Wetland Restoration and Protection Opportunity Identification

Nine Mile Creek Watershed District

Prepared for
Nine Mile Creek Watershed District

February 2021



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Abbreviations

BWSR	Board of Water and Soil Resources
MCBS	Minnesota County Biological Survey
MLCCS	Minnesota Land Cover Classification System
MN DNR	Minnesota Department of Natural Resources
MNRAM	Minnesota Routine Assessment Methodology
NHIS	Natural Heritage Information Systems
NMCWD	Nine Mile Creek Watershed District
NPC	Native Plant Community
NRRI	Natural Resources Research Institute
NWI	National Wetlands Inventory
USFWS	U.S. Fish and Wildlife Service
WCA	Wetland Conservation Act
WHEP	Wetland Health Evaluation Program

1 Introduction

1.1 Background

During development of the Nine Mile Creek Watershed District (NMCWD) 2017 Water Management Plan, the NMCWD Board of Managers, local cities, and other stakeholders identified wetland protection as an important issue and identified the following specific priority issues or opportunities related to wetland protection:

- Inventorying and assessing wetlands within the Nine Mile Creek watershed for function and value.
- Preserving the quality of existing wetlands and protecting high quality wetlands.
- Seeking opportunities to restore degraded wetlands.
- Improving wetland health by promoting diversity and abundance of native aquatic species and improving habitat.

The NMCWD's 2017 Water Management Plan (Barr, 2018) identifies protecting and restoring high-quality wetlands within the watershed as one of the primary wetland management objectives. This study is intended to be a first step for NMCWD in moving toward this objective, beyond implementation of the regulatory program. The objectives of this study included:

1) Compiling the best information available to identify high-quality wetlands throughout the Nine Mile Creek watershed and gain a better understanding of the functions and values of these wetlands
2) Identifying and summarizing specific wetland protection and restoration opportunities in the Nine Mile Creek watershed, with a focus on protecting or restoring the highest quality wetlands.
3) Using the best available information to identify the high quality wetlands throughout the Nine Mile Creek watershed to prioritize future management efforts.

2 Wetland Inventory and Functional Assessment

2.1 Introduction

To effectively manage wetlands, a basic understanding of the wetland resources present is required. Currently, the NMCWD does not have a wetland inventory. Cities within the NMCWD have some wetland inventory information, but different methods and sources were used, and much of the information is from the 1990s with varying levels of field verification. While the ideal approach would be to complete a comprehensive field wetland inventory and functional assessment of all wetlands within the watershed, this approach is time intensive. Additionally, the Minnesota Board of Water and Soil Resources (BWSR) is transitioning away from the functional assessment methodology that has been used for the past several decades in Minnesota and is currently working on developing a revised protocol. The National Wetlands Inventory (NWI), a publicly available resource developed by the U.S. Fish and Wildlife Service (USFWS), was updated in 2010 and much more accurately maps existing wetland resources, as compared to previous versions. Given the inconsistency in data available from cities within the watershed, the NWI data set represents the most current and comprehensive data set for wetlands in the Nine Mile Creek watershed. The NWI database provides information on the abundance, characteristics, and distribution of wetlands, but does not provide detailed information on wetland functions.

2.2 Wetlands in the Nine Mile Creek Watershed

Based on the NWI, there are approximately 3,968 acres of wetland in the Nine Mile Creek watershed (Table 2-1 and Figure 2-1). It should be noted that lakes are included in the total wetland acreage and are classified as lacustrine environments by the NWI. Because of the way the NWI divides wetland areas, the lacustrine area may not match the NMCWD's lake boundaries used for management purposes. The majority of the wetlands in the watershed are in the cities of Bloomington and Eden Prairie, representing approximately 63% of the wetland area in the watershed (Table 2-2). Edina and Minnetonka comprise another 34% of the wetland area in the watershed. Less than 3% of the wetland acreage within the watershed is located in Hopkins and Richfield.

Wetlands within the Nine Mile Creek watershed include nine different types, primarily based on the Circular 39 wetland classification system. The majority of the wetlands in the watershed are seasonally flooded basins (26%, by acreage), shallow marshes (27%, by acreage) and shallow open water areas (41% including lake (lacustrine) area, by acreage). Many of the wetlands are in the stream corridor or adjacent to lakes (Figure 2-1). Some of the rare wetland types in the watershed include wet meadows, bogs, and deep marshes.

Table 2-1 Wetland acreage, by city, in the Nine Mile Creek watershed.

City	Wetland Area (acres)	Lake Area[2] (acres)	Percentage of Wetland Acreage[1] in Nine Mile Creek Watershed
Bloomington	1,021	357	35%
Eden Prairie	760	347	28%
Edina	625	98	18%
Minnetonka	519	131	16%
Hopkins	102	0	3%
Richfield	8	0	<1%
Total	3035	933	

[1]Wetland acreage includes some areas managed as lakes by the NMCWD.

[2]Lake area presented in this table reflects area categorized as lacustrine in the NWI inventory and may not be consistent with the total area managed as lakes by the NMCWD.

Table 2-2 Wetland acreage in the Nine Mile Creek watershed, by Circular 39 wetland type.

Circular 39 Description	Type[1]	Wetland Area (acres)	% of Wetland Area
Seasonally Flooded Basins, Floodplain Forest	1	1,013	26%
Wet Meadow, Fresh Wet Meadow, Wet to Mesic Prairie, Sedge Meadow and Calcareous Fen	2	10	<1%
Shallow Marsh	3	1,083	27%
Deep Marsh	4	12	0%
Shallow Open Water[2]	5	1,624	41%
Shrub Swamp, Shrub Carr, Alder Thicket	6	108	3%
Wooded, Hardwood, and Coniferous Swamps	7	47	1%
Bogs	8	13	<1%
Riverine	90	44	1%
Undetermined	--	14	<1%
	Total	3,968	

[1] Circular 39 is a classification system developed by the U.S. Fish and Wildlife Service (USFWS) primarily for the inventory and classification of waterfowl habitat (Shaw and Fredine, 1959). Wetlands are classified based on the frequency and depth of inundation as well as vegetation community. Circular 39 includes 8 wetland types in Minnesota. The Riverine classification (Type 90) is also included in the NWI update.

[2] 933 acres of the shallow open water classification are considered lake area (lacustrine) and are managed as lakes by the NMCWD.

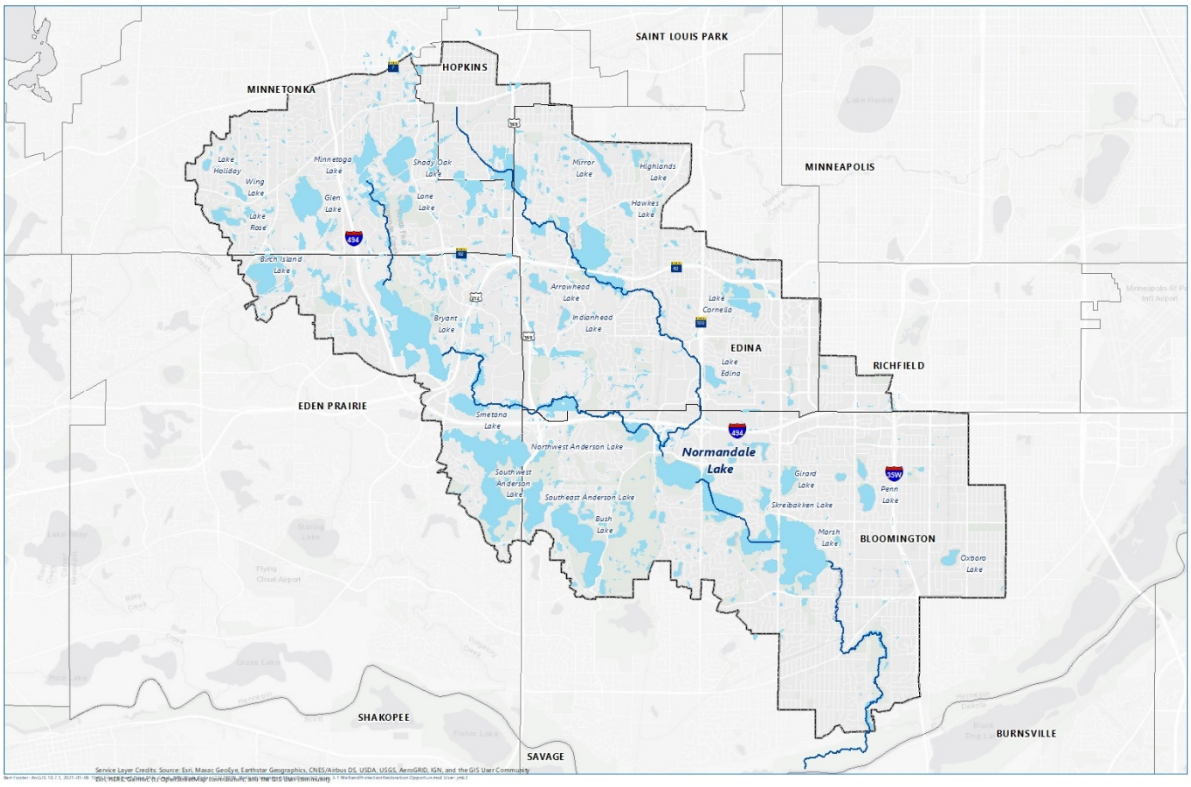


Figure 2-1 Wetlands in the Nine Mile Creek Watershed

2.3 Wetland Functional Assessments

Wetland functional assessments are critical in understanding wetland conditions and functions in the watershed. Wetland functions are the physical, chemical, and biological processes that characterize wetland ecosystems such as flooding, nutrient cycling, and habitat. Many of these wetland functions are valued by society and can also be viewed as ecosystem services (Millennium Ecosystem Assessment, 2003). For example, wetlands provide flood volume and rate control which protects properties downstream of the wetland. Flood control is highly valued by local communities interested in protecting valuable infrastructure. Other functions or ecosystem services include biodiversity, habitat provision, nutrient cycling, and groundwater protection.

Functional assessments are often used for regulation, but also can be used to:

- understand functions or "ecosystem services" a wetland provides
- characterize the condition of a wetland in terms of various functions or values
- identify and prioritize wetland protection and restoration opportunities

2.3.1 MNRAM Functional Assessment Methodology

The most widely available functional assessment approach in Minnesota is the Minnesota Routine Assessment Methodology (MNRAM). This approach was developed in the early 2000s and was broadly applied throughout Minnesota to support wetland protection and regulation. This approach was

supported by BWSR up until 2010 and has continued to be used by many municipalities and watershed management organizations for wetland management. While MNRAM is the most widely available data set on wetland functions, it is no longer supported by BWSR who is researching new methodologies.

The ideal approach for assessing wetlands in the Nine Mile Creek watershed would be to complete a field wetland inventory and functional assessment of all wetlands within the watershed. Using the wetland functional assessment data, wetlands could be classified for management planning or for implementing regulatory standards. While conducting a complete inventory and functional assessment should be considered for the future, updated functional assessment methodologies are currently in development for Minnesota. Consequently, the recommended approach is to use currently available data to prioritize and protect wetlands in the Nine Mile Creek watershed and continue to track future developments in functional assessment methodologies.

2.3.2 Compiling Available MNRAM Assessments

As part of this study, the best available wetland assessment data from each of the cities in the watershed were compiled. All of the cities except for Hopkins maintain some level of MNRAM functional data for wetlands in their jurisdictional boundary. However, the extent and type of data maintained by each city varies widely. For example, only Bloomington and Edina maintain full MNRAM databases although Edina's database is based on a modified methodology. Eden Prairie only maintains vegetation information for their wetlands since vegetation is the simplest and most widely used metric to assess wetlands. Following is a brief description of each city's available functional assessment data. The wetland assessment information available for each city and the NMCWD is summarized in Table 2-3, including the wetland field assessments conducted as part of this project (a full MNRAM functional assessment was conducted for each of the field-assessed wetlands—see Section 3.3). MNRAM functional assessment information from some NMCWD-permitted wetlands was also included.

Table 2-3 Readily available MNRAM data for each of the cities in the Nine Mile Creek watershed.

Wetland Function	Minnetonka	Eden Prairie	Bloomington	Edina[1]	Hopkins	Richfield	MNRAM assessments from NMCWD-permitted projects	Select wetlands assessed by NMCWD in 2020
Maintenance of Hydrologic Regime*			x	x			x	x
Maintenance of Wildlife Habitat*			x	x			x	x
Maintenance of Fish Habitat*			x	x			x	x
Maintenance of Amphibian Habitat*			x				x	x
Aesthetics-Recreation-Educational-Cultural*			x	x			x	x
Wetland Sensitivity to Stormwater and Urban Development*			x	x			x	x
Vegetative Diversity and Integrity		x	x	x			x	x
Hydrogeomorphology			x				x	x
Flood-Stormwater Attenuation			x	x			x	x
Downstream Water Quality			x				x	x
Maintenance of Water Quality			x	x			x	x
Shoreline Protection			x	x			x	x
Commercial Uses			x				x	x
Groundwater Interaction			x				x	x
Restoration Potential			x				x	x
Additional Stormwater Treatment Needs			x				x	x
Overall Wetland Management Classification (BWSR)	x		x			x	x	x
NMCWD Overall Wetland Rating			x[2]	x[3]			x	x

[1] Modified MNRAM methodology, 1999 inventory (Barr Engineering, 2018)
[2] Can be determined using current data
[3] Can be estimated using current data

2.3.2.1 City of Minnetonka

The City of Minnetonka provided their GIS wetlands database, which identifies an overall wetland management classification for each wetland within NMCWD. The overall wetland management classifications were established by the City of Minnetonka in the early-1990s based on assessment of wetland functions, identification of special resources, susceptibility of wetlands to stormwater inputs, and consideration of local management potential. While assessment of various wetland functions was conducted to establish the management classifications, individual functional ratings are not included within the City of Minnetonka's GIS database.

In addition, in 2017 the City of Minnetonka completed MNRAM assessments for many of the highest quality wetlands. The city provided the results of these assessments in pdf format, which include all of the MNRAM data. They also provided monitoring data through WHEP for two of the wetlands that were identified as high quality, which includes vegetation data identified to the genus and invertebrate monitoring results.

Minnetonka is the LGU responsible for WCA administration throughout Minnetonka, including wetlands within NMCWD. Beyond the WCA, the NMCWD wetland buffer requirements apply for wetlands within Minnetonka when a project requires a NMCWD permit.

2.3.2.2 City of Eden Prairie

The City of Eden Prairie provided their GIS wetlands database, which includes previously delineated wetland boundaries, previously permitted wetland fill and impact areas, constructed ponds, and wetland mitigation areas. The wetland inventory includes documentation of city easements present within and around the wetlands. They also provided their Microsoft Access database, which includes inlet and outlet maintenance issues, a list of dominant vegetation, vegetation ratings, and wetland type designations in Circular 39, Cowardin, and Eggers & Reed classification systems. The NMCWD is the LGU responsible for WCA administration for wetlands within NMCWD in the City of Eden Prairie. If the NMCWD overall wetland rating was not previously identified, the applicant is responsible for completing and submitting a MNRAM to comply with NMCWD buffer rules. NMCWD has the full suite of MNRAM functional ratings and NMCWD overall wetland rating for wetlands within previously permitted project areas.

2.3.2.3 City of Bloomington

The City of Bloomington provided their GIS wetlands database and MNRAM database from assessments completed in 2010, which includes all of the MNRAM data, individual functional ratings and the BWSR default wetland management classification for all identified wetlands in the City of Bloomington within NMCWD. The NMCWD overall wetland rating can be determined using the individual functional ratings. Bloomington is the LGU responsible for WCA administration throughout Bloomington, including wetlands within NMCWD. Beyond the WCA, the NMCWD wetland buffer requirements apply for wetlands within Bloomington when a project requires a NMCWD permit.

2.3.2.4 City of Edina

The City of Edina provided their GIS wetlands database, which includes individual functional ratings for wetlands within the City of Edina, which were determined using a modified MNRAM in 1998. Some of the MNRAM functions are not included in this inventory, however it includes all of the functions used in the NMCWD overall rating. The NMCWD is the LGU responsible for WCA administration for wetlands within NMCWD in the City of Edina. When a project requires a NMCWD permit application, the applicant typically is responsible for submitting a current MNRAM to comply with NMCWD buffer rules. NMCWD has the full suite of MNRAM functional ratings and NMCWD overall wetland rating for wetlands within previously permitted project areas.

2.3.2.5 City of Hopkins

The only wetland assessment data available for the City of Hopkins are for the wetlands within a previously permitted NMCWD project area, submitted by the applicant. The NMCWD is the LGU responsible for WCA administration for wetlands within NMCWD in the City of Hopkins. When a project requires a NMCWD permit application, the applicant typically is responsible for submitting a current MNRAM to comply with NMCWD buffer rules. NMCWD has the full suite of MNRAM functional ratings and NMCWD overall wetland rating for wetlands within previously permitted project areas.

2.3.2.6 City of Richfield

The City of Richfield Comprehensive Storm Water Management Plan has established BWSR default wetland management classification ratings for two wetlands within NMCWD. The NMCWD is the LGU responsible for WCA administration for wetlands within NMCWD in the City of Richfield. When a project requires a NMCWD permit application, the applicant typically is responsible for submitting a current MNRAM to comply with NMCWD buffer rules. NMCWD has the full suite of MNRAM functional ratings and NMCWD overall wetland rating for wetlands within previously permitted project areas.

2.4 Nine Mile Creek Watershed Wetlands Base Map

Developing a comprehensive, watershed-wide wetland inventory map with consistent database attributes was not feasible as part of this project. Currently, cities in the NMCWD use their own wetland maps and functional assessment databases with varying database attributes and regularity of maintenance. Further, each of the cities use different naming conventions to manage their data.

While the current inconsistencies in available wetland mapping and database attributes across the watershed present a significant challenge, it is important that the NMCWD have a wetland base map to reference for its wetland management efforts. To develop an up-to-date wetland base map for the Nine Mile Creek watershed, the NWI data were used as the most complete inventory available for the watershed. NWI were then compared to wetland inventory data available from the cities to identify additional wetlands and provide additional information regarding wetland type, function, and value. It should be noted that Barr staff did not complete a comprehensive update to the NWI coverage to include wetlands in the City databases that may be missing from the NWI database. This level of effort was beyond the scope of this project.

The NWI does not contain information related to the quality or functions of wetlands, so the next step was to incorporate City wetland functional assessment information into the GIS wetland layer. It should be noted that the NWI data layer may contain many GIS polygons for one MNRAM assessment area to account for the various plant community and wetland types within the MNRAM assessment area. Therefore, the GIS overlay process included a one-to-many database relation where MNRAM data were assigned to each polygon in the assessment unit. This approach maintains the detail in the NWI while adding the available functional assessment data. This overlay process allowed for creation of one watershed-wide data layer for the NMCWD that includes the NWI wetland types and boundaries, and the functional ratings provided by each city. This GIS database can be used by NMCWD staff to identify the best available information and inform future wetland evaluation and management activities within the watershed.

3 Wetland Protection and Restoration Opportunities

3.1 Introduction

The NMCWD's 2017 Water Management Plan identifies protecting and restoring high-quality wetlands within the watershed as one of the primary wetland management objectives. As a first step in moving the NMCWD toward this objective, the best available information on wetlands was compiled to gain a better understanding of the functions and values of wetlands within the Nine Mile Creek watershed (as described in Section 2). The following sections describe the additional efforts completed as part of this project to move the NMCWD toward its objective of protecting and restoring high-quality wetlands, which included this two-pronged approach:

1) **Identification of specific wetland protection and restoration opportunities** in the Nine Mile Creek watershed, with a focus on protecting or restoring the highest quality wetlands.

2) **Watershed-wide characterization of wetlands** using the best available data on wetland functions and values (MNRAM) to help guide future protection and/or enhancement efforts on a broad, city-by-city scale.

The first approach used readily available GIS coverages and local knowledge to identify and prioritize wetlands for protection and enhancement. Full field visits and MNRAM assessments were conducted on a select number of these wetlands. The second approach used the "best available" MNRAM data from the cities within the Nine Mile Creek watershed to prioritize wetlands for protection and enhancement.

3.2 Definition of High Quality Wetlands

Prioritizing wetlands for protection and enhancement is often based on a functional assessment such as MNRAM that rates the ability of a wetland to provide particular functions. Wetlands that are high quality and provide many functions are the best candidates for protection. Wetlands that have lower functional ratings may be good candidates for enhancement.

The NMCWD maintains rules to protect wetlands within the watershed (NMCWD, 2018). The Wetlands Management Rule (Rule 3.0) references MNRAM functional assessments (or an approved equivalent) to determine which wetlands are defined as "high-value" and require the highest level of protection or replacement if the NMCWD wetlands management rule is triggered. Table 3-1 outlines the functions and associated assessment ratings that result in a wetland receiving a high-value wetland designation within Rule 3.0, with a wetland being designated a "high-value" wetland if meeting one or more of the rating levels identified.

While the functional ratings identified in Table 3-1 relate specifically to the NMCWD's regulatory program, this framework provides a good starting point for identifying the high quality wetlands within the Nine Mile Creek watershed. As such, the same criteria were used to identify high quality wetlands for this study.

Table 3-1 Functional assessment ratings for high-value wetlands under NMCWD Rule 3.0.

Function or Value	Rating
Vegetative Diversity	Exceptional/High
Wildlife Habitat	Exceptional/High
Fish Habitat	Exceptional/High
Aesthetics/education/recreation/cultural AND Wildlife Habitat	Exceptional/High High/Medium
Stormwater Sensitivity AND Vegetative Diversity	Exceptional/High Medium or greater
Vegetative Diversity AND Maintenance of Hydrologic Regime	High/Medium High or greater

Table 3-2 outlines the wetland functional ratings in NMCWD's Rule 3.0 that result in the designation as a medium value wetland. Medium value wetlands are those that do not qualify as high value wetlands but that meet one or more of the rating levels in Table 3-2. These same criteria were used to identify medium quality wetlands for this study. The medium quality wetlands could be considered for enhancement opportunities.

Table 3-2 Functional assessment ratings for medium-value wetlands under NMCWD Rule 3.0.

Function or Value	Rating
Vegetative Diversity	Medium
Wildlife Habitat	Medium
Fish Habitat	Medium
Amphibian Habitat	Medium
Aesthetics/education/recreation/cultural AND Wildlife Habitat	Medium Low
Stormwater Sensitivity AND Vegetative Diversity	Medium Low
Vegetative Diversity AND Maintenance of Hydrologic Regime	Low Medium

3.3 Identification of Specific Wetland Protection and Restoration Opportunities

3.3.1 Desktop Analysis

As a first step in identifying wetland protection and restoration opportunities, Barr conducted a desktop GIS analysis using available datasets and wetland information obtained from cities within the Nine Mile Creek watershed. Table 3-3 summarizes the GIS data layers used to identify the preliminary list of opportunities. Through the desktop analysis, 40 preliminary wetland protection and restoration opportunities were identified (see Figure 3-1). The preliminary list included both wetland protection opportunities (wetlands with unique or rare native wetland community types or containing rare species within a habitat corridor) and wetland restoration opportunities (defined as potential hydrologic restoration for purposes of this study). A summary table of the 40 preliminary wetland protection and restoration opportunities is provided in Appendix A.

3.3.2 Field Assessments

Of the 40 identified wetland restoration and protection opportunities, 21 sites were selected for functional and vegetation field assessments. Selection of the 21 sites was based on further review of the available GIS data and feedback received from the NMCWD Board regarding preference toward opportunities to protect high-quality wetlands, versus the opportunities for hydrologic restoration and/or wetland bank establishment. Many of the 21 sites were identified as potential high-quality wetlands with unique or rare native wetland community types or containing rare species within a habitat corridor. There were some discrepancies between several datasets regarding the wetland community types and vegetation, so a site review was helpful to provide clarification of the current quality of these wetlands. Other selected sites were identified as having the potential for restoration within high priority areas that could enhance the habitat corridor connections and may have a link with future floodplain management efforts.

The remaining 19 of the initial 40 wetlands identified that were not field assessed in 2020 include wetlands with the potential for hydrologic restoration, potential restoration within a habitat corridor connection, and previously identified potential wetland bank sites. Field assessments of these additional sites could be considered in the future if additional hydrologic restoration opportunities are desired.

One known high-quality wetland that was not assessed as part of this project is the Glen Lake Tamarack Wetland (ID#36 in Figure 3-1), a DNR Public Water Wetland adjacent to Glen Lake in Minnetonka. Hennepin County is planning to obtain additional documentation of this wetland for the potential to incorporate it as part of the proposed Hennepin County Home School wetland bank site for Exceptional Natural Resource Value (ENRV) protection credit. Therefore, data on this wetland will be obtained during a future site visit coordinated by Hennepin County, along with the City of Minnetonka.

Table 3-3 GIS data layers used to prioritize wetlands for field evaluation of protection and restoration opportunities.

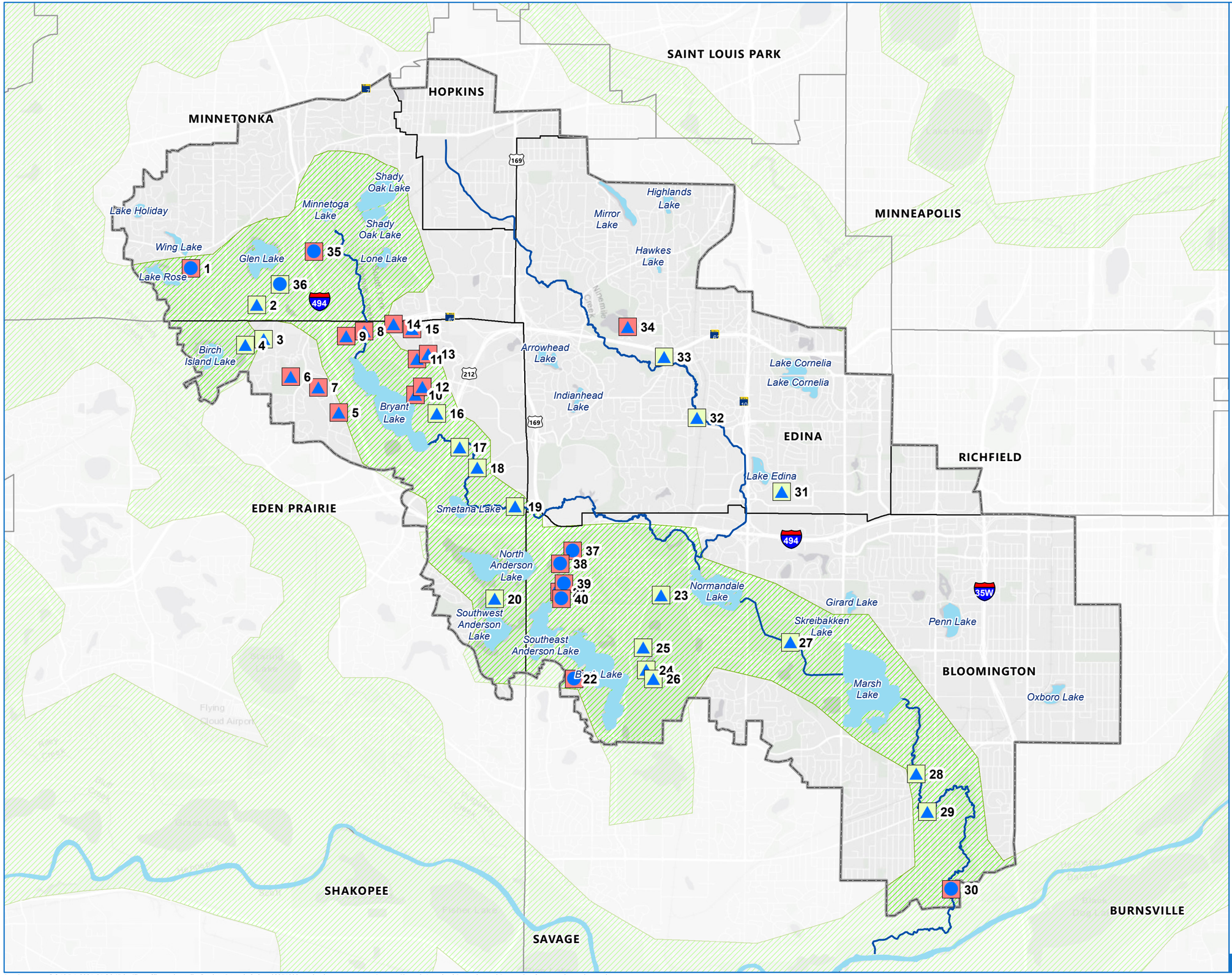
GIS Layer	Description
Soil Survey, with hydric soils identified	Hydric soil category ratings indicate the proportion of a soil survey map unit that meets the criteria for hydric soils.
Minnesota County Biological Survey (MCBS) Sites of Biodiversity Significance	This data layer represents areas with varying levels of native biodiversity that may contain high quality native plant communities, rare plants, rare animals, and/or animal aggregations. A biodiversity significance rank is assigned on the basis of the number of rare species, the quality of the native plant communities, size of the site, and context within the landscape.
Minnesota County Biological Survey (MCBS) Native Plant Communities	The MCBS identifies significant natural areas surveyed by county with data on status distribution, and ecology of plants, animals, and native plant communities used by all levels of government in natural resource planning and use decisions, including prioritization of protection of park lands and scientific and natural areas. The Minnesota Department of Natural Resources (MN DNR) Native Plant Community Classification system identifies plant communities within each ecoregion by classes, types, and subtypes based on plant species composition developed from analysis of extensive field plot data.
Minnesota Land Cover Classification System (MLCCS)	Land cover data set based on the Minnesota Land Cover Classification System coding scheme. This data was produced using a combination of aerial photograph interpretation and field surveys. There is a minimum mapping unit of 1 acre for natural vegetation and 2 acres for artificial cover types.
MN DNR Regionally Significant Ecological Areas	In 2003 the DNR Central Region conducted a landscape-scale assessment of the seven-county metro area to identify ecologically significant terrestrial and wetland areas. This assessment was based on LandSat data and aerial photo interpretation of grassland. In 2008 the DNR updated the assessment using MLCCS data.
Regional Ecological Corridors	Identification of potential ecological corridors between the MLCCS derived ecological patches. This was generated using cost / distance analysis, finding the shortest connection through the best land cover types between the patches. Natural and semi-natural areas were the preferred route, followed by agriculture land, then areas with low imperviousness (little development). Connections through developed areas were made if that was the only choice. Only patches within 5 kilometers of each other were connected.
Regional Parks	Regional park boundaries.
MN DNR Relevé Sites	The MN DNR maintains a database containing vegetation plot data collected by the relevé sampling method, which documents a list of plants in a delimited plot of vegetation with information on species cover, substrate, and other abiotic features in the plot.
MN DNR Native Plant Communities	This dataset contains results of the Minnesota County Biological Survey (MCBS), State Park land cover data, Forestry native plant community data, and Wildlife Management Areas land cover data. It includes polygons representing the highest quality native plant communities remaining in surveyed areas (typically counties). These native plant communities are important areas for conservation.
NRRI Restorable Wetland Inventory	The Minnesota Restorable Wetland Inventory uses an index developed by the University of Minnesota Natural Resources Research Institute (NRRI) in collaboration with the MN DNR. The index applies models to predict location of existing and restorable wetlands based on hydrological, geomorphological, and geological variables. The purpose of this index is to provide land managers and organization information on the location of potentially restorable wetlands.

GIS Layer	Description
Watershed Health Assessment Scores for Loss of Hydrologic Storage and Wetland Loss	These data were obtained from the MN DNR Watershed Health Assessment Framework which provides a summary of watershed-based water quality, biologic, geomorphologic, and hydrologic data for watersheds in Minnesota.
MN DNR Central Region Green Infrastructure	This is an interpretation of both functional and conceptual natural habitat corridors that link high quality natural communities both within and between counties of Central Minnesota.
MN DNR Central Region Regionally Ecological Significance	This is an analysis of regionally significant Terrestrial and Wetland Ecological Areas in the seven-county metropolitan area. Individual forest, grassland and wetland models were integrated to identify and rank the Terrestrial and Wetland Ecological Areas. The scores are determined by examining important ecological attributes of the ecological patches including size, shape, cover type diversity, and adjacent land use.
MN DNR Natural Heritage Information Systems (NHIS) Rare Natural Features	Rare Features Data are nonpublic data acquired under license from the MN DNR Division of Ecological and Water Resources. This data set provides biodiversity and conservation information with primary emphasis on species and ecological communities that are rare or otherwise imperiled for natural resource management, conservation planning, environmental review, biological and ecological research, land acquisition, and economic development.

3.3.3 Results

3.3.3.1 Wetland Protection Opportunities

Of the 21 site assessments conducted, nine of the wetlands were evaluated as high priority wetland protection opportunities (see Table 3-4). All nine were rated as high quality according to the NMCWD overall functional rating system based on the field assessment. Eight of the nine appear to be good opportunities for wetland protection activities (Figure 3-2). One of these site assessments indicated that the wetland has become degraded to the point that is it no longer a unique native community and not a high priority for protection (Tierney Quality Pond, City ID #60-13). Detailed descriptions of the nine wetlands, including site locations and photos, and wetland protection and preservation opportunities are provided in Appendix B. A summary of functional assessments for these wetlands is provided in Table 3-5Table 3-2. These wetlands are unique or have rare native wetland community types within NMCWD that should be protected and preserved to prevent degradation.



Preliminary Opportunities

- Wetland Protection. Assessed in 2020
- Wetland Restoration. Assessed in 2020
- Wetland Protection
- Wetland Restoration
- Habitat Corridor*
- Lakes
- Nine Mile Creek
- District Legal Boundary

* Central Region Green Infrastructure dataset prepared by the Mn DNR, 2008.

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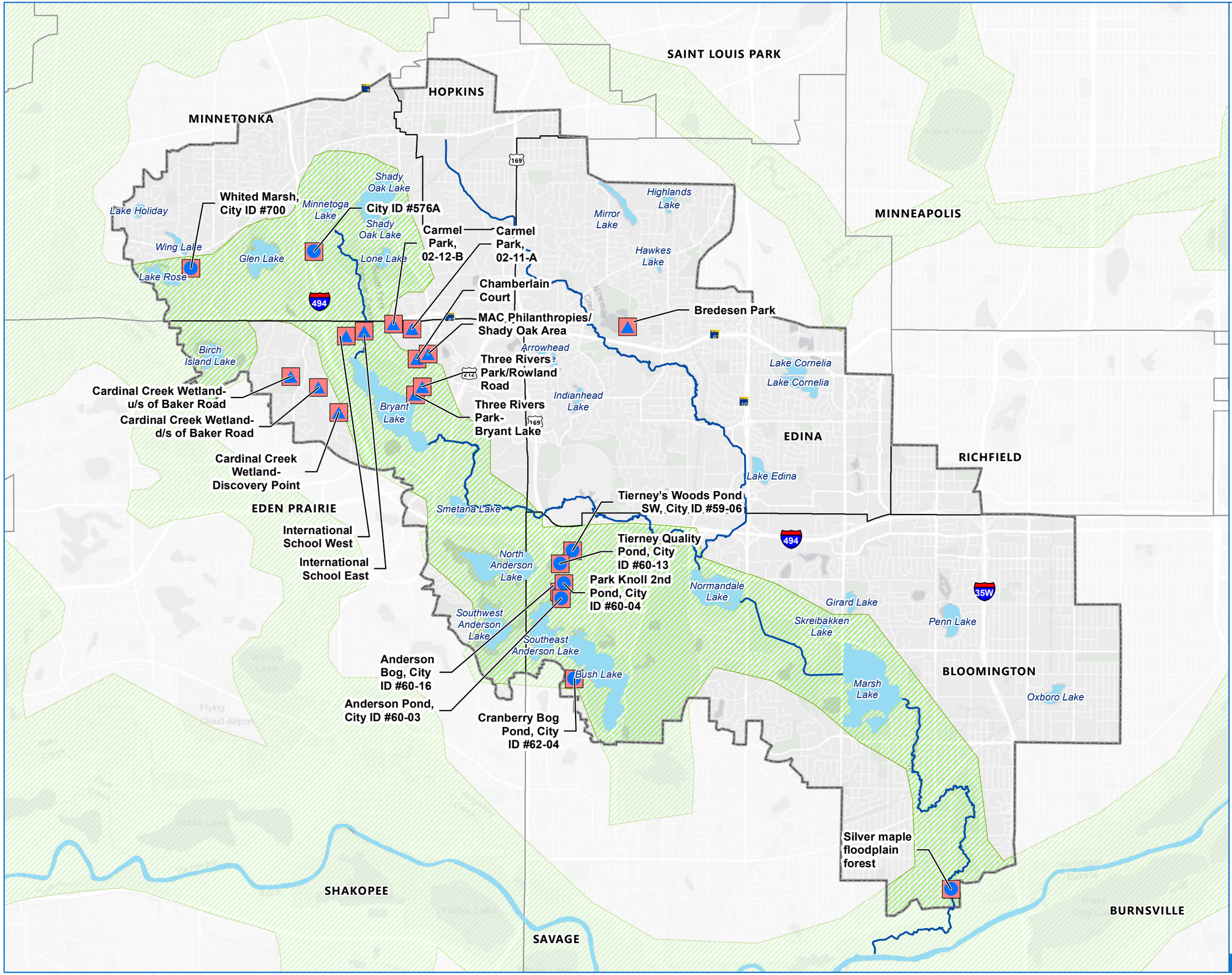
Miles

PRELIMINARY WETLAND PROTECTION AND RESTORATION OPPORTUNITIES

Figure 3-1



Wetland Protection Opportunities Assessed in 2020

- Wetland Protection
- Wetland Restoration
- Habitat Corridor*
- Lakes
- Nine Mile Creek
- District Legal Boundary

* Central Region Green Infrastructure dataset prepared by the Mn DNR, 2008.

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WETLAND PROTECTION AND RESTORATION OPPORTUNITIES ASSESSED IN 2020

Figure 3-2

Table 3-4 List of High Priority Wetlands Assessed for Wetland Protection Opportunities.

Wetland ID (Name)	Name	City	NMCWD Overall Classification Rating	Description	Protection Opportunities
27-117-22-33-013	Whited Marsh, City ID #700	Minnetonka	High	Graminoid Sphagnum Rich Fen Basin	Invasive species control, stormwater management, rain gardens and upland buffer improvements and protections
27-117-22-34-017	City ID #576A	Minnetonka	High	Graminoid Sphagnum Rich Fen Basin	Invasive species control, stormwater management, rain gardens and upland buffer protections, slope stabilization
27-116-21-19-003	Cranberry Bog Pond, City ID #62-04	Bloomington	High	Graminoid Sphagnum Rich Fen Basin	Invasive species control, stormwater management, upland buffer improvements and protections, boardwalk
27-116-21-18-008	Anderson Bog, City ID #60-16	Bloomington	High	Graminoid Sphagnum Rich Fen Basin	Preservation and protection of high quality wetland
27-116-21-18-007	Anderson Pond, City ID #60-03	Bloomington	High	Sedge meadow	Invasive species control, preservation and protection of high quality wetland
27-116-21-18-010	Park Knoll 2nd Pond, City ID #60-04	Bloomington	High	Sedge meadow	Invasive species control, preservation and protection of high quality wetland
27-116-21-18-014	Tierney Quality Pond, City ID #60-13	Bloomington	High	Previous sedge meadow excavated for storm pond	None, degraded due to development pressures and stormwater management practices
27-116-21-18-020	Tierney's Woods Pond SW, City ID #59-06	Bloomington	High	Sedge meadow/shallow marsh	Invasive species control, stormwater pre-treatment, prevent further degradation
27-027-24-28-003	Silver maple floodplain forest	Bloomington	High	Silver maple floodplain forest	Trail and streambank stabilization, invasive species control

Table 3-5 Site Assessment Functional Results for High Priority Wetlands Assessed for Wetland Protection Opportunities

Wetland ID (Name)	City	Maintenance of Characteristic Hydrologic Regime	Maintenance of Characteristic Wildlife Habitat Structure	Maintenance of Characteristic Fish Habitat	Aesthetics/ Recreation/ Education/ Cultural	Wetland Sensitivity to Stormwater and Urban Development	Weighted Average Vegetative Diversity and Integrity Rating by Community Proportion	NMCWD Overall Classification Rating
27-117-22-33-013	Minnetonka	Moderate	Moderate	Moderate	Moderate	Exceptional	Moderate	High
27-117-22-34-017	Minnetonka	Moderate	Moderate	Moderate	Moderate	Exceptional	Moderate	High
27-116-21-19-003	Bloomington	High	High	Moderate	High	Exceptional	High	High
27-116-21-18-008	Bloomington	High	Exceptional	Not Applicable	High	High	Exceptional	High
27-116-21-18-007	Bloomington	High	Exceptional	Not Applicable	High	Exceptional	Exceptional	High
27-116-21-18-010	Bloomington	High	Exceptional	Not Applicable	High	Exceptional	Exceptional	High
27-116-21-18-014	Bloomington	Moderate	Exceptional	Low	High	Moderate	Low	High
27-116-21-18-020	Bloomington	Moderate	Moderate	Not Applicable	Moderate	Exceptional	High	High
27-027-24-28-003	Bloomington	High	Exceptional	Exceptional	High	Exceptional	Low	High

3.3.3.2 Potential Hydrologic Restoration Areas

Wetland restoration entails re-establishment of an area as wetland that was historically wetland and is no longer wetland or remains as a degraded wetland, with the goal of restoring the wetland to pre-settlement hydrologic conditions. Hydrologic restoration activities can include breaking drain tile lines, plugging ditches, adjusting outlet elevations, discontinuing groundwater pumping, diking, berming, and minimal excavation or grading. Of the 21 site assessments conducted, 12 of the wetlands were evaluated based on the potential for hydrologic restoration of wetlands that have been filled, drained, or partially drained (see Figure 3-2). Table 3-6 summarizes the wetlands that were evaluated in 2020 for restoration potential. Eleven of the 12 evaluated appear to be good opportunities for hydrologic restoration activities. One of the sites has potential for flooding of adjacent residential properties (Cardinal Creek Wetland d/s of Baker Road, Wetland 27-116-22-03-003), so restoration isn't likely to be practical. Detailed descriptions, site locations and photos of each of the evaluated wetland restoration opportunities are provided in Appendix C.

Table 3-7 provides a summary of functional assessment results for the 12 wetlands evaluated for hydrologic restoration. Seven of the 12 wetlands were rated as high quality according to the NMCWD overall function rating system and five were rated as medium quality.

Prioritization of hydrologic restoration opportunities should be further evaluated using the functional ratings from the site assessments, in conjunction with other information such as the NMCWD's flood risk mapping and land ownership information. Urban hydrologic restoration is a challenging endeavor due to pressures from the surrounding development and invasive vegetation. In addition, the methods of hydrologic restoration within urban areas often require significant effort and can be more complex than typical hydrologic restoration methods used in rural agricultural areas. An initial identification of willing landownership partners and prioritization of desirable functional goals should be conducted for each area prior to further evaluating and prioritizing hydrologic restoration opportunities.

Table 3-6 List of Potential Opportunities in Wetlands Assessed for Hydrologic Restoration.

Wetland ID	Name, City ID	NMCWD Overall Classification Rating	City	Description
27-117-21-32-008	Bredesen Park, B5-04	High	Edina	Stormwater pre-treatment, channel stabilization or meandering to reduce erosion, increase flood storage, block or alter ditches, invasive vegetation management
27-116-22-02-005	Cardinal Creek Wetland-Discovery Point, 02-33-A	High	Eden Prairie	Vegetation rehabilitation, invasive vegetation management, increase vegetative diversity, adjust outlet control structure
27-116-22-03-005	Cardinal Creek Wetland-u/s of Baker Road, 03-31-A	High	Eden Prairie	Partnering with landowner, removing fill material, sediment removal, restoring hydrology to drained and partially drained portions of wetland
27-116-22-03-003	Cardinal Creek Wetland-d/s of Baker Road, 03-41-A	Medium	Eden Prairie	Hydrologic restoration of this partially drained wetland may not be practical without flooding adjacent residential properties.
27-116-22-02-033	International School- East, 02-21-A	Medium	Eden Prairie	Partner with International School. Disable old drain tile, stormwater pre-treatment, stream bank stabilization, invasive species control
27-116-22-02-032	International School- West, 02-22-A	High	Eden Prairie	Partner with International School. Remove ditches, raise outlet, disable old drain tile, stormwater pre-treatment, stream bank stabilization, invasive species control
27-116-22-02-004	Three Rivers Park- Bryant Lake, 02-44-B	High	Eden Prairie	Partner with Three Rivers Park District. Adjust outlet from wetland to north to restore hydrology and control invasive species.
27-116-22-02-018	Chamberlain Court, 02-14-A	High	Eden Prairie	Partner with City of Eden Prairie's culvert improvement project for restoration opportunities. Flood concerns with adjacent residential properties.
27-116-22-02-009	Three Rivers Park/Rowland Road, 02-41-A	Medium	Eden Prairie	Partner with Three Rivers Park District. Disable old drain tile if present.
27-116-22-02-016	MAC Philanthropies/Shady Oak Area, 02-14-B	High	Eden Prairie	Partner with MAC Philanthropies. Potential for additional flood storage. Invasive species control. Improve vegetative diversity.
27-116-22-02-024	Carmel Park, 02-12-B	Medium	Eden Prairie	Partner with City of Eden Prairie. Sediment removal, stormwater management, pre-treatment, increase naturalized upland buffer, invasive species control.
27-116-22-02-027	Carmel Park, 02-11-A	Medium	Eden Prairie	Partner with City of Eden Prairie. Sediment removal, stormwater management, pre-treatment, increase naturalized upland buffer, invasive species control.

Table 3-7 Site Assessment Functional Results for Wetlands Assessed for Hydrologic Restoration.

Wetland ID	Name, City ID	Maintenance of Characteristic Hydrologic Regime	Maintenance of Characteristic Wildlife Habitat Structure	Maintenance of Characteristic Fish Habitat	Aesthetics/ Recreation/ Education/ Cultural	Wetland Sensitivity to Stormwater and Urban Development	Weighted Average Vegetative Diversity and Integrity Rating	NMCWD Overall Classification Rating
27-117-21-32-008	Bredesen Park, B5-04	Low	Moderate	Moderate	High	Moderate	Low	High
27-116-22-02-005	Cardinal Creek Wetland- Discovery Point, 02-33-A	Moderate	Moderate	Moderate	High	Moderate	Low	High
27-116-22-03-005	Cardinal Creek Wetland- U/S of Baker Road, 03-31-A	Moderate	Moderate	Moderate	High	Moderate	Moderate	High
27-116-22-03-003	Cardinal Creek Wetland- d/s of Baker Road, 03-41-A	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Medium
27-116-22-02-033	International School- East, 02-21-A	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Medium
27-116-22-02-032	International School- West, 02-22-A	Moderate	Moderate	Low	High	Moderate	Low	High
27-116-22-02-004	Three Rivers Park- Bryant Lake, 02-44-B	Moderate	Moderate	Not Applicable	High	Moderate	Low	High
27-116-22-02-018	Chamberlain Court, 02-14-A	High	Moderate	Moderate	High	Moderate	Low	High
27-116-22-02-009	Three Rivers Park/Rowland Road, 02-41-A	Moderate	Moderate	Not Applicable	Moderate	Moderate	Low	Medium
27-116-22-02-016	MAC Philanthropies/Shady Oak Area, 02-14-B	High	Moderate	Moderate	High	Moderate	Low	High
27-116-22-02-024	Carmel Park, 02-12-B	High	Moderate	Moderate	Moderate	Moderate	Low	Medium
27-116-22-02-027	Carmel Park, 02-11-A	Moderate	Moderate	Not Applicable	Moderate	Moderate	Low	Medium

3.4 Watershed-wide Characterization of Wetlands

Another objective of this project was to develop a watershed-wide characterization of wetlands using the best available data on wetland functions and values (MNRAM) to help guide future protection and/or enhancement efforts on a broad, city-by-city scale. Wetlands that are high quality and provide many functions are the best candidates for protection and enhancement. To help identify these wetlands, wetland conditions in the Nine Mile Creek watershed were evaluated using available MNRAM data from the cities to estimate their current conditions. Even though the cities' MNRAM assessment data varies in age and extent, these assessments currently represent the best available data for the wetlands in the watershed. Since each of the cities has varied extents and type of information, the characterization schemes were tailored to the available data. The schemes were based on the NMCWD's wetland rules (see Section 3.2) as it pertains to using wetland functions or values to define high- or medium- value wetlands, where possible given the available data, to be consistent with current regulatory approaches. Ultimately, these data describe our best understanding of current wetland conditions in the Nine Mile Creek watershed and which wetlands may need protection or enhancement.

Numerous wetland characterization schemes could be employed to identify high-priority wetlands based on the desired wetland restoration approach. For example, the NMCWD could evaluate the role of wetlands in providing watershed habitat by summarizing habitat and vegetative conditions (MNRAM results) in designated wildlife corridors. For the purposes of this project, simple rules were developed to characterize wetland conditions based on the framework for defining high- or medium-value wetlands in the NMCWD rules. It should be noted that the some of the cities maintain other information in their databases that could be useful for the NMCWD. For example, the City of Eden Prairie periodically evaluates wetland vegetation and maintains data regarding invasive species. These data were not used in this evaluation but are available for staff review in the wetland base map.

Cities with similar MNRAM data sets were grouped in the following sections for the purpose of characterizing high- and medium-quality wetlands. For example, data from the cities of Edina and Bloomington included results for all of the functions assessed in MNRAM while the City of Minnetonka and the City of Richfield only provided BWSR overall classifications.

3.4.1 City of Edina and Bloomington

Fifty-three percent of the wetland acreage in the Nine Mile Creek watershed is in the cities of Edina and Bloomington. These two cities provided the most comprehensive MNRAM functional data sets allowing for a more detailed characterization approach. For wetlands in these two cities, ratings for each of the five wetland functions identified in the NMCWD's Rule 3.0, Appendix 3b for designating high-value wetlands were used to categorize the wetlands. Wetlands were categorized as "High Quality- Protection" or "Medium Quality- Enhancement" based on functional ratings as outlined in Table 3-8 through Table 3-10.

Table 3-8 Wetland functional ratings used to categorize wetlands as High Quality- Protection wetlands or Medium Quality- Enhancement Opportunity wetlands in Edina and Bloomington.

Function	Approach	Rating	Category
Vegetation Diversity	MNRAM Vegetation	Exceptional/High	High Quality- Protection
		Medium	Medium Quality- Enhancement
Wildlife/Fish Habitat	MNRAM Wildlife Habitat MNRAM Fish Habitat	Exceptional/High Habitat	High Quality- Protection
		Exceptional/High	High Quality- Protection
		Medium Vegetation in Corridor	Medium Quality- Enhancement
Cultural/Recreation/ Education	MNRAM Cultural MNRAM Wildlife	Exceptional/High and Wildlife Habitat Exceptional/High/Medium	High Quality- Protection
		Medium	Medium Quality- Enhancement
Stormwater Sensitivity	MNRAM Stormwater Sensitivity MNRAM Vegetation	Sensitivity Exceptional/High and Vegetation Medium or greater	High Quality- Protection
Maintenance of Hydrologic Regime	MNRAM Hydrologic Regime MNRAM Vegetation	Vegetation Medium or greater and Hydrologic Regime High or greater	High Quality- Protection

Most of the wetlands in the City of Edina had functional rating data with only 85 acres unassessed (Table 3-9). For fish and amphibian habitat, many of the unassessed wetlands were because these wetlands were not conducive to provide those habitats. Vegetative conditions in Edina's wetlands are generally degraded with over 231 palustrine acres with moderate vegetation conditions that might be good opportunities for enhancement.

Table 3-9 Priority categorization for wetlands in the City of Edina.

MNRAM Function	Type[2]	High Quality-Protection (acres)	Medium Quality-Enhancement (Acres)	Low Quality (acres)	Not Assessed[1]
Vegetation Diversity	Palustrine Wetland	11	231	298	85
	Lacustrine Lake	21	45	32	0
Wildlife Habitat	Palustrine Wetland	163	258	119	85
	Lacustrine Lake	21	45	32	0
Fish Habitat	Palustrine Wetland	154	82	93	296
	Lacustrine Lake	21	77	0	0
Amphibian Habitat	Palustrine Wetland	0	0	110	514
	Lacustrine Lake	0	0	0	98
Cultural/Resource/Education	Palustrine Wetland	149	258	133	85
	Lacustrine Lake	66	0	32	0
Stormwater Sensitivity	Palustrine Wetland	2	0	538	85
	Lacustrine Lake	0	0	98	0
Maintenance of Hydrologic Regime	Palustrine Wetland	8	0	532	85
	Lacustrine Lake	0	0	98	0

[1] Not all wetlands are assessed for fish and amphibian habitat even if other MNRAM procedures are completed.

[2] Lakes were removed from the NWI database by removing all lacustrine classifications. The areas were not adjusted to reflect District lake boundaries used for management.

For Bloomington, the majority of the wetlands were assessed with MNRAM. The bulk of high-quality ratings were in the cultural and education functional category, as well as Wildlife habitat (Table 3-10). Over 40% of the wetlands had high quality vegetation conditions.

Table 3-10 Priority categorization for wetlands in the City of Bloomington.

MNRAM Function	Type[2]	High Quality-Protection (acres)	Medium Quality-Enhancement (Acres)	Low Quality (acres)	N/A[1]
Vegetation Diversity	Palustrine Wetland	421	128	234	239
	Lacustrine Lake	1	271	84	0
Wildlife Habitat	Palustrine Wetland	497	401	21	103
	Lacustrine Lake	103	252	0	0
Fish Habitat	Palustrine Wetland	125	696	28	174
	Lacustrine Lake	272	32	0	52
Amphibian Habitat	Palustrine Wetland	84	450	242	247
	Lacustrine Lake	0	0	304	52
Cultural/Resource/Education	Palustrine Wetland	585	304	30	103
	Lacustrine Lake	304	52	0	0
Stormwater Sensitivity	Palustrine Wetland	179	0	740	103
	Lacustrine Lake	168	0	187	0
Maintenance of Hydrologic Regime	Palustrine Wetland	501	0	418	103
	Lacustrine Lake	272	0	84	0

[1] Not all wetlands are assessed for fish and amphibian habitat even if other MNRAM procedures are completed.

[2] Lakes were removed from the NWI database by removing all lacustrine classifications. The areas were not adjusted to reflect District lake boundaries used for management.

3.4.2 City of Eden Prairie

Twenty-eight percent of the wetland acreage in the Nine Mile Creek watershed is in Eden Prairie. The City of Eden Prairie primarily maintains vegetation information about their wetlands for use in management and protection. In addition to the MNRAM data ratings, the City maintains data on invasive species, vegetation community types, and rare or threatened species. These data can be used to evaluate restoration on a case-by-case basis or more broadly as the NMCWD desires. For example, if the NMCWD wanted to avoid protection or restoration opportunities in wetlands infested by reed canary grass because of the difficulty in management, the wetlands could be sorted to exclude all wetlands with reed canary grass infestation.

Since Eden Prairie relies on the vegetation rating and only maintains that aspect in their MNRAM database, wetlands were categorized for protection or enhancement using the MNRAM vegetation rating (Table 3-11). It should be noted that the City of Eden Prairie database maintains several records for each wetland mapped as a single polygon if the wetland has several communities. It was beyond the scope of this project to sort each of these records according to the NWI database. However, all of the records are

available in the Nine Mile Creek wetlands base map. For the purposes of this preliminary categorization, the average vegetation rating in the Eden Prairie database was generally used to categorize the wetlands.

Table 3-11 Characterization scheme used to categorize wetlands as High Quality- Protection or Medium Quality- Enhancement Opportunity wetlands in Eden Prairie.

Function	Approach	Rating[1]	Category
Vegetation Diversity	MNRAM Vegetation Rating	Exceptional/High	High Quality- Protection
		Medium	Medium Quality- Enhancement

[1] The City of Eden Prairie wetland database includes several records for each wetland mapped as a single polygon if the wetland has several communities. For the purposes of this preliminary categorization, the average vegetation rating in the Eden Prairie database was generally used to categorize the wetlands.

Nearly 90 percent of the palustrine wetlands in Eden Prairie were assessed or had data for the vegetation community, with 45 acres in the high quality- protection category and 397 acres with moderate vegetation conditions that might be good opportunities for enhancement (Table 3-12).

Table 3-12 Priority categorization for wetlands in the City of Eden Prairie.

MNRAM Function	Type[1]	High Quality- Protection (acres)	Medium Quality- Enhancement (acres)	Low Quality (acres)	N/A (acres)
Vegetation Diversity	Palustrine Wetland	45	397	232	86
	Lacustrine Lake	0	170	0	177

[1] Lakes were removed from the NWI database by removing all lacustrine classifications. The areas were not adjusted to reflect District lake boundaries used for management.

3.4.3 City of Minnetonka and Richfield

Just under seventeen percent of the wetland acreage in the Nine Mile Creek watershed is in Minnetonka and Richfield. Both cities currently maintain just the overall wetland classification developed from the MNRAM assessment in their GIS database, versus ratings for individual wetland functions. The overall classifications were used to categorize the wetlands in Minnetonka and Richfield as "High Quality- Protection" or "Medium Quality- Enhancement Opportunity" (Table 3-13).

Table 3-13 Wetland classifications used to categorize wetlands as High Quality- Protection wetlands or Medium Quality Enhancement Opportunity wetlands in Minnetonka and Richfield.

Classification	Category	Description
Preserve	High Quality- Protection	Maintain wetland and existing functions, values and wildlife habitat. Possible need for active management of wetland to protect unique features. Apply strict avoidance standards. May be appropriate to develop a conservation easement.
Manage 1	Medium Quality- Enhancement	Maintain wetland without degrading existing functions, values and wildlife habitat.
Manage 2	Low Value	Maintain wetland footprint. Improve wetland biological and plant community diversity/integrity or enhance other functions if possible.

Only 22 acres in the City of Minnetonka were categorized in the High Quality- Protection category, based on field assessments conducted as part of this project and the Preserve designation in the City of Minnetonka's wetland management classification system. 347 acres of wetland in Minnetonka (including lacustrine areas) were categorized as medium quality opportunities for enhancement (Table 3-14). Because the overall classifications take into account all of the wetland functions, it's not surprising that most fall in the medium quality enhancement category.

No wetlands in the City of Richfield were categorized as High Quality- Protection or Medium Quality- Enhancement Opportunity wetlands (Table 3-14).

Table 3-14 Priority categorizations for wetlands in the City of Minnetonka and Richfield

City	Type[2]	High Quality-Protection[3] (acres)	Medium Quality-Enhancement[3] (Acres)	Low Quality (acres)	N/A[1] (acres)
Minnetonka	Palustrine Wetland	22	292	205	67
	Lacustrine Lake	0	55	76	
Richfield	Palustrine Wetland	0	0	8	
	Lacustrine Lake	0	0	0	

[1] Not all wetlands are assessed for fish and amphibian habitat even if other MNRAM procedures are completed.

[2] Lakes were removed from the NWI database by removing all lacustrine classifications. The areas were not adjusted to reflect District lake boundaries used for management.

[3] Wetland characterizations were developed using full MNRAM data if available. If MNRAM was not available, overall wetland classification was used.

4 Summary and Recommendations

4.1 Introduction

Wetlands are a key feature in the Nine Mile Creek watershed with over 3,960 acres of wetlands representing approximately 12 percent of the watershed. Many of these wetlands occur in large complexes of various vegetation communities providing a multitude of wetland functions including biodiversity, habitat, flood control and other watershed services. Developing an understanding of their functions on both an individual and watershed scale provides managers the ability to prioritize limited resources for enhancement, develop policies to protect high quality wetlands, and to ensure that critical ecosystem services and wetland functions are maximized.

A primary purpose of this project was to take a first step in understanding the quality and functions of wetlands in the Nine Mile Creek watershed using the best available data. Another key purpose of this project was to identify wetland protection and restoration opportunities in the Nine Mile Creek watershed, with a focus on high quality wetlands.

4.2 Wetland Base Map

The majority of data for wetlands in the Nine Mile Creek watershed is managed by the cities in the watershed and needed to be combined into one watershed map and database. However, each of the cities maintains different levels of information and uses their own GIS data layer for the wetlands in their city. To support watershed-level wetland management, a wetland base map was created to combine municipal data with the NWI data layer using multiple GIS overlays and a one-to-many database relation. The new data layers contains overall wetland information for each polygon in the NWI data and links to city-maintained data. The data layers provide flexibility in managing wetlands in the watershed on an individual and watershed or subwatershed basis. The creation of this database was a necessary first step in understanding wetland functioning on a watershed level.

While this project represents a first step in identifying wetlands for protection and enhancement, the watershed wetlands base map (and associated data layers) can be used to further assess wetlands as needed. For example, if the NMCWD were interested in identifying wetlands for education opportunities, the GIS wetland data layers could be used to identify high quality wetlands in parks or on public property. If the NMCWD wanted to develop an understanding of wildlife habitat, the GIS wetland data layers could be used to identify wetlands in defined wildlife corridors. While the City MNRAM databases are often based on older data or not included the GIS data layers, the watershed wetlands GIS layer could be updated with new information, as available, to provide these answers.

4.2.1 Data and Wetland Base Map Management

The Nine Mile Creek wetland base map represents an opportunity to manage wetland data on a watershed basis and provide a central location for information from multiple agencies. However, workflows need to be developed to ensure the map gets updated routinely as new information is generated by multiple agencies. For example, workflows could address updating wetland boundaries as

new delineations are completed or updating functional assessments completed as part of a permitting process. Data from national or state efforts could be included such as floristic quality assessments conducted by the MPCA or assessments completed as a part of the National Wetland Condition Assessment program implemented by the USEPA. The base map could also be linked to other data sources such as the Wetland Health Evaluation Program (WHEP) to provide all the information about the wetlands in one location. This data layer could also be used in the field through an online GIS portal to put all of the information at a wetland managers fingertips.

4.2.2 Functional Wetland Assessment

The current information of wetland functions and conditions is based on MNRAM and is incomplete for many of the wetlands in the NMCWD. Further, MNRAM is no longer supported by BWSR who is currently pursuing an updated approach for wetland functional assessments. There are numerous models and approaches being developed in the upper Midwest that might be applicable. Because much of the wetland functional data are outdated and a new approach will be developed in the next few years, Barr does not recommend a heavy investment in organizing more detailed MNRAM data. Rather, Barr recommends using the easily accessible MNRAM assessments and other data collected by cities and other agencies in the short term while working with BWSR to develop the new approach. Participation in the development of the new wetland functional assessment approach will help ensure that NMCWD concerns and issues are addressed and the tool advances the NMCWD's ability manage and understand wetlands in the watershed.

4.2.3 Wetland Management Framework

Finally, the NMCWD should consider developing a wetland management framework that supports a watershed view of wetlands and wetland functions. The framework could include wetland management to support wildlife, wetland hydrology and influence on flood control, or the role of wetlands in maintaining water quality in the watershed. The NMCWD's rules regarding wetlands are a first step in developing this framework as it highlights functions important to the NMCWD. A framework could allow for NMCWD to look at wetlands more broadly and determine their functions as group. For example, a wetland management framework may determine goals for 75% of the wetlands to provide wildlife habitat with 90% of the wetlands in wildlife corridors having a high rating. Once these goals are established, the inventory and functional assessment can be used to quantitatively determine progress toward the goals and identify opportunities to enhance wetlands or policies to meet the goals.

4.3 Priority Wetlands for Protection and Enhancement

A two-pronged approach was used to identify wetlands for protection and enhancement in the Nine Mile Creek watershed. The first approach used local knowledge and readily-available GIS information to identify special wetlands for protection and key wetlands for enhancement. Over 40 wetlands were identified and 21 were assessed in the field. These wetlands generally represent high quality wetlands with the greatest need for protection or wetlands with the greatest enhancement opportunities. The second approach used the best available wetland functional assessment data to characterize wetland functions on a watershed basis and identify the highest quality wetlands for protection or enhancement. Since each of

the cities has varied extents and type of information, the characterization schemes were tailored to the available data.

4.3.1 High Quality Wetland Protection Opportunities

Of the 21 wetlands field assessed, eight were determined to be high quality wetland protection opportunities (Table 4-1; Figure 3-2). Possible management activities include invasive species control, stormwater management to control the rate, volume and quality of water draining to the wetland, and buffer improvements. All of these wetlands have special plant communities and institutional measures could be considered such as conservation easements or other special protections. Several of the wetlands also represent good educational opportunities such as trails and signage.

Table 4-1 High priority wetland protection opportunities in the Nine Mile Creek watershed.

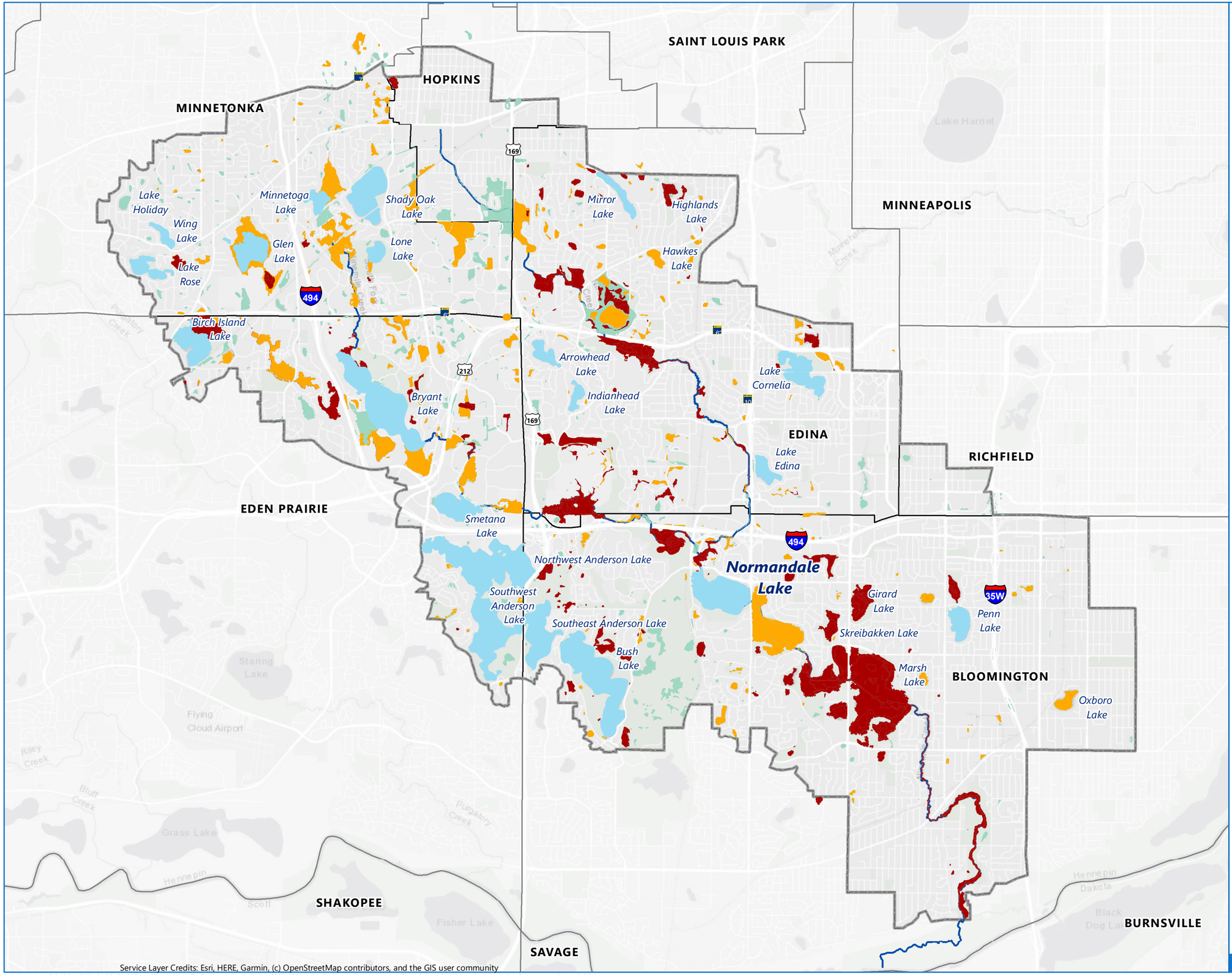
Wetland ID	Name/Location	Description	Protection Opportunities	Descriptions
27-117-22-33-013	Whited Marsh, Minnetonka	Graminoid Sphagnum Rich Fen Basin	• Invasive species control • Stormwater management • Rain gardens • Upland buffer improvements and protections	Coordinate with MN DNR for invasive species control including: Pull, treat, and/or increase beetles for purple loosestrife management. Consider cattail management. Coordinate with Hennepin County to remove buckthorn in tax forfeit property and install rain garden or other suitable stormwater pre-treatment options. Partner with surrounding landowners to install raingardens or other suitable stormwater pre-treatment options. Incorporate native species in upland buffer establishment to provide beneficial pollinator habitat for the federally endangered rusty-patched bumble bee
27-117-22-34-017	City ID #576A, Minnetonka	Graminoid Sphagnum Rich Fen Basin	• Invasive species control • Stormwater management • Rain gardens • Upland buffer protections • Slope stabilization	Partner with surrounding landowners including MN DOT, business owner, and townhome association for invasive species control, stormwater management, rain gardens, upland buffer protections, and slope stabilization.
27-116-21-19-003	Cranberry Bog Pond, Bloomington	Graminoid Sphagnum Rich Fen Basin	• Invasive species control • Stormwater management • Upland buffer improvements and protections boardwalk	Partner with City of Bloomington and surrounding landowners for invasive species control, stormwater management, upland buffer improvements and protections. Consider boardwalk and educational opportunities.
27-116-21-18-008	Anderson Bog, Bloomington	Graminoid Sphagnum Rich Fen Basin	• Institutional wetland protections	Consider educational opportunities. Partner with City of Bloomington for buckthorn removal in Tierney's Woods
27-116-21-18-007	Anderson Pond, Bloomington	Sedge meadow	• Invasive species control • Institutional wetland protections	Partner with City of Bloomington for buckthorn removal in Tierney's Woods.
27-116-21-18-010	Park Knoll 2nd Pond, Bloomington	Sedge meadow	• Invasive species control • Institutional wetland protections	Preserve and protect this high-quality wetland. Partner with City of Bloomington for buckthorn removal in Tierney's Woods.
27-116-21-18-020	Tierney's Woods Pond SW, Bloomington	Sedge meadow/shallow marsh	• Invasive species control • Stormwater pre-treatment • Institutional wetland protections	Partner with landowner to pull few purple loosestrife plants ASAP. Consider stormwater pre-treatment measures to prevent further degradation of this high-quality native wetland community.
27-027-24-28-003	Silver maple floodplain forest, Bloomington	Silver maple floodplain forest	• Invasive species control • Trail and streambank stabilization	Trail and streambank stabilization, invasive species control- coordinate community events for spring garlic mustard pull and fall buckthorn removal and education.

In addition to the wetland protection opportunities identified in the desktop and field analysis, available MNRAM data was used to characterize wetlands in each city with regard to high quality protection opportunities. The NMCWD's Wetlands Management Rule (Rule 3.0) references MNRAM functional assessments (or an approved equivalent) to determine which wetlands are defined as "high-value" or "medium-value" as it pertains to the level of protection or replacement required if the NMCWD wetlands management rule is triggered. As presented previously in Tables 3-1 and 3-2, certain functional ratings (or combinations thereof) result in a wetland being defined as "high-value" or "medium-value". While these functional ratings relate specifically to the NMCWD's regulatory program, this framework provides a good starting point for identifying the highest quality wetlands within the Nine Mile Creek watershed.

The NMCWD Rule 3.0 wetland definition criteria were used as a basis to identify potential high quality wetlands for protection, where sufficient data was available. Where MNRAM functional data was not available, wetland characterization schemes tailored by city were used (see Section 3.4). Table 4-2 summarizes the acreage of potential high quality protection wetlands for each city. Just over 71% of the wetlands in Bloomington were categorized as high quality protection opportunities. Most of these wetlands (889 acres) were ranked high because of a high rating for the cultural and education opportunity function. However, almost 31% had high vegetative ratings and 44% had high wildlife habitat ratings. Many of the wetlands in Bloomington are in parks or in the stream corridor, likely increasing their values. More than half of Edina's wetlands were categorized as high quality protection opportunities, however only 32 acres were high quality vegetation communities. Most of Edina's high rankings were for fish and wildlife habitat. Only 22 of the 650 acres of wetlands in the Minnetonka portion of the Nine Mile Creek watershed were characterized as high quality protection wetlands. This may be a result of the limited data available electronically pertaining to individual functional ratings, as opposed to a reflection of the current quality of the wetlands.

Table 4-2 Summary of characterization of high quality protection and medium quality enhancement opportunities in the Nine Mile Creek watershed.

Overall Characterization	Edina	Bloomington	Eden Prairie	Minnetonka	Richfield	Hopkins
High Quality- Protection (Acres)	378	980	434	22	0	6
Medium Quality- Enhancement Opportunity (Acres)	234	294	313	347	0	4
Low Quality or N/A (Acres)	111	103	360	281	8	93
TOTAL	723	1378	1107	650	8	102



NMCWD Wetland Characterization*

- High Quality- Protection
- Medium Quality- Enhancement
- Other Wetlands
- Lakes
- Nine Mile Creek
- District Legal Boundary

*The extent, level of detail, and age of the available data varied by city. Results of the wetland characterization should not be used for regulatory purposes and should be considered preliminary.

0 1 2
Miles

WETLAND CHARACTERIZATION: PROTECTION AND ENHANCEMENT OPPORTUNITY WETLANDS

Figure 4-1

Service Layer Credits: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Barr Footer: ArcGIS 10.7.1, 2021-01-06 13:46 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23271809_Wetland_Inventory\Maps\Reports\Figure 3-1 WetlandProtectionRestoration Opportun.mxd User: jmk2

4.3.2 Wetland Enhancement Opportunities

Of the 21 wetlands field assessed as part of this project, 12 wetlands were evaluated based on the potential for hydrologic restoration of wetlands that have been filled, drained, or partially drained, 11 of which were preliminarily determined to be good opportunities for hydrologic restoration activities (Table 4-3, Figure 3-2). Restoration opportunities for these wetlands primarily include hydrologic restoration and invasive species control with the potential for water quality improvements, vegetative diversity, flood storage, and upland buffer protections.

In addition to the wetland enhancement opportunities identified in the desktop and field analysis, available MNRAM data was used to characterize wetlands in each city that are medium quality and may have good potential for enhancement. The NMCWD Rule 3.0 wetland definition criteria were used as a basis to identify medium quality wetlands for potential improvement. Since each of the cities has varied extents and type of functional assessment information, the wetland characterization schemes were tailored based on the available data (see Section 3.4). The potential medium quality wetlands for consideration as enhancement opportunities are summarized for each city in Table 4-2 and shown in Figure 4-1). Minnetonka had the largest wetland area identified for enhancement (347 acres) followed by Bloomington, Eden Prairie, and Edina. It should be noted that Eden Prairie only provided data for 45% of their wetlands.

4.3.3 Wetland protection and enhancement projects

As a result of an initial review to identify critical wetlands, approximately 20 wetlands were identified for protection or enhancement based on special characteristics of the wetland or their location in the watershed. Each of these wetlands were visited in the field to verify the special conditions and opportunities for enhancement. These wetlands represent good opportunities for further protection or enhancement. Additionally, the remaining wetlands were assessed using the best available MNRAM data from each city. The results of this assessment highlight those wetlands that are a high protection opportunity or high enhancement opportunity using the approach for determining medium- or high-value wetlands based on functional ratings in NMCWD's rules as a basis.

Next steps for these wetlands may include:

- Pursuing partnerships with landowners to conduct wetland restoration and/or protection activities
- Establishing incentive programs for landowners to encourage protection and/or enhancement of the high-priority wetland areas
- Developing education and volunteer programs focused on protection and/or enhancement of the high-priority wetland areas

Table 4-3 List of Potential Opportunities in Wetlands Assessed for Hydrologic Restoration

Wetland ID	Name/Location	City ID	Description
27-117-21-32-008	Bredesen Park, Edina	B5-04	• Stormwater pre-treatment • Channel stabilization or meandering to reduce erosion • Increase flood storage • Block or alter ditches • Invasive vegetation management
27-116-22-02-005	Cardinal Creek Wetland-Discovery Point, Eden Prairie	02-33-A	• Vegetation rehabilitation • Invasive vegetation management • Increase vegetative diversity • Adjust outlet control structure
27-116-22-03-005	Cardinal Creek Wetland- u/s of Baker Road, Eden Prairie	03-31-A	• Partnering with landowner • Removing fill material, sediment removal • Restoring hydrology to drained and partially drained portions of wetland
27-116-22-02-033	International School- East, Eden Prairie	02-21-A	• Partner with International School • Disable old drain tile • Stormwater pre-treatment • Stream bank stabilization • Invasive species control
27-116-22-02-032	International School- West, Eden Prairie	02-22-A	• Partner with International School • Remove ditches, disable old drain tile • Raise outlet • Stormwater pre-treatment • Stream bank stabilization • Invasive species control
27-116-22-02-004	Three Rivers Park- Bryant Lake, Eden Prairie	02-44-B	• Partner with Three Rivers Park District • Outlet from wetland to north to restore hydrology and control invasive species.
27-116-22-02-018	Chamberlain Court, Eden Prairie	02-14-A	• Partner with City of Eden Prairie's culvert improvement project for restoration opportunities. • Flood concerns with adjacent residential properties.
27-116-22-02-009	Three Rivers Park/Rowland Road, Eden Prairie	02-41-A	• Partner with Three Rivers Park District • Disable old drain tile if present
27-116-22-02-016	MAC Philanthropies/Shady Oak Area, Eden Prairie	02-14-B	• Partner with MAC Philanthropies • Potential for additional flood storage • Invasive species control • Improve vegetative diversity
27-116-22-02-024	Carmel Park, Eden Prairie	02-12-B	• Partner with City of Eden Prairie • Sediment removal • Stormwater management, including pretreatment • Increase naturalized upland buffer • Invasive species control
27-116-22-02-027	Carmel Park, Eden Prairie	02-11-A	• Partner with City of Eden Prairie • Sediment removal • Stormwater management, including pretreatment • Increase naturalized upland buffer • Invasive species control

5 References

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Barr Engineering Co., Nine Mile Creek Watershed District Water Management Plan. October 2017.

Millennium Ecosystem Assessment Project. 2003. *Ecosystems and Human Well-being: A Framework for Assessment*. Island Press. ISBN: 9781559634038

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Appendices

Appendix A

Table of Preliminary Wetland Protection and Restoration Opportunities

Summary of preliminary wetland protection and restoration opportunities identified through desktop study.

ID (Figure 3-1 Label)	Name	Opportunity Type	Assessed in 2020	Initial Opportunity	Location
1	Whited Marsh, City ID #700	Protection	yes	protection/restoration of high quality wetland	rich fen or bog in Minnetonka
2	Glen Lake Wetland Bank Site	Restoration	no	Glen Lake Wetland Bank Site	Glen Lake
3	-	Restoration	no	degraded wetland	between Glen Lake and Cardinal Creek wetlands
4	-	Restoration	no	degraded wetland	between Glen Lake and Cardinal Creek wetlands
5	Cardinal Creek Wetland- Discovery Point	Restoration	yes	potential hydrologic restoration and protection	Cardinal Creek wetland adjacent to Discovery Point
6	Cardinal Creek Wetland- u/s of Baker Road	Restoration	yes	potential hydrologic restoration	Cardinal Creek wetlands
7	Cardinal Creek Wetland- d/s of Baker Road	Restoration	yes	potential hydrologic restoration	Cardinal Creek wetlands
8	International School East	Restoration	yes	potential hydrologic restoration	Bryant Lake area
9	International School West	Restoration	yes	potential hydrologic restoration	Bryant Lake area
10	Three Rivers Park-Bryant Lake	Restoration	yes	potential hydrologic restoration	Bryant Lake area
11	Chamberlain Court	Restoration	yes	potential hydrologic restoration	Bryant Lake area
12	Three Rivers Park/Rowland Road	Restoration	yes	potential hydrologic restoration	Bryant Lake area
13	MAC Philanthropies/Shady Oak Area	Restoration	yes	potential hydrologic restoration	Bryant Lake area
14	Carmel Park, 02-12-B	Restoration	yes	potential hydrologic restoration	Bryant Lake area
15	Carmel Park, 02-11-A	Restoration	yes	potential hydrologic restoration	Bryant Lake area
16	-	Restoration	no	potential hydrologic restoration	between Bryant Lake and Anderson Lakes

17	-	Restoration	no	potential hydrologic restoration	between Bryant Lake and Anderson Lakes
18	-	Restoration	no	potential hydrologic restoration	between Bryant Lake and Anderson Lakes
19	-	Restoration	no	potential hydrologic restoration	between Bryant Lake and Anderson Lakes
20	-	Restoration	no	potential hydrologic restoration	Anderson Lakes area
21	Anderson Bog, City ID #60-16	Protection	yes	protection/restoration of high quality wetland	rich fen in Tierney's Woods
22	Cranberry Bog Pond, City ID #62-04	Protection	yes	protection/restoration of high quality wetland	rich fen near Bush Lake
23	-	Restoration	no	potential hydrologic restoration	between Bush Lake and Normandale Lake
24	-	Restoration	no	potential hydrologic restoration	between Bush Lake and Normandale Lake
25	-	Restoration	no	potential hydrologic restoration	between Bush Lake and Normandale Lake
26	-	Restoration	no	potential hydrologic restoration	between Bush Lake and Normandale Lake
27	-	Restoration	no	potential protection and hydrologic restoration	between Nordmyr and Marsh Lake
28	-	Restoration	no	potential restoration/habitat corridor connection	between Marsh Lake and Minnesota River
29	-	Restoration	no	potential restoration/habitat corridor connection	between Marsh Lake and Minnesota River
30	Silver maple floodplain forest	Protection	yes	potential restoration/habitat corridor connection	between Marsh Lake and Minnesota River
31	-	Restoration	no	potential wetland bank	former Fred Richards Golf Course
32		Restoration	no	potential restoration/habitat corridor connection	between Bredesen Park and Lake Edina
33		Restoration	no	potential restoration/habitat corridor connection	between Bredesen Park and Lake Edina
34	Bredesen Park	Restoration	yes	potential restoration	Bredesen Park

35	City ID #576A	Protection	yes	protection/restoration of high quality wetland	rich fen or bog in Minnetonka
36	Glen Lake Tamarack Wetland	Protection	no	protection/restoration of high quality wetland	tamarack wetland adjacent to Glen Lake
37	Tierney's Woods Pond SW, City ID #59-06	Protection	yes	protection/restoration of high quality wetland	bog or wet meadow floating mat in Tierney's Woods
38	Tierney Quality Pond, City ID #60-13	Protection	yes	protection/restoration of high quality wetland	sedge meadow in Tierney's Woods
39	Park Knoll 2nd Pond, City ID #60-04	Protection	yes	protection/restoration of high quality wetland	sedge meadow in Tierney's Woods
40	Anderson Pond, City ID #60-03	Protection	yes	protection/restoration of high quality wetland	sedge meadow in Tierney's Woods

Appendix B

Summaries of Wetland Protection Opportunities

Appendix B

Summaries of Wetland Protection Opportunities

Wetland ID 27-117-22-33-013 (Whited Marsh)

Wetland ID 27-117-22-33-013 is located in the City of Minnetonka within a residential neighborhood south of Excelsior Blvd to the east of Lake Rose. The City of Minnetonka refers to this wetland as Whited Marsh Wetland ID #700 and it has been designated by the MN DNR as Public Water Wetland ID 27078300W. It is a High-value wetland under NMCWD rules due to an exceptional rating for sensitivity to stormwater and urban development and a moderate weighted average vegetative diversity and integrity rating. The NWI identifies this as a Type 8 (PSS3/EM1Bq) bog. Using the MN DNR Native Plant Community (NPC) classification system, this wetland would have a designation of OPn92b Graminoid Sphagnum Rich Fen (Basin), which is uncommon within the developed metropolitan area.

The majority of this wetland consists of a floating mat of Sphagnum (*Sphagnum sp*.) moss dominated with native plant species including large cranberry (*Vaccinium macrocarpon*), tamarack (*Larix laricina*), steeplebush (*Spireaea tomentosa*), paper birch (*Betula papyrifera*), and fen wiregrass sedge (*Carex lasiocarpa*). Sphagnum (peat) moss is a very spongy moss capable of holding 16-26 times its weight in water. It can create an acidic environment in which only specialized plants are able to survive such as the sundew (*Drosera rotundifolia*), which is a carnivorous plant with sticky glands on the leaves that capture insects for nutrients. Other native species present in this wetland include cotton grass (*Eriophorum sp*.), bog birch (*Betula pumila*), pussy willow (*Salix discolor*), least duckweed (*Lemna minor*), jewelweed (*Impatiens capensis*), clearweed (*Pilea pumila*), lake sedge (*Carex lacustris*), woolgrass (*Scirpus cyperinus*), red osier dogwood (*Cornus alba*), meadow willow (*Salix petiolaris*), marsh fern (*Thelepteris palustris*), St. John's wort (*Hypericum sp*.), white pine (*Pinus strobus*), red pine (*Pinus resinosa*), willowherb (*Epilobium ciliatis*), hummock sedge (*Carex stricta*), rice cut grass (*Leersia oryzoides*), purple marshlocks (*Comarum palustre*), poison sumac (*Toxicodendron vernix*), lake sedge (*Carex lacustris*), and Canadian rush (*Juncus canadensis*).

Vegetation Enhancement Recommendations

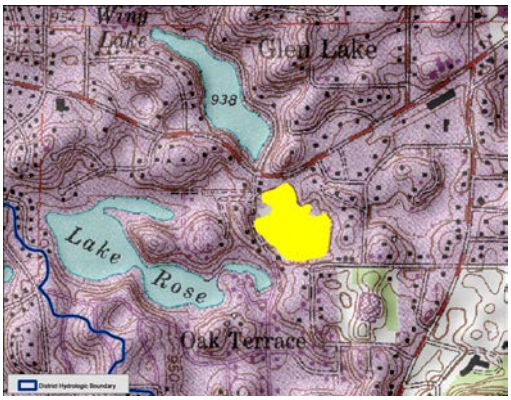
Purple loosestrife (*Lythrum salicaria*), narrowleaf cattail (*Typha angustifolia*), and glossy buckthorn (*Frangula alnus*) are non-native and invasive species located primarily along the outer edges of this wetland. The south and east edge of the wetland are dominated by cattail and the northwest corner is dominated by purple loosestrife. Control of these species is recommended to prevent further encroachment into the high quality central portion of this wetland. The City of Minnetonka has previously released beetles to control purple loosestrife. The beetle population should be re-evaluated to determine whether a re-release may be helpful. Purple loosestrife can also be pulled or treated, though since this is a Public Water Wetland, a MN DNR permit may be required for vegetation removal. A storm pond located at the northeastern corner of this wetland is dominated by cattails, which may be a contributing seed source for the cattails growing within the eastern portion of the wetland.

Protection Recommendations

This wetland is a special feature within the NMCWD and should be preserved and protected. Protection measures may include encouraging surrounding residents to install rain gardens through matching grants programs and other stormwater management and pre-treatment activities surrounding the wetland.

The upland buffer area surrounding this wetland includes non-native invasive common buckthorn, especially in the Hennepin County tax forfeited land at the northwest corner of wetland (PID 3311722240028). The NMCWD could partner with Hennepin County to conduct buckthorn removal and install a rain garden on this property. Native species incorporated into rain gardens and other native upland buffer establishment could provide beneficial pollinator habitat for the federally endangered rusty-patched bumble bee, which has been documented in the vicinity of this wetland.

Aerial view of wetland.



Wetland location, USGS quadrangle map.

Tamarack, cotton grass, and fen wiregrass sedge.

Rich fen with floating Sphagnum moss mat.

Cranberry plants emerging from Sphagnum moss.

Cranberry and sedges.

Wetland ID 27-117-22-34-017 (City ID #576A)

Wetland ID 27-117-22-34-017 is located in the City of Minnetonka just east of Interstate 494 and west of Rowland Road. The wetland is situated on privately owned land with a town home and a business property. The City of Minnetonka identifies this as Wetland ID #576A. It is a High-value wetland under NMCWD rules due to an exceptional rating for sensitivity to stormwater and urban development and a moderate weighted average vegetative diversity and integrity rating. The NWI identifies this as a Type 8 (PSS3Bq) bog. Using the MN DNR NPC classification system, this wetland would have a designation of OPn92b Graminoid Sphagnum Rich Fen (Basin), which is uncommon within the developed metropolitan area.

The majority of this wetland consists of a floating mat of Sphagnum moss dominated with native plant species including large cranberry, poison sumac, lake sedge, paper birch, and steeplebush. Other native species present in this wetland include, fen wiregrass sedge, purple marshlocks, marsh fern, hummock sedge, black spruce (*Picea mariana*), watermeal (*Wolfia columbiana*), least duckweed, violet (*Viola sp*.), meadow willow, bedstraw (*Galium sp*.), St. John's wort, broad leaf cattail, beggarticks (*Bidens sp.),* and tufted loosestrife (*Lysimachia thyrsiflora*).

Vegetation Enhancement and Wetland Protection Recommendations

Non-native invasive species within the wetland include purple loosestrife, narrowleaf cattail, and glossy buckthorn. Control of these species is recommended to prevent further degradation of this unique wetland community surrounded by pressures from extensive land disturbance.

This wetland is a special feature within the NMCWD and should be preserved and protected. Protection measures can include installation of rain gardens and other stormwater management and pre-treatment activities surrounding the wetland. Additional native buffer establishment and stormwater management protections between Interstate 494 and the wetland may provide protection from salt, sediment, and other transportation related contaminants.

The upland buffer area at the southern end of the wetland is a steeply sloped oak forest. Removal of non-native common buckthorn within this forested buffer would be beneficial for wildlife. Several areas along this steep slope are eroded, which may contribute undesirable sediment into the wetland. Potential wetland protection opportunities upslope of the southern edge of the wetland may include partnering with the adjacent business owner to provide slope stabilization and rain gardens or trenches at the edge of the parking lot on the top of the slope. Additional partnering with the townhome association located east of the wetland could include installation of rain gardens or other appropriate stormwater management features.

Aerial view of wetland.

Wetland location, USGS quadrangle map.

Open water moat surrounding floating mat.

Floating Sphagnum moss mat with poison sumac

Stunted black spruce.

Floating Sphagnum moss mat with sedges.

Wetland ID 27-116-21-19-003 (Cranberry Bog Pond)

Wetland ID 27-116-21-19-003 is located in the City of Bloomington west of Bush Lake adjacent to West Bush Lake Road. The majority of the wetland is situated on privately owned land surrounded by residential properties, with the exception of the eastern edge, which is City of Bloomington property. The City of Bloomington identifies this as Cranberry Bog Pond Wetland ID #62-04 and it has been designated by the MN DNR as Public Water Wetland ID 27101900W named Cranberry Bog. It is a High-value wetland under NMCWD rules due to high ratings for hydrologic regime, wildlife habitat, aesthetic/recreation/education, sensitivity to stormwater and urban development, and an exceptional vegetative and integrity rating. Similarly, the wetland is designated as Preserve under Bloomington's wetland management classification system. The NWI identifies this as a Type 8 (PSS/EM1Bq) bog. It is listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of OPn92b Graminoid Sphagnum Rich Fen (Basin), which is uncommon within the developed metropolitan area. Vegetation data were collected for a DNR Relevé plot within this wetland in 2004 and 2014.

The majority of this wetland consists of a floating mat of Sphagnum and two other non-Sphagnum mosses dominated with native plant species including large cranberry, rannoch rush (*Scheuchzeria palustris*), marsh fern, paper birch, and steeplebush. Other native species present in this wetland include, sundew, fen wiregrass sedge, purple marshlocks, arrow-leaved tearthumb (*Persicaria sagittata*), American bugleweed (*Lycopus americanus*), jewelweed, muhly grass (*Muhlenbergia sp.*) black spruce, clearweed, boneset (*Eupatorium perfoliatum*), Joe pyeweed (*Eutrochium maculatum*), flat topped aster (*Doellingeria umbellata*), violet (*Viola sp.*), pussy willow, heart leaved willow (*Salix eriocephala*), bog willow (*Salix pedicellaris*), Bebb's willow (*Salix bebbiana*), bog St. John's wort (*Triadenum fraseri*), cotton grass, arrowhead (*Sagittaria latifolia*), bog bean (*Menyanthes trifoliata*), interrupted fern (*Osmunda claytoniana*), woolgrass, river bulrush (*Bolboschoenus fluviatillis*), bog willow (*Salix pedicellaris*), meadow willow, red maple (*Acer rubrum*), bog birch, willowherb (*Epilobium coloratum* and *Epilobium leptophyllum*), red pine, white pine, rush (*Juncus sp.*), least duckweed, watermeal, blue flag iris (*Iris versicolor*), ivy-leaf duckweed (*Lemna trisulca*), broad leaf cattail, chokeberry (*Aronia melanocarpa*), red osier dogwood, nodding burr-marigold (*Bidens cernua),* lake sedge, fowl bluegrass (*Poa palustris*), three-way sedge (*Dulichium arundinaceum*), and tufted loosestrife.

Vegetation Enhancement and Wetland Protection Recommendations

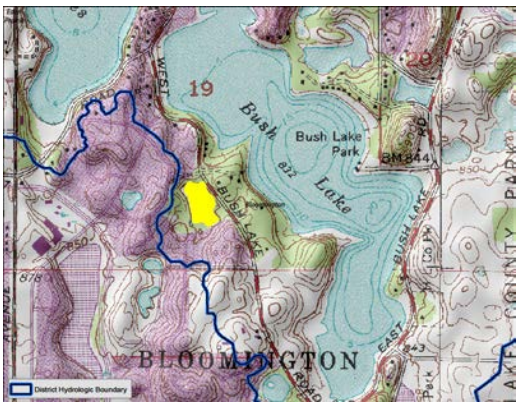
Non-native invasive species within the wetland include reed canary grass (*Phalaris arundinacea*), purple loosestrife, and narrowleaf cattail. Control of these species is recommended to prevent degradation of this unique wetland community.

Wood ducks and mallards were observed within the wetland during the site assessment. This wetland is a special feature within the NMCWD and should be preserved and protected. Of primary importance is pre-treatment stormwater management which may include installation of rain gardens in the residential properties and other stormwater management measures adjacent to West Bush Lake Road. Additional native buffer establishment and stormwater management protections may provide protection from salt, sediment, and other inputs from West Bush Lake Road. Residents appear to value and appreciate this natural resource and have been working on their own to remove buckthorn and provide natural buffer protection. An open water moat surrounds the wetland, making it difficult to access, except during frozen

conditions. Consideration could be given to construction of a boardwalk to provide wetland access with educational signage documenting the unique vegetation. The wetland is separated by West Bush Lake Road from Bush Lake Park, however, coordinated efforts with the city and residents may be beneficial if wetland access is desired. If a boardwalk access is desired, careful planning is crucial to encourage education and appreciation while preventing additional human disturbance of this valuable resource.

Portions of forested upland buffer are dominated by common buckthorn. Removal of non-native common buckthorn within this forested buffer would be beneficial for wildlife. Potential wetland protection opportunities may include partnering with the residential landowners for rain garden installation and buckthorn removal and partnering with the City of Bloomington for installation of other appropriate stormwater management features.

Aerial view of wetland.



Wetland location, USGS quadrangle map.

Sedge dominated area with non-Sphagnum moss.

Floating Sphagnum moss mat with cranberries

Sphagnum moss with bog bean and cranberry plants.

Sphagnum moss with Rannoch rush.

Wetland ID 27-116-21-18-008 (Anderson Bog in Tierney's Woods)

Wetland ID 27-116-21-18-008 is located in the City of Bloomington within city owned Tierney's Woods Park. Tierney's Woods area is located within a high ecological score area of a MN DNR Central Region Regionally Significant Area. The City of Bloomington identifies this wetland as Anderson Bog Wetland ID #60-16. It is a High-value wetland under NMCWD rules due to high ratings for hydrologic regime, wildlife habitat, aesthetics/recreation/education, and wetland sensitivity to stormwater and urban development, and an exceptional vegetative diversity and integrity rating. Similarly, it is rated as Preserve under Bloomington's wetland management classification system. The NWI identifies this wetland as a Type 3 (PEM1C) shallow marsh. It is listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of OPn92b Graminoid Sphagnum Rich Fen (Basin), with a high biodiversity significance ranking. The surrounding upland red oak-white oak forest of Tierney's Woods is also listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of MHs37 southern dry-mesic oak forest with a high biodiversity significance ranking and an S3 vulnerable to extirpation rank. Vegetation data were collected for a DNR Relevé plot within this wetland in 1997 and 2014.

This wetland is comprised of a floating mat of Sphagnum moss dominated with native plant species including fen wiregrass sedge, three-way sedge, marsh fern, lake sedge, tall manna grass (*Glyceria grandis*), and woolgrass. Other native species present in this wetland include, common spikerush (*Eleocharis palustris*), Virginia bugleweed (*Lycopus virginicus*), arrow-leaved tearthumb, bublet-bearing water hemlock (*Cicuta bulbifera*), stiff marsh bedstraw (*Galium tinctorium*), tufted loosestrife, arrowhead, marsh skullcap (*Scutellaria galericulata*), bog St. John's wort, least duckweed, nodding burr-marigold, and nodding smartweed (*Persicaria lapathifolia*).

Wetland Protection Recommendations

Reed canary grass is the only invasive species identified within this wetland, which is present along the outer fringe. Control of these species is recommended to prevent degradation of this unique wetland community. Common buckthorn is present within the forested upland community. Buckthorn removal could improve wildlife habitat for the area. Some buckthorn removal has been completed previously within this park, though new growth of seedlings are regenerating.

This wetland is a special feature within the NMCWD which should be preserved and protected. Access to the area is through dirt paths within Tierney's Woods Park, allowing for appreciation of the natural surroundings with minimal disturbance. Efforts to encourage educational opportunities within this wetland should be carefully weighed against the potential for human disturbance.

Aerial view of wetland.

Wetland location, USGS quadrangle map.

Lake sedge dominated area.

Three-way sedge.

Wetland overview.

Lake sedge, fen wiregrass sedge, three-way sedge, and tall manna grass.

Wetland ID 27-116-21-18-007 (Anderson Pond in Tierney's Woods)

Wetland ID 27-116-21-18-007 is located in the City of Bloomington within city owned Tierney's Woods Park. Tierney's Woods area is located within a high ecological score area of a MN DNR Central Region Regionally Significant Area. The City of Bloomington identifies this wetland as Anderson Pond Wetland ID #60-03. It is a High-value wetland under NMCWD rules due to high ratings for hydrologic regime and aesthetics/recreation/education, and exceptional ratings for wildlife habitat, wetland sensitivity to stormwater and urban development, and vegetative diversity and integrity. Similarly, it is rated as Preserve under Bloomington's wetland management classification system. The NWI identifies this wetland as a Type 3 (PEM1C) shallow marsh. It is listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of WMn82b sedge meadow, with a high biodiversity significance ranking. The surrounding upland red oak-white oak forest of Tierney's Woods is also listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of MHs37 southern dry-mesic oak forest with a high biodiversity significance ranking and an S3 vulnerable to extirpation rank.

This wetland has a non-floating, non-Sphagnum moss base and is dominated with native plant species including three-way sedge, lake sedge, arrow-leaved tearthumb, and woolgrass. Other native species present in this wetland include Virginia bugleweed, nodding burr-marigold, blue flag iris, and arrowhead.

Wetland Protection Recommendations

Reed canary grass is the only invasive species identified within this wetland, which is present along the outer fringe. Control of these species is recommended to prevent degradation of this unique wetland community. Common buckthorn is present within the forested upland community. Buckthorn removal could improve wildlife habitat for the area. Some buckthorn removal has been completed previously within this park, though new growth of seedlings are regenerating.

This is a high quality wetland within the NMCWD which should be preserved and protected. Access to the area is through dirt paths within Tierney's Woods Park, allowing for appreciation of the natural surroundings with minimal disturbance.

Aerial view of wetland.

Wetland location, USGS quadrangle map.

Lake sedge.

Lake sedge and woolgrass.

Common buckthorn seedlings at upland edge.

Wetland overview.

Wetland ID 27-116-21-18-010 (Park Knoll 2nd Pond in Tierney's Woods)

Wetland ID 27-116-21-18-010 is located in the City of Bloomington within city owned Tierney's Woods Park. Tierney's Woods area is located within a high ecological score area of a MN DNR Central Region Regionally Significant Area. The City of Bloomington identifies this wetland as Park Knoll 2nd Pond Wetland ID #60-04. It is a High-value wetland under NMCWD rules due to high ratings for hydrologic regime and aesthetics/recreation/education, and exceptional ratings for wildlife habitat, wetland sensitivity to stormwater and urban development, and vegetative diversity and integrity. Similarly, it is rated as Preserve under Bloomington's wetland management classification system. The NWI identifies this wetland as a Type 3 (PEM1C) shallow marsh. It is listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of WMn82b sedge meadow, with a high biodiversity significance ranking. The surrounding upland red oak-white oak forest of Tierney's Woods is also listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of MHs37 southern dry-mesic oak forest with a high biodiversity significance ranking and an S3 vulnerable to extirpation rank.

This wetland appears to have flooded in 2020 in comparison with previous years. On October 9, 2020, the wetland was inundated with up to 12 inches of standing water and was dominated with native river bulrush. Other native vegetation within the wetland included lake sedge, nodding bur-marigold, and arrow-leaved tearthumb. The previous invasive reed canary grass was flooded out.

Wetland Protection Recommendations

This wetland is a high quality wetland within the NMCWD which should be preserved and protected. Access to the area is through dirt paths within Tierney's Woods Park, allowing for appreciation of the natural surroundings with minimal disturbance. Common buckthorn is present within the forested upland community. Buckthorn removal could improve wildlife habitat for the area. Some buckthorn removal has been completed previously within this park, though new growth of seedlings are regenerating.

Aerial view of wetland (2020 imagery).

Wetland location, USGS quadrangle map.

 **Aerial view of wetland (2018 imagery).**	 **Flooded wetland conditions in 2020.**

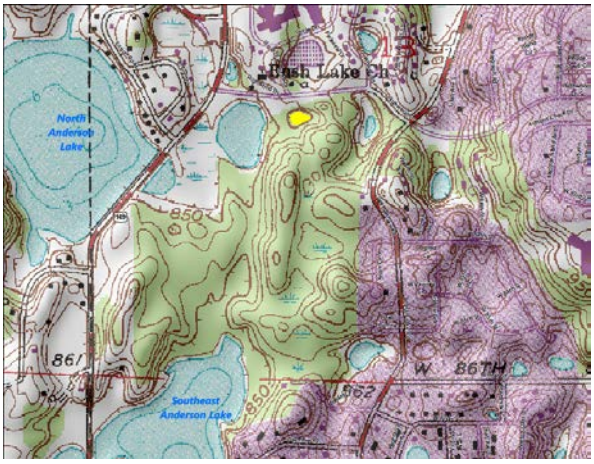
Wetland ID 27-116-21-18-014 (Tierney Quality Pond)

Wetland ID 27-116-21-18-014 is located in the City of Bloomington within city owned Tierney's Woods Park. Tierney's Woods area is located within a high ecological score area of a MN DNR Central Region Regionally Significant Area. The City of Bloomington identifies this wetland as Tierney Quality Pond Wetland ID #60-13. It is a High-value wetland under NMCWD rules due to exceptional wildlife habitat. It is rated as Preserve under Bloomington's wetland management classification system. The NWI identifies this wetland as a Type 5 (PUBGx) excavated shallow open water community. It is listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of WMn82b sedge meadow (in 1996), with a high biodiversity significance ranking. The surrounding upland red oak-white oak forest of Tierney's Woods is also listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of MHs37 southern dry-mesic oak forest with a high biodiversity significance ranking and an S3 vulnerable to extirpation rank.

This wetland has been excavated for use as a storm pond with a defined inlet pipe. It was inundated with several feet of water during the 2020 site assessment with floating duckweed and watermeal at the surface. It receives significant nutrient and trash inputs from surrounding development.

The change of wetland type over time from a sedge meadow in 1996 to the current use of this wetland as a storm pond is an example of a previously high quality wetland that has become degraded over time due to due to development pressures and stormwater management practices. This can be a warning to avoid the same fate to the other wetlands described in this report which still retain diverse high quality native vegetation and pre-settlement characteristics.

Aerial view of wetland (2020 imagery).



Wetland location, USGS quadrangle map.

Open water wetland with floating duckweed and watermeal.

Adjacent upland buffer in Tierney's Woods.

Wetland ID 27-116-21-18-020 (Tierney's Woods Pond SW)

Wetland ID 27-116-21-18-020 is located in the City of Bloomington within a residential area north of Tierney's Woods Park off of Tierney's Woods Road. The City of Bloomington identifies this wetland as Tierney's Woods Pond SW ID #59-06. It is a High-value wetland under NMCWD rules due to a high rating for vegetative diversity and integrity and exceptional sensitivity to stormwater and urban development. The NWI identifies this wetland as a Type 8/4 (PEM1Bq/PABG) bog/deep marsh.

This wetland has a floating, non-Sphagnum moss base and is dominated with native plant species including lake sedge, nodding burr-marigold, woolgrass, and water plantain (*Alisma subcordatum*). Other native species present in this wetland include common duckweed, Virginia bugleweed, marsh fern, rice cut grass, and arrow-leaved tearthumb. Snapping turtles and muskrats are known to be present within this wetland.

Wetland Protection Recommendations

Non-native and invasive species within the wetland include minor amounts of reed canary grass and purple loosestrife. The few purple loosestrife plants should be pulled to prevent further spread.

This is a high quality wetland within the NMCWD which should be preserved and protected. It is currently utilized as a storm pond with piped inlets and a sediment plume at the inlet location. The landowner to the north is very appreciative of the wetland and could be a valuable partner in protection efforts. Stormwater pre-treatment measures are recommended to prevent further degradation of this wetland.

Aerial view of wetland.

Wetland location, USGS quadrangle map.

 **Lake sedge and woolgrass.**	 **Inlet pipe.**
 **Wetland overview.**	 **Muck soils and downed trees provide wildlife habitat.**

Wetland ID 27-027-24-28-003 (Silver Maple Floodplain Forest)

Wetland ID 27-027-24-28-003 is the silver maple floodplain forest area along Nine Mile Creek located in the City of Bloomington between Marsh Lake and the Minnesota River. The wetland is in an outstanding ecological score area of a MN DNR Central Region Regionally Significant Area. It is a High-value wetland under NMCWD rules due to high ratings for hydrologic regime and aesthetic/recreation/education and exceptional ratings for wildlife, fish habitat, and wetland sensitivity to stormwater. A trail along Nine Mile Creek provides recreational opportunity for aesthetic appreciation of this area. Floodplain wetlands in this area provide valuable downstream water quality flood protection. This area may also provide habitat for the state threatened Blanding's turtles (*Emydoidea blandingii*). The NWI identifies this wetland as a Type 1 (PFO1A) hardwood wetland. It is listed in the Minnesota Biological Survey as a Native Plant Community with the MN DNR NPC classification system designation of FFs68a Silver Maple (Virginia Creeper) Floodplain Forest, with a high biodiversity significance ranking and an S3 vulnerable to extirpation rank. Vegetation data were collected for a DNR Relevé plot within this floodplain wetland outside of the NMCWD hydrologic boundaries in 1997 and 2014.

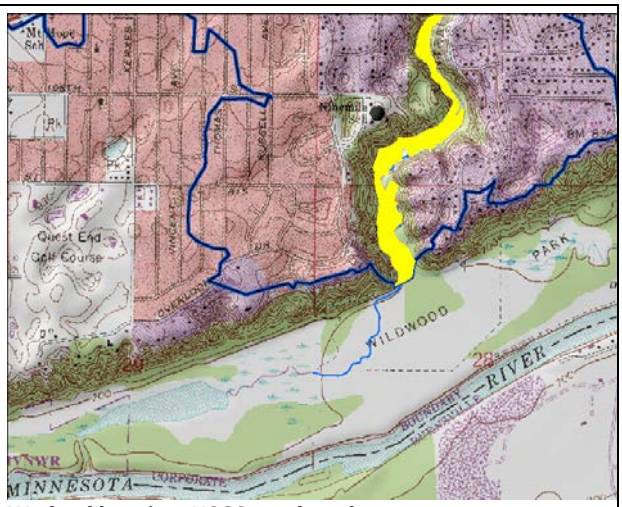
Native plant species within this wetland include silver maple (*Acer saccharinum*), green ash (*Fraxinus pennsylvanica*), cottonwood (*Populus deltoides*), black willow (*Salix nigra*), red elm (*Ulmus rubra*), riverbank grape (*Vitis riparia*), flat-topped aster, small-spike false nettle (*Boehmeria cylindrica*), wood nettle (*Laportea canadensis*), wild geranium (*Geranium maculatum*), jewelweed (*Impatiens capensis*), red raspberry (*Rubus idaeus*), sticktight (*Hackelia virginiana*), clearweed (*Pilea pumila*), stinging nettle (*Urtica dioica*), smartweed (*Persicaria amphibia*), scouring rush (*Equisetum hyemale*), rice cut grass, Virgina creeper (*Parthenocissus quinquefolia*), and Virginia waterleaf (*Hydrophyllum virginianum*).

Non-native and invasive species include: garlic mustard (*Allaria petiolaria*), ground ivy (*Glechoma hederacea*), common buckthorn, reed canary grass, and amur maple (Acer ginnala).

Wetland Protection Recommendations

Significant streambank restoration has previously been conducted in this area. Currently portions of the trail are eroding into Nine Mile Creek and there are additional areas of streambank erosion which could be stabilized. Educational events along with springtime garlic mustard pulls and fall buckthorn removal events could be organized to engage community members who routinely use the trails in this area.

Aerial view of wetland.



Wetland location, USGS quadrangle map.

Appendix C

Summaries of Hydrologic Restoration Opportunities

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Summaries of Hydrologic Restoration Opportunities

Wetland 27-117-21-32-008 Bredesen Park in Edina

The NWI identifies this wetland area in Edina's Bredesen Park as partially ditched or drained and was identified as having the potential for hydrologic restoration. This wetland is a series of ponded areas with fringes of cattails and areas with saturated soils. The ponded areas have a fringe of non-native cattails in shallow water. Saturated soil areas are mostly open and dominated by non-native reed canary grass with some shrubs and trees. Some wooded areas have cottonwood, boxelder, green ash, and common buckthorn and are likely saturated or have shallow inundation for short periods each year, though portions may be drained.

A significant amount of untreated stormwater is flowing into the wetland from the neighborhood to the northeast. Stormwater flows through eroded gullies/channels into ponded areas. There is space for possible treatment prior to stormwater entering the ponds, but that might require some tree removal.

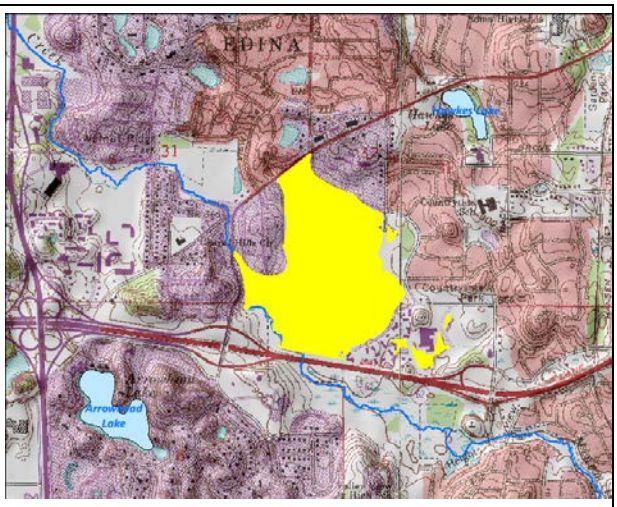
Some of the channels could be stabilized or even meandered to reduce erosion. Some cross-veins or blocks could be used to pond water and add some storage without removing a lot of trees. There is a considerable elevation difference between the pond and the neighborhood and street, but the parking lot in the park is fairly low in elevation relative to the ponds, which may become flooded.

There are several ditches in this wetland. Portions of these could be blocked and/or altered to reduce flow-through, increase storage, and expand the wetland area. Some of the wetland areas nearer the outer edges (north and east) could be used to hold more water to protect other portions.

In addition to stormwater treatment, vegetation management recommendations include:

- Buckthorn removal and restoration of native shrubs and trees to increase diversity of trees and shrubs and the ground layer.
- Reed canary grass management. Hydrology restoration, including stormwater treatment is recommended prior to treatment of reed canary grass. The area could then be restored to native wet meadow communities with installation of native seed mixes and live plants to increase vegetative diversity.
- Cattail management could be done after hydrology restoration and water quality improvements are completed. Supplemental native plantings in some areas may do well in portions of this wetland.

Aerial view of wetland.



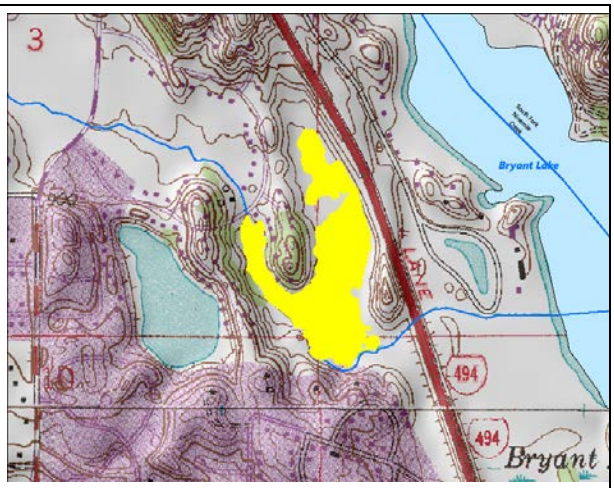
Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-005 Cardinal Creek Wetland- Discovery Point

The NWI identifies this wetland area in Eden Prairie as partially ditched or drained and was identified as having the potential for hydrologic restoration. This wetland is near NMCWD Discovery Point office, so could provide an opportunity for public showcase. There is potential for vegetation rehabilitation, which may include cattail removal and supplemental marsh species to increase diversity. In addition, more buckthorn removal on the east edge of the wetland and native vegetation establishment would help to block traffic from I494.

Hydrologic restoration could include removing the dam that controls the outlet to provide a more natural water level in the wetland. Or allow the water to drop slowly to help with flood storage.

Aerial view of wetland.

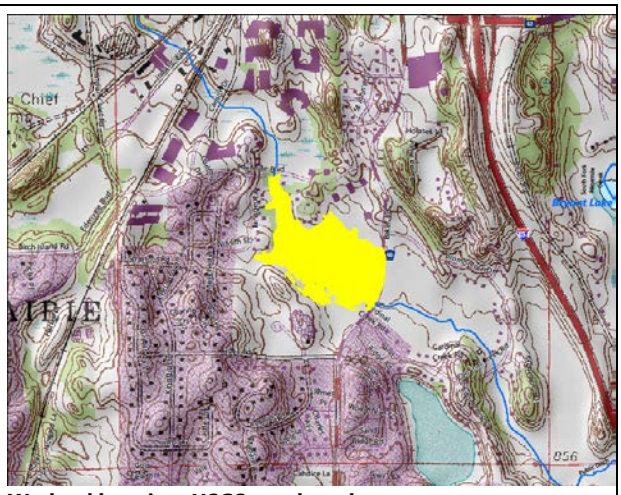


Wetland location, USGS quadrangle map.

Wetland 27-116-22-03-005 Cardinal Creek Wetland– u/s of Baker Road

The NWI identifies this wetland area in Eden Prairie as partially ditched or drained and was identified as having the potential for hydrologic restoration. A portion of this wetland is within the Agape Christi (Liberty Baptist Church) property on Baker Road. Agape Christi Academy is in the process of making some improvements on their site, which may include providing a naturalized upland buffer within an area of this wetland that was previously filled (prior to wetland regulations) for a parking lot. The parking lot is dilapidated and will likely be removed. It is recommended that the NMCWD consider partnering with Agape Christi with comprehensive options and opportunities for restoration beyond the Agape Christi property.

Aerial view of wetland.



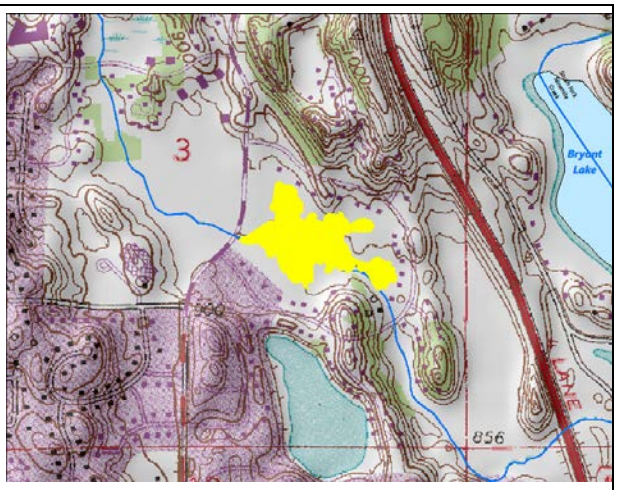
Wetland location, USGS quadrangle map.

Edge of parking lot

Wetland 27-116-22-03-003 Cardinal Creek Wetland- d/s of Baker Road

The NWI identifies this wetland area in Eden Prairie as partially ditched or drained and was identified as having the potential for hydrologic restoration. Though it is unlikely that restoration would be possible or practical without flooding adjacent residential neighbors.

Aerial view of wetland.



Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-033 International School- East

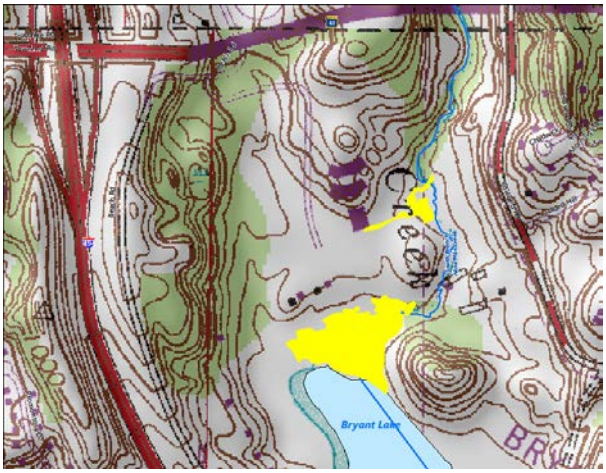
This is a high value wetland associated with Nine Mile Creek and Bryant Lake in Eden Prairie that may be partially ditched or drained. Some old drain tile may be present that partially drains this wetland. If so, disabling the drain tile would help to restore natural hydrology in this wetland.

The wetland receives untreated stormwater from the International School parking lot and buildings. Stormwater management and pre-treatment measures are recommended.

Stream bank stabilization is recommended. The stream banks are eroded.

The wetland is dominated by invasive reed canary grass, which may be a persistent challenge unless hydrology is changed in the wetland. Buckthorn removal is recommended within the adjacent oak forest upland buffer area.

Aerial view of wetland.



Wetland location, USGS quadrangle map.

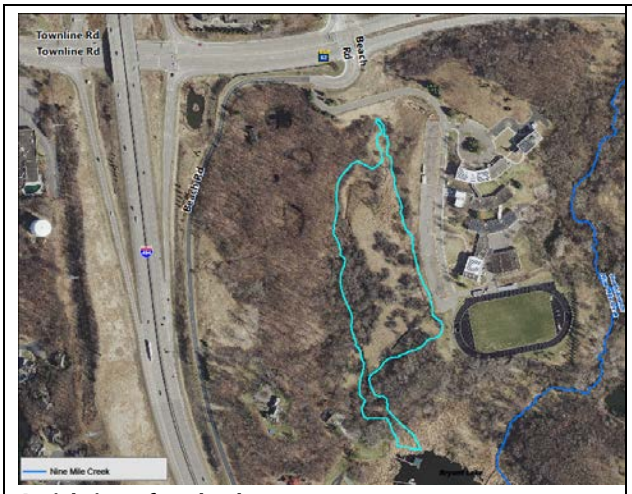
Wetland 27-116-22-02-032 International School- West

This wetland was previously identified by the City of Eden Prairie as having potential for restoration. The ditches flowing through this could be removed to restore hydrology without flooding neighbors. The surface could be scraped to fill ditches or portions of ditches to restore hydrology and improve some of the vegetation, which is currently dominated by reed canary grass, nettles, and buckthorn. There may be old drain tiles that are partially draining the wetland, which could be disabled to restore hydrology.

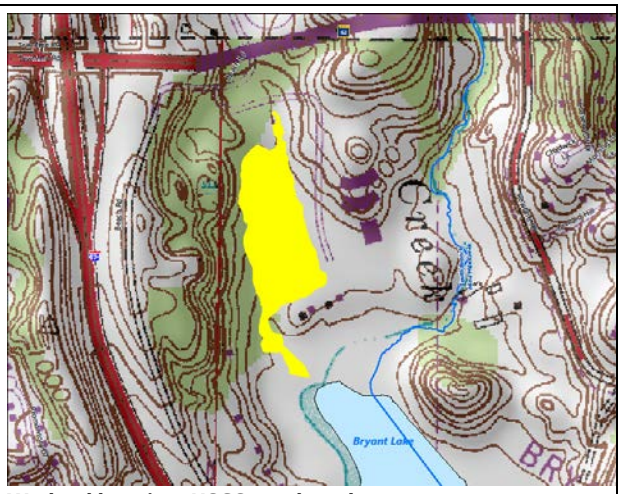
Where the ditches come together, it becomes a stream with eroded banks. This outlet could be raised to keep water in the wetland and the channel could be stabilized.

Untreated stormwater drains into this wetland from the parking lot and buildings. There is sufficient space that could have managed runoff, which could improve the water quality in Bryant Lake.

Buckthorn removal is recommended within the adjacent oak forest upland buffer area.



Aerial view of wetland.



Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-004 Three Rivers Park- Bryant Lake

This wetland is located within Three Rivers Park District's Bryant Lake Regional Park in Eden Prairie. It is identified in the NWI as partially ditched or drained and was previously identified by the City of Eden Prairie as having the potential for restoration. It is dominated by reed canary grass, which may become drowned out if hydrology is restored. The wetland to the north of this has a control structure that is holding back hydrology, so the northern wetland is flooded while the southern wetland is partially drained. A trail separates the two wetlands, with a culvert below. The culvert may be plugged at this location.

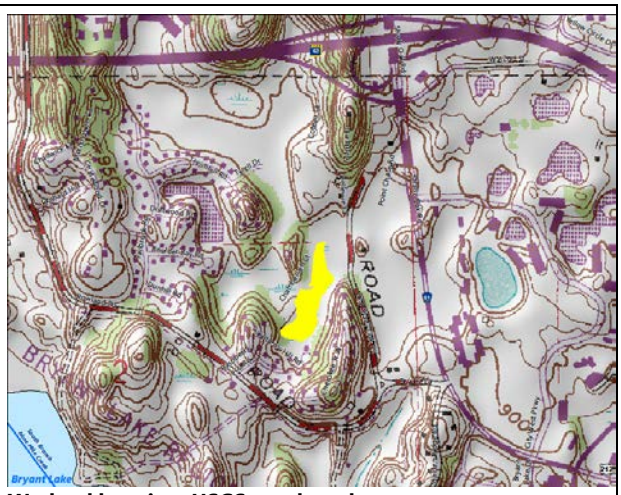
Aerial view of wetland.

Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-018 Chamberlain Court

This wetland was identified in the NWI as partially ditched or drained, though there isn't much potential for hydrologic restoration, due to concerns of adjacent residential flood potential. The wetland is dominated by invasive cattail and reed canary grass and would be a challenge to convert to native vegetation. The City of Eden Prairie is currently proposing some culvert improvement projects in this neighborhood, and could be consulted regarding a potential partnership for any restoration opportunities.

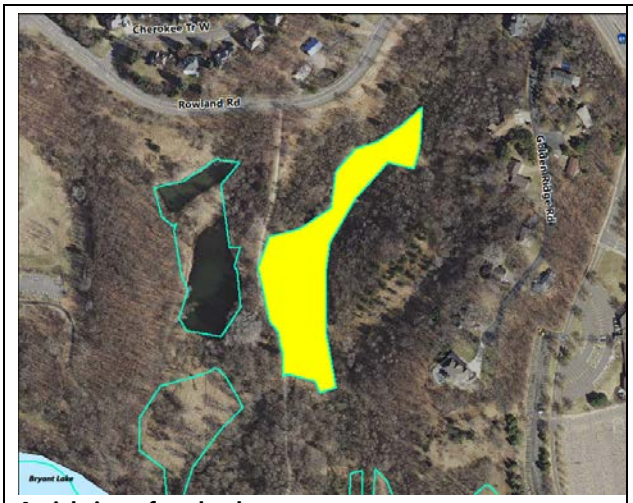
Aerial view of wetland.



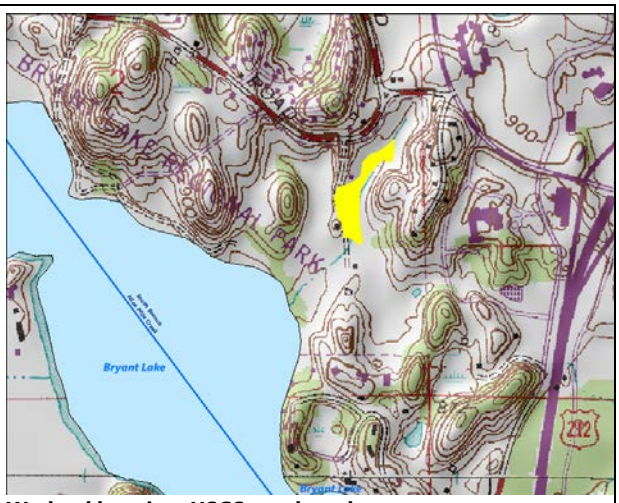
Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-009 Three Rivers Park/Rowland Road

This wetland is located within Three Rivers Park District's Bryant Lake Regional Park in Eden Prairie. It is identified in the NWI as partially ditched or drained and was previously identified as having the potential for restoration. The wetland is dominated by reed canary grass. Unless there is a source for hydrology to this wetland, or there is old drain tile that could be disabled, it is unclear how hydrologic restoration would be achieved.



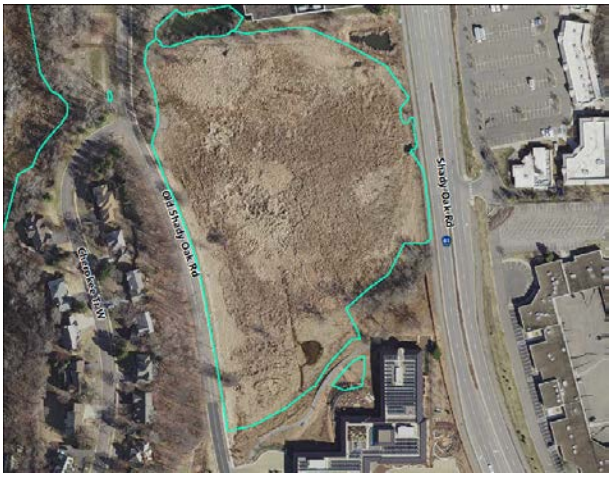
Aerial view of wetland.



Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-016 MAC Philanthropies/Shady Oak Area

This wetland is partially within the MAC Philanthropies site in the City of Eden Prairie adjacent to Rowland Road and Shady Oak Road. The MAC Philanthropies building and site is a showcase for alternative energy and sustainable design. They use a portion of the wetland for geothermal energy on their site and may be an agreeable partner in restoring this wetland. Their site grounds are maintained with native vegetation and have made some improvements to the wetland vegetation. Though it is dominated by invasive cattail and reed canary grass, so would be a significant effort to improve without some form of hydrologic restoration. Depending on how hydrology is restored, concerns with flooding in this neighborhood may prohibit opportunities. In addition, the City of Eden Prairie is currently proposing some culvert improvement projects in this neighborhood, and could be consulted regarding a potential partnership for any restoration opportunities.



Aerial view of wetland.

Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-024 and 116-22-02-027 Carmel Park

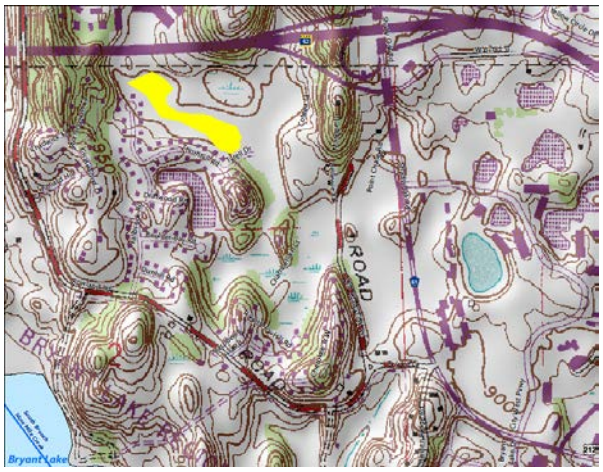
These two wetlands within the City of Eden Prairie's Carmel Park are connected through culvert under the parking lot and entrance road within the park. They are both dominated by non-native and invasive cattail and reed canary grass. They were identified in the NWI as partially ditched or drained, though is unclear whether hydrologic restoration would be possible or practical and neither appear to be significantly drained.

If hydrology could be brought to these wetlands, they may be able to sustain increased hydrology without flooding neighbors. Another wetland (Wetland 27-116-22-02-035) in Carmel Park was not initially identified in the desktop review, though found during the site assessments to have high quality vegetation. This wetland is a deep marsh with a floating mat in the center dominated by river bulrush. If hydrology could be restored to the other two wetlands in Carmel Park, there is potential for similar native vegetation found in this adjacent wetland.

Additional stormwater management improvements are recommended. Sediment from the parking lot is directed into the wetlands. The surrounding park is mowed right up to the edge of the wetland and much of it does not appear to be used for activities other than an area with a children's parking lot. Rain gardens and naturalized upland buffer are recommended to provide more protection from degradation in these wetlands.

Wetland 27-116-22-02-024

Aerial view of wetland.

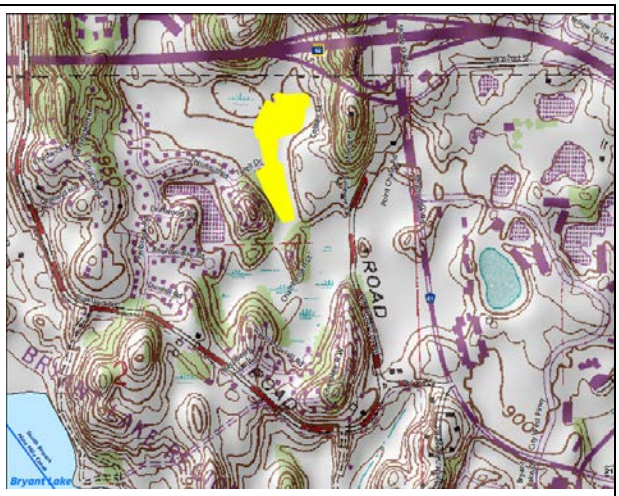


Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-024

Wetland 27-116-22-02-027

Aerial view of wetland.



Wetland location, USGS quadrangle map.

Wetland 27-116-22-02-027 – sediment directed into wetland

Wetland 27-116-22-02-035 – high quality vegetation.