulgare	Bull thistle							L
Conium maculatum	Poison hemlock	L						
Daucus carota	Queen Anne's lace	L						
Euphorbia cyparissias	Cypress spurge	L						
Euphorbia marginata	Snow-on-the-mountain			L				

SCIENTIFIC NAME	COMMON NAME	Heritage-RI Swing Bridge	Trail: RI Swing Bridge to Dehrer	Dehrer	Ernster	Riverfront	Trail: Riverfront to Pine Bend Bluff SNA	Pine Bend Bluff SNA
Euphorbia virgata	Leafy spurge	L						
Frangula alnus	Glossy buckthorn							
Glechoma hederacea	Creeping charlie			M				
Hemerocallis fulva	Daylily							
Hypericum perforatum	Common St. John's wort	L					L	
Iris pseudacorus	Yellow iris	L						
Lactuca seriola	Prickly lettuce						L	
Leonurus cardiaca	Motherwort	L	L	L	M			L
Linaria vulgaris	Butter and eggs							L
Lonicera tatarica	Invasive honeysuckle		M	H	L	L		L
Lotus corniculatus	Bird's foot trefoil	M	M			L	M	M
Lythrum salicaria	Purple loosestrife	M						
Medicago lupulina	Black medick			L				
Melilotus albus	White sweet clover	L						
Melilotus officinalis	Yellow sweet clover	L						
Miscanthus sacchariflorus	Amur silvergrass	M						
Morus alba	White mulberry	L		L				L
Pastinaca sativa	Wild parsnip				L			
Phalaris arundinacea	Reed canary grass	M		L		L		
Rhamnus cathartica	Common buckthorn	L	M	H	M	H		M
Robinia pseudoacacia	Black locust	L	M					
Rumex crispus	Curly dock	L			L			
Saponaria officinalis	Soapwort							M
Securigera varia	Crown vetch	H		M	L	H	L	M
Setaria spp.	Foxtail	L						L
Silene vulgaris	Bladder campion			L	L			
Sisymbrium loesii	Tall hedge mustard							

SCIENTIFIC NAME	COMMON NAME	Heritage-RI Swing Bridge	Trail: RI Swing Bridge to Dehrer	Dehrer	Ernster	Riverfront	Trail: Riverfront to Pine Bend Bluff SNA	Pine Bend Bluff SNA
Torilis japonica	Japanese hedge parsley			M				
Typhus angustifolia	Narrow-leaved cattail						L	
Ulmus pumila	Siberian elm	M	L	L				L
Verbascum thapsus	Common mullein						L	L

Abundance codes: H=High, M=Medium, L=Low

Table 25: Invasive Species Nodes 11-12 (Rosemount)

SCIENTIFIC NAME	COMMON NAME	Flint Hills Resources	Mosaic
Alliaria petiolata	Garlic mustard	M	L
Arctium minus	Common burdock	L	L
Artemesia absinthium	Absinthe wormwood	L	
Berteroa incana	Hairy alyssum	L	
Bromus inermis	Smooth brome	M	M
Centaurea stoebe micranthos	Spotted knapweed	L	
Cirsium arvense	Canada thistle	L	
Cirsium vulgare	Bull thistle	L	
Daucus carota	Queen Anne's lace	L	
Leonurus cardiaca	Motherwort	L	L
Linaria vulgaris	Butter and eggs	L	
Lonicera tatarica morrowii, L. maackii	Invasive honeysuckle	L	M
Lotus corniculatus	Bird's foot trefoil	L	
Melilotus albus	White sweet clover	L	
Melilotus officinalis	Yellow sweet clover	L	
Morus alba	White mulberry	L	
Pastinaca sativa	Wild parsnip	L	
Rhamnus cathartica	Common buckthorn	M	H
Robinia pseudoacacia	Black locust	L	

SCIENTIFIC NAME	COMMON NAME	Flint Hills Resources	Mosaic
Securigera varia	Crown vetch	M	
Setaria spp.	Foxtail	L	
Ulmus pumila	Siberian elm	M	L
Verbascum thapsus	Common mullein	L	

Abundance codes: H=High, M=Medium, L=Low

Table 26: Invasive Species Nodes 13-15 (Nininger Township)

SCIENTIFIC NAME	COMMON NAME	SLP-Fahey	SLP-Schaar's Bluff	Benjamin
Alliaria petiolata	Garlic mustard		L	
Ambrosia trifida	Giant ragweed			H
Berteroa incana	Hairy alyssum			M
Bromus inermis	Smooth brome		H	H
Centaurea stoebe micranthos	Spotted knapweed			H
Cirsium arvense	Canada thistle			L
Cirsium vulgare	Bull thistle	L		
Glechoma hederacea	Creeping Charlie		L	
Lactuca seriola	Prickly lettuce	L		
Lotus corniculatus	Bird's foot trefoil			L
Morus alba	White mulberry			M
Phalaris arundinacea	Reed canary grass		L	
Phleum pratense	Timothy			L
Poa pratensis	Kentucky bluegrass			L
Rhamnus cathartica	Common buckthorn	M	L	L
Securigera varia	Crown vetch		M	L
Setaria spp.	Foxtail	L		L
Sisymbrium loesii	Tall hedge mustard		L	
Torilis japonica	Japanese hedge parsley		L	L
Trifolium pratense	Red clover			L
Ulmus pumila	Siberian elm	M		M

Abundance codes: H=High, M=Medium, L=Low

Table 27: Invasive Species Nodes 16-21 (Hastings)

SCIENTIFIC NAME	COMMON NAME	Trail: Benjamin to Lk Rebecca	Lk Rebecca	Hastings River Flats	Jaycee Park	Levee Park	MRG Eastern Extension
Acer ginnala	Amur maple	L					
Alliaria petiolata	Garlic mustard		L	L			M
Ambrosia trifida	Giant ragweed					L	
Arctium minus	Common burdock			L		L	L
Berteroa incana	Hairy alyssum			L			
Bromus inermis	Smooth brome	M	M	M			
Cardamine impatiens	Narrow-leaf bittercress						M
Centaurea stoebe micranthos	Spotted knapweed	L				L	
Cirsium arvense	Canada thistle			L		L	
Frangula alnus	Glossy buckthorn					L	M
Glechoma hederacea	Creeping Charlie			L			
Leonurus cardiaca	Motherwort	L		L		L	
Lonicera tatarica morrowii, L. maackii	Invasive honeysuckle			L		L	L
Lotus corniculatus	Bird's foot trefoil			L			
Lythrum salicaria	Purple loosestrife		L				L
Melilotus albus	White sweet clover					L	
Melilotus officinalis	Yellow sweet clover					L	
Morus alba	White mulberry				L		
Phalaris arundinacea	Reed canary grass		M	L			H
Phleum pratense	Timothy	L					
Poa pratensis	Kentucky bluegrass	H	L	L	H	H	
Rhamnus cathartica	Common buckthorn	M	L	L			H
Saponaria officinalis	Soapwort						H
Securigera varia	Crown vetch					L	
Setaria spp.	Foxtail			H			
Silene vulgaris	Bladder campion			L			
Typhus angustifolia	Narrow-leaved cattail		L				M
Ulmus pumila	Siberian elm	H		L	L		
Verbascum thapsus	Common mullein		L	L			

TARGET PLANT COMMUNITIES AND RESTORATION RECOMMENDATIONS

Priorities identified in this plan focus attention on the preservation, restoration, or enhancement of particular species, plant communities, water resources, or ecosystem processes. Restoration or conservation objectives are listed for each target plant community within each site below.

PRAIRIE

GENERAL MANAGEMENT ACTIONS TO ACHIEVE PRAIRIE

1) **Convert turf and altered grasslands to native prairies.** Underutilized park areas with maintained turf cover, trail corridors with extensive mowed grass, or former pastured lands dominated by non-native, cool-season grasses can be converted to native shortgrass or tallgrass prairies, depending on soil type and hydrological conditions. Even moderately sized areas of mowed turf can be enhanced with prairie/pollinator plantings. The purpose and importance of these "pocket prairies" (primarily for community enjoyment and to create habitat corridors) must be clearly communicated to the public and to staff maintaining the parks so that errant mowing does not disturb establishing plants. One year of herbicide site preparation is recommended to exhaust the weed seed bank prior to seeding with native prairie vegetation, and a limited species palate compatible with park uses should be used.
2) **Remove encroaching woody species.** Prairie or woodland margins succeed to wooded secondary forest, thus shading out prairie grasses and forbs. Reestablishing prairie boundaries by removing encroaching shrubs such as sumac, gray dogwood and/or prickly ash will ensure fine fuel (grass) cover for continued management by fire.
3) **Ongoing prairie management.** Prairie maintenance is dependent upon periodic burning, with three to four years as a typical burn interval depending on biomass accumulation. Spot mowing and herbicide treatments should be utilized to manage invasive species and promote native species diversity. In sites where burning may be prohibitive due to proximity to residential neighborhoods, alternative management techniques such as haying or grazing should be explored.

OAK SAVANNA

GENERAL MANAGEMENT ACTIONS TO ACHIEVE OAK SAVANNA

1) **Eliminate cover of all invasive shrubs.** Invasive common buckthorn and honeysuckle species exhibit the greatest extent of shrub layer cover of many woodlands and oak

savanna remnants within the Mississippi River Greenway corridor. Removing these species, performing follow-up maintenance, and establishing a diverse, native shrub and herbaceous plant layer appropriate for the native plant community target is necessary to protect these remnants or to restore lost habitat. Ongoing maintenance of these restorations, including prescribed fire, is needed.

2) **Remove secondary growth or ruderal trees and shrubs.** Native tree species such as box elder, Eastern cottonwood, green ash and black walnut have afforested oak savannas due to fire suppression. To re-establish savanna plant communities, these species, in addition to any non-native (Siberian elm, black locust) trees should be removed to reduce the tree density to between 10 and 20 percent canopy cover, with a preference towards retaining bur oaks.
3) **Establish savanna grasses and forbs as the dominant ground cover.** Native grasses, and forbs, to a somewhat lesser extent, comprise the dominant vegetative cover within intact oak savannas. In areas where extensive tree and shrub removal is necessary, there is little likelihood of native seedbank presence or viability. Following canopy thinning, site preparation, including repeated mowing and selective herbicide application, will limit woody regrowth and suppress the initial flush of weedy vegetation expressing itself from the seedbank. Urban and agricultural sites typified by the areas identified in the corridor have a long history of human-caused disturbance, such that weed pressure will be high, and prioritizing initial weed control with prolonged site preparation will support better establishment and persistence of planted native species. With time, the herbaceous layer will be competitive against weedy species.
4) **Utilize fire as a management tool to control woody encroachment.** Senesced native grasses accumulate biomass over time and provide fine fuels that will carry prescribed fire through restored oak savannas. The reintroduction of burning in these fire-dependent systems will diminish fire-intolerant seedling trees and shrubs. Selecting less frequent fire return intervals that allow the initial establishment of young white/bur oak trees or selectively protecting tree species from fire will allow for some oak recruitment and ensure continued regeneration of the oak savanna.
5) **Manage areas adjacent to the oak savanna.** Savannas are vulnerable to invasive species reestablishment and the movement of shade-tolerant species from nearby woodlands. Care should be taken to limit the effects of properties surrounding remnant or restored habitat by ensuring the management of adjacent parcels.

OAK WOODLAND

GENERAL MANAGEMENT ACTIONS TO ACHIEVE OAK WOODLAND

1) **Eliminate the cover of all invasive shrubs.** As in oak savanna areas, these shrubs prevent the recruitment of younger oak trees and the establishment of native

graminoids and forbs on the forest floor. Follow-up management of resprouts is recommended in the fall season after initial removal and prior to the onset of dormancy.

2) **Thin forest to promote future diverse canopy composition.** Tree species indicative of secondary growth, such as box elder, Eastern cottonwood, green ash, and black walnut, can be thinned to achieve a 20 to 80 percent canopy cover, preserving oaks in general and white/bur oaks in particular but thinning activities can vary allowing for a naturalized mosaic grading to adjacent cover types. By thinning less desirable trees, the composition of future canopy cover can be directed to sustain the continued presence of oaks.
3) **Incorporation of climate resilient and adaptive tree species.** Minnesota's climate has changed and continues to change, which has affected the suitability, regeneration, and long-term viability of some native trees. In managing the canopy for resiliency to climate change and higher diversity, the addition of climate-adapted and climate-resilient tree species should be considered, as well. Emerging data documenting the resiliency of native tree species, the potential viability of these same species grown in USDA zones to the south, and the suitability of species native to zones south of Minnesota are emerging and should be referenced in reforestation planning.
4) **Establish dispersed native shrub layer.** Native shrubs offer greater habitat advantages to wildlife in terms of both food and structural complexity compared to the buckthorn and honeysuckle they replace. While use of competition and shading is an emerging strategy for buckthorn management, it is not meant to take the place of periodic maintenance sweeps to keep exotic shrubs from re-establishing within this matrix. Fire-tolerant shrubs would succeed in cases where woodland burns are also elected as a strategy for maintaining exotic species and woodland structure.
5) **Establish native shade-tolerant forbs for increased pollinator value.** Woodland forbs, especially spring ephemerals such as bloodroot, *Anemone* spp., and Jack-in-the-pulpit support early emerging insects, some of which have developed specialized ecological roles in association with host plants (e.g., plants providing pollen to bees or inducing ant-mediated seed dispersal known as myrmecochory). Native woodland forb cover also helps to reduce erosion of bare forest soils, as leaves intercept rain drops and increase water infiltration rates, all contributing to greater water quality.

ALTERED DECIDUOUS FOREST

GENERAL MANAGEMENT ACTIONS TO RESTORE ALTERED DECIDUOUS FOREST TO NATIVE PLANT COMMUNITY

1) **Invasive shrub removal.** This is the single greatest threat and first step in the restoration process in altered deciduous forests. Some of the hardwood forests found in the Greenway corridor differ in the extent to which invasive shrubs are problematic. As previously mentioned, if resources are limited, sites with minimal invasion should be prioritized for maintenance and removal of invasive shrubs with management of more degraded sites undertaken as resources are more available. Restoration of areas with invasive shrub pressure can be undertaken progressively in this way.
2) **Selective thinning of afforested areas.** In addition to woody encroachment by invasive species, some altered deciduous forests are also afforested whereby the lack of disturbance and other abiotic factors have allowed for the establishment of dense tree cover of especially shade-tolerant species. These woodlands lack species and structural diversity in the canopy, subcanopy, and shrub layers and can lack diversity in herbaceous cover. Selective thinning of species such as green ash, box elder, black walnut, and black cherry throughout a range of size classes will create canopy gaps and allow for the planting of more diverse tree and shrub species, which will improve habitat.
3) **Native graminoid seeding to establish vegetative cover.** Following the removal of the invasive tree and shrub species, the establishment of vegetative cover is key to preventing the reinvasion of those same invasive species and the germination of weed seeds held in the seed bank. Immediate seeding with a simple graminoid mix should be done in the growing season following initial removal. Any necessary follow-up broadleaf herbicide application to resprouted woody invasives will not damage the grasses germinating from seeding.
4) **Native tree and shrub planting to diversify the canopy and shrub layer, where appropriate.** The addition of native trees and shrubs in areas where sufficient canopy gaps are created by invasive woody removal should be undertaken. Plantings should be prioritized in locations where trees and shrubs can be watered, protected from wildlife browse, and can be used to protect bare ground and steeper slopes from soil erosion. Species such as black chokeberry *(Aronia melanocarpa),* gray dogwood *(Cornus racemosa),* American hazelnut *(Corylus americana),* ninebark *(Physocarpus opulifolius),* chokecherry *(Prunus virginiana),* and nannyberry *(Viburnum lentago)* are suitable for the woodlands.

5) **Native plug planting of shade-tolerant, earthworm-resistant graminoids and forbs.** Minnesota's hardwood forests developed in the absence of earthworms. Without worms, fallen leaves decompose slowly, creating a spongy layer of organic "duff." This duff layer is the natural growing environment for native woodland wildflowers. It also provides habitat for ground-dwelling animals and helps prevent soil erosion. A common condition in many of Minnesota's altered deciduous forests is invasion of earthworms and the detrimental effects. Earthworms eat the leaves that create the duff layer and are capable of consuming it completely. Canopy trees survive, but seedlings of these trees do not, and many woodland ferns and forbs are lost, as well. In areas of heavy earthworm infestation, soil erosion and leaching of nutrients reduces the productivity of forests and ultimately degrade wildlife habitat. Few species are known to be more resistant to the effects of earthworms, but Pennsylvania sedge *(Carex pensylvanica),* ramps or wild leeks *(Allium tricoccum)*, Jack in the pulpit (*Arisaema triphyllum),* wild columbine *(Aquilegia canadensis),* and zigzag goldenrod *(Solidago flexicaulis)* have been shown to have some resistance, and the planting of these species could be prioritized.

MESIC HARDWOOD FORESTS

GENERAL MANAGEMENT ACTIONS TO RESTORE MESIC HARDWOOD FOREST

1) **Eliminate cover of all invasive shrubs.** As previously mentioned, this is the single greatest threat and first step in the restoration process. Some of the hardwood forests found in the Greenway corridor differ in the extent to which invasive shrubs are problematic. If resources are limited, sites with minimal invasion should be prioritized for maintenance and removal of invasive shrubs with management of more degraded sites coming as resources are more available. Protection of remnant and more intact restored habitats is necessary to allow the plant communities to persist over time. Restoration of areas with invasive shrub pressure can be undertaken progressively.
2) **Establish dispersed native tree and shrub layer.** Planting native shrubs in the understory of these forests contributes to added complexity to the structure of these forests, competes with invasive shrubs, and provides enhanced wildlife habitat value.
3) **Diversify canopy species.** While some of the mesic hardwood forests within the corridor are the result of afforestation within the last 75 years, large scale removal of native trees in public parks is generally opposed by the community. For sites that would require significant canopy removal or a high degree of input to convert an existing altered woodland to a documented Minnesota native plant community, a broader target community can allow for a more flexible approach to selecting future canopy species composition. Forests dominated by cottonwood, boxelder, green ash and black walnut can be transitioned to other forest types by selectively removing tree species.

Even mature specimens impacted by insects such as ash (due to emerald ash borer) or disease will need to be selectively removed, and replacement plantings should consider species appropriate to various target communities. For example, replacing pioneering tree species with oaks or basswood would set a successional trajectory more closely resembling native plant communities such as Southern Dry-Mesic Oak Forest (MHs37) and Southern Mesic Oak Basswood Forest (MHs38). More mesic sites can be targeted for introducing species more common in SE forests, including bitternut hickory in Southern Wet-Mesic Hardwood Forests (MHs49) or Southern Terrace Forests (FFs59) found along streams.

4) **Incorporation of climate resilient and adaptive tree species.** As previously noted, Minnesota's changing climate requires an understanding of which Minnesota-native tree species are resilient to the effects of climate change, which are not, and which species common in ranges to the south may be suitable additions to mesic hardwood forests of the future.
5) **Establish native ground cover.** Planting woodland sedges, grasses, and forbs (especially spring ephemerals) will create opportunities for reducing erosion, controlling invasive species with competition and the reintroduction of fire, and adding pollinator resources to these altered forests. Continued management to remove weedy biennials such as garlic mustard and lesser celandine will aid the re-establishment of herbaceous species composition on the forest floor.
6) **Be responsive to the impacts of invasive earthworms.** The destructive effects of invasive earthworms in the woodlands of the upper Midwest can be seen within the Vermillion Greenway corridor. The lack of organic material on the forest floor, as well as middens left behind by earthworms indicate the need to reestablish herbaceous vegetation that is more resistant to earthworms, such as Pennsylvania sedge, zig-zag goldenrod, wild columbine, and jack-in-the-pulpit.

FLOODPLAIN FORESTS

GENERAL MANAGEMENT ACTIONS TO RESTORE FLOODPLAIN FORESTS

Management activities recommended for wet forests are similar to those of more mesic and dry woodlands, including reducing invasive tree and shrub cover, diversifying the canopy, and reestablishing a diverse and resilient herbaceous layer. Canopy species composition differs, however, and tends to be dominated by tree species such as Eastern cottonwood and silver maple. Maintenance by fire is less effective due to minimal fine fuels or continuous fuels such that these forests will continuously need to be managed to avoid encroachment of invasive shrubs. Additionally, these forests are not fire-adapted, and disturbance regimes are tied to periodic flooding and canopy gaps with the loss of short-lived floodplain tree species. Regeneration of Eastern cottonwood in floodplain forests of the Upper Midwest has been

steadily decreasing and is being tied to the climate change effects of prolonged spring flooding followed by prolonged summer drought. As the floodplain forests of the Vermillion River are restored, consideration should be given to establishing a more diverse and climate-resilient tree canopy by planting species such as hackberry, American sycamore, red oak, white oak, and black walnut.

WETLANDS

GENERAL MANAGEMENT ACTIONS TO RESTORE WETLANDS

1) **Manage invasive species.** The wetlands within the corridor primarily fall into two types: the seasonally flooded basins that make up the floodplain of the Mississippi and Vermillion Rivers and the more diverse wetland mosaic within other sites that includes shallow open water, shallow and deep marsh, and shrub swamp. Within the Mississippi floodplain, the degree to which water level fluctuates with precipitation events is dependent upon upstream watershed connectivity (lower fluctuation) and the degree of impervious surfaces (higher fluctuation). Increases in impervious surfaces within the watershed have given rise to higher levels of disturbance in the floodplain wetlands, which has allowed a shrub layer of invasive shrubs to dominate. A significant effort would be necessary to convert these wetlands to native plant communities after a long period of being dominated by invasive shrubs. Once initial removal is undertaken, it is likely that some remnant wetland seedbank has persisted, and the potential to establish a native herbaceous layer is high. Where a native seedbank is not present, the re-establishment of a floodplain plant community is better served by targeted plug planting, as seed is often swept away during flood events. Adjacent upland areas currently dominated by reed canary grass can be restored to native cover by way of repeated mowing in mid-spring and fall, followed by judicious herbicide application that avoids off-target damage to cool season sedges and rushes. Follow-up maintenance is necessary to treat resprouts and eventually exhaust the substantial seedbank.
2) The relatively high-quality wetland mosaic within the Eastern Extension should be protected by targeted management of buckthorn that was noted in a few interior areas, especially the roadsides.

Table 28: Recommended Target Plant Community by Site and Restoration Steps

EXISTING PLANT COMMUNITY	CITY	SITES	TARGET PLANT COMMUNITY	RESTORATION STEPS
Remnant and Restored Prairie	South St. Paul	Kaposia Landing	Southern Dry Prairie (UPs13),	• Prescribed burning to (re)introduce fire

EXISTING PLANT COMMUNITY	CITY	SITES	TARGET PLANT COMMUNITY	RESTORATION STEPS
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks, Pine Bend Bluff SNA	Southern Mesic Prairie (UPs23), or Southern Wet Prairie (WPs54)	• Eliminate woody encroachment/invasive shrubs • Control invasives in the herbaceous layer • Enhancement native seeding • Regular disturbance (2-3 years) via prescribed burning/mowing/haying
	Rosemount	Flint Hills Resources, Mosaic, Spring Lake Park - Fahey		
	Nininger Township	Spring Lake Park - Schaar's Bluff, Benjamin Easement		
	Hastings	Trail Section: Benjamin to Lake Rebecca Park, Lake Rebecca Park, Hastings River Flats		
Altered Grasslands/Prairie	South St. Paul	North of Kaposia Landing, Kaposia Landing, Simon's Ravine Trailhead	Southern Dry Prairie (UPs13) or Southern Mesic Prairie (UPs23) or Southern Wet Prairie (WPs54)	• Eliminate woody encroachment/invasive shrubs • Control invasives in the herbaceous layer • Native seeding • Prescribed burning/mowing/haying
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks, Trail Section: RI Swing Bridge to Dehrer Park, Dehrer Park, Ernster Park, Trail Section: Ernster Park to Pine Bend Bluff SNA		
	Rosemount	Mosaic, Spring Lake Park - Fahey		
	Nininger Township	Spring Lake Park - Schaar's Bluff, Trail Section: Spring Lake Park to Benjamin Easement, Benjamin Easement		
	Hastings	Trail Section: Benjamin to Lake Rebecca Park, Jaycee Park, Levee Park		
Oak Savanna	South St. Paul	Simon's Ravine	Southern Dry and Mesic Savanna (UPs14 and UPs24)	• Invasive shrub removal • Ash, boxelder, cottonwood, hackberry, walnut thinning • Protection of rare/sensitive species • Native seeding/plug planting of savanna graminoids and forbs • Regular disturbance (3-5 years) via
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks		
	Rosemount	Flint Hills Resources, Mosaic		
	Nininger Township			
	Hastings			

EXISTING PLANT COMMUNITY	CITY	SITES	TARGET PLANT COMMUNITY	RESTORATION STEPS
				prescribed fire/mowing/haying
Oak Woodland and Oak Forest	South St. Paul	Simon's Ravine	Southern Dry-Mesic Pine-Oak Woodland (FDs27), Southern Dry-Mesic Oak Woodland (FDs37), Southern Dry-Mesic Oak Forest (MHs37), and Southern Mesic Maple-Basswood Forest (MHs39)	• Invasive shrub removal • Native graminoid seeding post-shrub removal. • Ash, boxelder, cottonwood, hackberry, walnut thinning • Oak sapling planting where necessary • Native shrub planting • Native seeding/plug planting of shade-tolerant, earthworm-resistant graminoids and forbs • Woodlands only - prescribed fire (5-7 years)
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks, Trail Section: RI Swing Bridge to Dehrer Park, Dehrer Park, Ernster Park, Trail Section: Ernster Park to Pine Bend Bluff SNA, Pine Bend Bluff SNA		
	Rosemount	Flint Hills Resources, Mosaic, Spring Lake Park - Fahey		
	Nininger Township	Spring Lake Park - Schaar's Bluff		
	Hastings	None		
Altered Deciduous Woodland/Forest	South St. Paul	Simon's Ravine	Southern Dry-Mesic Pine-Oak Woodland (FDs27), Southern Dry-Mesic Oak Woodland (FDs37), Southern Dry-Mesic Oak Forest (MHs37), Southern Mesic Maple-Basswood Forest (MHs39), and Southern Wet Mesic Hardwood Forest (MHs49)	• Invasive shrub removal • Native graminoid seeding post-shrub removal. • Native tree and shrub planting to diversity canopy/shrub layer, where appropriate • Native seeding/plug planting of shade-tolerant, earthworm-resistant graminoids and forbs • Woodlands only - prescribed fire (5-7 years)
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks, Trail Section: RI Swing Bridge to Dehrer Park, Dehrer Park, Ernster Park, Riverfront Park, Trail Section: Ernster Park to Pine Bend Bluff SNA		
	Rosemount	Mosaic, Spring Lake Park - Fahey		
	Nininger Township	Spring Lake Park - Schaar's Bluff, Benjamin Easement		
	Hastings	Trail Section: Benjamin to Lake Rebecca Park, Lake Rebecca Park		
Floodplain Forest	South St. Paul	Kaposia Landing	Southern Terrace Forest (FFs59) or Southern	• Invasive shrub removal • Native graminoid seeding post-shrub removal. • Native tree and shrub
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks, Dehrer Park, Riverfront Park		

EXISTING PLANT COMMUNITY	CITY	SITES	TARGET PLANT COMMUNITY	RESTORATION STEPS
Floodplain Forest (continued)	Rosemount	Mosaic	Floodplain Forest (FFs68)	planting to diversify canopy/shrub layer where appropriate • Native seeding/plug planting of shade-tolerant, earthworm-resistant graminoids and forbs
	Hastings	Lake Rebecca Park, Hastings River Flats, Eastern Extension		
Freshwater Emergent Wetland	South St. Paul	Kaposia Landing, Simon's Ravine Trailhead	Northern Bulrush-Spikerush Marsh (MRn93) and Southern Seepage Meadow Carr (WMs83)	• Invasive shrub removal • Herbicide application in combination with mechanical removal (mowing, scraping, hydrological manipulations) • Native tree and shrub planting to diversify shrub layer where appropriate • Native plug plantings of floodplain graminoids and forbs
	Inver Grove Heights	Heritage Village - RI Swing Bridge Parks		
	Rosemount	Mosaic		
	Nininger Township	Trail Section: Spring Lake Park to Benjamin Easement		
	Hastings	Trail Section: Benjamin to Lake Rebecca Park, Eastern Extension		

WORKPLAN PRIORITIZATION AND IMPLEMENTATION

The following tasks and budget are based on known costs and project needs at the time of the restoration agreement. All parties, prior to implementation, will agree upon additional future tasks.

PAST AND CURRENT VEGETATION RESTORATION SUMMARY

Several sites within the MRG have been actively managed as native plant communities for years. Below is a summary outlining past and current restoration efforts within the MRG corridor.

Table 29: Past and Current Vegetation Management

GREENWAY NODE	PLANT COMMUNITY	ACTIVITY	YEAR INITIATED
North of Kaposia Landing	Altered grassland		
Kaposia Landing	Restored Prairie, Altered grassland, Freshwater Emergent Wetland		
Simon's Ravine Trailhead	Oak Savanna, Oak Forest, Freshwater Emergent Wetland		
Heritage Village - RI Swing Bridge Parks	Dry Prairie, Mesic Prairie, Floodplain Forest	Restoration: Invasive plant control, seeding, prescribed burning	2013
Trail Section: RI Swing Bridge to Dehrer Park	Oak Forest, Altered Deciduous Forest	None	
Dehrer Park	Altered Deciduous Woodland, Altered grassland	None	
Ernster Park	Altered Deciduous Woodland, Altered grassland	None	
Riverfront Park	Altered Deciduous Woodland	None	
Trail Section: Riverfront Park to Pine Bend Bluff SNA	Oak Forest, Altered Deciduous Woodland, Altered grassland	None	
Pine Bend Bluff SNA	Mesic Prairie	Restoration: Invasive plant control, seeding, prescribed burning	2007
	Oak Woodland	Enhancement: Invasive woody control	2008

GREENWAY NODE	PLANT COMMUNITY	ACTIVITY	YEAR INITIATED
Flint Hills Resources	Remnant Prairie, Oak Forest, Oak Savanna, Altered Deciduous Woodland, Altered grassland	Restoration: Invasive plant control, seeding, prescribed burning	2002, ongoing
Mosaic Property	Oak Forest, Altered Deciduous Woodland, Altered grassland	None	
Spring Lake Park - Fahey Trailhead	Dry prairie, Mesic Prairie, Oak Woodland, Oak Forest	Restoration: Invasive plant control, seeding, prescribed burning	2014
	Oak Forest, Oak Woodland	Enhancement: Invasive woody control	2014
Spring Lake Park - Schaar's Bluff	Oak Forest, Oak Woodland	Enhancement: woody invasive plant control	2006
Trail Section: Spring Lake Park to Benjamin Easement	Altered grassland/prairie	None	
Benjamin Easement	Dry Prairie	Restoration: Invasive plant control, seeding, prescribed burning	2004, ongoing
Trail Section: Benjamin Easement to Lake Rebecca Park	Altered grassland/prairie	None	
Lake Rebecca Park	Floodplain Forest, Emergent Wetland, Restored Prairie, Altered Deciduous Woodland	Restoration: Invasive plant control, seeding, prescribed burning	2003
		Enhancement: Invasive woody control	2022
Hastings River Flats	Restored Prairie	Restoration: Invasive plant control, seeding, prescribed burning	2003
		Enhancement: Invasive woody control	2022
Jaycee Park	Altered grassland	None	
Levee Park	Altered grassland/prairie	Restoration: Invasive plant control, seeding, prescribed burning	2021
Eastern Extension to Goodhue Co. Line	Floodplain Forest, Freshwater Emergent Wetland	None	

RESTORATION PRIORITIZATION

Ecological restoration can be costly and time-consuming during the first few years. Often, it is advisable to prioritize by starting on a subset of units first rather than starting in all units and potentially sacrificing follow-up steps. This section contains tables prioritizing which units within nodes to start first. Prioritization is based on invasive species abundance and extent, potential for erosion, restoration cost, and potential to increase habitat quality.

Table 30: Funding options for the restoration of Priority 1 natural area nodes and units.

PRIORITY 1 UNITS						
NODE # and NAME	UNIT	ACRES	FUNDING SECURED IN 2025		ADDITIONAL FUNDING NEEDED	TOTAL COST OF UNIT
			LCCMR GRANT	RAISE GRANT		
South St. Paul						
2: Kaposia Landing	South Kaposia, SE of Bryant Ave entrance	5	$25,140			$25,140
3: Simon's Ravine	Oak Savanna	9	$61,125	$15,125		$76,250
	Simon's Ravine	17	$81,030			$81,030
Wakota Scenic Trailhead	Wakota TH Levee	11	$10,920		$32,750	$43,670
Inver Grove Heights						
4: Heritage Park	Grasslands and wet basins	29	$25,240	$77,160		$102,400
4: RI Swing Bridge Park	All units	18	$25,240	$32,935		$58,175
10. Pine Bend Bluff SNA	Mesic Prairie	0.7		$3,899		$3,899
	Prairie Edge	2.7		$29,066		$29,066
	Trailhead	1.6		$7,200		$7,200
	Oak Woodland	3.2		$2,560		$2,560
Rosemount						
11: Flint Hills Resources	Restored prairie surrounding interpretive area	4.7			$39,340	$39,340
	Cemetery	0.4			$6,200	$6,200
	Grassland ROW	1.5			$10,800	$10,800
Township of Nininger						
13: Spring Lake Park Fahey	Restored prairie	15.3			$61,200	$61,200
	Oak Woodland	26.8			$83,430	$83,430
14: Spring Lake Park Schaar's Bluff	Schaar's Bluff	56.5				$251,826

16: Benjamin easement	Ag field (Unit 6)	15.1			$71,900	$71,900
	Hay field (Unit 8)	2.4			$16,800	$16,800
	Sculpture garden (Unit 4)	1			$7,900	$7,900
Hastings						
17: Trail: Benjamin to Lake Rebecca	Stormwater pond	1			$6,950	$6,950
	Dry prairie	0.8			$8,400	$8,400
18: Lake Rebecca Park	Mesic savanna/woodland	7	$25,240	$27,260		$52,500
	Mesic prairie	16		$38,500		$38,500
19: Hastings River Flats	Prairie units	23			$80,500	$80,500
	Shoreline	4			$20,000	$20,000
			$253,935	**$233,705**	**$446,170**	**$1,185,636**

Note: Text in red shows natural areas prioritized for restoration utilizing 2025 grant money that are not located within natural area nodes along the MRG.

Table 31: Funding options for the restoration of Priority 2 natural area nodes and units

PRIORITY 2 UNITS						
NODE	**UNIT**	**ACRES**	**FUNDING SECURED IN 2025**		**ADDITIONAL FUNDING NEEDED**	**TOTAL COST OF UNIT**
			LCCMR GRANT	**RAISE GRANT**		
South St. Paul						
Wildflower Levee Park	Greenway	12	$10,920	$21,840	$30,080	$62,840
Inver Grove Heights						
7: Ernster Park	All units	2	$11,570			$11,570
9: Trail Section: Dehrer Park to Pine Bend Bluff SNA	Pine Bend Elementary Woodland	15	$77,125	$16,275		$93,400
	DOT land near PB elementary	9				$35,730
4: Heritage Park	Floodplain Forest	6	$27,450			$27,450
8: Riverfront Park	All units	4	$16,000			$16,000
10: Pine Bend Bluffs SNA	House unit	6.7			$46,900	$46,900
	Stormwater pond near trailhead	2.1			$10,500	$10,500

	Oak woodland - public	1.2			$7,800	$7,800
	Oak woodland - private	5.8			$39,700	$39,700
Rosemount						
11: Flint Hills Resources	Oak savanna	0.4			Private funding - FHR	$0
	Greenway corridor ROW	6.6			$47,520	$47,520
	Utility corridor	1.6			Private funding - FHR	$0
	Grassland	8.2			Private funding - FHR	$0
Township of Niningner						
16: Benjamin easement	Oak woodland (Unit 3)	2.8			$20,150	$20,150
	Oak forest (Unit 1)	1.7			$13,104	$13,104
	Oak savanna (Unit 7)	3.9			$23,543	$23,543
	Nonnative grassland	3.6			$1,800	$1,800
Hastings						
22: Eastern Extension	Ravenna trail DNR boat launches	30				$81,225
17: Trail: Benjamin to Lake Rebecca Park	Remnant dry prairie	0.3			$7,050	$7,050
	Oak savanna	1.4			$34,300	$34,300
	Oak woodland	1.3			$7,800	$7,800
18: Lake Rebecca Park	Dam	3			$28,500	$28,500
	Floodplain forest	20			$20,000	$20,000
21: Levee Park	Pollinator planting	0.1			$8,800	$8,800
			$143,065	**$38,115**	**$241,097**	**$539,232**

Note: Text in red shows natural areas prioritized for restoration utilizing 2025 grant money but are not located within natural area nodes along the MRG.

RESTORATION SEQUENCE WORKPLAN

Restoration Sequence work plans for vegetation management at each management unit are included below in Table 32. These work plans were developed to provide guidelines for achieving the target communities shown in Table 28. This work plan was developed to focus on the natural resource management and restoration priorities for protecting and improving areas within the Greenway Corridor. The primary goals are listed as well as a prioritization made by the landowner, activities, schedules, responsibilities, and estimated costs. Note that the costs shown are estimates, based on similar work at other sites. Actual costs may be higher or lower, depending on multiple factors. Each management unit was prioritized for importance of the restoration need as a shared understanding by County or City staff and FMR ecologists, on a scale of 1 to 3, with 1 being the highest. Restoration sequence workplans are included for priority 1 and 2 units.

Table 32: Restoration sequence plan and task cost estimates for Priority 1 nodes and units

PRIORITY 1 UNITS								
PLANT COMMUNITY	**YEAR**	**SEASON**	**ACTIVITY**	**SLOPE <30% ACRES**	**SLOPE >30% ACRES**	**COST/AC SLOPE <30%**	**COST/AC SLOPE >30%**	**COST PER TASK**
South St. Paul								
Node 2: Kaposia Landing								
Turf	1, 2, 3	Spring, Summer	Prep herbicide 2 times annually for 3 years	5		$1,380		$6,900
Turf	4	Spring	Drill seed native upland mixes	5		$1,710		$8,550
Turf	4 and 5	Spring, Summer	Establishment mowing once annually for 2 years	5		$1,950		$9,750
Node 3: Kaposia Oak Savanna (West of Simon's Ravine)								
Oak savanna	1	Winter	Cut, treat, pile, burn buckthorn and honeysuckle	9			$3,200	$28,800
Oak savanna	1	Winter	Cut, treat, pile, burn secondary growth box elder and Siberian elm, assume 1/2 of site	4		$3,200		$12,800
Oak savanna	2	Fall	Woody invasive foliar follow-up	9		$950		$8,550
Oak savanna	2	Fall	Supplemental seeding	9		$900		$8,100
Oak savanna	1, 2, 3	Spring	Prescribed burn	9		$2,000		$18,000
Node 3: Simon's Ravine								

Oak woodland and forest	1	Winter	Cut, treat, pile, burn buckthorn and honeysuckle		8		$3,200	$25,600
Oak woodland and forest	1	Winter	Cut, treat, pile, burn black locust and Siberian elm		1		$2,620	$2,620
Oak woodland and forest	2	Fall	Woody invasive foliar follow-up		8		$975	$7,800
Oak woodland and forest	2	Fall	Graminoid seeding		8		$865	$6,920
Oak woodland and forest	1, 2, 3	Spring	Garlic mustard spot mowing		17		$510	$8,670
Oak woodland and forest	1, 2	Spring	Hedge parsley and crown vetch spot herbicide once annually for 2 years		1		$1,020	$1,020
Oak woodland and forest	2	Fall	Earthworm resistant savanna species seeding		9		$2,600	$23,400
Trailhead area	4, 5	Spring	Enhancement planting	1		$5,000		$5,000
Wakota Scenic Trail								
Trailhead area	1, 2	Spring, Summer	Prep herbicide twice annually for 2 years	11		$920		$10,120
Trailhead area	3	Fall	Drill seed native upland mixes	11		$1,100		$12,100
Trailhead area	4, 5	Spring, Summer	Establishment mowing annually for 2 years	11		$1,950		$21,450
Inver Grove Heights								
Node 4: Heritage Park Grasslands and Basins								

Grasslands & Wet Basins	1, 2, 3, 4, 5	All	Reference 2025 Heritage-RISB NRMP Update	29		$3,531		$102,399
Node 4: RI Swing Bridge Park All units								
All units	1, 2, 3, 4, 5	All	Reference 2025 Heritage-RISB NRMP Update	16		$3,636		$58,176
Node 10: Pine Bend Bluff SNA								
Mesic prairie	1	Spring, Fall	Prescribed burn	0.7		$2,000		$1,400
Mesic prairie	1	Summer, Fall	Cut, treat, pile, burn buckthorn and honeysuckle	0.7		$1,570		$1,099
Mesic prairie	4	Spring, Fall	Prescribed burn	0.7		$2,000		$1,400
Prairie edge	1	All	Cut, treat, chip, haul non-oak species (quaking aspen, dead ash, hackberry, etc.)	2.7		$4,880		$13,176
Prairie edge	1	Winter	Forestry mow shrub understory (buckthorn, honeysuckle, red osier dogwood, sumac, etc.)	2.7		$2,000		$5,400
Prairie edge	2	Spring	Graminoid seeding (in coordination with DNR)	2.7		$885		$2,390
Prairie edge	2	Fall	Follow up foliar buckthorn spray	2.7		$1,000		$2,700
Prairie edge	3	Spring, Fall	Prescribed burn	2.7		$2,000		$5,400
Trailhead area	1,2,3	Spring, Summer, Fall	Invasive herbaceous spot spray / mow, 3x annually	1.6		$4,500		$7,200
Oak woodland	1	All	Removal of tree tubes	3.2		$800		$2,560

Rosemount								
Node 11: Flint Hills Resources-Restored Prairie, Cemetery, Grassland ROW								
Restored prairie near interpretive area	1,2,3	Spring, Summer, Fall	Invasive herbaceous spot spray / mow, 3x annually for 3 years	4.7		$7,200		$33,840
Restored prairie near interpretive area	1	Fall, Winter	Forestry mow or cut/stump treat invasive shrubs	1		$2,500		$2,500
Restored prairie near interpretive area	2, 3	Fall	Follow up foliar buckthorn spray (2 years)	1		$3,000		$3,000
Cemetery	1	Fall, Winter	Cut, treat, stack, burn invasive shrubs (buckthorn, honeysuckle)	0.4		$5,000		$2,000
Cemetery	2, 3	Fall	Follow up foliar buckthorn spray (2 years)	0.4		$3,500		$1,400
Cemetery	1,2	Winter, Spring	Graminoid seeding of buckthorn replacement mix	0.4		$2,000		$800
Cemetery	3	Summer, Fall	Mow after native grass seed set	0.4		$1,500		$600
Cemetery	3	Fall, Winter	Enhancement seeding	0.4		$2,000		$800
Cemetery	4	Spring	Establishment mow	0.4		$1,500		$600
Grassland ROW	1,2,3	Spring, Summer, Fall	Invasive herbaceous spot spray / mow, 3x annually for 3 years	1.5		$7,200		$10,800

Township of Nininger								
Node 13: Spring Lake Park Fahey								
All units	1, 2, 3	All	Reference 2018 "Dakota County Spring Lake Park Reserve: Archery Trail North Loop Management Brief"	57		$4,418		$251,826
Node 13: Spring Lake Park Schaar's Bluff								
Restored prairie	1	Winter	Cut, treat, pile, burn Siberian elm; forestry mow or brush saw areas of high-density cottonwood saplings	15		$2,800		$42,000
Restored prairie	2	Fall	Supplemental seeding	15		$1,280		$19,200
Oak woodland	1	Winter	Cut, treat, pile, burn buckthorn	27		$1,570		$42,390
Oak woodland	2	Fall	Woodland supplemental seeding	27		$1,520		$41,040
Node 16: Benjamin Easement-Ag field, Hayfield, Sculpture Garden								
Several units	1, 2, 3	All	Reference 2024 Benjamin Easement NRMP	18.5		$5,222		$96,600
Hastings								
Node 17: Trail Section: Benjamin to Lake Rebecca Park-Stormwater Pond, Dry Prairie								
Stormwater pond	1	Summer	Prep mow / burn	1		$3,000		$3,000

Stormwater pond	1	Fall, Winter	Broadcast forb enhancement seed mix	1		$2,000		$2,000
Stormwater pond	2, 3	Spring, Summer	Establishment mowing annually for 2 years	1		$1,950		$1,950
Dry prairie	1	Spring, Summer	Spot mow / spray invasive herbaceous plants		0.8		$1,500	$1,200
Dry prairie	1	Fall	Prescribed burn		0.8		$3,500	$2,800
Dry prairie	1	Fall, Winter	Enhancement seeding		0.8		$2,000	$1,600
Dry prairie	2	Spring, Summer	Establishment mow 2x		0.8		$2,000	$1,600
Dry prairie	2	Spring, Summer	Spot mow / spray invasive herbaceous plants		0.8		$1,500	$1,200
Node 18: Lake Rebecca Park-River Flats Park								
Mesic savanna / woodland	1,2,3	All	Reference 2024 Lake Rebecca Master Plan	7		$5,500		$38,500
Mesic prairie	1,2,3	All	Reference 2024 Lake Rebecca Master Plan	16		$3,281		$52,500
Node 19: Hastings River Flats								
Prairie units	1,2,3,4,5	All	Reference 2025 Hastings River Flats NRMP Update	23		$3,500		$80,500
Shoreline	1,2,3,4,5	All	Reference 2025 Hastings River Flats NRMP Update	4		$5,000		$20,000

Note: Text in red shows natural areas prioritized for restoration utilizing 2025 grant money that are not located within natural area nodes along the MRG.

Table 33: Restoration sequence plan and task cost estimates for Priority 2 nodes and units

PRIORITY 2 UNITS								
PLANT COMMUNITY	**YEAR**	**SEASON**	**ACTIVITY**	**SLOPE <30% ACRES**	**SLOPE >30% ACRES**	**COST/AC SLOPE <30%**	**COST/AC SLOPE >30%**	**COST PER TASK**
South St. Paul								
Wildflower Levee Park								
Turf	1, 2, 3	Spring, Summer	Prep herbicide and prep mow once annually for 2 years	12		$920		$11,040
Turf	4	Spring	Drill seed native upland mixes	12		$1,960		$23,520
Turf	4 and 5	Spring, Summer	Establishment mowing once annually for 2 years	12		$1,950		$23,400
Wooded perimeter	1	Winter	Cut, treat, chip, haul significant Siberian elm	1		$4,880		$4,880
Inver Grove Heights								
Node 7: Ernster Park								
Oak forest	1	Winter	Cut, treat, pile, burn buckthorn and honeysuckle across 1/3 of site	2		$1,570		$3,140
Oak forest	1	Winter	Cut, treat, chip, haul EAB-infected ash, Siberian elm, black locust.	0.5		$4,880		$2,440
Oak forest	2, 3	Spring	Garlic mustard spot spraying, once annually for 2 years	2		$950		$1,900

Oak forest	2	Fall	Woody invasive foliar follow-up	2		$950		$1,900
Oak forest	2	Fall	Enhanced graminoid seeding	2		$1,095		$2,190
Node 9: Pine Bend Elementary School Forest								
Oak woodland	1	Winter	Cut, treat, pile, burn buckthorn and honeysuckle	15		$4,000		$60,000
Oak woodland	1	Winter	Cut, treat, chip, haul Siberian elm assume 1/3 of site	0.5		$3,200		$1,600
Oak woodland	2, 3	Spring	Garlic mustard spot spraying, once annually for 2 years across 1/3 of site	5		$950		$4,750
Oak woodland	2, 3, 4	Fall	Woody invasive foliar follow-up; 3 years	5		$1,425		$7,125
Oak woodland	2	Fall	Graminoid seeding	15		$885		$13,275
Oak woodland	5	Spring	Enhancement planting across 1/3 of site	5		$1,330		$6,650
Node 9: MNDOT Land								
Turf	1, 2, 3	Spring, Summer	Prep herbicide and prep mow once annually for 2 years	9		$920		$8,280
Turf	4	Spring	Drill seed native upland mixes	9		$1,100		$9,900
Turf	4 and 5	Spring, Summer	Establishment mowing once annually for 2 years	9		$1,950		$17,550
Node 4: Heritage Park Floodplain Forest								

Floodplain Forest	1, 2, 3, 4, 5	All	Reference 2025 Heritage-RISB NRMP Update	6		$4,575		$27,450
Node 8: Riverfront Park								
Terrace Forest	1	Winter	Cut, treat, pile, burn buckthorn and honeysuckle	4		$4,000		$16,000
Node 10: Pine Bend Bluff SNA								
House unit	1	Fall, Winter	Brush cut / slash invasive shrub whips	6.7		$2,500		$16,750
House unit	2, 3	Spring, Summer	Invasive herbaceous species spot spray / mow (garlic mustard, soapwort, etc.)	6.7		$1,500		$10,050
House unit	2	Fall	Follow up foliar spray invasive shrub resprouts	6.7		$1,000		$6,700
House unit	2	Fall, Winter	Graminoid seeding (in coordination with DNR)	6.7		$1,000		$6,700
House unit	3	Fall, Winter	Follow up foliar spray invasive shrub resprouts	6.7		$1,000		$6,700
Stormwater pond near trailhead	1	Fall, Winter	Cut, treat, pile, burn buckthorn, honeysuckle, and small Siberian elm	2.1		$3,000		$6,300
Stormwater pond near trailhead	2	Fall	Follow up foliar spray invasive shrub resprouts	2.1		$1,000		$2,100
Stormwater pond near trailhead	3	Fall	Follow up foliar spray invasive shrub resprouts	2.1		$1,000		$2,100

Oak woodland - public	1	Fall, Winter	Cut, treat, pile, burn buckthorn and honeysuckle	1.2		$3,000		$3,600
Oak woodland - public	2	Fall	Follow up foliar spray invasive shrub resprouts	1.2		$1,000		$1,200
Oak woodland - public	2	Fall	Graminoid seeding (in coordination with DNR)	1.2		$1,500		$1,800
Oak woodland - public	3	Fall	Follow up foliar spray invasive shrub resprouts	1.2		$1,000		$1,200
Oak woodland - private	1	Fall, Winter	Cut, treat, pile, burn buckthorn and honeysuckle	4.8	1	$3,000	$3,500	$17,900
Oak woodland - private	2	Fall	Follow up foliar spray invasive shrub resprouts	4.8	1	$1,000	$1,500	$6,300
Oak woodland - private	2	Fall	Graminoid seeding with erosion control	4.8	1	$1,500	$2,000	$9,200
Oak woodland - private	3	Fall	Follow up foliar spray invasive shrub resprouts	4.8	1	$1,000	$1,500	$6,300
Node 11: Flint Hills Resources-Oak Savanna, MRG ROW, Utility corridor, Grassland								
Oak savanna, utility corridor, grassland units	1,2,3,4,5	All	Reference 2008 and 2025 NRMPs, landowner will incurr costs.					-

Greenway corridor ROW	1,2,3	Spring, Summer, Fall	Invasive herbaceous spot spray / mow, 3x annually for 3 years	6.6		$7,200		$47,520
Township of Nininger								
Node 16 Benjamin Easement: Oak Woodland, Oak Forest, Oak Savanna, Nonnative Grassland								
Several units	1, 2, 3	All	Reference 2024 Benjamin Easement NRMP	9.4		$6,042		$56,797
Nonnative grassland	1,2,3		Turf to prairie conversion steps	3.6		$5,000		$18,000
Hastings								
Node 22: Eastern Extension-Ravenna Trail DNR Boat Launches								
Floodplain Forest	1	Winter	Cut/treat/chip/haul black locust	1		$3,200		$3,200
Floodplain Forest	1	Winter	Cut/treat/pile/burn buckthorn; assume 3/4 of sites	15		$4,000		$60,000
Floodplain Forest	2	Fall	Woody invasive foliar follow-up	10		$475		$4,750
Floodplain Forest	2	Fall	Graminoid seeding	15		$885		$13,275
Ravines and road ditches	1, 2	Spring	Targeted spot herbicide application of reed canary grass and hybrid cattail in areas where Special Concern species are present.	2		$1,000		$2,000
Node 17: Trail Section: Benjamin to Lake Rebecca Park-Remnant Dry Prairie, Oak Savanna, Oak Woodland								
Remnant dry prairie	1	Fall, Winter	Cut, treat, pile, burn honeysuckle, Siberian elm, and cedar		0.3		$8,000	$2,400

Remnant dry prairie	2	Spring, Summer	Spot mow / spray invasive herbaceous plants		0.3		$2,500	$750
Remnant dry prairie	2	Fall	Prescribed burn		0.3		$6,000	$1,800
Remnant dry prairie	2	Fall, Winter	Enhancement seeding		0.3		$2,500	$750
Remnant dry prairie	3	Spring, Summer	Establishment mow 2x		0.3		$2,500	$750
Remnant dry prairie	3	Fall	Spot spray invasive woody resprouts as needed		0.3		$2,000	$600
Oak savanna	1	Winter	Cut, treat, chip, haul significant Siberian elm and dead green ash	1.4		$10,000		$14,000
Oak savanna	1	Winter, Spring	Graminoid seeding with erosion control	1.4		$1,500		$2,100
Oak savanna	2, 3	Spring, Summer	Invasive herbaceous spot spray / mow, 3x annually for 2 years	1.4		$6,000		$8,400
Oak savanna	3	Fall	Prescribed burn	1.4		$5,000		$7,000
Oak savanna	3	Fall, Winter	Enhancement seeding	1.4		$2,000		$2,800
Oak woodland	1	Fall, Winter	Cut, treat, stack, burn buckthorn and honeysuckle	1.3		$2,500		$3,250
Oak woodland	2	Fall	Follow up foliar spray buckthorn	1.3		$1,000		$1,300
Oak woodland	2	Fall, Winter	Graminoid seeding	1.3		$1,500		$1,950
Oak woodland	3	Fall	Follow up foliar spray buckthorn	1.3		$1,000		$1,300
Node 18: Lake Rebecca Park-Dam, Deciduous Forest, Floodplain Forest								

Deciduous forest, Floodplain forest	1,2,3	Fall	Reference 2024 Lake Rebecca Master Plan	20		$1,000		$20,000
Dam	1,2	Spring, Summer, Fall	Herbaceous invasive species spot mow / spray 3x/year for 2 years	3		$6,000		$18,000
Dam	2	Fall	Enhancement seeding	3		$2,000		$6,000
Dam	3	Spring, Summer	Establishment mow 2x	3		$1,500		$4,500
Node 21: Levee Park								
Pollinator planting	1,2	Spring, Summer, Fall	Herbaceous invasive species spot mow / spray 3x/year for 2 years	0.1				$3,000
Pollinator planting	2	Fall	Enhancement seeding and erosion control	0.1				$800
Pollinator planting	3	Spring	Establishment mow 2x	0.1				$1,000
Pollinator planting	3	Spring	Enhancement planting	0.1				$1,000
Pollinator planting	3	Spring, Summer	Watering every 2 weeks, as needed	0.1				$3,000

Note: Text in red shows natural areas prioritized for restoration utilizing 2025 grant money but are not located within natural area nodes along the MRG.

LONG TERM MONITORING AND MANAGEMENT

Restored areas will need to be regularly monitored to identify ecological issues, such as erosion and sedimentation, invasive species, and disease. Early detection of concerns enables quick, cost-effective responses to address them before significant problems evolve.

Once the primary restoration tasks are completed, the restoration process converts to an adaptive management phase. Long-term management, summarized in Table 34 below, is an important piece of maintaining the habitat over time. It is difficult to predict specifically how these areas will change over time, so being flexible and responding to needs as they arise is important. Without continued monitoring and management, these areas will likely degrade rapidly, and efforts will be undone in 5-10 years. In fact, oftentimes, if a site is not going to be managed long-term, then it probably shouldn't even be started at all. Critical long-term management actions are described below.

PRESCRIBED BURNING

Prairie, oak savanna, and oak woodland units are dependent upon regular prescribed fire. Prescribed burns are an essential tool for managing woody encroachment and controlling invasive species. Additionally, burns stimulate grass and herbaceous growth in the understory by warming the soil and encouraging early growth and regeneration of these plants. Typically, prairie burns are conducted every 1-3 years, but this can vary depending on the site. Savanna burns should be conducted every 1-4 years, depending on fuel accumulation. Oak woodland burns should be conducted every 3-7 years to maintain an open understory. Planning to burn a subset of the acres annually (by breaking a site up into burn units and rotating burning on these units) is a good long-term strategy to allow refuge for pollinators.

SEEDING AND PLANTING

Over time, it is likely that some areas within the more industrialized sections of the MRG may benefit from seeding and planting to maintain ground cover or increase species diversity. This is especially true in areas with high erosion potential, significant invasive species pressure, and significant dead green ash canopy because those conditions accelerate the degradation of native plant communities. Specifically with high cover of dead green ash, the light conditions in the understory will change over time, and seeding of additional light-tolerant species is advised. Seeding can be done in the winter or after a prescribed fire to allow for good seed-soil contact. Planting can be completed by volunteers in the growing season.

In higher quality restorations and remnants, especially those nodes with more than 50% native cover (e.g., Simon's Ravine, Pine Bend Bluffs SNA, Spring Lake Park Reserve), the most useful interventions are to reestablish a disturbance regime, such as prescribed burning or light grazing, and perform a small degree of supplemental seeding with seed origins within 250 miles of the project site.

SPOT TREATMENT OF INVASIVE SPECIES

Both herbaceous and woody invasive species are a continued threat to the ecosystem health of these restored areas. Seeds from invasive species are constantly being transported by wind, water, wildlife, and people, so there is not a way to mitigate this threat, especially in a greenway corridor that it long and linear in shape, which increases edge effect. The best long-term strategy to prevent invasive species establishment is to establish a regular monitoring and spot treatment regime to catch new populations of invasive species early and treat them. Treatment can be conducted with herbicide, mowing, or hand pulling prior to seed set to prevent spread. Conducting these actions prior to seed set is critically important. Mowing after seed set has resulted in spread of invasive species along the MRG corridor. Mowing before flowering ensures seeds will not be spread. If plants have started to flower, check for seed viability. Operator should switch to herbicide use if seed production has started. It is relatively easy to manage a small population in the first or second year after arrival. If left to proliferate, invasive species can rapidly expand and have much larger ecological and monetary impacts over time.

MONITORING AND MANAGEMENT

Regular monitoring of remnant and restored areas is critical to long-term habitat maintenance. Wildlife and vegetation surveys should be conducted on a consistent, regular basis to document condition of native plant community and identify threats including invasive species presence, erosion, or pests and disease. It is important that the same type of survey is conducted over time to allow for comparison of data. Then, monitoring data should be utilized to inform management decisions and mobilize resources adaptively. This allows land managers to respond to the biggest threats, rather than following an over-prescriptive plan that does not respond to on-the-ground conditions.

DATA STORAGE AND MAPPING

It is critical to have a system for managing ecological data for each node. Restoration and habitat management is a long-term commitment that will likely outlast staff turnover and individual grant timelines. It is important to have information about each node saved in a consistent way where it can be found twenty years from now. The management history of a place informs future action, so keeping detailed notes and records for each site cannot be overstated. GIS data and maps noting the presence and distribution of invasive species is a key component. Populations of invasive spaces often take years to manage, so well-organized spatial data that document distribution is an efficient way to help land managers make informed decisions. GIS files that are site-specific and updated frequently with management and changes can become long-term catalogs of site history with precise spatial references.

Table 34: Long-Term Management Schedule

LONG-TERM MGMT TASK	LOCATION	FREQUENCY
	Prairie (restored & remnant)	Every 2-3 years

Prescribed burning	Oak Savanna	Every 3-4 years
	Oak Woodland	Every 5-7 years
Seeding	Areas where active invasive species management is occurring	A minimum of once after invasive species management is complete. Ideally, multiple rounds of seeding to reintroduce native species during and after management.
	Areas with erosion	As needed to prevent erosion; installation to include check dams or erosion control blanket on steep slopes (>20% slopes)
	Areas with significant change in the tree canopy / light availability	As needed to respond to changing light conditions in understory
Planting	Areas where faster cover of native plants is desired	As needed depending on funding and conditions; on steep slopes where seeds can easily wash off; with species that do not readily germinate from seed in situ.
Spot treatment of invasive species	Areas where resources have been used to restore and manage native plant communities	As needed depending on monitoring data
Monitoring	All sites	Follow Dakota County standards for monitoring frequency
Data storage & mapping	All sites	Follow Dakota County standards for data storage and mapping

STRATEGIC PARTNERSHIPS FOR IMPLEMENTING GREENWAY NATURAL RESOURCE PROJECTS

PRECEDENT OF COUNTY POLICY SUPPORTING NATURAL RESOURCES IMPROVEMENTS OF GREENWAYS

Two County Documents illustrate the precedent for addressing natural resource management projects along the County Greenway System, namely the Natural Resources Management System Plan (NRMSP) adopted on May 23, 2017 (Resolution No. 17-274), and the Dakota County Greenway Collaborative Guidebook (henceforth the Greenway Guidebook) adopted September 28, 2010 (Resolution No. 10-487). These documents establish the motivation and guidelines for the use of County resources to address natural resource management projects and improvements on non-County land.

The NRMSP acknowledged that natural resources are transboundary in nature and for the County to be effective at protecting and improving them, it must work with landowners and partners on lands outside of County ownership. The NRMSP states the following:

> *"To implement this system-wide plan, the County recognizes it will need to continue to pursue and secure state and other grants, capitalize on partnerships, collaborate with municipalities and other entities in the County, and commit additional internal County resources for staff, volunteer coordination, equipment, and external contractor work (NRMSP pg. 4)."*

Goals for Greenways outlined in the NRMSP include the following:

10.3.4 Greenway Goals

- The most highly invasive species should be controlled since greenways can contribute to the spread of invasive species.
- Restoration and enhancement of high-quality areas within County-owned lands and easements will improve visitor experience and can reduce long- term maintenance costs.
- It will be important to work with a wide range of partners to restore and enhance non-County-owned lands and easements within regional greenway corridors and to identify opportunities for collaboration and increased efficiencies (NRMSP pg. 93)

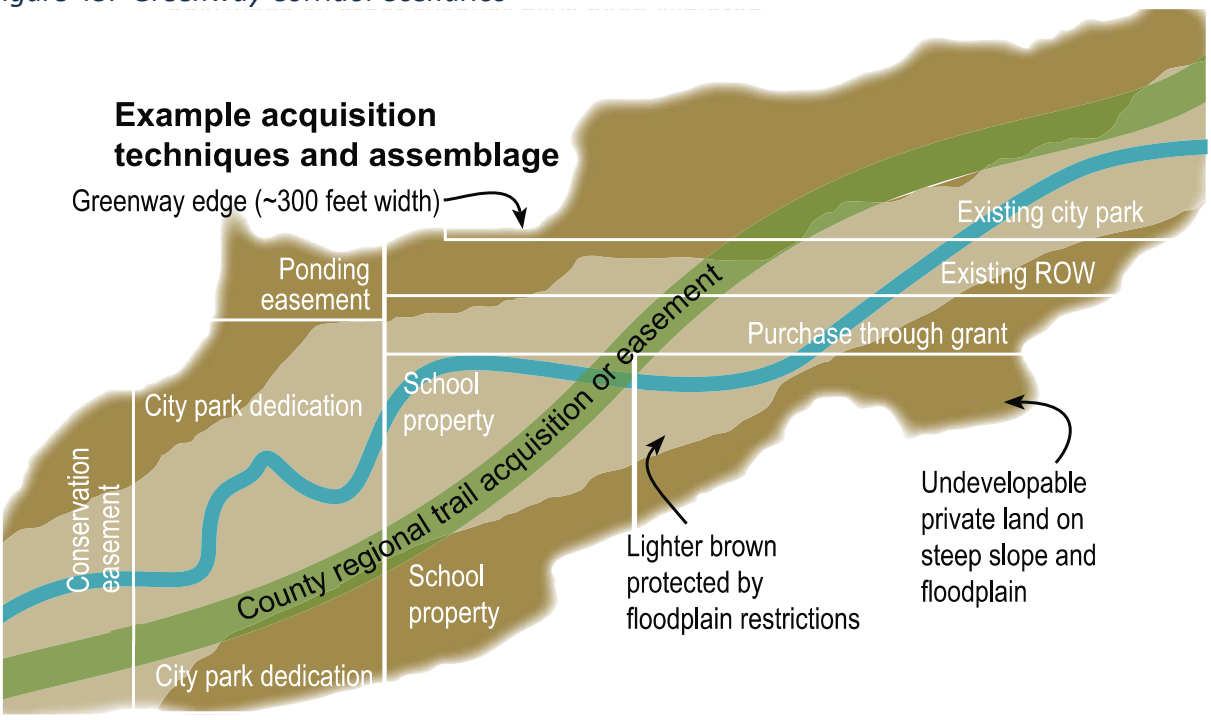
To effectively manage greenways to intercept the spread of invasive species and ensure the quality of natural resource improvements, the following was determined:

11.3.4. Management of Greenways

Due to the multiple ownerships in greenways and the County's limited control, only priority investments should be made in greenways. The County, working with partners, should control the most highly invasive species, restore and enhance the most important greenway lands and easements, monitor wildlife indicator species, and develop NRMPs for each greenway (NRMSP, pg. 108).

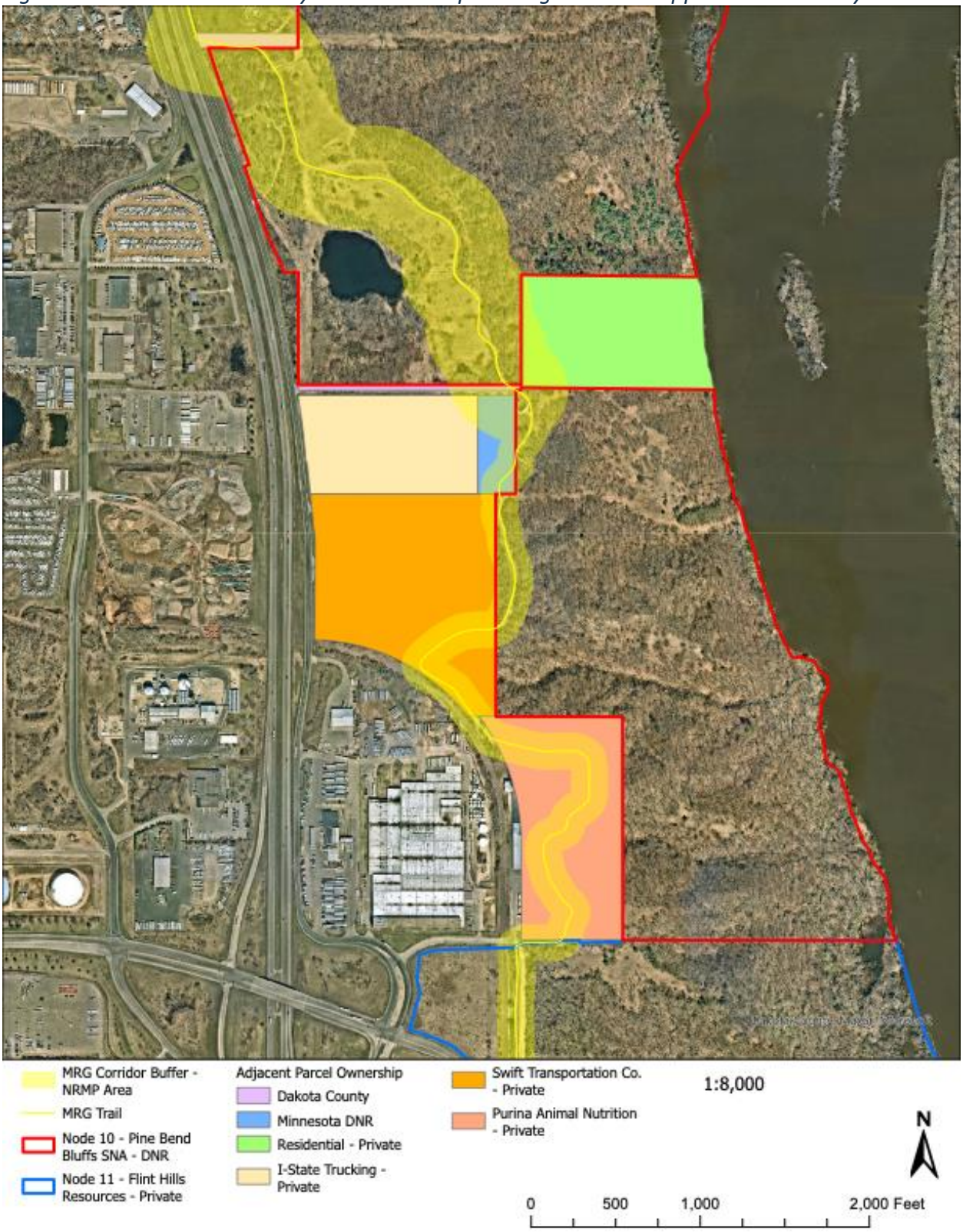
Furthermore, the Dakota County Greenway Guidebook established guidelines for typical cost-share structures and roles pertaining to different components of Greenways. The County establishes 30-foot easements for Greenway trails and assumes all native vegetation maintenance within the easement. While a native planting within this easement provides some benefit, there is need to provide wildlife with wider contiguous corridors to establish any real habitat value. The Greenway Guidebook established 100 ft, 200 ft and 300 ft wide corridors depending upon whether the Greenway occurred within an urban, suburban, or rural context, respectively (See Figures 43 and 44). The Guidebook specifically calls upon initiating natural resource restoration and enhancement efforts within these corridors, which necessitates working in partnerships in the frequent case that these corridors occur within public, non-County lands such as city parks and school properties.

Figure 43: Greenway Corridor Scenarios



(Taken from the Greenway Guidebook, pg. 22)

Figure 44: Particular Greenway Corridor Example Along the Mississippi River Greenway



Finally, outside of these 100 to 300 ft-wide Corridors, there may exist other Sensitive Lands such as stream buffers or the remaining areas within the boundaries of city parks or other public natural areas through which the Greenway passes. To maintain a holistic approach to managing natural resource projects with respect to the natural community and to exercise flexibility towards working in partnership with multiple landowners, the Greenway Guidebook offers the following guiding principles:

> *Greenway corridors: The first stewardship priority is restoring continuous native habitat in greenway corridors themselves. This continuous ribbon of varying widths will function as a wildlife corridor and buffer streams from damaging effects like runoff, pollution, and invasive species.*
>
> *Adjoining Sensitive Lands: The next order of stewardship priority is habitat restoration and protection of the most sensitive lands, including uplands, which link greenways to the broader landscape. These landscapes perform vital functions of preserving habitat and species diversity and stormwater infiltration and cleansing. Prioritization of adjoining landscapes will be based on intrinsic sensitivities like erodibility, aquifer recharge, the presence of wetlands and the presence of native plant communities. A*
>
> *Healthy Natural Framework: Stewardship of the first- and second-order landscapes will reestablish a stronger habitat network that will have greater resilience and will provide a strong framework for future growth (The Greenway Guidebook, pg. 35-36).*

The installation of natural plantings (i.e., native prairie grasses and forbs, trees and shrubs) and stormwater treatment best management practices (i.e., raingardens, infiltration and bioretention basins, bioswales, etc.) are commensurate with new Greenway trail design and implementation as much as possible, and the County is committed to continually maintaining and enhancing these plantings for high levels of biodiversity to sustain benefits to pollinators and water quality. Additionally, the County would construct additional needed stormwater practices to any trail sections that are re-constructed as capital infrastructure components are replaced to meet current standards.

GUIDELINES FOR COST-SHARE

The Greenway Guidebook offers guidelines for assisting Partnerships for the implementation of Greenway trail installations and supporting facilities (trailhead restrooms, parking lots, wayfinding; see Greenway Guidebook pg. 21) and a similar model can be extended towards implementing Natural Resource projects. Table 35 outlines the Roles and Responsibilities of Dakota County and Landowner Partner organizations for each of the consideration areas discussed above.

Table 35: Proposed Management Activities and Responsibilities Greenway Roles

Greenway Roles/Location	30-foot Easement	100-300' Corridor	Natural Lands Beyond

Grant Match Cost Share	County	County and Landowner have equal cost share (50/50)	County/Landowner have 25/75 cost share. County may assist more in high-value areas.
Restoration PM	County	County/Landowner Partnership	Landowner, County may assist
Maintenance	County	County, Landowner may assist	Landowner

GRANT OPPORTUNITIES AND REQUIREMENTS

Dakota County utilizes and encourages external grant funding to implement natural resources projects on County owned land, but there exist opportunities for these projects to be bundled with smaller, non-County owned lands within Greenway Corridors that would not receive the same competitive consideration if they were submitted to granting organizations as separate projects. Likewise, many local government or non-governmental organization public land owners along these Corridors may not have the staff capacity or organizational structure to take advantage of grant opportunities to implement natural resource projects on their lands, despite their willingness and interest to enact these improvements.

The State of Minnesota's Legacy Amendment offers funding opportunities for ecological restoration by way of the Outdoor Heritage Fund (through direct appropriations or through the Department of Natural Resources Conservation Partners Legacy Grant Program) or Clean Water Fund (through the Board of Water and Soil Resources competitive grant programs).

Dakota County typically leverages 20% of requested grant funds as cash match when applying for State grants. For areas included in grants not owned in fee by Dakota County, part of these match funds would need to be contributed by Landowner Partners. Partnership contributions towards grant match funds would be agreed upon in the form of a Joint Powers Agreement in advance of initiating grant-funded natural resource projects. Additionally, this JPA would detail the roles of staff from the County or Landowner in terms of contributions of staff time for project management, contractor oversight, public and volunteer engagement, plant material acquisition, and other pertinent details within the scope of Natural Resource management of the site during the project period. Example scenarios for land acquisition and easements are shown in Figure 39.

CONTINUED NATURAL RESOURCE MANAGEMENT

MAINTENANCE AGREEMENTS

Dakota County and both City and civic partners collaborating on Natural Resource project implementation will establish management agreements that ensure the restoration areas paid for with grant dollars will be maintained into the future. Such maintenance activities are outlined in the Long-Term Management Schedule (Table 34) and include revisiting sites multiple

times a year to target undesirable plants for spot chemical treatment or mechanical removal. The maintenance activities should be agreed upon at the initiation of the partnership and before project implementation agreement, and documents such as Joint Powers Agreements (JPAs) or Supplemental Maintenance Agreements (SMAs) must be approved through normal business procedures for each partner in the agreement (i.e., Board or Council approval).

ONGOING MANAGEMENT ACTIVITIES

Ongoing management activities included in JPAs or SMAs ensure the future integrity of restoration targets. Ideally, upon completion of these restoration projects, the routine vegetation maintenance on these sites (outside the County trail easement boundaries) are carried out either by the Landowner staff members or through contractors specialized in installing and maintaining native plantings. Coordinated maintenance activities could be utilized via contributions to a shared maintenance contract to simultaneously address lands falling within the County Easement, the 100 to 300-foot-wide Greenway Corridor, and adjacent Natural Lands Outside Corridor, with County and Landowner contributions detailed in JPAs or SMAs. Ongoing management activities need not be restricted solely to vegetation maintenance, and the following possibilities would work toward managing native plantings within agreed upon parameters for maintaining their ecological integrity:

- Hosting Conservation Corps or Green Corps positions for organizing maintenance and enhancement projects
- Leading volunteer groups for restoration projects (buckthorn hauling, garlic mustard pulls, tree and shrub plantings, litter pick-up) adjacent to or follow-up within grant-funded project areas 113
- Leading school and volunteer groups in enhancement planting activities
- Hosting public meetings educating private landowners about cost-share opportunities for native plantings (BWSR - Lawns to Legumes, Dakota SWCD – Landscaping for Clean Water) and guidance on activities that they can take to improve the ecological diversity on their own property.
- Working with specialized volunteers such as Master Gardeners, Master Water Stewards and Master Naturalists for additional planting events

The above activities could be considered as alternatives to cash-match requirements for partnership grants if completed during the project implementation phase, or they could be considered as contributions towards offsetting long-term maintenance costs as estimated in JPAs or SMAs.

Additionally, Dakota County Staff can assist Landowners in some of the following ways within Greenway Corridors:

- Training staff in native and invasive plant identification

- Training staff with management techniques for in-house long-term native planting maintenance
- Organizing volunteer events for enhancement plantings
- Conducting vegetation and wildlife monitoring on public lands to assess effectiveness of restoration projects
- Coordinating Conservation Corps crews for limited maintenance activities and enhancement plantings

TREE DISEASES

EMERALD ASH BORER

Emerald ash borer (EAB) is a non-native wood-boring beetle from Asia that was first identified in the United States in the summer of 2002. Likely transported from Asia to Michigan in ash wood used for pallets and other shipping materials, the beetle has now been confirmed in 36 states, including Minnesota. The beetle works by depositing larvae under the bark of the tree; these larvae then feed on the wood, eventually disrupting enough of the phloem to prevent the transport of nutrients throughout the tree. While Minnesota's cold weather can stymie the spread of the beetle, winter low temperatures often do not get low enough to be very effective, especially with the advent of Climate Change, and thus it continues to infect and kill ash trees within the Metro area, including Dakota County.

Nearly all ash trees along the MRG are infected with EAB and are in various states of decline (Figure 45, Table 36). Dakota County completed an EAB management plan in 2018, which identified 225 hazard green ash trees along the greenway and created a timeline and cost estimate for the removal of these trees. This cost estimate did not include the removal of infected ash trees in the natural areas at large, citing several reasons, including management goals of maintaining pre-settlement vegetation, access, cost, and potential for forest regeneration after ash dies.

Moving forward, ash removal is recommended when dead trees impose hazards along the greenway. Additionally, removal is recommended in plant communities where prairie and oak savanna are the target plant communities because leaving standing dead ash would create a hazard during prescribed burns. Removal of ash in woodland and forest restoration areas should be considered during restoration if it increases access to the site and allows for more effective long-term management. For example, prescribed burning in woodlands. Otherwise, dead ash can be left standing. Invasive species management in pockets with changing light conditions due to dead ash should be prioritized, and re-seeding with light-loving native seed mixes is desired.

Figure 45: Presence of Emerald Ash Borer-infected trees within Nodes

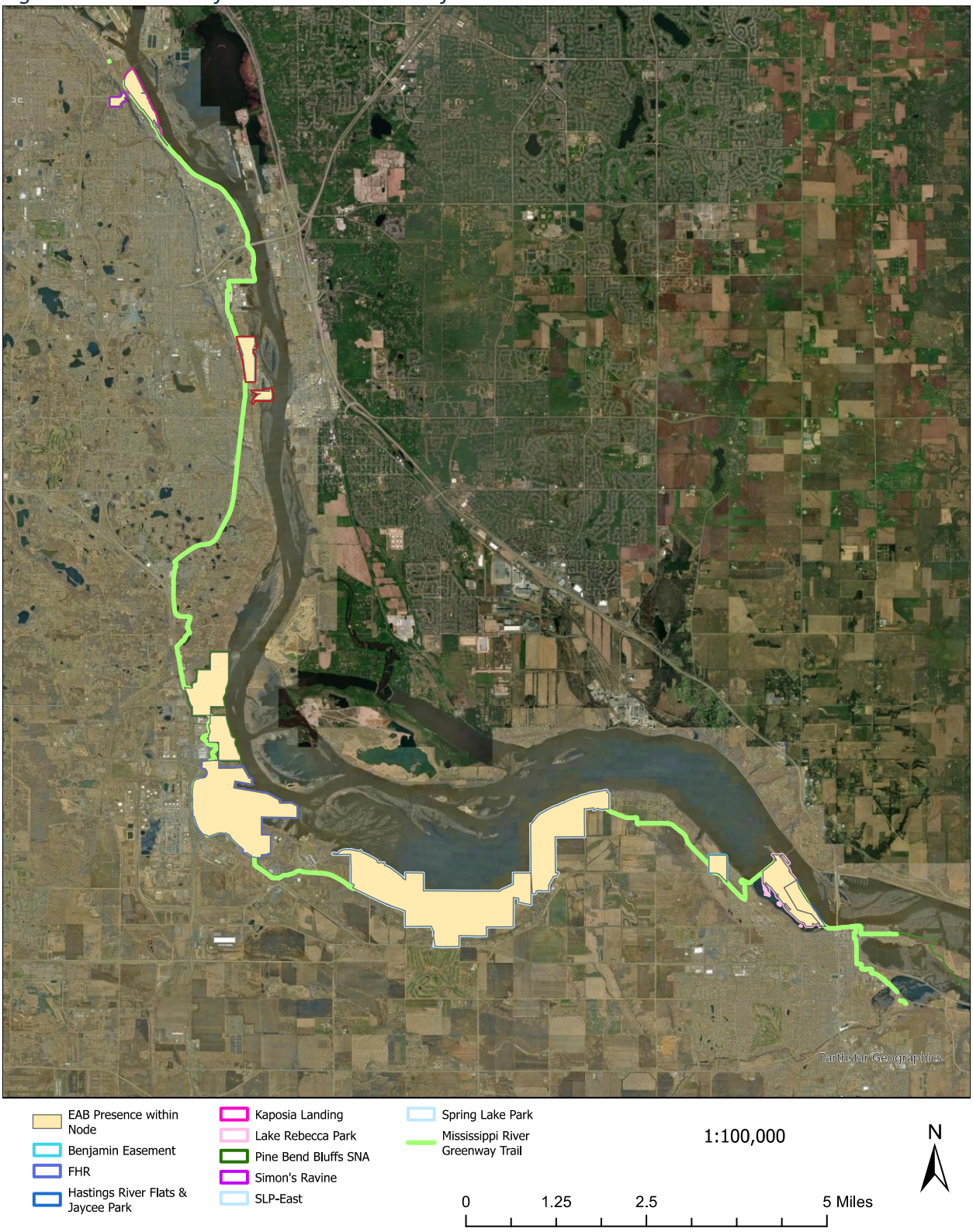


Table 36: Presence and absence of emerald ash borer across MRG.

NATURAL AREA NODES	EAB Presence	
	Along trail / hazard trees	In node at large
1. North of Kaposia	A	A
2. Kaposia	A	P
3. Simon's Ravine	A	P
4. Heritage-RI Swing Bridge	A	P
5. Trail: RI Swing Bridge to Dehrer	A	P
6. Dehrer	A	A
7. Ernster	A	A
8. Riverfront	A	A
9. Trail: Ernster to Pine Bend Bluff SNA	A	A
10. Pine Bend Bluff SNA	P	P
11. Flint Hills Resources	A	P
12. Mosaic	P	P
13. SLP-Fahey	A	P
14. SLP-Schaar's Bluff	A	P
15. Trail: SLP to Benjamin	A	A
16. Benjamin	A	P
17. Trail: Benjamin to Lake Rebecca	A	P
18. Lake Rebecca	A	P
19. Hastings River Flats	A	P
20. Jaycee Park	A	A
21. Levee Park	A	A
22. MRG Eastern Extension	A	P

P = present, A = absent.

OAK WILT

Oak wilt is an increasingly common tree disease caused by the fungus *Bretziella fagacearum*. While the disease is present in many eastern US states, it is most prevalent in the Midwestern US. It is an issue of serious concern within Minnesota in and around the seven-county metro area. Oak wilt affects all of Minnesota's most common oak species (red oak [*Quercus rubra*], pin oak [*Q. ellipsoidalis*], bur oak [*Q. macrocarpa*], and white oak [*Q. alba*]), though it does not affect these species equally. Red and pin oak are the most susceptible species, with infected individuals wilting in six weeks or less. Bur and white oaks may take years to wilt completely and may only do so one branch at a time. The fungus can be transported from tree to tree by sap beetles but most commonly spreads through root grafts. The beetles are attracted to the fungal mats created when mature oaks die from oak wilt and to wounds on uninfected oaks, providing a convenient pathway of spread for the fungus. Oaks commonly form root grafts between individuals, allowing direct transfer of the fungus from infected to healthy individuals.

Vegetation surveys in 2024 identified several potential oak wilt infection centers along the greenway (Figure 46, Table 37). The next step will be testing potentially infected trees within these centers to positively confirm the presence of oak wilt. Samples can be submitted to the plant disease clinic through the University of Minnesota – Extension. If infected individuals are found, root barriers may be installed around infected trees using a vibratory plow. Other options include soil sterilization and inoculation of high-value individual trees. Care should also be taken to avoid injuring trees during the early growing season (April to July), when trees are most susceptible to the fungal spread. If a tree is injured during this time, covering the wounds is recommended. If pruning or other activities must be done, waiting for the winter is the safest option.

Figure 46: Potential Oak Wilt Presence within nodes

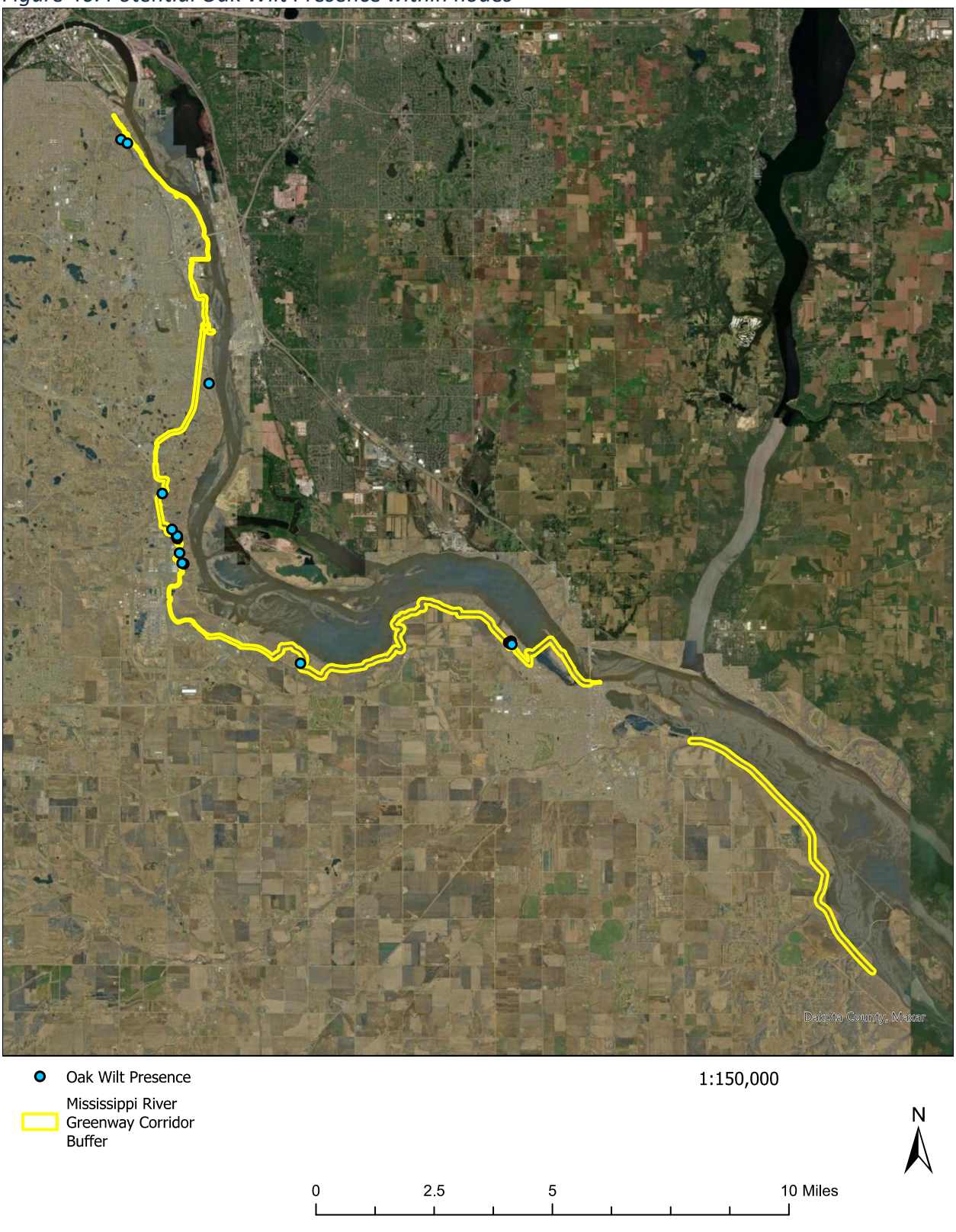


Table 37: Presence and absence of potential oak wilt across MRG.

NATURAL AREA NODES	Indicators of Oak Wilt Presence	
	Along trail / hazard trees	In node at large
1. North of Kaposia	A	A
2. Kaposia	A	A
3. Simon's Ravine	A	P
4. Heritage-RI Swing Bridge	A	A
5. Trail: RI Swing Bridge to Dehrer	A	A
6. Dehrer	A	A
7. Ernster	A	P
8. Riverfront	A	A
9. Trail: Ernster to Pine Bend Bluff SNA	A	P
10. Pine Bend Bluff SNA	P	P
11. Flint Hills Resources	P	P
12. Mosaic		
13. SLP-Fahey	A	A
14. SLP-Schaar's Bluff	A	P
15. Trail: SLP to Benjamin	A	A
16. Benjamin	A	P
17. Trail: Benjamin to Lake Rebecca	A	A
18. Lake Rebecca	A	A
19. Hastings River Flats	A	A
20. Jaycee Park	A	A
21. Levee Park	A	A
22. MRG Eastern Extension	A	A

P = potential for trees infected with oak wilt (present), A = signs of oak wilt not indicated (absent)

BUR OAK BLIGHT

Bur oak blight (BOB) affects only bur oaks and is most injurious to upland individuals in savanna remnants. Caused by a species of fungus in the *Tubaki* genus, BOB causes lesions and discoloration of the veins on the underside of the leaves, eventually causing large portions of the leaf to die. In many cases, severe infections will cause tree death, though individual susceptibility to the disease varies. The fungus can overwinter on leaf petioles that remain attached to trees and is primarily spread by rain droplets moving spores throughout the tree. Early results suggest that inoculation of trees with fungicide may help slow or stop the spread of the disease within individual trees. Monitoring existing oaks for symptoms will be an important to slow or stop spread; moreover, if oaks are planted in the future, it may be beneficial to avoid planting the variety *Q. macrocarpa var. oliviformis*, which has shown the most severe susceptibility to BOB. Evidence of BOB was not found along the MRG.

DUTCH ELM DISEASE

There are many elms growing within the floodplain forests along the Mississippi River. These trees are not only ecologically valuable but are also at high risk to attack from tree pests. Elms are susceptible to Dutch Elm Disease. These tree pests have caused widespread mortality of elms throughout the eastern United States and specifically in Minnesota.

Dutch Elm disease is a fungal infection caused by the fungus *Ceratocystis ulmi*, which is native to Asia, and is spread by both native and non-native bark beetles (family: Curculionidae). Once the fungus is introduced onto a tree, the tree reacts by sealing its own xylem tissues (conduits of water and nutrients) to prevent further spread. This effectively prevents water and nutrients from reaching the upper branches, causing gradual die-off as more and more of the xylem is sealed. Symptoms include a yellowing and browning of leaves spreading from the outer crown toward the trunk. Dutch elm disease was first recorded in Minnesota near Monticello in 1961 and has since spread throughout the state. Minnesota relied heavily on American elms (*Ulmus americana*) as shade trees on streets, with about 140 million in the state at the time of the outbreak. The disease is now present in all Minnesota counties, though elms remain an important component of many Minnesota forests.

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APPENDIX A. OBSERVED PLANT SPECIES

Below are the data sheets containing all plant species observations made during 2024 Mississippi River Greenway NRMP fieldwork.

APPENDIX B: SOILS OCCURRING WITHIN THE MISSISSIPPI RIVER GREENWAY

SOIL MAP UNIT SYMBOL	MAP UNIT NAME	ACRES IN MRG CORRIDOR	PERCENT OF MRG CORRIDOR
611F	Hawick loamy sand, 20 to 40 percent slopes	191.5	10.40%
7B	Hubbard loamy sand, 1 to 6 percent slopes	155.8	8.50%
1027	Udorthents, wet	148.3	8.10%
8B	Sparta loamy fine sand, 1 to 6 percent slopes	85.9	4.70%
342C	Kingsley sandy loam, 8 to 15 percent slopes	76.5	4.20%
W	Water	58.3	3.20%
342B	Kingsley sandy loam, 3 to 8 percent slopes	55.9	3.00%
39A	Wadena loam, 0 to 2 percent slopes	55.8	3.00%
1039	Urban land	50.8	2.80%
100A	Copaston loam, 0 to 2 percent slopes	47.8	2.60%
251D	Marlean loam, 12 to 18 percent slopes	44.6	2.40%
415B	Kanaranzi loam, 2 to 6 percent slopes	43.5	2.40%
285B	Port Byron silt loam, 2 to 6 percent slopes	39	2.10%
299B	Rockton loam, 2 to 6 percent slopes	34.1	1.90%
39B	Wadena loam, 2 to 6 percent slopes	33.8	1.80%
411B	Waukegan silt loam, 1 to 6 percent slopes	32.4	1.80%
299A	Rockton loam, 0 to 2 percent slopes	31.1	1.70%
320B	Tallula silt loam, 2 to 6 percent slopes	31	1.70%
N644A	Scotah loamy fine sand, 0 to 3 percent slopes, occ flooded	29.5	1.60%
411A	Waukegan silt loam, 0 to 1 percent slopes	27.2	1.50%
1055	Aquolls and Histosols, ponded	22.9	1.20%
1821	Algansee sandy loam, occasionally flooded	22.4	1.20%
342E	Kingsley sandy loam, 15 to 25 percent slopes	20.5	1.10%
7C	Hubbard loamy sand, 6 to 12 percent slopes	19.9	1.10%
1827A	Waukegan silt loam, bedrock substratum, 0 to 2 percent slopes	19.7	1.10%
41B	Estherville sandy loam, 2 to 6 percent slopes	18.9	1.00%
177C	Gotham loamy fine sand, 6 to 12 percent slopes	18.9	1.00%
857A	Urban land-Waukegan complex, 0 to 1 percent slopes	18.8	1.00%
1827B	Waukegan silt loam, bedrock substratum, 2 to 6 percent slopes	16.8	0.90%
7D	Hubbard loamy sand, 12 to 18 percent slopes	15.6	0.90%

SOIL MAP UNIT SYMBOL	MAP UNIT NAME	ACRES IN MRG CORRIDOR	PERCENT OF MRG CORRIDOR
415A	Kanaranzi loam, 0 to 2 percent slopes	15.5	0.80%
177B	Gotham loamy fine sand, 2 to 6 percent slopes	14.8	0.80%
39C	Wadena loam, 6 to 12 percent slopes	14.1	0.80%
857B	Urban land-Waukegan complex, 1 to 8 percent slopes	14	0.80%
283A	Plainfield loamy sand, 0 to 2 percent slopes	13.7	0.70%
454E	Mahtomedi loamy sand, 15 to 25 percent slopes	13.5	0.70%
7A	Hubbard loamy sand, 0 to 1 percent slopes	13.3	0.70%
463	Minneiska loam, occasionally flooded	12.7	0.70%
301B	Lindstrom silt loam, till plain, 2 to 6 percent slopes	12.5	0.70%
896E	Kingsley-Mahtomedi complex, 15 to 25 percent slopes	12	0.70%
41A	Estherville sandy loam, 0 to 2 percent slopes	11	0.60%
8A	Sparta loamy fine sand, 0 to 1 percent slopes	10.7	0.60%
100B	Copaston loam, 2 to 6 percent slopes	10.6	0.60%
98	Colo silt loam, occasionally flooded	10.3	0.60%
861C	Urban land-Kingsley complex, 3 to 15 percent slopes	9.8	0.50%
299C	Rockton loam, 6 to 12 percent slopes	9.7	0.50%
320C2	Tallula silt loam, 6 to 12 percent slopes, eroded	9.3	0.50%
251E	Marlean loam, 18 to 25 percent slopes	8.1	0.40%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	7.9	0.40%
611D	Hawick gravelly sandy loam, 12 to 20 percent slopes	7.7	0.40%
1898F	Etter-Brodale complex, 25 to 60 percent slopes	7.6	0.40%
415C	Kanaranzi loam, 6 to 12 percent slopes	7.3	0.40%
611C	Hawick gravelly sandy loam, 6 to 12 percent slopes	7.1	0.40%
1848B	Sparta loamy sand, bedrock substratum, 2 to 8 percent slopes	7	0.40%
858C	Urban land-Chetek complex, 1 to 15 percent slopes	6.9	0.40%
189	Auburndale silt loam	6.7	0.40%
285A	Port Byron silt loam, 0 to 2 percent slopes	6.7	0.40%
1902B	Jewett silt loam, 1 to 6 percent slopes	6.5	0.40%
226	Lawson silt loam	6.2	0.30%
344	Quam silt loam	6.1	0.30%
27A	Dickinson sandy loam, 0 to 2 percent slopes	5.9	0.30%
411C	Waukegan silt loam, 6 to 12 percent slopes	5.8	0.30%
408	Faxon silty clay loam	5.5	0.30%
94C	Terril loam, 4 to 12 percent slopes	4.9	0.30%

SOIL MAP UNIT SYMBOL	MAP UNIT NAME	ACRES IN MRG CORRIDOR	PERCENT OF MRG CORRIDOR
283D	Plainfield loamy sand, 6 to 18 percent slopes	4.3	0.20%
39D	Wadena loam, 12 to 18 percent slopes	3.3	0.20%
880F	Brodale-Rock outcrop complex, 18 to 45 percent slopes	2.9	0.20%
250	Kennebec silt loam	2.9	0.20%
454B	Mahtomedi loamy sand, 3 to 8 percent slopes	2.8	0.20%
283B	Plainfield loamy sand, 2 to 6 percent slopes	2.4	0.10%
27B	Dickinson sandy loam, 2 to 6 percent slopes	2.3	0.10%
1815	Zumbro loamy fine sand	2.3	0.10%
454C	Mahtomedi loamy sand, 8 to 15 percent slopes	2.2	0.10%
1827C	Waukegan silt loam, bedrock substratum, 6 to 12 percent slopes	1.9	0.10%
1003	Anthroportic Udorthents-Pits-Dumps complex, abandoned, 2 to 45 percent slopes	1.7	0.10%
1816	Kennebec variant silt loam	1.7	0.10%
313	Spillville loam, 0 to 2 percent slopes, occasionally flooded	1.7	0.10%
173F	Frontenac silt loam, 25 to 40 percent slopes	1.6	0.10%
1824	Quam silt loam, ponded	1.6	0.10%
100C	Copaston loam, 6 to 12 percent slopes	1.4	0.10%
1030	Pits, sand and gravel	1.3	0.10%
895B	Kingsley-Mahtomedi-Spencer complex, 3 to 8 percent slopes	1.2	0.10%
150B	Spencer silt loam, 2 to 6 percent slopes	1.2	0.10%
39B2	Wadena loam, 2 to 6 percent slopes, eroded	0.5	0.00%
342F	Kingsley sandy loam, 25 to 40 percent slopes	0.3	0.00%
865B	Urban land-Hubbard complex, 0 to 6 percent slopes	0.2	0.00%

APPENDIX C: FUTURE CONSIDERATIONS AND ECOLOGICAL IMPACTS

FIRE SUPPRESSION

The application or withdrawal of ecosystem functions, processes, and components will have varying effects. Sometimes these effects are subtle and sometimes they are overt. They can be acute or chronic. As is so oftentimes the case, there are complex interactions between species and amongst abiotic features that result in changes to or even shifts in ecosystems. For example, periodic fires were very important parts of natural processes prior to settlement. Fire kills small woody seedlings that might otherwise grow into mature trees and shrubs, thus keeping the understory of woodland and the ground layer of savannas open. The resulting open areas allow wildflowers, grasses, sedges, and ferns to thrive. When fires occurred historically, a very diverse and varied herbaceous ground layer flourished under woodlands and savannas, with hundreds of species occurring. The lack of fire over the last 150 years has negatively impacted native woodlands and savannas. In broad terms, woodlands have succeeded and are currently succeeding to forests, with savannas and prairies succeeding to woodlands.

EROSION CONTROL

Soil type and topography vary along the greenway. Some areas have highly erodible soils, steep topography, or both, which can result in erosion issues. The lack of deep-rooted plant cover in these areas exacerbates the problem and can lead to areas of significant erosion.
Bare soil resulting from the effects of invasive plants and earthworms also leads to splash erosion. A denser vegetation layer throughout these erosion-prone areas would act to break the impact of raindrops and dissipate the energy of stormwater running on these slopes, but in some cases larger interventions will be required.

During restoration of woodland areas, all bare soil should be seeded with native forb and graminoid (grass and sedge) mixes once removal of non-native shrubs is complete. Installing natural wood erosion bars ("water bars") in areas where erosion (sheet and rill) is progressing is recommended, although this can cause much disturbance of the soil and vegetation. This task can be accomplished by placing poles of cut woody material perpendicular to the slope and anchored between two trees. In areas where erosion is present, but tree cover is lacking, bars can be anchored by pounding wood stakes into the slope. These stakes can be purchased at hardwood stores or crafted from additional cut vegetation. In areas where erosion is worsening, erosion blankets, grass strips, seeding and other means may be necessary to further control erosion. Erosion control blankets should be purchased and installed, using manufacturers specifications, with supervision by parks staff or subcontractors. It is important to install correctly to avoid blanket sliding down the slope after installation.

NON-NATIVE AND OVER-POPULATED ANIMALS

EARTHWORMS

No species of earthworms were native to the northern part of the U.S., since the last glaciation over 10,000 years ago. During the last century, "litter dwelling," "soil dwelling," and "deep

burrowing" species of have been introduced – primarily as cast-off bait from anglers. Since then, these introduced earthworms have become established and are very invasive in our native woodlands and forests. These species move into new areas in waves, one species following another, with ultimately the largest worms, night-crawlers, invading and becoming established. Where soils/systems have evolved without them, these earthworm species, contrary to popular opinion, are not good for the soil – tunneling into the top layers of soil and consuming large amounts of leaf litter (duff). The result of their activities is a net soil compaction and a marked increase in the duff turnover rate (the time it takes for the litter layer to be decomposed and turn into humus). Where there used to be several inches of the light, fluffy duff layer in native forests and woodlands, there is now only a trace of duff or often none at all, with compacted, bare soil often prevalent. This situation can result in increased erosion and nutrient runoff and lead to detrimental impacts for nearby lakes and streams. The lack of duff layer and soil compaction have negative ramifications on native forb populations, especially spring ephemerals that evolved under conditions that required thick, fluffy duff layers.

GRAZING, BROWSING, AND WHITE-TAIL DEER

Another factor of the woodland decline is over-browsing/over-grazing. Areas that were pastured by cattle or sheep received heavy grazing pressure that was previously unknown. Native grazers (primarily bison and antelope) would move around and not concentrate in one area for long periods of time. This allowed a very diverse forb layer to thrive. With the introduction of cattle in the last century and a half, that grazing pattern changed. Cattle will concentrate their grazing much longer and their impacts are much greater. Many native forbs simply cannot survive this type of grazing pressure.

Today, deer browsing, not grazing, has a more significant negative impact on woodlands. Deer populations in the Metropolitan Area have significantly increased over the last century, due to direct and indirect causes. The conversion of native forest, woodland, savanna, and prairie, first to agricultural land and then to more "suburbanized landscapes," has favored deer. Forest fragmentation and managing for large gaps and residential lots, with linear woodlands, has greatly increased the suburban "edge effect." Deer prefer areas with large amounts of long, linear forest/woodland edge that can be used as open areas to feed and wooded areas for cover. Active vegetation management for deer hunting by wildlife managers has also increased deer abundance. Deer prefer to feed on many native forbs, shrubs, and tree seedlings. Although deer will eat buckthorn and honeysuckle, they do not prefer them if given the choice. This combination of factors greatly increases the browsing pressure on the few natives that can survive earthworm and buckthorn infestations. The lack of oak regeneration, typical of such woodlands, is one result of these conditions.

The synergistic effect of four factors: fire suppression, earthworm infestation, buckthorn/ honeysuckle invasion, and high deer browsing pressure, has resulted in oak woodland decline. Although difficult to remediate, this decline can be improved and possibly reversed by implementing appropriate management activities.

CLIMATE CHANGE

With the advent of global climate change, conditions for plant communities are changing. By the end of the century, scientists believe that much of Minnesota will not be conducive for the growth of boreal pine or boreal mixed forests. The climate of the Twin Cities will be more like that surrounding Sioux Falls, South Dakota, or Oklahoma City, Oklahoma. Minnesota is expected to receive the same average amounts of precipitation or slightly more, but yearly distributions will be different. More rain is expected during the winter months and less rain during the summer months. The result will be a sort of "savannafication" of the region.

By facilitating the movement of plants from more southerly and westerly regions of Minnesota, degradation of natural areas may be mitigated or averted. By promoting healthy oak woodland, oak savanna, and prairie ecosystems, the potential negative shift from unsustainable land management expectations and serious loss of diversity to better outcomes can occur by focusing on strategies emphasizing resistance and resilience. Appropriate actions could mimic, assist, or enable ongoing natural adaptive processes, such as species dispersal and migration, population mortality and colonization, changes in species dominance and community composition, and changing disturbance regimes.

APPENDIX D. RECOMMENDED PLANT SPECIES FOR RESTORATION

Listed below are some of the species culturally significant to the Dakota people, who stewarded this region prior to colonization. These should be incorporated into planting plans and seed mixes whenever possible.

DRY PRAIRIE	MESIC PRAIRIE	SAVANNA	WOODLAND	WETLAND
Aster species	Aster species	Sunchoke	Blue cohosh	Boneset
Beardstongue/ Penstemon	Compass plant	Bur oak	Jack-in-the-pulpit	Ironweed
Buffaloberry	Dogbane	Hazelnut	Trillium (nodding)	Sweetgrass
Four O'Clock	Mountain mint	Pin cherry	Wild ginger	
Leadplant	Rattlesnake master	Raspberry	Wild leeks	
Prairie rose	Sumac (*Rhus glabra*)	Red osier dogwood	Basswood	
Prairie sage	Yarrow	Wild plum	Bitternut hickory	
Prairie smoke			Black cherry	
Prairie turnip			Chokecherry	
Sand cherry			Elderberry	
Wild lupine			Gooseberry	
Wild strawberry			Hackberry	
			Juneberry	
			Nannyberry	
			Wild grape	

APPENDIX E. SUGGESTED NATIVE SHRUBS FOR REPLACING COMMON BUCKTHORN

DRY UPLAND AREAS				
Common name	*Scientific name*	Height [feet]	Light	Wildlife Value
New Jersey tea	*Ceanothus americanus*	2 to 3	Full sun	High: butterflies and hummingbirds
Gray dogwood	*Cornus racemosa*	9	Sun/shade	Very high
American hazelnut	*Corlyus americana*	6 to 12	Sun/part shade	High: birds and mammals
Beaked hazelnut	*Corlyus cornuta*	6 to 12	Sun/shade	High
Pin cherry	*Prunus pensylvanica*	10 to 30	Sun	Excellent
Smooth rose	*Rosa blanda*	4 to 6	Sun/part shade	
Silver buffaloberry	*Shepherdia argentea*	8 to 10	Full sun	High: birds
Wolfberry	*Symphoricarpos occidentalis*	2 to 4	Full sun	
DRY-MESIC UPLAND AREAS				
Common name	*Scientific name*	Height [feet]	Light	Wildlife Value
Allegheny serviceberry	*Amelanchier laevis*	15 to 25	Sun/part shade	High
Round-leaved dogwood	*Cornus rugosa*	8 to 12	Part sun/shade	High: butterflies use flowers; birds eat berries
Eastern wahoo	*Euonymus atropurpurea*	6 to 20	Sun/shade	
Common ninebark	*Pysocarpus opulifolius*	8 to 10	Full sun	High: birds
American plum	*Prunus americana*	20 to 35	Sun	High
Choke cherry	*Prunus virginiana*	20 to 35	Sun/part shade	Excellent
Red-berried elder	*Sambucus pubens*	6 to 12	Sun to shade	High: birds
Smooth rose	*Rosa blanda*	4 to 6	Sun/part shade	
Bladdernut	*Staphylea trifolia*	8 to 15	Shade	
Highbush cranberry	*Viburnum trilobum*	6 to 12	Sun to shade	High: birds
Wafer ash	*Ptelea trifoliata*	10 to 15	Sun to shade	Larval host for swallowtail butterfly
FLOOD TOLERANT AREAS				
Common name	*Scientific name*	Height [feet]	Light	Wildlife Value
American elder	*Sambucus canadensis*	8 to 10	Full sun	High: birds
False Indigo	*Amrophy fruticosa*	8 to 10	Sun/part shade	Butterflies

Black chokeberry	*Aronia melanocarpa*	5 to 8	Sun/shade	High: birds
Buttonbush	*Cephalanthus occidentalis*	6 to 12	Full sun	Birds, butterflies
Pagoda dogwood	*Cornus alternifolia*	15 to 20	Sun/shade	
Silky dogwood	*Cornus amomum*	6 to 12	Full sun	High: birds
Red twig dogwood	*Cornus sericea*	6 to 12	Sun/part shade	High: birds
Witch hazel	*Hamamelis virginiana*	20 to 30	Sun or shade	Late-season pollinators
St. Johns Wort	*Hypernicum kalmaianum*	2 to 3	Sun/part shade	Pollinators
Winterberry	*Ilex verticillata*	6 to 8	Sun/part shade	High: birds
Black current	*Ribes americanum*	3 to 6	Sun/part shade	High: birds and mammals
Pussy willow	*Salix discolor*	20	Full sun	Soil stabilizer
Red willow	*Salix sericea*	6 to 8	Full sun	High: birds
Meadowsweet	*Spirea alba*	3 to 6	Full sun	High: birds
Nannyberry	*Viburnum lentago*	16 to 20	Sun/part shade	High
Highbush cranberry	*Viburnum trilobum*	6 to 12	Sun/part shade	High: birds

APPENDIX F. METHODS FOR CONTROLLING NON-NATIVE AND INVASIVE PLANTS

INVASIVE TREES AND SHRUBS

COMMON BUCKTHORN, TATARIAN HONEYSUCKLE, SIBERIAN ELM AND BLACK LOCUST

These are some of the most common invasive woody species likely to invade native woodlands or prairies in Minnesota. Buckthorn and honeysuckle are European species that escaped and invaded woodlands in many parts of the country. They are exceedingly aggressive and, lacking natural diseases and predators, can out-compete native species. They remain photosynthetically active longer than most other native shrubs and trees, which gives them a competitive advantage. The seeds are disseminated by birds, which make them especially problematic in open woodlands, savannas, and overgrown prairies. They also benefit from the net actions of invasive earthworms, fire suppression, and high deer populations, forming a synergy that helps set the stage for their establishment and dominance. Invasions eventually result in dense, impenetrable brush thickets that greatly reduce ground-level light availability and can cause declines in native species abundance and diversity.

Siberian elm, native to eastern Asia, grows vigorously, especially in disturbed and low-nutrient soils with low moisture. Seed germination is high and seedlings establish quickly in sparse vegetation. It can invade and dominate disturbed areas in just a few years. Black locust is native to the southeastern United States and the very southeastern corner of Minnesota. It has been planted outside its natural range (it was promoted as an erosion control species and a soil stabilizer partly because it was falsely assumed to be a nitrogen fixer, and since it quickly colonizes bare slopes), and readily invades disturbed areas. It reproduces vigorously by root suckering and can form monotypic stands.

BIOLOGICAL CONTROL

Currently there are no biological control agents for non-native woody plants in Minnesota. Recently, an 11-year study conducted by the DNR and University of MN resulted in the conclusion that there were no viable biological control agents for common or glossy buckthorn, based in part on the lack of damage to the host plants and a lack of host specificity (http://www.dnr.state.mn.us/invasives/terrestrialplants/woody/buckthorn/biocontrol.html).

CHEMICAL CONTROL

The most efficient way to remove woody plants that are 1/2 inch or more in diameter is to cut the stems close to the ground and treat the cut stumps with herbicide immediately after they are cut, when the stumps are fresh, and the chemicals are most readily absorbed. Failure to treat the stumps will result in resprouting, creating the need for future management interventions.

In non-freezing temperatures, a glyphosate herbicide such as Roundup can be used for most woody species. It is important to obtain the concentrated formula and dilute it with water to achieve 10% glyphosate concentration. Adding a marker dye helps to make treated stumps more visible, improving accuracy and overall efficiency. In winter months, an herbicide with the active ingredient triclopyr must be used. *Garlon 4* is a common brand name and it must be mixed with a penetrating oil, such as diluent blue. *Garlon* 4 will also work throughout the year. Do not use diesel fuel, as it is much more toxic in the environment and to humans.

Brush removal work can be done at any time of year except during spring sap flow, but late fall is often ideal because buckthorn retains its leaves longer than other species and is more readily identified. Moreover, once native plants have senesced, herbicide will have fewer non-target effects on native vegetation. Cutting can be accomplished with loppers or handsaws in many cases. Larger shrubs may require brush cutters and chainsaws, used only by properly trained professionals.

For plants in the pea family, such as black locust, an herbicide with the active ingredient clopyralid can be more effective than glyphosate. Common brand names for clopyralid herbicides are Transline, Stinger, and Reclaim.

In the year following initial cutting and stump treatment, there will be a flush of new seedlings as well as possible resprouting from some of the cut plants. Herbicide can be applied to the foliage of these plants. Fall is the best time to do this, when desirable native plants are dormant and when the plant is pulling resources from the leaves down into the roots. Glyphosate, triclopyr and Krenite (active ingredient – fosamine ammonium) are the most commonly used herbicides for foliar application. Krenite prevents bud formation so the plants do not grow in the spring. This herbicide can be effective, but results are highly variable. Glyphosate or a triclopyr herbicide such as Garlon can also be used. Glyphosate is non-specific and will kill anything green, while triclopyr targets broadleaf plants and does not harm graminoids. All herbicides should be applied by licensed applicators and should not be applied on windy days. Care should be taken to avoid application to other plants. “Weed Wands” or other devices that allow dabbing of the product can be used rather than spraying, especially for stump treatment. Basal bark herbicide treatment is another effective control method. A triclopyr herbicide such as Garlon 4, mixed with a penetrating oil, is applied all around the lower 6-12 inches of the tree or shrub, taking care so that it does not run off. If the herbicide runs off it can kill other plants nearby. More herbicide is needed for effective treatment of plants that are four inches or more in diameter.

Undesirable trees and shrubs can also be destroyed without cutting them down. Girdling is a method suitable for small numbers of large trees. Bark is removed in a band around the tree, just to the outside of the wood. If girdled too deeply, the tree will respond by resprouting from the roots. Girdled trees die slowly over the course of one to two years. Girdling should be done in late spring to mid-summer when sap is flowing and the bark easily peels away from the

sapwood. Herbicide can also be used in combination with girdling for a more effective treatment. Girdling has the added benefit of creating snags for wildlife habitat. While girdling a large number of trees is not feasible, girdling the occasional large tree will provide a matrix of habitat for species that depend on standing dead trees for food or nesting opportunities.

MECHANICAL CONTROL

Three mechanical methods for woody plant removal are hand pulling (only useful on small seedlings and only if few in number), weed wrenching (using a weed wrench tool to pull stems of one to two inches diameter), and repeated or "critical" cutting. Pulling and weed wrenching can be done any time when the soil is moist and not frozen. The disadvantage to both methods is that they are somewhat time-consuming, as the soil from each stem should be shaken off. Weed wrenching also creates a great deal of soil disturbance and should not be used on steep slopes or anywhere that desirable native forbs are growing. The soil disturbance also creates opportunities for colonization by other non-native plants. This method is the least preferable and is probably best used in areas that have hardly any desirable native plant cover.

Repeated cutting consists of cutting the plants (by hand or with a brush cutter) at critical stages in its growth cycle, typically twice per growing season. Cutting in mid spring (late May) intercepts the flow of nutrients from the roots to the leaves and cutting in fall (about mid-October) intercepts the flow of nutrients from the leaves to the roots. Depending on the size of the stem, the plants typically die within three years, with two cuttings per year.

PRESCRIBED FIRE

Prescribed burning is the most efficient, cost effective, and least harmful way to control very small stems, seedlings, and resprouts of all woody plants. It also restores an important natural process to fire-dependent natural communities (oak forests, for example). Burning can only be accomplished if adequate fuel (fine fuels such as grasses and sedges, and leaf litter, especially oak leaves) is present and can be done in late fall or early spring, depending on site conditions.

INVASIVE NATIVE SHRUBS

PRICKLY ASH

A common native shrub, prickly ash can become excessively abundant, especially in areas that have been disturbed or grazed. Complete eradication is not necessary, but management typically targets reducing the extent of a population. Removal is most easily accomplished in the same manner as for buckthorn – cutting shrubs and treating cut stumps with glyphosate herbicide. Cutting can be completed at any time of the year.

SMOOTH SUMAC

Like prickly ash, smooth sumac can become excessively abundant in grasslands and savannas, especially in areas where fire has been suppressed for long periods of time. It can form dense,

clonal stands that dominate other vegetation. Unlike prickly ash or buckthorn, however, controlling smooth sumac does not require herbicide applications, since that would require a tremendous amount of herbicide, be quite labor intensive, and probably cause heavy damage to surrounding plants. Control of smooth sumac can be easily accomplished by cutting and burning, or a combination of these two methods. To be effective, the sumac must be burned or cut twice a year: the first time in the late spring, just after it has fully leafed out (expended maximum energy), and the second time in late summer, after it has re-sprouted. Repeat this method annually for two to five years to deplete the clone of its energy, working back at the edges of the clone and reducing cover from the outside of the area towards the center. If cutting or burning is performed only once a season, the clone will persist, since this will not be enough to drain the root system of stored energy. Cutting twice a year without burning will be effective, but burning is doubly so, since fire tends to benefit herbaceous plants and suppress woody ones.

DISPOSAL

The easiest and most cost-effective method to handle large amounts of woody brush is usually to stack it and burn it. This is most typically done during winter to lessen the impacts to soil (compaction, erosion, rutting, etc.), though often brush will be piled soon after the removal and burned during the winter. In areas where brush is not dense, it can be cut up into smaller pieces, scattered, and left on the ground where it will decompose in one to three years (this method is especially useful on slopes to reduce erosion potential). Small brush piles can also be left in the woods as wildlife cover. Where there is an abundance of larger trees, cut trees may be hauled and chipped and used for mulch or as a biofuel. Alternatively, the wood can be cut and used for firewood, if a recipient can be found, or perhaps saved to be used later as waterbars for slope stabilization.

FORBS

SPOTTED KNAPWEED

Knapweed is a perennial species that has become a troublesome prairie invader. Of all the typical prairie weeds, spotted knapweed is probably the most difficult to manage. It cannot be controlled with burning—like sweet clover it actually increases with fire. Hand-pulling individuals or small groups of individuals can be effective for small infestations, and is often a good volunteer group task. However, knapweed has a fairly large tap root and can be difficult to pull. Pulling is typically more difficult when soil is hard (dry), clayey, or compacted, but easier when soil is wet (following a rain), sandy, and friable. If knapweed populations are large, a bio-control (knapweed beetles--weevils) is recommended. Knapweed beetles (weevils) are released during the summer. Weevils can be purchased online and they are sent via the mail. Knapweed populations should be monitored each year to keep a record of the effectiveness of the bio-control.

Weevils are effective for long-term control, but not a good short-term control option. Spot treatment with a systemic herbicide such as Milestone or Transline can be effective for short-

term control. Applying herbicide to prairie restoration areas should be done with care. Remnants with high diversity should be spot treated, not broadcast-treated. It is recommended to treat first with the least impactful chemical, monitor to see if that works, and then try another if it does not work. Degraded and highly disturbed areas can be treated a little less gently, perhaps using broadcast applications. Always follow the product label when using any chemical for weed control. Treatment should be done before the target plants form seed, so late spring and early summer are best. Professional pesticide applicators are required for herbicide treatment.

CANADA THISTLE

While native thistles are not generally problematic, exotics such as Canada thistle are clone-forming perennials that can greatly reduce species diversity in old fields and restoration areas (Hoffman and Kearns 1997). A combination of chemical and mechanical control methods may be needed. Chemical control is most effective when the plants are in the rosette stage and least effective when the plants are flowering. Where native grasses and sedges are present, use of a broadleaf herbicide such as 2,4-D is recommended, since 2,4-D only affects dicots. 2,4-D is most effective when applied 10-14 days before the flowering stems bolt. It is applied at a rate of 2-4 lb/acre using a backpack or tractor-mounted sprayer or in granular form. Dicamba could also be used, with the advantages that it can be applied earlier in the spring at a rate of 1 lb/acre. Another chemical that has been used for thistles is aminopyralid ("Milestone"), which can be applied at bud stage. Aminopyralid will affect other species and it has longer residual activity than some other chemicals, so use with caution—typically use it on large patches/clones of thistles and avoid areas of higher diversity. Plants that do not respond to treatment or that are more widely dispersed could be controlled mechanically.

Mechanical control, involving several cuttings per year for three or four years, can reduce an infestation if timed correctly. The best time to cut is when the plants are just beginning to bud because their food reserves are at their lowest. If plants are cut after flowers have opened, the cut plants should be removed because the seed may be viable. Plants should be cut at least three times throughout the season. Late spring burns can also discourage this species, but early spring burns can encourage it. Burning may be more effective in an established prairie, where competition from other species is strong, rather than in an old field, where competition is likely to be weaker.

SWEET CLOVER

White and yellow sweet clover are very aggressive biennial species that *increase* with fire. Where sweet clover is found, it should be controlled in conjunction with treatment that attempts to eliminate smooth brome, if prairie restoration occurs. Sweet clovers are common plants in agricultural areas, so if restoration is implemented, the project area should be surveyed for this species on an annual basis. Often times, following initial brush removal and/or burning, a flush of weedy annuals and biennials such as sweet clover can occur. Well-timed mows and burnings are usually adequate to control these species. Mowing the site, as is

typically prescribed for prairie restoration maintenance, should occur when all plants on the site (including sweet clovers) are approximately 12 inches in height. Sweet clover can bloom even at a height of 6 inches, but if it is burned or mowed in the following year in the late spring, it should be controlled. On steep sites, brush cutting can be substituted for mowing. Individual plants or small populations can be removed by hand-pulling. If seed production occurs, prodigious amounts of seed can be produced and spread, so pull before seeds appear or bag seed producing plants. Competition from native species also helps control sweet clovers and other weedy annuals and biennials.

To some extent, common burdock and common mullein can be treated similarly to sweet clover, since they are both exotic, biennial forbs that are typically found in disturbed areas or restoration projects.

GARLIC MUSTARD

Garlic mustard is an exotic biennial forb of woodlands and woodland edges that is very invasive and aggressive. Following the introduction of just a few plants, populations can rapidly increase and a dramatic "explosion" of garlic mustard plants can occur. In some areas it can form monotypic stands that crowd out other species, while recent studies have shown that in other locations it may simply occupy open ecological niches. Nevertheless, garlic mustard can be very invasive in woodlands, and it is recommended to monitor and remove it as soon as it is detected (early detection and rapid response). Garlic mustard also produces a flavonoid (root exudate) that suppresses mycorrhizal inoculation. Thus species that are mycorrhizae dependent, like oaks, will become stunted and easily out-competed by garlic mustard. The flavinoid persists in the soil years after garlic mustard plants are removed, which is a good reason to keep woodlands garlic mustard-free.

Probably the best way to control garlic mustard is to closely monitor your site, and if garlic mustard is found, hand pull it before it spreads. Hand-pulling should occur before siliques (seed pods) form. Once siliques form, removed plants should be bagged and transported from the site, since the plant may have enough energy in the stem and root to make viable seeds, even though it is not growing in the ground. If bagging and transporting are not an option, making weed piles is an option, but prepare to deal with garlic mustard plants in the future at each pile. Garlic mustard plants produce hundreds of seeds per plant—they are very prolific. When pulling garlic mustard plants, take care to remove the entire root, since they may re-sprout if part of the root is left in the ground. This can be difficult, since roots are "S-shaped" and tend to break off at ground level.

Chemical control is not recommended except in cases where garlic mustard is growing in large monoculture patches. In such cases, a systemic herbicide may be appropriate. Glyphosate is non-specific, and will kill any actively growing plant. One technique that has been effective is applying a water soluble herbicide during warm days in the winter, when no snow cover or only a thin snow cover exists. Garlic mustard rosettes (first year plants) remain green mostly all year round, and can be killed during the winter when nearly all other plants are dormant. Another

successful technique is to use an herbicide specific to broadleaved plants, like triclopyr ("Garlon"), but one that is water soluble, which can be dispensed with a backpack sprayer or the like; this will not kill grasses or sedges.

There are studies underway by the Minnesota DNR and University of Minnesota that show good potential for bio-control of garlic mustard via an exotic weevil (http://www.legacy.leg.mn/projects/biological-control-european-buckthorn-and-garlic-mustard). The testing phase is complete, but the approval process still needs to be performed. If approved, this method could revolutionize garlic mustard control. However, whether it will be effective or not on a landscape scale is yet to be determined.

GRASSES

SMOOTH BROME

Smooth brome is a cool season grass —active early in the growing season in southern Minnesota (April-May-June) and then going semi-dormant in July-September. It reproduces by means of underground stems (stolons and rhizomes) called "tillers". The most effective treatment is timed to occur at the same time as the brome is "tillering"—mid to late May in southern Minnesota. Burning two years in a row (late-season burns in June) followed by seeding has been shown to be effective in controlling smooth brome. Consider that this timing may be a week or two earlier on steep south-facing slopes or in very sandy or sand-gravel soils. Following this method will usually be sufficient to control smooth brome. Seeding following burns, preferably with native seed collected on-site, or purchased from a seller that provides local ecotypes, is important for restoring cover at the site. Evaluation can occur each year, and especially after two years. If this is not working, perhaps try a cool-season overspray of a grass-specific herbicide either in the spring (April) or in the fall (October). Using glyphosate as a cool-season overspray herbicide application is a last resort, since it is non-specific and can kill everything.

Kentucky bluegrass and creeping fescue can be treated similarly to smooth brome, since like smooth brome, they are both exotic, stoloniferous, cool-season grasses. Spring burns are the most effective tool against all of these species.

REED CANARY GRASS

This species is extremely difficult to eradicate and requires repeated treatment over a period of one to three years. A combination of burning, chemical treatment and mowing can be used in accessible areas, or chemical treatment alone in inaccessible areas. The combination method starts by burning in late spring to remove dead vegetation and to stimulate new growth. When new sprouts have reached a height of 4 to 6 inches, the site can be sprayed with a 5% solution of a glyphosate herbicide appropriate for wetland habitat (e.g., Rodeo). The site is then mowed in late summer, followed by chemical application after re-growth. This treatment will stimulate new growth and germination to deplete the seed bank. The sequence of chemical treatment and mowing are repeated for at least a second season, and possibly a third until the grass is completely eradicated. Then native grass and forb seed can be broadcast or drilled.

If reed canary grass is eradicated from an area, future management of the grassland, namely burning, will likely keep the reed canary in check. Monitoring and mapping new individuals or clumps should continue, however, and those individuals should be treated if burning is not adequately controlling them. If the plants are small they can be removed by digging out the entire root. Generally though, chemical treatment is more feasible. If plants are clumped, they can be treated by tying them together, cutting the blades, and treating the cut surface with herbicide. Otherwise, herbicide should only be applied in native planted areas on very calm days to avoid drift to non-target plants.

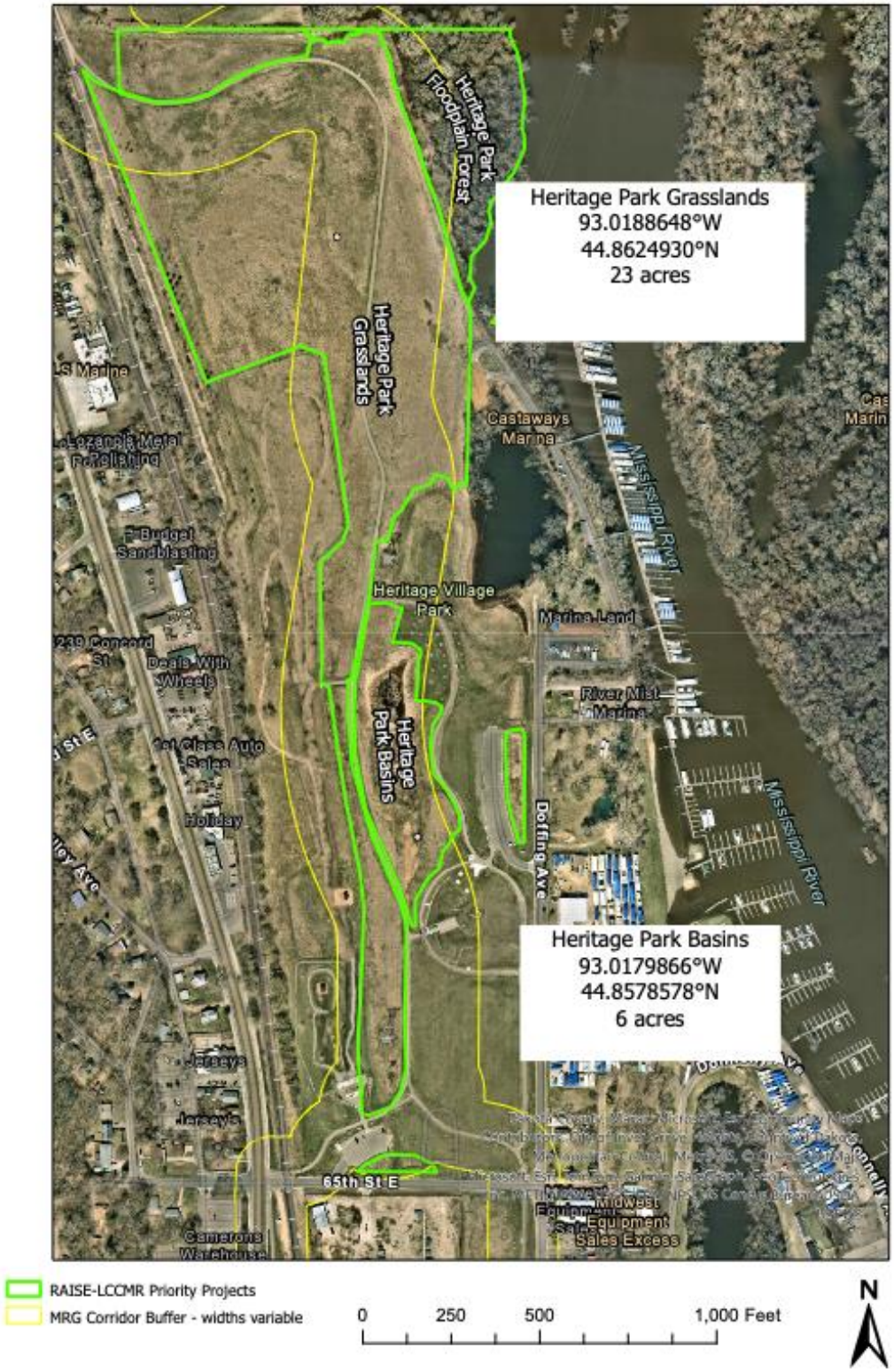
APPENDIX G. NATURAL AREA NODES AERIAL PHOTOS SHOWING LCCMR AND RAISE GRANT PRIORITY AREAS

Ernster Park- LCCMR $11,570

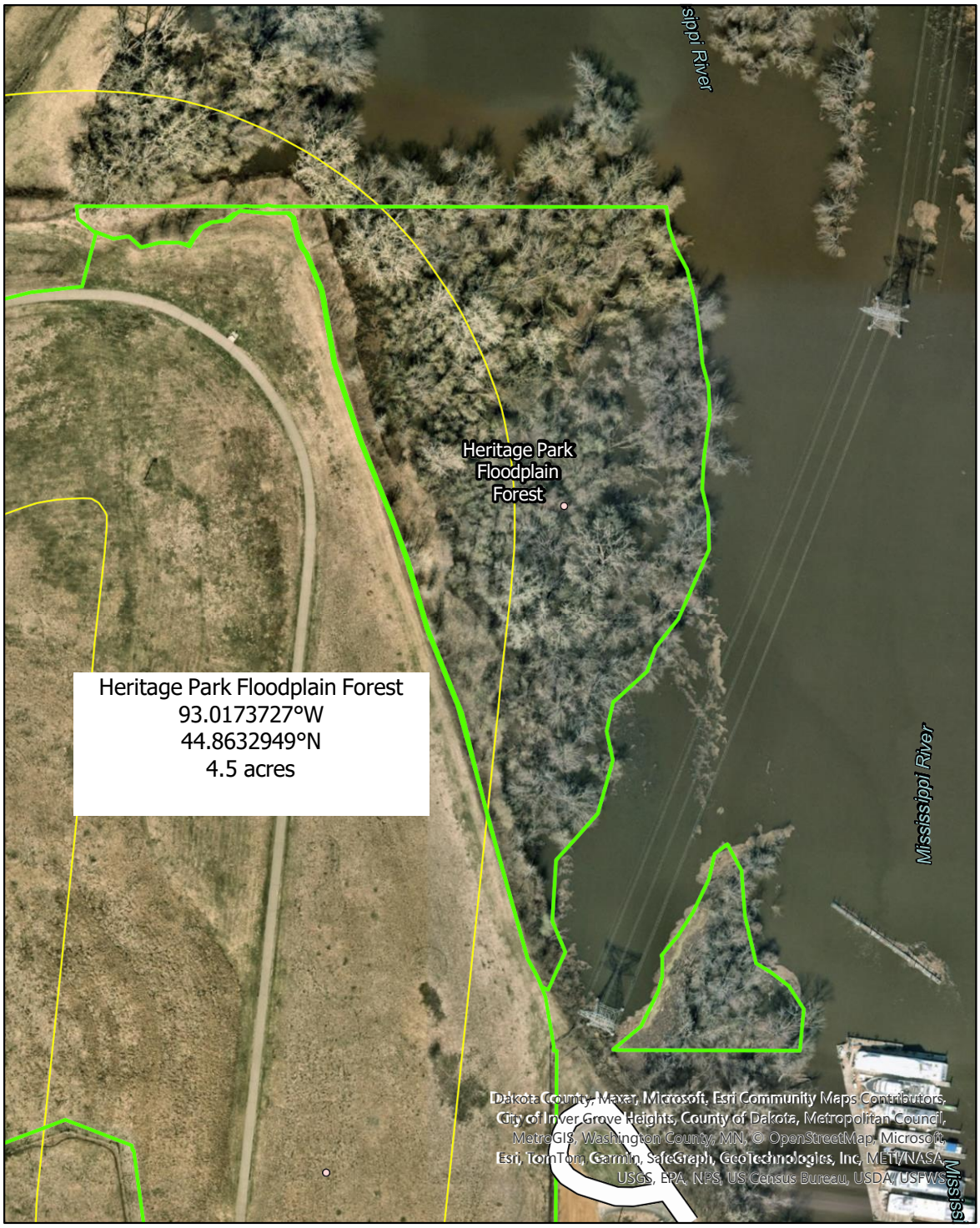
RAISE-LCCMR Priority Projects

MRG Corridor Buffer -

Heritage Park Grasslands and Basins- LCCMR $25,240; RAISE $77,160



Heritage Park Floodplain Forest- LCCMR $27,450



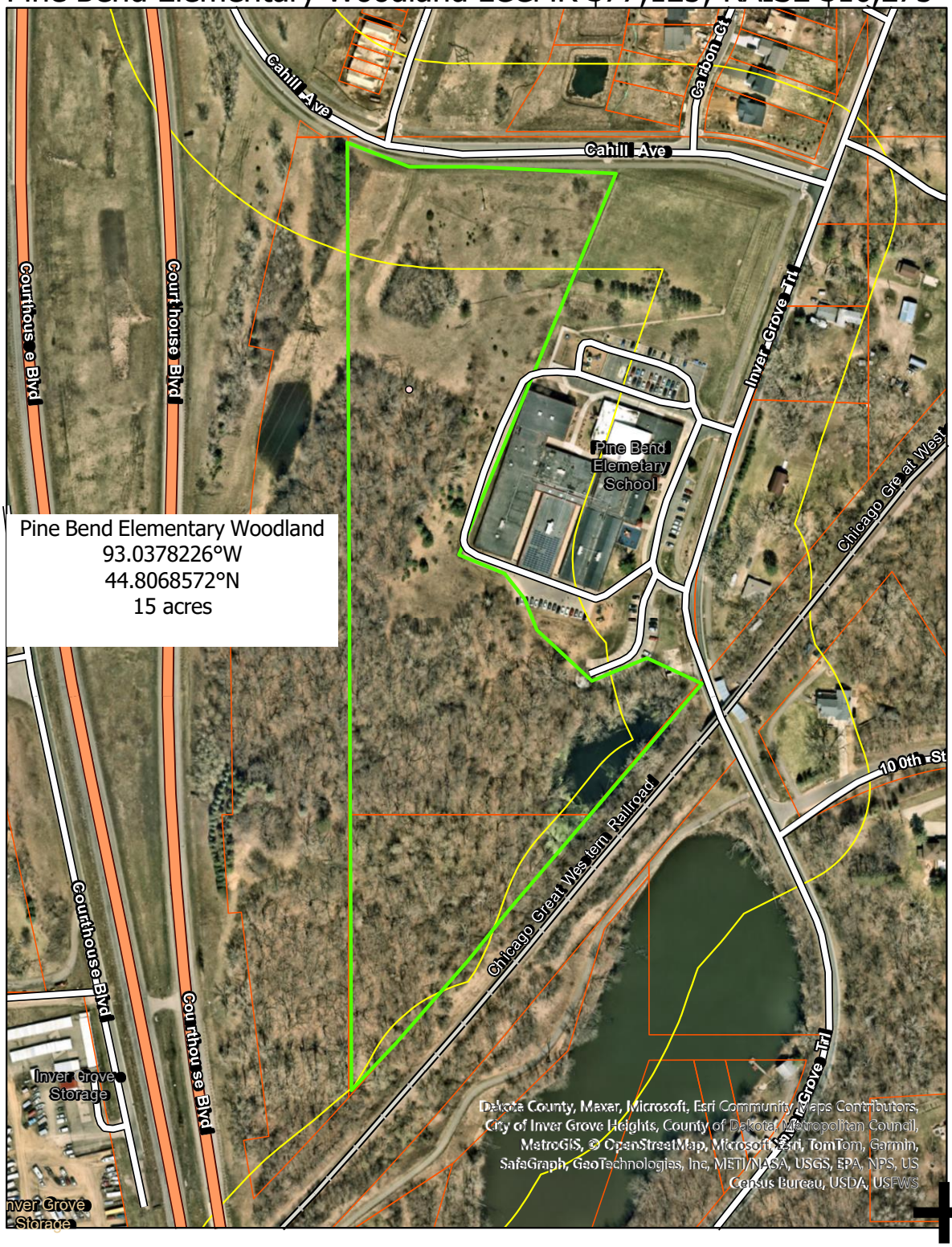
Kaposia Oak Savanna- LCCMR $61,125; RAISE $15,125

South Kaposia- LCCMR $25,140

RAISE-LCCMR Priority Projects

Lake Rebecca-River Flats Parks LCCMR $25,240; RAISE $66,040

Pine Bend Elementary Woodland LCCMR $77,125; RAISE $16,275

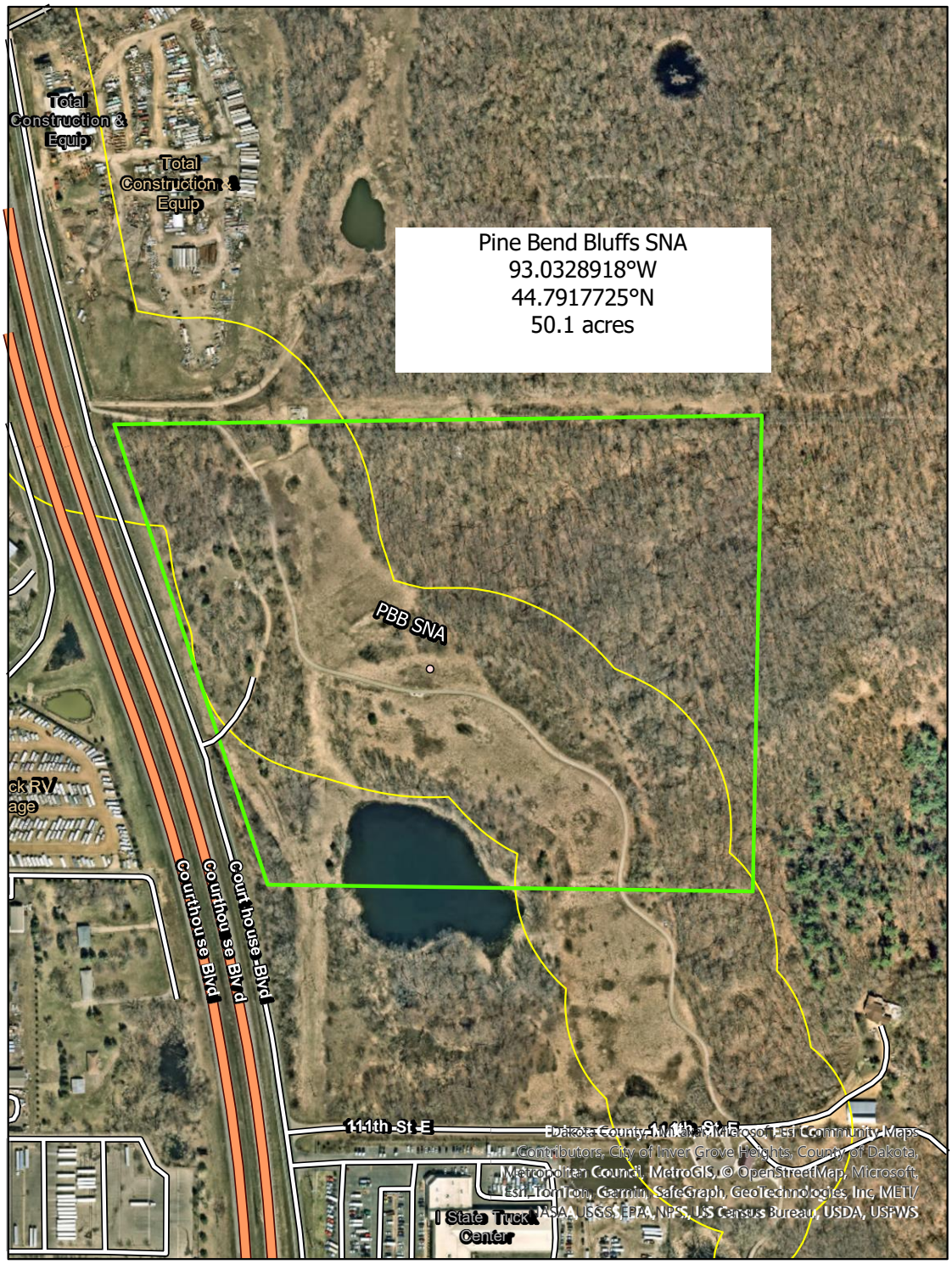


RAISE-LCCMR Priority Projects

MRG Corridor Buffer - widths variable

0 125 250 500 Feet

Pine Bend Bluffs SNA- RAISE $104,625



RAISE-LCCMR Priority Projects

MRG Corridor Buffer - widths variable

0 250 500 1,000 Feet

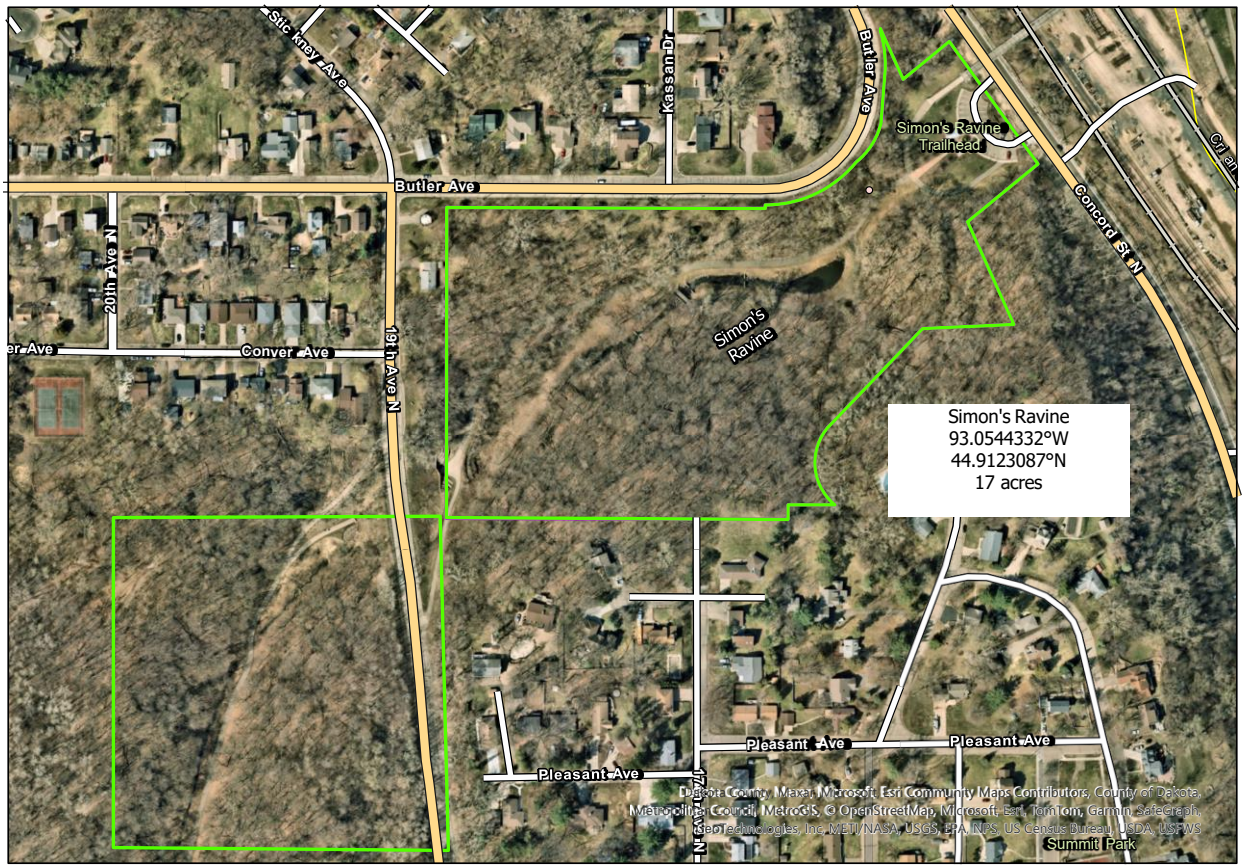
Riverfront Park- RAISE $16,000

RAISE-LCCMR Priority Projects

0 125 250 500 Feet

Rock Island Swing Bridge Park- LCCMR $25,240; RAISE $32,935

Simon's Ravine- LCCMR $81,030



Wakota Trailhead Levee-LCCMR $10,920

Wildflower Levee Park- LCCMR $10,920; RAISE $21,840