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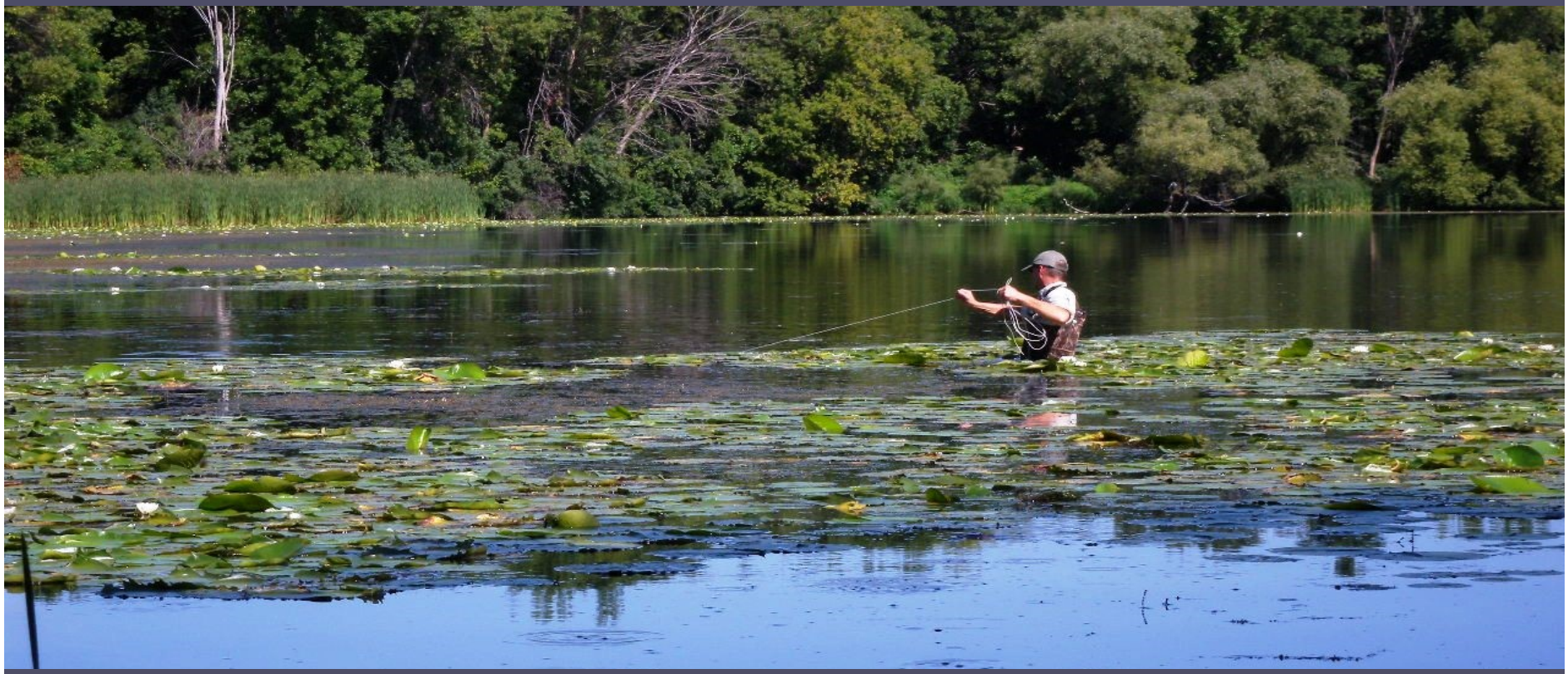
Blue Earth County Water Management Plan 2017-2026
Wetland Protection, Enhancement and Restoration Section



Appendix I — Wetlands
Blue Earth County Land Use Plan

Wetland Protection, Enhancement and Restoration

Wetland Functions and Local Public Value

Wetland functions are science based natural processes that occur in wetlands. The value of a wetland is an estimate of the importance or worth of one or more of its functions to society and individuals. Wetlands are considered valuable because they use and filter nutrients, recharge water supplies, retain water, reduce flooding, and provide fish and wildlife habitat. Wetlands also provide recreational opportunities and aesthetic benefits.

Local Public Values

Minnesota Statutes 2017, section 103B.3355 requires local public values of wetlands be determined based on the functions of wetlands.

The wetland functions most important in local watersheds were determined with consideration of watershed and ecological goals, an assessment of existing wetlands functions and citizen and technical stakeholders' input. Citizen surveys to determine important wetland functions and aquatic resources were conducted just prior to developing this plan.

Loss of wetlands, wildlife habitat, water quality and groundwater quality are priority management concerns. Protecting and restoring these functions are the highest priority for achieving watershed and ecological goals in local watersheds. The ability of wetlands to provide multiple benefits has the greatest local public value.

Most Important Wetland Functions

The following wetland functions were determined to be most important in local watersheds and have the greatest local public value:

- **Wildlife Habitat**, including terrestrial and aquatic habitat and connectivity of those habitats
- **Public Recreation,** including hunting and fishing areas, wildlife viewing areas, and nature areas
- **Water Storage**, including floodwater and stormwater attenuation and the potential for downstream flooding and downstream erosion in the watershed
- **Water Quality**, including utilization of nutrients that would otherwise pollute public waters, filtering of pollutants to surface and groundwater and shoreline protection
- **Groundwater Protection**, including utilization of the wetland for groundwater protection or as a recharge area for groundwater and low flow augmentation of streams and rivers
- **Rare Plant and Animal Habitat,** as mapped in the MNDNR Minnesota County Biological Survey
- **Ability to Provide Multiple Benefits,** including wildlife habitat, water storage, water quality, groundwater protection, rare plant and animal habitat and public recreation functions

All wetlands provide important functions, but not all wetlands provide all functions equally well.

Source: United States Geological Survey

Less Important Wetland Functions

The wetland functions determined to be less important in local watersheds reflect a realistic view of existing wetland conditions and functions, watershed and ecological needs and use of wetlands in the county. The least important wetland functions include the following:

- **Native Plant Habitats**
- **Commercial uses,** including wild rice and cranberry growing and harvesting and aquaculture

The commercial use function is less important because there are no wetlands providing wild rice or cranberry growing in the county at this time. However, wetlands in the county and in much of the state were historically used for growing and harvesting reed canary grass seed.

The USDA 1978 *Soil Survey of Blue Earth County,* description of Muskego muck soils states "Several of the larger bogs in the northeastern part of the county are used for growing reed canary grass seed." This was not uncommon in southern Minnesota. According to the MNDNR, reed canary grass has been planted throughout the U.S. since the 1800s for forage and erosion control. While many Minnesota state agencies have recently removed reed canary grass from their planting lists, it is still being planted in the state.

Reed canary grass seed likely remain in large wetlands, and the seed is easily transported in watersheds. Invasive species like reed canary grass and invasive cattails flourish in the nutrient rich conditions in watersheds where the county is located.

Wetlands and Ecological Conditions

Blue Earth County is located in two of the three major biomes that meet in Minnesota: the Tallgrass Prairie and the Eastern Deciduous Forest commonly called the Big Woods. The vegetation types that defined these biomes were distributed on the landscape according to climate, soil and landform patterns. The county is located in a vegetation ecotone known as the forest/prairie border. As described in the USDA 1978 *Soil Survey of Blue Earth County*, "The County extends along a northern margin of an extensive zone of ecological tension between prairie and forest regions. Throughout the centuries this margin advanced and retreated as shifts in the climate pattern affected temperature, relative humidity, wind velocity and precipitation."

Historic Wetlands

Soil characteristics and historic maps are the best available indicators of the extent of pre-settlement wetlands in the County.

Hydric Soils

One of the criteria used to delineate wetlands is the presence or absence of hydric soil. The USDA Soil Survey shows 34.9 percent of the land in the county is hydric soil and another 20.9 percent is predominately hydric.

The presence of wetlands leaves signatures in the soil for centuries and these soils should be capable of wetland restoration. As described in the USDA NRCS Soil Survey:

> "…hydric soils formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Soils in which the hydrology has been artificially modified are hydric if the soil, in an unaltered state, was hydric. Hydric soils that have been converted to other uses should be capable of being restored to wetlands."

Native Vegetation

The USDA 1978 *Soil Survey of Blue Earth County* describes native vegetation and its importance in soil formation**:**

> "Before this county was settled, the native vegetation was most important in the complex of living organisms that affect the formation of soils. Two types of vegetation, forest and prairie, have strongly influenced the formation of soils. The survey area is along the northern margin of a large area covered partly by prairie and partly by forest. Throughout the centuries this margin advanced and retreated as shifts in the climate pattern affected temperature, relative humidity, wind velocity and precipitation."

The map of native vegetation in the USDA 1978 *Soil Survey of Blue Earth County* shows more extensive areas of Big Woods and oak openings along the rivers in the county compared to the *Map of Natural Vegetation at the Time of the Public Land Survey 1847-1907.*

Historic maps

The Original Public Land Survey, completed in Minnesota between 1847 and 1907, shows lakes, rivers, waterfalls and smaller wetlands surveyors observed along the one mile section lines being surveyed. Subsequent historic maps, including an 1877 map of the county, and the 1908 Soil Survey show the location of many large shallow lakes and wetlands in the county that were later drained.

Woodlands and Forests

The *Map of Natural Vegetation at the Time of the Public Land Survey 1847-1907* shows river bottom forest and Big Woods hardwoods extended along the lower, incised reaches of the major rivers in the county and their tributaries, including the Blue Earth, Le Sueur, Maple, Cobb, Watonwan and Perch Creek, as well as the Minnesota River and the lowest reaches of the Little Cottonwood, Morgan Creek, and

Minneopa Creek. Oak openings and barrens and aspen-oak land were also along parts of the Watonwan, Blue Earth, Maple, Cobb, Little Cobb, Bull Run Creek, Le Sueur and the Minnesota River near Mankato.

In the greater Blue Earth River watershed, the pre-settlement, forested and wooded areas were almost entirely along the rivers in Blue Earth County and north of the Le Sueur River in the Big Woods. The remainder of land in these watersheds was tall grass prairie except near some of the lakes.

Today most of the wooded areas in the county and in the major watersheds are along the rivers in the incised reaches, ravines and floodplains.

Prairie and Wet Prairie

The *Map of Natural Vegetation at the Time of the Public Land Survey 1847-1907* shows significant wet prairies in every watershed in the county, including watersheds in the historic Big Woods.

The largest expanse of wet prairie in the county extended from just north of the Watonwan River from the county line to near the mouth of the Watonwan River and north into part of the Lake Crystal watershed. The soils in this area are largely hydric, with coarse texture and a shallow depth to water table.

Lakes

In addition to the lakes that exist today, the 1908 Soil Survey map shows several large lakes in the county that no longer exist.

Wetland Losses

Wetland resources in all local watersheds have changed significantly since pre-settlement. Conversion of the pre-settlement landscape to cities, towns, roads, farmsteads and agricultural uses required wetland drainage and removing native vegetation from the tall grass prairie and woodlands. More than 90% of wetlands in the county have been drained.

Many large shallow lakes and wetlands in the county were drained in the early 1900's. Historic Jackson Lake (1,627 acres) near Amboy in the Le Sueur watershed and Solberg Lake (620 acres) and Dakins Lake (200 acres) in Butternut Valley Township in the Middle Minnesota watershed are examples of large wetlands and shallow lakes that were drained in the early 1900's.

Wetlands of all sizes were easily drained for agriculture with subsurface tile and ditches. The USDA 1978 *Soil Survey of Blue Earth County* states "About 54 percent of the county is wet and requires artificial drainage for crop production."

The U.S. Fish and Wildlife Service and Ducks Unlimited produced a restorable depressional wetlands inventory for many counties in the Prairie Pothole region of Minnesota including Blue Earth County. This inventory includes over 32,787 (71,218 acres) potentially restorable wetlands in the county. The potentially restorable wetlands in this inventory range in size from under .1-acres to over 900 acres.

Reaches of some streams and rivers were channelized, and in some cases berms or levees were constructed with pumping systems to prevent flooding of adjacent farmland. Riverine and floodplain wetlands were eliminated along with wildlife habitat and important wetland functions for flood and stormwater attenuation, nutrient assimilation and wildlife habitat. The rivers and streams with the most channelized areas in the county are in the Cobb, Little Cobb and Maple in the Le Sueur watershed and small streams in the Blue Earth and Watonwan watershed.

The Army Corps of Engineers Flood Control Project that protects Mankato, North Mankato and South Bend Township from Minnesota River and Blue Earth River flooding eliminated wetlands between the river and the floodplain.

The Rapidan dam on the Blue Earth River created a reservoir that flooded riparian and floodplain wetlands.

Water control structures and dams maintain lake levels on all recreational lakes in the county. This affects wetlands and limits the growth of wetland vegetation in aquatic zones and riparian areas as water levels are maintained at consistently higher levels.

Filling wetlands in the near shore areas of lakes for residential and urban development and beaches is a common practice. Wetlands near lakes are also being developed for second- or third-tier development.

Permanent loss and impacts from urban and residential development is the greatest threat to existing wetlands at this time.

Existing Wetlands

The best available information about existing wetlands is the National Wetland Inventory (NWI).

National Wetlands Inventory (NWI)

The National Wetlands Inventory (NWI) maps and data for Blue Earth County were updated in 2015 by the MNDNR. The NWI wetland boundaries should not be used to delineate wetland boundaries.

The NWI does not show all wetlands in the county nor does it show the regulatory boundaries of wetlands. Many wetlands in cultivated fields and some smaller wetlands were excluded from the NWI. Wetlands in wooded areas are either excluded or the regulatory boundaries of the NWI wetlands in wooded areas are much larger or smaller than shown in the NWI.

Description

The National Wetlands Inventory (NWI) was established by the U.S. Fish and Wildlife Service (FWS) in 1974 to conduct a nationwide inventory of U.S. wetlands. The FWS's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources to aid in conservation efforts. The NWI relies on trained image analysts to identify and classify wetlands and deepwater habitats from aerial imagery.

National Wetlands Inventory Data Limitations, Exclusions and Precautions

The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. By policy, the U.S. Fish and Wildlife Service also excludes certain types of "farmed wetlands" as may be defined by the Food Security Act or that do not coincide with the FWS definitions or classification.

Precautions - Persons intending to engage in activities involving modifications within or adjacent to suspected wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland Conditions

Degraded wetlands

Existing wetlands have been negatively impacted by human factors such as hydrologic alterations, nutrient loading, accelerated sedimentation, loss or manipulation of upland vegetation and invasive species. Degraded wetlands are common in both agricultural and developed landscapes in all watersheds in the county.

Sedimentation and Nutrient Loading

Army Corps of Engineers *A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Prairie Potholes (HGM):*

> "Accelerated sedimentation may be the most detrimental impact on wetlands. Accumulation of sediment in wetlands decreases wetland volume, decreases the duration wetlands retain water, and changes plant community structure by burial of seed banks."

> "Excessive nutrient loading to a wetland can cause nuisance algal blooms and the production of monotypic stands of invasive or weed species. Observed point source or nonpoint source of nutrients may include but is not limited to: fertilized lawns, agricultural runoff, manure storage or spreading, concentrated stormwater runoff, or pet waste inputs."

Invasive Vegetation

The MnRAM wetland vegetation diversity/integrity of wetlands in local watersheds is generally low to moderate or the FQA Biological Condition Gradient Tier is fair or poor, based on the functional assessments of sample wetlands conducted to support this plan. These findings were consistent with the MPCA *Status and trends of wetlands in Minnesota: Depressional Wetland Quality Assessment (2007-2012)* report findings for wetlands in the temperate prairie region.

The USDA 1978 *Soil Survey of Blue Earth County,* description of Muskego muck soils in "Several of the larger bogs in the northeastern part of the county are used for growing reed canary grass seed." This was not uncommon in southern Minnesota. According to the MNDNR, reed canary grass has been planted throughout the U.S. since the 1800s for forage and erosion control. While many Minnesota state agencies have removed reed canary grass from their planting lists, it is still being planted in the state.

Reed canary grass seed likely remain in large wetlands, and the seed is easily transported in watersheds. Invasive species like reed canary grass and invasive cattails flourish in the nutrient rich conditions in the county and common in southern Minnesota.

Developed Land Uses

The quality of wetlands in urban settings is generally low or medium. The surrounding landscape of nearly continuous areas of impervious surfaces, stormwater collection systems and shallow-rooted turf grass unavoidably result in degraded wetlands. Land modification is extensive. Soil protection is usually accomplished with hard surfacing and terracing. Vegetative cover is largely manicured turf-grass with shallow root systems. Buffering between wetlands and adjacent upland uses is typically low. The water management philosophy tends to emphasize conveyance, rate control, and flood prevention. Water management tends to focus on storm water by using curb, gutter, and sewer systems augmented by ponds. Altered local hydrology sometimes negatively impacts wetlands by increasing or decreasing natural surface and subsurface drainage to the wetland.

Agricultural Land Uses

Wetlands located in cultivated fields and on agricultural land provide minimal wetland functions due to drainage, filling, sedimentation and excessive nutrient loading. During floods, drained wetlands provide some flood or stormwater retention functions for a short time.

A significant extent of land in the county is drained by ditches and subsurface drainage tile that drain directly to ravines, rivers, lakes and wetlands.

Priority Areas and Replacement Sites

More than 90% of the pre-settlement wetlands in the county have been lost due to draining and filling activities undertaken to increase the economic productivity of the land, so there is an abundance of wetland restoration opportunities.

All wetlands provide important functions for people and wildlife while human values and priorities drive policy and management decisions. Restoration of the pre-settlement landscape or protecting all wetlands is not desirable or consistent with local comprehensive plans. At the same time there is interest in protecting, enhancing and restoring wetlands in the county to provide wildlife habitat and water quality functions in a way that serves multiple interests.

High Priority Areas

The purpose of identifying and prioritizing wetlands and potential wetland restoration or replacement sites is to link high priority areas and watershed goals with voluntary conservation projects and wetland management and mitigation to the benefit of both.

Science-based, locally-defined criteria were developed to determine priority areas and potential replacement sites in the Greenprint and the *Blue Earth County Water Management Plan* through a collaborative effort of local governments and representatives of the U.S. Fish and Wildlife Service, MNDNR, SWCD, MPCA, BWSR, engineering consultants and citizens.

Priority areas and potential replacement sites (potentially restorable basins) were aligned with the ability to provide natural resource and wetland functions important in local watersheds and with the greatest local public value, including the following:

- **Wildlife Habitat,** including terrestrial and aquatic habitat and connectivity of habitat
- **Public Recreation**, including hunting and fishing areas, wildlife viewing areas, and natural areas
- **Water Storage,** including floodwater and stormwater retention and the potential for downstream flooding and erosion in the watershed
- **Water Quality**, including utilization of nutrients that would otherwise pollute public waters, filtering of pollutants to surface and groundwater and shoreline protection
- **Groundwater Protection,** including utilization of the wetland for groundwater protection or as a recharge area for groundwater and low flow augmentation of streams and rivers
- **Rare Plant and Animal Habitat,** as shown in the MNDNR County Biological Survey
- **Ability to Provide Multiple Benefits,** including wildlife habitat, water storage, water quality, groundwater protection, rare plant and animal habitat and public recreation functions

These important wetland functions were grouped and/or divided into four priorities, including 1) the ability to provide multiple benefits, 2) water storage, 3) water quality and 4) groundwater protection.

Priority Areas and Replacement Sites for Multiple Benefits

The highest priority areas are interconnected ecological corridors and wetland complexes in the Greenprint. These priority areas contain important wildlife habitats and aquatic resources and provide multiple wetland functions important in local watersheds.

Protecting and restoring wetlands and avoiding impacts to wetlands in priority areas is important for sustaining water quality and wildlife habitat functions in local watersheds. Impacts to and loss of wetlands in the Greenprint priority areas can result in critical loss or fragmentation of habitat or changes in hydrology that reduce the ability of the wetland and potentially the entire wetland complex or corridor to provide the desired functions important in their watershed.

Making the Greenprint

A land use planning approach was used to identify Greenprint priority areas based on ability to provide multiple benefits important in local watersheds. An analysis of landscape position, proximity and connectivity of important features was used to identify Greenprint priority areas in river corridors, wetland complexes, and shorelands. Features analyzed were land cover, vegetation, floodplains, rivers, streams, lakes, wetlands, rare plant and animal habitat, sensitive geology, recreation and protected or publicly-owned lands.

The Greenprint contains diverse landscapes, hydrologic conditions, natural buffers, and all wetland types present in southern Minnesota. Wetland restoration or replacement in Greenprint priority areas will likely be more ecologically sustainable as these areas provide connectivity of aquatic resources and upland habitat, and most are more likely to be protected from future disturbance from the surrounding land uses.

The Greenprint contains wetlands that would have critical wetland resource designations if using the BWSR Minnesota Rapid Assessment Method (MnRAM). The MnRAM Version 3.4 states that wetlands should be evaluated for designation as critical resources based on several features defined in Minnesota Statutes. These critical wetland resources should be classified into the “Preserve” management class due to their special functions. Criteria for designating wetlands as critical resources are as follows:

1. Outstanding Resource Value Waters
2. Designated Scientific and Natural Areas
3. Wetlands with known occurrences of Threatened or Endangered Species
4. State Wildlife Management Areas
5. State Aquatic Management Areas
6. Wellhead Protection Areas
7. Sensitive Ground Water Areas
8. Designated trout streams or trout lakes
9. Calcareous fens
10. High priority areas for wetland preservation, enhancement, restoration and establishment
11. Designated Historic or Archaeological Sites

More information and criteria used for the Greenprint are in the Priority Areas for Protection and Restoration section of this plan.

Priority Areas and Replacement Sites for Groundwater Quality and Recharge

Groundwater protection and recharge are a high priority in the county and affect groundwater aquifers beyond county or watershed boundaries. In most of the county soil infiltration and groundwater recharge of deeper aquifers is limited.

Areas with shallow depth to bedrock, karst and potential for groundwater recharge were identified using the *Geologic Atlas of Blue Earth County, Part B*. A map of areas with shallow depth to bedrock is in the General Background section of this plan. Most, but not all, of these areas are in Greenprint priority areas.

In most of the county soil infiltration and groundwater recharge of deeper aquifers is limited. The 2016 *Geologic Atlas of Blue Earth*

County, Part B, includes an analysis of pollution sensitivity and an evaluation of the recharge rate of surface water into deeper aquifers.

Maps of rapid or focused recharge for specific aquifers are show in in Figures 25 through 32 on pages 42 to 47 of the *Geologic Atlas of Blue Earth County, Part B.*

A map showing a compilation of the highest rates of recharge for each of the aquifers in the *Geologic Atlas of Blue Earth County, Part B* is in the Priority Areas for Protection and Restoration section of the *Blue Earth County Water Management Plan.* It includes the High and Very High classes in which the vertical travel time for water to enter a buried sand aquifer is less than a year. Many private water wells in the county are in buried sands aquifers.

Priority Replacement Sites

Potentially restorable basins were identified and prioritized based on ability to provide 1) water storage or 2) water quality functions. Shallow basins that support vegetation are needed for water quality treatment to utilize nutrients. Greater storage volume and potentially deeper basins are needed for water storage.

Replacing degraded wetlands in the Greenprint and priority areas identified in the *Blue Earth County Water Management Plan* is certain to provide a gain in wetland function and public value, especially in areas where impact avoidance will continue to maintain a degraded wetland or result in further degradation of the wetland from altered hydrology, invasive species, fertilized lawns, concentrated stormwater runoff, trash, or pet waste inputs.

Some of the potentially restorable basins identified in this plan will not be suitable for wetland restoration but might be suitable for constructed stormwater wetlands or conservation practices to provide water quality or water storage functions important in local watersheds. Ultimately, site conditions and landowner goals will determine how or if potential sites might be used for conservation projects.

Strategic Sites for Water Storage - Flood and Stormwater Attenuation

Each potentially restorable basin (landscape depression) was analyzed for the ability to store surface water runoff from its catchment area. Potential sites were prioritized based on three water storage criteria: 1) ability to hold a 10-year, 24-hour storm event (4.37 inches), 2) which sites hold the largest volume of water, and 3) sites that have the smallest footprint while storing the most water.

More information about water storage priority areas and maps of potentially restorable basins that best provide water storage functions are in the Priority Areas for Protection and Restoration section of this plan.

Strategic Sites for Water Quality – Assimilation of Nutrients

Wetland vegetation needed for removing nutrients survives best in wetlands less than three feet deep. Each potentially restorable basin was analyzed to determine which basins were three feet or fewer deep. The ratio of the wetland to its contributing watershed was also analyzed.

A map of potential priority sites for nutrient assimilation is in the Priority Areas for Protection and Restoration section of this plan.

Sites for Stormwater Wetlands - Attenuation and Water Quality Treatment Functions

Natural wetland restoration is preferred county-wide and is generally preferred by the Wetland Conservation Act (Minnesota Rules part 8420.0522 subpart 5A).

Wetlands in Urban Watersheds

"Urban development trends generally are detrimental to wetlands. Many wetlands are lost in the process and those that remain are degraded by the high intensity of uses in the urbanized surrounding areas. For example, the almost continuous concrete, asphalt, and rooftops that harden the landscape result in increased levels of stormwater runoff.

Attempts to restore urban watersheds include *softening* the watershed by restoring important resources in locations where their functions will add green structure (i.e., slow down the flow of stormwater and contribute in other ways to the overall improvement of the watershed).

In most situations, wetland restoration projects are planned to provide the highest level of ecological condition possible. Included in this planning tenet is the assumption that the wetlands will also perform their functions at the highest levels possible. Restorations in highly urbanized portions of watersheds can make this standard difficult or impossible to achieve.

The wetlands needed in some parts of urban watersheds end up being planned and implemented to perform functions such as flow attenuation, water quality improvement, and floodwater retention at the expense of overall wetland quality. These working wetlands, because of the constant stress they experience, may be mostly or completely comprised of an invasive species plant community and have poor water quality, high rates of sedimentation, and other indications of degradation. However, their role is not to be pristine examples of wetlands; instead, their mission is to perform their designed functions in a way that maximizes the overall good for the watershed. While these wetlands may not be "pretty to look at," some would consider them "true beauties" when the overall benefits they provide for the watershed are considered."

Source: *Incorporating Wetlands Into Watershed Plans,* EPA Region 5 Wetlands Supplement

In some watersheds, constructed wetlands or water quality treatment wetlands may best provide wetland functions to achieve watershed goals for improving water quality or flood and stormwater attenuation functions. The WCA design and monitoring requirements for water quality treatment system wetland creations would apply to these sites if constructed.

Priority areas and watersheds for constructed wetlands and water quality treatment wetlands are in the Priority Areas for Protection and Restoration and the Stormwater Management sections of this plan.

Wetland Replacement Sites

There are more than 3,000 potentially-restorable basins in the county that are two acres or larger, and of those more than 1,400 are greater than five acres.

In Greenprint priority areas there are more than 1,300 potentially restorable basins, and of those 624 are five acres or larger with a median area of 9.6 acres. In addition to 3,000 potentially-restorable basins two acres and larger, there are thousands of opportunities to restore smaller basins or enhance and restore existing wetlands.

More information about potentially restorable wetlands and priority areas is in the Priority Areas for Protection and Restoration section of this plan. The following tables summarize the availability of potentially restorable wetlands in each major watershed.

Potentially Restorable Wetlands over 2-Acres Summarized By Watershed

Watershed	Number	Total Area in Acres	Median Area in Acres	Basin Owned by One Property Owner	
				Number	Percent
Blue Earth	541	4,739	3.99	289	53.4%
Le Sueur	1,311	11,034	4.10	668	51.0%
Minnesota River-Mankato	975	12,139	4.89	514	52.7%
Watonwan	446	3,677	3.99	284	63.7%
Cannon	12	48	4.09	5	41.7%
Total	**3,285**	**31,638**	**4.28**	**1,760**	**53.6%**

Wetland Functions Classification Framework

A classification system and prioritization framework was developed to predetermine wetland functions and the local public value of wetlands in the county. Predetermining and classifying wetland functions and values establishes expectations for wetland protection in the county.

This function based classification system can be used by the WCA local government unit (LGU) and technical evaluation panel (TEP) to evaluate the public value and associated functions of wetlands when considering applications and making decisions regarding wetland impact sequencing (impact minimization, avoidance and replacement) and the adequacy of proposed wetland replacement.

The four functional classes in the classification framework are based on an analysis of landscape position, proximity and connectivity to important natural resources, environmentally sensitive areas, wildlife habitat, recreation and the ability to provide important wetland functions for water quality and wildlife habitat in local watersheds.

The following factors were considered to classify wetland functions:

- Proximity to Greenprint corridors and wetland complexes or planned or existing contiguous open space. This is based on an analysis of landscape position and ability to provide important wetland functions and the greatest local public value. (Blue Earth County Greenprint map)
- Whether the wetland is identified in a formally-adopted municipal stormwater management plan
- Connection to Protected Lakes or Protected Wetlands
- Whether the wetland is in an area with shallow depth to bedrock or karst area mapped in the *Geologic Atlas of Blue Earth County Part B* and as shown in the *Blue Earth County Water Management Plan*
- Whether the wetland is in a well head or source water protection plan area

The highest priority areas for wetland preservation, protection, enhancement and restoration are interconnected, continuous and stepping-stone corridors in the Greenprint. These priority areas contain important wildlife habitats and aquatic resources where wetland impacts can result in critical loss or fragmentation of habitat or changes in water storage and hydrology that reduce the ability of the entire wetland complex or corridor to provide the desired functions in the watershed.

Some wetlands in the Greenprint may not have high or exceptional functional ratings for all functions, but high or exceptional functional ratings are not required for a wetland to be a high priority for protection as the location, distribution, proximity and connectivity was considered at the landscape scale in local watersheds.

Wetland restoration or enhancement projects and replacement of degraded wetlands in the Greenprint priority areas are more likely to provide sustainable ecological functions and important wetland functions with local public value.

Potential replacement sites that may provide water quality functions such as water storage and nutrient assimilation functions important in local watersheds are also identified in this plan.

The Wetland Functions Classification Framework and the criteria used to assign each of the four wetland functions classes are described on the following pages.

Maps of NWI wetlands that were assigned wetland functions classifications using the framework are on the following pages. The Wetland Management Classification maps in this plan shows only wetlands in the National Wetland Inventory (NWI). Wetlands not mapped for the NWI may be assigned a wetland function classification by local government units administering the WCA.

Functional Class 1 (Preserve) and Class 2 (Protect) wetlands

These wetlands are important anchors and connections in the Greenprint priority corridors and wetland complexes. Wetlands in the Greenprint were predetermined to provide water quality, wildlife habitat, water storage, groundwater quality or public recreation functions important in local watersheds. Preserving and protecting these wetlands is important for achieving the immediate and long term resource needs and watershed and ecological goals in local watersheds.

Functional Class 1 (Preserve) wetlands have important habitat, hydrologic, vegetation/floral characteristics, or are extremely difficult or impossible to replace through wetland creation or restoration. These wetlands and the functions they provide should be preserved.

Functional Class 2 (Protect) wetlands provide or enhance connections for habitat diversity within open green spaces and form connectivity between habitats and open green spaces. Their functions and values are difficult or impossible to replace once lost. These wetlands, in addition to their value in river corridors, lake watersheds, wetland complexes and open green spaces, can contribute important water quality functions. These wetlands and the functions they provide should be protected to the greatest extent possible.

Functional Class 3 (Manage) wetlands

These wetlands may be degraded by surrounding land uses and are generally isolated in cultivated agricultural landscapes. These wetlands may provide some wetland functions for wildlife habitat, water quality or water storage depending on proximity to Greenprint corridors and wetland complexes, water storage capability in its catchment area, and vegetation. Potential for degradation of wetland quality and functions by development and/or expected future development could result in further degradation of these wetlands.

Wetland Function Class 4 (General Use) wetlands

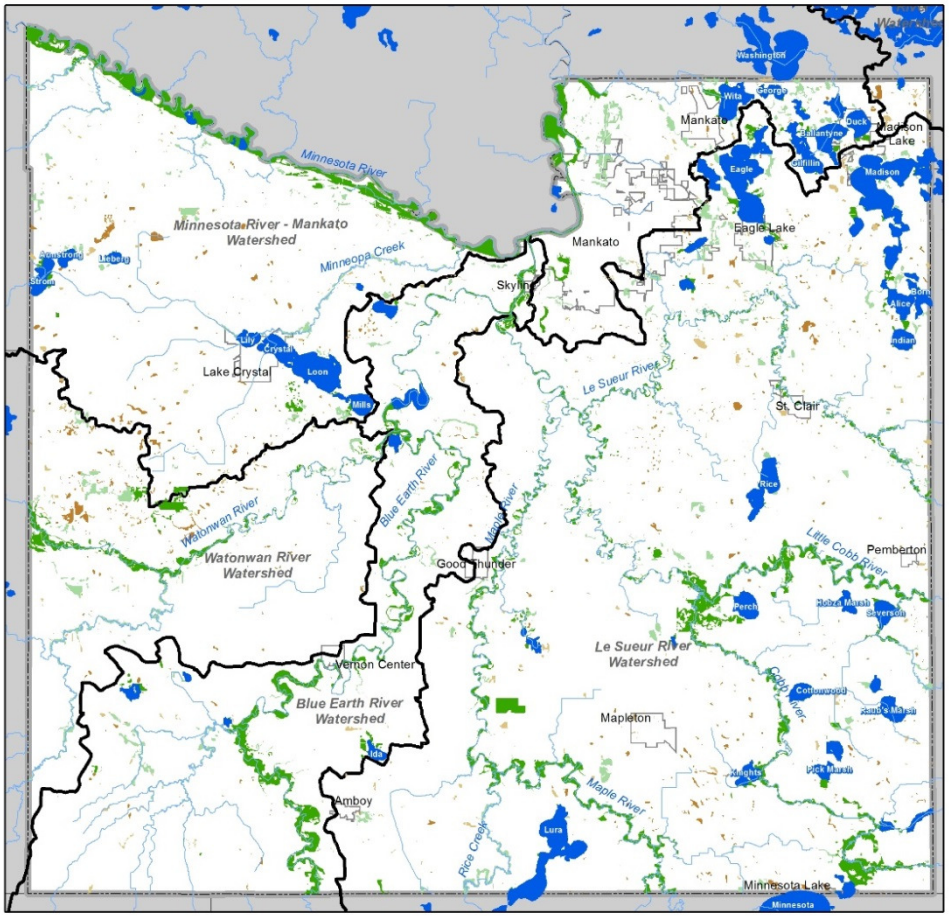
These wetlands are known to be degraded. They are cultivated in agricultural fields and provide minimal functions due to drainage, diversion of the contributing watershed, filling, pollutant runoff, and manipulation of vegetation or adjacent upland. Most of these wetlands are typically Type 1 wetlands defined by the Fish and Wildlife Service Circular 39, and many are not included in the NWI. Replacing or restoring degraded wetlands in priority areas identified in this plan is certain to provide a gain in wetland function and public value, especially in areas where impact avoidance will continue to maintain a degraded wetland or result in further degradation of the wetland from altered hydrology, invasive species, fertilized lawns, concentrated stormwater runoff, litter, or pet waste inputs.

Wetland Functions Classification Framework

Function Class & Description		Criteria
1	"Preserve" wetlands are valuable for protection of important native species or wildlife habitat; OR they are important to provide multiple important wetland functions in Greenprint priority wetland complexes and corridors.	A wetland is classified as Class 1 "Preserve" if **any** of the following apply: • Is within a Greenprint priority corridor or wetland complex • Mapped Moderate, High, or Outstanding importance for native vegetation in biological diversity by the Minnesota Department of Natural Resources Minnesota County Biological Survey (MCBS). • Is a calcareous fen • Is in a designated FEMA floodplain • Is a Protected Lake or Wetland • Is in a Wildlife Management Area, Waterfowl Production Area, or government-owned conservation area • Is a riparian wetland of a Protected Lake or Protected Wetland • Is identified in a local wellhead protection plan or source water protection plan
2	"Protect" wetlands are important in Greenprint wetland complexes or corridors, interconnected park and open spaces, or are important for water storage or water quality protection.	A wetland is classified as Class 2 "Protect" if **any** of the following apply: • Is within or provides connections to Greenprint priority wetlands complexes or corridors • Is located in an area with shallow depth to bedrock or karst, as shown in the Geologic Atlas for Blue Earth County, Part B maps • Provides connection to existing or planned, interconnected park and open green spaces • Is adjacent to or has a hydrologic connection to a Public Water Lake or Public Water Wetland • Is identified in a municipal stormwater plan showing wetlands for water quality
3	"Manage" wetlands may be important for water storage, water quality protection, or interconnected green space but have moderate or low ecological value due to surrounding land uses.	A wetland is classified as Class 3 "Manage" if **all** of the following apply: • Is neither within nor provides connectivity to Greenprint priority wetland complexes or corridors or other planned parks or interconnected open green space • Is not in a local municipality or county engineered and adopted stormwater management plan • Is not in a cultivated field or agricultural land
4	"General" wetlands have been significantly altered and degraded through past disturbances. Most of these are Type 1 wetlands in cultivated fields.	A wetland is classified as "General Use" Class 4 if **all** of the following apply: • Is not within or does not provide connectivity to priority wetland complexes, Greenprint Corridors or other interconnected open green space • Is not in a local municipality or county stormwater management plan • Is in a cultivated field or agricultural land

Agricultural land is land used principally for horticulture, the cultivation or production of row crops, pasture or hay land crops; or farm animals; and public and private drainage systems and field roads located on any of these lands.

Wetland Management Classification



Wetland Management Class

- Class 1
- Class 2
- Class 3
- Class 4

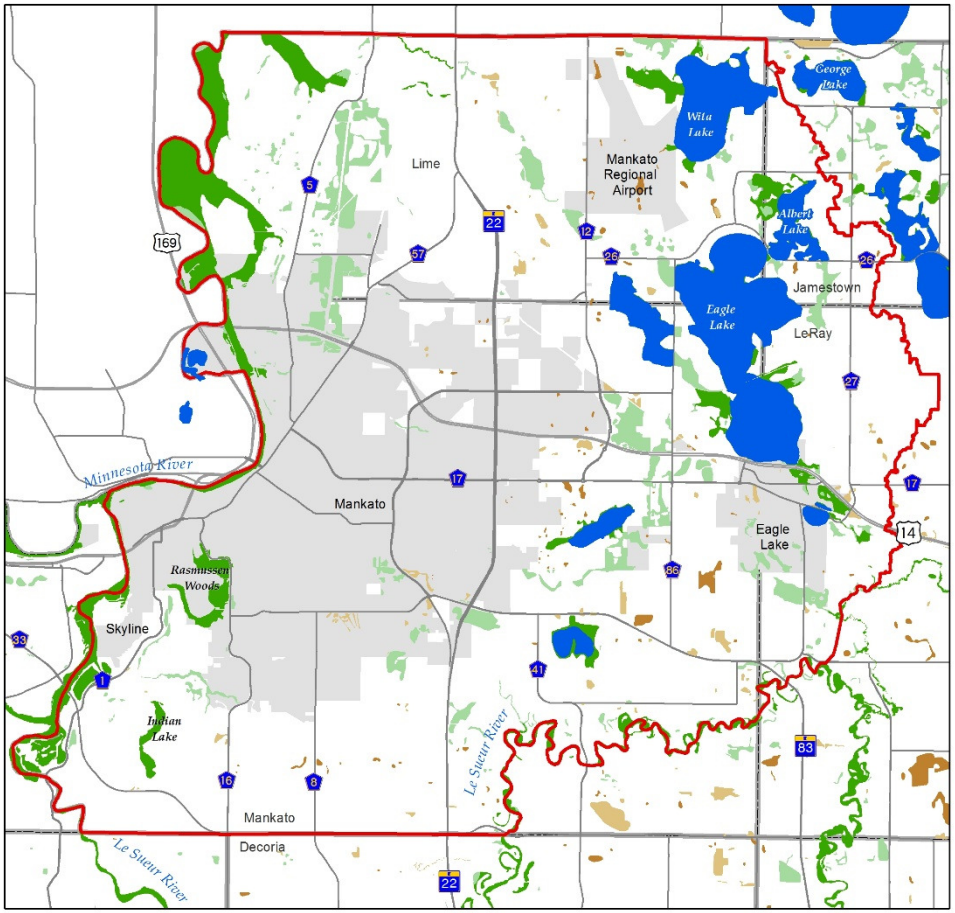
- Major Watershed
- Public Water Basin

0 — 5 Miles

Prepared By: Blue Earth County 2016

The National Wetlands Inventory (NWI) is the base layer for the classification. The boundaries of NWI are different than actual wetland delineations and are shown for planning purposes only.

North Central Planning Area - Wetland Management Classification



0 — 1 — 2 — 3 — 4 Miles

Wetland Management Class

- Class 1
- Class 2
- Class 3
- Class 4

- North Central Planning Area
- Public Water Basin
- City
- Township

Prepared By: Blue Earth County 2016

Regulations and Regulatory Agencies

Specific regulation of activities that may impact individual wetlands are based on wetland boundary delineations and evaluation of proposed activities as required by the Minnesota Wetland Conservation Act, and Federal Laws administered by the United States Army Corps of Engineers and the Minnesota Pollution Control Agency.

Federal

Army Corps of Engineers
Under the Federal Clean Water Act (CWA), the Corps has been delegated authority to issue permits for dredge or fill impacts to waters of the U.S. The Corps CWA Section 404 jurisdiction includes waters that are either navigable or that have a "significant nexus" to navigable water or waters of the United States.

While delineations determine if an area is a wetland, the Jurisdictional Determination (JD) is made by the Corps to determine whether an area is subject to Corps jurisdiction. Case by case evaluations are sometimes required to determine if there is a "significant nexus" to navigable waters. JDs can be requested early or as part of the permit application.

Minnesota Pollution Control Agency (MPCA)
Water quality certification authority under the Clean Water Act Section 401 is delegated by the Federal government to the MPCA. A 401 water quality certification or waiver is required for every Corps permit; however, for general permits and letters of permission, a 401 certification or waiver has been completed in advance. For individual permits, the MPCA conducts an individual review.

State of Minnesota

Wetland Conservation Act
The purpose of the Wetland Conservation Act, Minnesota Rules, part 8420.0100, is to:

1. achieve no net loss in the quantity, quality, and biological diversity of Minnesota's existing wetlands;
2. increase the quantity, quality, and biological diversity of Minnesota's wetlands by restoring or enhancing diminished of drained wetlands;
3. avoid direct or indirect impacts from activities that destroy or diminish the quantity, quality, and biological diversity or wetlands; and
4. replace wetland values where avoidance to activity is not feasible or prudent.

Implementation of Wetland Conservation Act (WCA) is the responsibility of both State and local government units (LGU).

Minnesota Board of Water and Soil Resources (BWSR)
In conjunction with Local Government Units (LGUs), BWSR administers the Minnesota Wetland Conservation Act (WCA), which regulates all wetlands except those that are deemed Public Waters (Wetland Conservation Act of 1991, Laws of Minnesota 1991, Chapter 354, as amended and Minnesota Rules, part 8420)). WCA approval does not preclude the need for a Corps permit.

The Board of Water and Soil Resources (BWSR) promulgates administrative rules for the program, provides training to local government units (LGUs), participates on technical evaluations panels (TEP), hears appeals from local government determinations, and assures proper implementation by LGUs.

Blue Earth County and the City of Mankato
In conjunction with BWSR, the WCA LGUs administer the WCA. The WCA LGU is responsible for making the initial regulatory determinations for the WCA program. There are three WCA local government units in the county that administer WCA: Blue Earth County Environmental Services and Public Works, and the City of Mankato. Blue Earth County and the City of Mankato each has a Technical Evaluation Panel (TEP).

The County's administration of the WCA is partially funded with the BWSR Natural Resources Block Grant (NRBG), County funds and the County's wetland determination fees paid by the land owner/developer. The SWCD's participation in WCA administration is partially funded through an annual transfer of NRBG WCA funds to the SWCD from the County. The minimum amount of the transfer of the NRBG to the SWCD is determined by the BWSR.

Minnesota Department of Natural Resources (MNDNR)
The MNDNR is the WCA LGU for MNDNR managed property of the State of Minnesota. The MNDNR has jurisdiction for Public Waters and Public Waters Wetlands, defined by Minnesota Statutes 2017, section 103G.005 and as shown on the Public Waters Map. Some Public Waters may also be under Army Corps of Engineers jurisdiction. The MNDNR administers a Public Waters Work Permit Program that covers an inventoried subset of lakes, rivers and larger wetlands within the state (Minnesota Statutes 2017, section 103G). MNDNR permits may be necessary if the project affects inventoried waters. The MNDNR permit would be in addition to a Corps permit.

Road Projects
The Minnesota Department of Transportation (MnDOT) is the WCA LGU with jurisdiction for State road projects. Blue Earth County Public Works is the WCA LGU for road projects in the county. MnDOT and local road project planning typically involves consultation and coordination with local governments and a public engagement process.

The WCA allows qualifying township, city, or county road impacts to be mitigated via the BWSR road replacement bank. These banks should be used when available.

All road authorities developing road projects should consider the *Blue Earth County Water Management Plan* priority areas for protection and restoration and wetlands sections during environmental review and project development phases of road projects as well as establishing mitigation sites and wetland banks in priority areas.

Wetland Conservation Act Implementation

WCA rules require the local government unit (LGU) and technical evaluation panel (TEP) to evaluate the public value and associated functions of wetlands when considering applications and making decisions regarding wetland impact sequencing (impact minimization, avoidance and replacement) and the adequacy of proposed wetland replacement.

The *Blue Earth County Water Management Plan* has identified priority areas for wetland and natural resource protection, enhancement and restoration and a function-based classification system and prioritization framework for evaluating the function and public value of wetlands. This framework will be used to assess the function and value of wetlands when evaluating the eligibility and assessing sequencing and sequencing flexibility applications and when evaluating the ecological suitability and sustainability of replacement sites.

WCA Sequencing Requirements
The Wetland Conservation Act (WCA), Minnesota Rules, part 8420.0520 sequencing requirements are, in priority order, to:

1) avoid direct or indirect impacts,

2) minimize impacts,
3) rectify impacts,
4) reduce or eliminate impacts, and
5) replace unavoidable impacts.

Reference Minnesota Rules, part 8420.0520 Subp. 3C (3) (f) and Minnesota Rules, part 8420.0520 Subp. 4E.

Wetland Replacement Standards

The Wetland Conservation Act (WCA), Minnesota Rules, part 8420.0522 and part 8420.0528 requires wetland replacement projects to replace the public value of wetlands lost as a result of an impact. The public value is based on wetland functions. The preferred method of restoration takes advantage of naturally occurring hydrogeomorphic conditions with minimal landscape alteration is most likely to result in a wetland that functions wholly, perpetually and naturally. Wetland restoration is generally preferred over creation. Restoration sites must be ecologically suitable for the landscape and sustainable.

Replacement Sites

Science-based, locally-defined criteria were developed to determine priority areas and potential replacement sites in the Greenprint and the *Blue Earth County Water Management Plan* through a collaborative effort of local government staff and representatives of the U.S. Fish and Wildlife Service, MNDNR, SWCD, MPCA, BWSR, engineering consultants and citizens.

Wetlands impacts replaced in the Greenprint and *Blue Earth County Water Management Plan* priority areas have the greatest potential to address watershed and ecological goals, provide sustained wetland functions and connect communities with ecosystems.

The County will continue to collaborate with other local units of government, regulatory agencies and other entities in the county and major watersheds to identify potential replacement opportunities.

Comprehensive Wetland Protection and Management Plan

The authority to prepare Comprehensive Wetland Protection and Management Plans is provided in the Minnesota Wetland Conservation Act (WCA), Minnesota Rules, part 8420.0830, and Minnesota Statutes 2017, section 103G.2243.

The idea for developing a local wetland plan for the county was first recommended during the local Greenprint planning efforts in 2006 that involved local citizens, local units of government and state agencies in a years-long planning process. Developing a Comprehensive Wetland Protection and Management Plan was a priority objective of the *Blue Earth County Water Management Plan 2008-2016.*

The County worked with local partners, stakeholders and technical committees for several years from 2014-2016 to develop a Comprehensive Wetland Protection and Management Plan. One of the most widely supported objectives of the plan was to replace wetland impacts in the county, because many wetland impacts were replaced in other counties. Much of that work involved updating the Greenprint, assessing wetland functions, types and conditions in the county, identifying and prioritizing wetlands and replacement sites and proposing alternatives to some parts of the WCA.

As an alternative to the wetland plan, the BWSR recommended incorporating the work done to prioritize wetlands and replacement sties and the function-based classification system and prioritization framework in this *Blue Earth County Water Management Plan* to be used by the WCA LGUs and the TEP when evaluating sequencing and replacement plan applications instead of a wetland plan. Depending on how well this approach addresses the County's watershed and ecological goals, the County may consider working with local partners, stakeholders and the TEP to complete a wetland plan during the planning period.

The technical work analyzing the location, type and functions of historical and existing wetlands, identifying and prioritizing wetlands, and the strategic locations of replacement sites for the wetland plan was used to support wetland and other priority concerns in the *Blue Earth County Water Management Plan* and will be available in a technical report.

Wetland Protection

Importance of Wetland Buffer Areas

Wetland storage capacity and other wetland functions are diminished by human activities that degrade wetlands. The Army Corps of Engineers describes some of the problems with wetlands that lack upland buffer protection in the *A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Prairie Potholes (HGM)*:

> "Accelerated sedimentation may be the most detrimental impact on wetlands. Accumulation of sediment in wetlands decreases wetland volume, decreases the duration wetlands retain water, and changes plant community structure by burial of seed banks."

In developed areas of the county there are chronic problems with encroachment in wetland areas by all types of building structures, construction site runoff, paving, filling, mowing and vegetation removal.

A buffer of undisturbed vegetation around a wetland can provide a variety of benefits. Buffers reduce the impacts of surrounding land uses on wetland functions by stabilizing soils to prevent erosion; filtering solids, nutrients, and other harmful substances; and moderating water level fluctuations during storms.

Buffers also provide essential habitat for feeding, roosting, breeding and rearing of young birds and animals; and cover for safety, movement and thermal protection for many species of birds and animals. Since many animal species require both wetland and upland habitats as part of their life cycles, and also require opportunities to move to escape predators or find food and cover, buffers should be planned to maximize these connections. Wider buffers provide additional water quality and habitat benefits.

Buffers can be planned to connect important upland habitats to wetlands, or connect wetlands and other waters. Buffers will be most effective if the landowners around a wetland make a continuous buffer, and connect desirable wetland and upland habitats.

Blue Earth County Wetland Protection Requirements

Blue Earth County requires a one-rod (16.5 feet) buffer around delineated wetlands in subdivisions, and the City of Mankato requires a 16.5 foot building setback from wetlands. Structural setbacks and protection of the shoreland areas of Public Waters and Public Waters Wetlands are greater than 16.5 feet and are regulated by municipal and county shoreland ordinances in accordance with Minnesota Rules, part 6120.

Blue Earth County subdivision and shoreland ordinances require construction or land alteration activities avoid a net increase in impervious surfaces that drain to surface waters or wetlands, or relocation of impervious surfaces closer to wetlands, or changes to drainage patterns (slopes, meander patterns, etc.) that increase the velocity or rate of runoff to wetlands. Graded slopes adjacent to wetland protection areas should be no steeper than 3:1 and protected to control erosion and sediment runoff to the wetland.

Construction Site and Stormwater Requirements

Construction projects where there is one acre or more of land disturbance are regulated by the MPCA National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General or Individual Permit. The NPDES permit definition of surface water includes "all streams, lakes, ponds, marshes, wetlands, reservoirs, springs, rivers, drainage systems, waterways, watercourses, and irrigation systems whether natural or artificial, public or private…"

The MPCA NPDES Construction Stormwater General Permit requires a Stormwater Pollution Prevention Plan (SWPPP) that identifies the location of wetlands, buffers, protection of impaired waters and the design of permanent stormwater management systems.

Buffer requirements for surface waters, including wetlands, are a minimum of 50-feet and are summarized in the Stormwater Section of this plan and in the MPCA NPDES Construction Stormwater General Permit.

All stormwater discharged from the project during construction and from permanent stormwater systems after construction should not cause a significant adverse impact to wetlands from inundation or decreased flow to the wetland.

Wetland Protection and Setback Recommendations

Blue Earth County and local units of government in the county with land use controls may consider revising existing or establishing new wetland setbacks to protect wetland functions for water storage and wildlife habitat and minimize encroachment and filling wetlands in the county.

The MPCA *Pollution Prevention and the MS4 Program: A Guide on Utilizing Pollution Prevention Activities to Meet MS4 General Permit Requirements* recommends the determination of buffer widths on individual wetlands be based on the following minimum guidelines:

- 50 feet for reduction of human impact
- 50 to 100 feet for overall water quality protection
- 50 to 200 feet for habitat protection and species diversity

The high end of the range is recommended for sensitive water bodies, steep slopes and surrounding land uses that could adversely impact the water body. Buffer width should be added to off-set the adverse impacts of slope, poor soils, human land use pressures, or to add extra protection for sensitive aquatic organisms or wildlife.

The Army Corps of Engineers *St. Paul District Compensatory Mitigation Policy for Minnesota,* January 2009, recommends varying the width of upland buffer "depending upon the goals for the site (e.g., water quality, wildlife habitat), adjacent land use (golf fairway vs. parking lot), slope (steep vs. gentle), vegetation and soils. For example, a 25-50 foot width may be adequate to achieve water quality improvements, while a 90-330 foot width may be necessary for certain wildlife habitat functions." For wetland replacement projects the Army Corps of Engineers requires a 25 foot minimum average buffer width in urban settings and 50 feet in rural settings, and buffer widths can be adjusted upward for site-specific conditions such as slope, soils, vegetation, etc.

Additional Wetland Protection and Management Strategies

Green Infrastructure - Greenprint

Wetlands and upland buffers are important elements of the Greenprint vision for the county. The Greenprint consists of strategically planned, interconnected networks of waterways, wetlands, woodlands, wildlife habitats, and other natural areas; greenways, parks, trails; conservation lands; and other open spaces that support natural ecosystem processes and contributes to the health and quality of life for communities and people in the county. More information about the Greenprint is in Priority Areas for Protection and Restoration section of this plan.

Wetland Protection Easements

Wetland buffers are integral to the preservation of natural wetland functions and public values in the county. Wetland buffer or

protection easements may be considered for wetlands in priority areas where wetlands have high greater public value for wildlife, water quality, water storage or are important for open green space connections. Minnesota Statutes 2017, section 462.357 Subdivision 1 allows municipalities to purchase development rights in the form of conservation easements.

Wetland Dedication

Minnesota Statutes 2017, section 394.25 subdivision 7 allows counties and Minnesota Statutes 2017, section 462.358 subdvision 2b allows municipalities to require that a portion of any proposed subdivision be dedicated to the public or preserved for public use as parks, recreational facilities, playgrounds, trails, wetlands or open space. Any cash payments received in lieu of dedication must be used only for the acquisition of development or improvement of parks, recreational facilities, playgrounds, trails, wetlands or open space. Blue Earth County, the City of Mankato and other local governments in the county currently require park dedication of land or payment of fees in-lieu of land dedication.

Wetland Stewardship Opportunities for Commercial and Industrial Land Use

The MPCA *Pollution Prevention and the MS4 Program: A Guide on Utilizing Pollution Prevention Activities to Meet MS4 General Permit Requirements* recommends additional wetland stewardship activities to incorporate site-level and regional planning as summarized below.

Commercial and industrial sites have a higher degree of impact on wetlands than most land uses, due to their typically large amounts of impervious surfaces. Summer heat and winter salt on large parking lots, conversion of green space and natural communities to impervious surfaces with increased stormwater runoff and other factors, can create adverse impacts on wetland ecosystems. Extra protection efforts for wetlands adjacent to industrial and commercial land to preserve their functional values is recommended.

The following strategies may be applied in cooperation between the local government unit and developers of commercial and industrial sites to preserve functions and values.

- Concentrate open space and/or green space adjacent to wetland buffers.
- Provide natural landscaping around wetlands and buffers, and in areas away from building entrances.
- Plant wetland buffers to provide screening between adjacent land uses, or to mitigate for tree removal during construction.
- Cooperate among businesses to increase the overall size and connections among buffers.

Benefits:

These actions can further protect wetlands and provide additional habitat components that are valuable to wetland ecosystems.

- Wildlife use of these areas will likely increase.
- Compared to traditional turf, native landscaping will reduce maintenance costs.
- Native plantings can provide an attractive setting for businesses that want to emphasize their concern for environmental and habitat quality.
- These areas can be used for walking trails, lunch areas, or other employee activities.

Wetland Protection, Restoration and Enhancement Goals and Strategies

Goal: Protect, enhance and restore wetlands in priority areas to provide important water quality, wildlife habitat and groundwater protection functions in local watersheds.

Wetland Conservation Act (WCA) Strategies and Policies

ONGOING PROGRAM: WETLAND CONSERVATION ACT, MINNESOTA RULES, PART 8420.
The County will continue to administer the Wetland Conservation Act, Minnesota Rules, part 8420, in accordance with Minnesota Rules and Statutes and with guidance from the *Blue Earth County Water Management Plan*.

Wetland Conservation Act (WCA) Implementation Policies

WCA rules require the local government unit (LGU) and technical evaluation panel (TEP) to evaluate the public value and associated functions of wetlands when considering applications and making decisions regarding wetland impact sequencing (impact minimization, avoidance and replacement) and the adequacy of proposed wetland replacement. The *Blue Earth County Water Management Plan* provides a function-based classification system and prioritization framework for wetlands in consideration of local public values. This framework will be used to assess the function and value of wetlands.

The following policies related to the implementation of the WCA are adopted to help achieve the plan's wetland goals.

SEQUENCING POLICY: IMPACT AVOIDANCE AND MINIMIZATION.
When evaluating wetland impact avoidance and minimization, the LGU and TEP should consider the functional classification of the wetland(s) and their public value in relation to priority preservation and replacement areas as designated in the *Blue Earth County Water Management Plan*. (Reference: Minnesota Rules, part 8420.0520 subpart 3C (3) (f) and subpart 4E.)

SEQUENCING POLICY: FLEXIBILITY.
When evaluating whether or not to exercise flexibility in the application of the sequencing steps, the LGU and TEP should consider the functional classification of the wetland(s) and the priority wetland replacement areas in the *Blue Earth County Water Management Plan*. (Reference: Minnesota Rules, part 8420.0520 subparts 7A(1) and 7B.)

REPLACEMENT STANDARDS POLICY: ECOLOGICAL SUITABILITY.
When evaluating and determining the appropriate location, type, function, design and ecological suitability of replacement wetlands, the LGU and TEP should consider the priority wetland replacement areas in the *Blue Earth County Water Management Plan*. (Reference: Minnesota Rules, part 8420.0522 subpart 5D and part 8420.0528 subpart 1.)

Wetland Planning

STRATEGY: WETLAND REPLACEMENT SITES.

Science-based, locally-defined criteria were developed to determine priority areas and potential replacement sites in the Greenprint and the *Blue Earth County Water Management Plan* through a collaborative effort of local government staff and representatives of the U.S. Fish and Wildlife Service, MNDNR, SWCD, MPCA, BWSR, engineering consultants and citizens.

Action: The County may continue to collaborate with other local units of government, regulatory agencies and other entities to identify potential replacement opportunities in local watersheds to achieve plan goals. (Reference: Minnesota Rules, part 8420.0520 Subp. 7F.)

STRATEGY: COMPREHENSIVE WETLAND PROTECTION AND MANAGEMENT PLAN.

The County may consider development of a Comprehensive Wetland Protection and Management Plan as an alternative to WCA rules in accordance with Minnesota Rules, part 8420.0830.

Wetland Protection, Enhancement and Restoration Strategies

PRIORITY WETLANDS POLICY: PRIORITY WETLAND FUNCTIONS FRAMEWORK.

Policy: Local units of government should consider the wetland functions classification framework and the natural resource priority areas in the Priority Areas for Protection and Restoration Section of the *Blue Earth County Water Management Plan* when developing all types of land use and comprehensive plans. (Reference: Minnesota Statutes 2017, sections 394.23, 394.231, 462.357 Subd.9)

STRATEGY: AQUATIC AND NATURAL RESOURCES IN LAKE WATERSHEDS.

Action: Protect, enhance and restore wetlands and aquatic vegetation in near-shore areas to provide critical fish and wildlife habitat and shoreline protection from waves and ice ridges.

Action: Protect, enhance and restore water quality, water storage, fish and wildlife habitat and recreation functions with wetland restoration, wetland and upland buffers for habitat and erosion control, constructed wetlands, stormwater quality treatment wetlands or similar conservation projects in lake watersheds.

STRATEGY: AQUATIC AND NATURAL RESOURCES IN GREENPRINT PRIORITY AREAS.

Land Use Policy: Local government units in the county will consider minimizing fragmentation and development of woodlands, wildlife habitat, open space, shoreland, and wetlands in Greenprint priority areas. (Reference: Minnesota Statutes 2017, sections 394.23, 394.231, 462.357 subdivision 9)

Action: Protect, enhance and restore wetlands and natural resources and restore channelized streams in Greenprint river corridors to provide wildlife habitat, floodwater storage, groundwater recharge, nutrient assimilation, water quality, open space and recreation functions.

Action: Protect, enhance and restore wetlands and upland wildlife habitat and grasslands in Greenprint wetland complexes, shoreland and river corridors.

Action: Seek funds and support private and non-profit partnerships and investments to protect, enhance and restore wetlands, upland habitat, other natural resources and recreation in the Greenprint and priority areas in the Priority Areas for Protection and Restoration Section of the *Blue Earth County Water Management Plan*.

STRATEGY: GROUNDWATER PROTECTION AND RECHARGE FUNCTIONS.

Action: Protect and restore wetlands and upland buffers in areas with the potential to recharge buried sand and bedrock aquifers and in areas with moderate or high pollution sensitivity as shown in the *Geologic Atlas of Blue Earth County, Part B* or the Priority Areas for

Protection and Restoration Section of the *Blue Earth County Water Management Plan*.

STRATEGY: WATER STORAGE FUNCTIONS.

Action: Ensure community resilience with wetland protection, enhancement and restoration, constructed wetlands, water quality treatment wetlands and other water storage practices to minimize flooding and/or erosion in ravines and downstream channels.

STRATEGY: NUTRIENT ASSIMILATION AND TREATMENT FUNCTIONS.

Action: Protect, enhance and restore wetlands or wetland functions to provide treatment for nitrogen and phosphorus in priority areas and watersheds in the *Blue Earth County Water Management Plan.*

STRATEGY: STORMWATER AND WATER QUALITY TREATMENT WETLANDS.

Action: Constructed wetlands or water quality treatment wetlands should be considered in watersheds where water storage, flow attenuation, flood water storage or nutrient treatment functions are needed for water quality or to prevent flooding or erosion downstream.

Wetland Protection Strategies

Erosion and sedimentation, filling and encroachment from surrounding land uses result in wetland degradation are common throughout the county. The result is loss of stormwater retention and flood storage functions as well as wildlife habitat. Wetlands in urban areas, lake watersheds and Greenprint priority areas are the highest priority for wetland protection.

STRATEGY: UPLAND BUFFERS AND SETBACKS FOR WETLANDS.

Action: The County will ensure wetland functions are protected with upland buffers a minimum of 16.5 feet from wetlands when new subdivisions are platted.

Action: Local units of government in the county will continue to ensure wetland functions are protected with existing structural setbacks and upland buffers.

Action: Local units of government in the county will consider wetland buffers and/or structural setback requirements, conservation easements, or open space dedication to protect wetlands from accelerated sedimentation and loss of water storage, loss of habitat or encroachment from surrounding land uses.

STRATEGY: CONSTRUCTION STORMWATER CONTROLS.

Action: Protect wetlands from development impacts during construction with vegetated buffers, perimeter controls and other erosion control strategies to ensure wetland storage volume is not diminished due to accelerated erosion and sedimentation. (Reference: MPCA NPDES Construction General Permit)

Action: Ensure that existing wetland hydrology is maintained and stormwater discharged from development projects and permanent stormwater systems does not cause a significant adverse impact to wetlands from inundation or decrease of flow. (Reference: MPCA NPDES Construction General Permit)

Wetland Priorities

Wetland Functions and Local Public Value

Wetland functions are science based natural processes that occur in wetlands. The value of a wetland is an estimate of the importance or worth of one or more of its functions to society and individuals. Wetlands are considered valuable because they use and filter nutrients, recharge water supplies, retain water, reduce flooding, and provide fish and wildlife habitat. Wetlands also provide recreational opportunities and aesthetic benefits.

Local Public Values

Minnesota Statutes 2017, section 103B.3355 requires local public values of wetlands be determined based on the functions of wetlands.

The wetland functions most important in local watersheds were determined with consideration of watershed and ecological goals, an assessment of existing wetlands functions and citizen and technical stakeholders' input. Citizen surveys to determine important wetland functions and priority aquatic and natural resource concerns were conducted just prior to developing this plan.

Loss of wetlands, wildlife habitat, water quality and groundwater quality are priority management concerns. Protecting and restoring these functions are the highest priority for achieving watershed and ecological goals in local watersheds. The ability of wetlands to provide multiple benefits has the greatest local public value.

Most Important Wetland Functions

The following wetland functions were determined to be most important in local watersheds and have the greatest local public value:

- **Wildlife Habitat**, including terrestrial and aquatic habitat and connectivity of those habitats
- **Public Recreation,** including hunting and fishing areas, wildlife viewing areas, and nature areas
- **Water Storage**, including floodwater and stormwater attenuation and the potential for downstream flooding and downstream erosion in the watershed
- **Water Quality**, including utilization of nutrients that would otherwise pollute public waters, filtering of pollutants to surface and groundwater and shoreline protection
- **Groundwater Protection**, including utilization of the wetland for groundwater protection or as a recharge area for groundwater and low flow augmentation of streams and rivers
- **Rare Plant and Animal Habitat,** as mapped in the MNDNR Minnesota County Biological Survey
- **Ability to Provide Multiple Benefits,** including wildlife habitat, water storage, water quality, groundwater protection, rare plant and animal habitat and public recreation functions

These important wetland functions were grouped and/or divided into four priorities, including 1) the ability to provide multiple benefits, 2) water storage, 3) water quality and 4) groundwater protection.

All wetlands provide important functions, but not all wetlands provide all functions equally well.

Source: United States Geological Survey

High Priority Areas

Science-based, locally-defined criteria were developed to determine priority areas and potential wetland replacement sites in the Greenprint and the *Blue Earth County Water Management Plan* through a collaborative effort of local governments and representatives of the U.S. Fish and Wildlife Service, MNDNR, SWCD, MPCA, BWSR, engineering consultants and citizens.

The highest priority areas are interconnected ecological corridors and wetland complexes in the Greenprint. These priority areas contain important wildlife habitats and aquatic and natural resources that provide multiple wetland functions important in local watersheds.

Protecting and restoring wetlands and avoiding impacts to wetlands in priority areas is important for sustaining water quality and wildlife habitat functions in local watersheds. Impacts to and loss of wetlands in the Greenprint priority areas can result in critical loss or fragmentation of habitat or changes in hydrology that reduce the ability of the wetland and potentially the entire wetland complex or corridor to provide the desired functions important in their watershed.

Wetland enhancement and restoration in Greenprint priority areas are more likely to be ecologically sustainable as these areas provide connectivity to other aquatic resources and upland habitat and are more likely to be protected from future disturbance from the surrounding landscape.

Wildlife Habitat

Wildlife habitat and recreation are the wetland functions most valued by local residents. Protecting, enhancing and restoring wildlife habitat and restoring fragmented habitat in areas where wetlands provide multiple benefits is a long-term resource need in the county and local watersheds.

Habitat loss refers to the complete eradication of a parcel of habitat, such as conversion of native wetlands, lake and stream shoreline plant communities, prairies, forests, or brushlands to agricultural, residential, or industrial uses.

Habitat degradation occurs when the habitat is still present but its value to native plant, wildlife, and aquatic communities has been impaired or changed significantly. For example, wildlife habitats in urban and exurban developments retain some but not all important natural characteristics, so that some wildlife species can persist while others disappear or greatly decline. In lakes, near-shore habitats (needed by many aquatic species for breeding and juvenile rearing) become degraded when too much native vegetation is removed from shorelines and woody debris and aquatic plants are removed from near-shore waters.

Habitat fragmentation is the breakup of large contiguous areas of habitat into smaller and smaller parcels and fragments. The fragments are no longer close enough or sufficiently connected to allow fish, wildlife, and other native organisms to move freely among habitats in order to use optimal breeding and rearing sites. For example, road construction can fragment prairie, wetland, brushland, or forest; low-head dams in rivers and various water control structures in lakes disrupt natural movements of fish and amphibians. Habitat fragmentation may degrade the genetic capacity of wild populations to adapt to future environmental change because it fragments larger populations—which harbor more genetic variation—into smaller breeding groups. A cumulative effect of habitat loss, degradation, and fragmentation is large declines in abundance and productivity of wild populations, threatening their ability to adapt to future environmental changes and to persist for the enjoyment of future generations.

Long Term Resource Needs

Wetland Protection Buffers

Sustainable wetlands should include buffers and upland protection or treatment. Accelerated sedimentation may be the most detrimental impact on wetlands. Accumulation of sediment in wetlands decreases wetland volume, decreases the duration wetlands retain water, and changes plant community structure by burial of seed banks. (Source: ACE HGM)

Priority Sites for Wetland Water Quality Functions

Priority Replacement Sites

Potentially restorable basins were identified and prioritized based on ability to provide 1) water storage or 2) water quality functions. Shallow basins that support vegetation are needed for water quality treatment to utilize nutrients. Greater storage volume and potentially deeper basins are needed for water storage.

Replacing degraded wetlands in the Greenprint and priority areas identified in the *Blue Earth County Water Management Plan* is certain to provide a gain in wetland function and public value, especially in areas where impact avoidance will continue to maintain a degraded wetland or result in further degradation of the wetland from altered hydrology, invasive species, fertilized lawns, concentrated stormwater runoff, trash, or pet waste inputs.

Some of the potentially restorable basins identified in this plan will not be suitable for wetland restoration but might be suitable for constructed stormwater wetlands or conservation practices to provide water quality or water storage functions important in local watersheds. Ultimately, site conditions and landowner goals will determine how or if potential sites might be used for conservation projects.

Potentially Restorable Basins

The U.S. Fish and Wildlife Service and Ducks Unlimited produced a restorable depressional wetlands inventory for many counties in the Prairie Pothole region of Minnesota including Blue Earth County. This inventory includes over 32,787 (71,218 acres) potentially restorable wetlands in the county. The potentially restorable wetlands in this inventory range in size from under .1-acres to over 900 acres.

To prioritize potentially restorable basins for this plan, the County used terrain analysis based on the 2012 LiDAR Digital Elevation Model. For this analysis, a minimum size of two acres and depth of at least six inches were used as the starting criteria. A consultant, Houston Engineering Incorporated, performed the terrain analysis that allowed for many functions like storage volume, ability to hold certain rainfall events and ability for nutrient treatment to be assessed. There are over 3,000 total potentially restorable depressions of at least two acres in size analyzed to support prioritizing wetland replacements.

Priority Areas – Groundwater Protection and Recharge

Groundwater Pollution Sensitivity and Recharge

Groundwater protection and recharge are a high priority in the county and affect groundwater aquifers beyond county or watershed boundaries.

In most of the county soil infiltration and groundwater recharge of deeper aquifers is limited. Areas with shallow depth to bedrock, karst and potential for groundwater recharge were identified for this plan using the *Geologic Atlas of Blue Earth County, Part B*.

The 2016 *Geologic Atlas of Blue Earth County, Part B*, includes an analysis of pollution sensitivity and an evaluation of the recharge rate of surface water into deeper aquifers.

> "The travel times to buried aquifers vary from days to thousands of years. Areas with relatively short travel times of less than a few years are rated high or very high pollution sensitivity. Areas with

estimated travel times of decades or longer are rated low or very low pollution sensitivity."

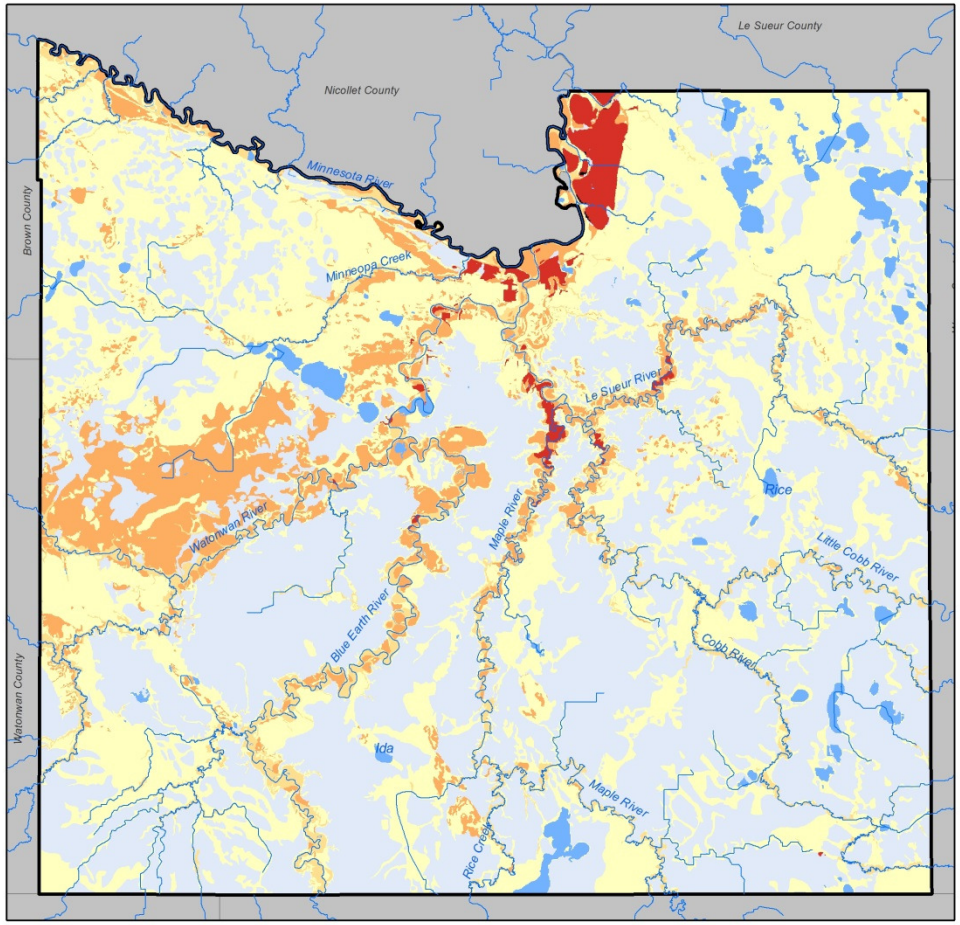
Maps of rapid or focused recharge for specific aquifers are show in in Figures 25 through 32 on pages 42 to 47 of the *Geologic Atlas of Blue Earth County, Part B*.

The map on the following page shows a compilation of the highest rates of recharge for each of the aquifers in the Geologic Atlas. It includes the "High" and "Very High" classes in which the vertical travel time for water to enter a buried sand aquifer is less than a year.

Of the potentially restorable wetlands identified in this plan, 316 are located in an area with "High" or "Very High" potential for groundwater recharge.

To determine whether a potential site can provide groundwater protection or groundwater recharge in practice, a more detailed field analysis will be necessary. Whether a potential site might be developed for a wetland restoration or another type of conservation practice will depend on site suitability and landowner goals. Site suitability should include an analysis of surrounding land uses and potential sources of pollution when restoring wetlands or constructing water storage and water quality practices in areas with high or very high pollution sensitivity to ensure the project will protect water quality instead of becoming a source of pollution. Additional buffers and other measures may be needed in these areas.

Pollution Sensitivity of Near-Surface Materials



Pollution Sensitivity: Estimated vertical travel time through near-surface materials

- High: hours to a week
- Moderate: a week to weeks
- Low: weeks to months
- Very Low: months to a year
- Karst[1]
- Bedrock
- Water

N

0 5 Miles

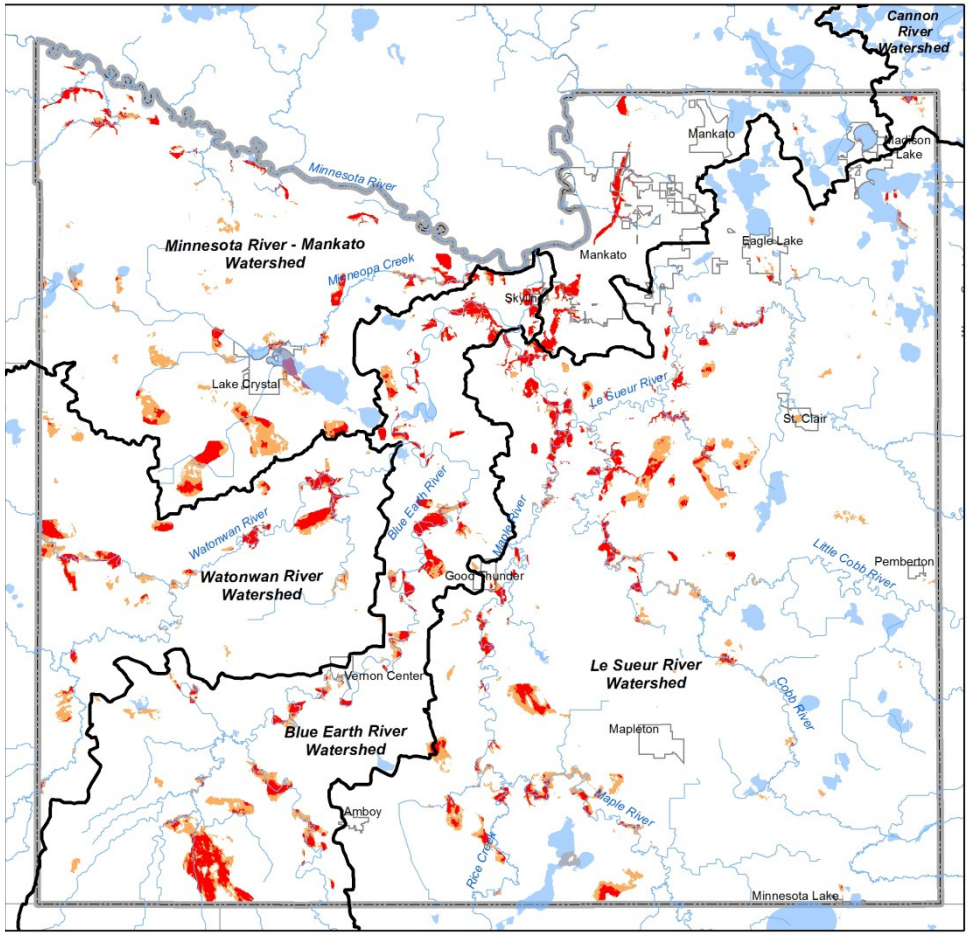
Prepared By: Blue Earth County 2016

Source: Geologic Atlas of Blue Earth County - Part B Minnesota Department of Natural Resources 2016

1 Karst allows a direct, very rapid exchange between surface water and groundwater and significantly increases groundwater contamination risk from surface pollutants.

This pollution sensitivity model assumes a 10-foot-deep water table and vertical travel of possible pollutants through unsaturated, near-surface materials.

Areas of Highest Potential Groundwater Recharge



Major Watershed

Recharge Potential and Estimated vertical travel time for water to enter a buried sand aquifer

- Very High: Hours to Months
- High: Months to Years

N W E S

0 5 Miles

Prepared By: Blue Earth County 2016

Source: Geologic Atlas of Blue Earth County - Part B Minnesota Department of Natural Resources 2016

This map shows a compilation from the pollution sensitivity maps on pages 42-47 of the Geologic Atlas of Blue Earth County, Part B. Pollution sensitivity is defined by the physical properties that affect downward migration of pollutants to the groundwater. The main variable is the rate that water travels from the surface to the aquifers.

Priority Areas – Water Storage – Flood water and Stormwater Attenuation

Description of Water Storage Function

Water storage functions relate to the capacity to collect and retain surface water runoff, direct precipitation and discharging groundwater. Water storage includes water standing in the basin and water held in the soil.

The source of the following description of water storage functions is from *A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Prairie Potholes (HGM)*, Army Corps of Engineers.

Water that is delayed or stored in the wetland reduces the amount of runoff down slope, thereby ensuring a decrease in flood crests down gradient. Wetlands facilitate detention of runoff because many lack well-defined surface water outlets and, between basins, subsurface flows in glacial till are slow. When runoff is detained in a regionally dispersed manner by wetland basins, pulses of water that eventually enter downstream areas in most cases are staggered (desynchronized). This broadens the storm hydrograph and reduces streamflow peaks.

Land use activities also affect erosion up slope and sediment import into the wetlands. An increased sediment load will decrease the wetland's capacity to store water, sometimes nearly eliminating storage capacity.

Although accumulation and retention of sediments and particulates are recognized functions of wetlands resulting in improved water quality, it has a negative effect on wetland hydrology. Many wetlands are closed basins; thus, sediment inputs are derived primarily from wind and water erosion of upland soils within the catchment. Upland land use affects the movement of water, sediment, and pollutants into the wetland. Generally, the higher the percentage of catchment under perennial cover, the better the condition of the wetland. Properly managed perennial cover helps to slow the movement of water down slope, which aids in the filtering of sediments and entrapment of pollutants.

Prioritizing Potential Sites for Water Storage

Each potentially restorable basin (landscape depression) was analyzed for the ability to store surface water runoff from its catchment area. For planning purposes, this analysis assumes each basin is empty and allows for comparison among potential sites. However, most existing wetlands with the greatest storage capacity typically contain water because wetland (hydric) soils in the county are poorly- or very poorly-drained with very low infiltration rates. Water storage capacity in a wetland will vary seasonally and year-to-year as it will depend on recent rainfall as well rain and snow in previous years.

Potential sites were prioritized based on the ability to hold a 10-year, 24-hour storm event (4.37 inches), which sites hold the largest volume of water and which sites have the smallest footprint while storing the most water.

To determine whether a site can provide water storage functions in practice, a more detailed field analysis will be necessary. Whether a potential site might be developed for a wetland restoration or another type of conservation practice will depend on site suitability and landowner goals.

Potentially Restorable Basins - Priority Water Storage Criteria

Maps on the following pages display potential sites for water storage based on the following prioritization criteria:

1. Ability to store a 10-year 24-hour rain event (4.37 inches),
2. Largest potential storage volume (100 acre feet or more), and
3. Top 10% for ratio of volume to surface area – they hold the most water in the smallest footprint

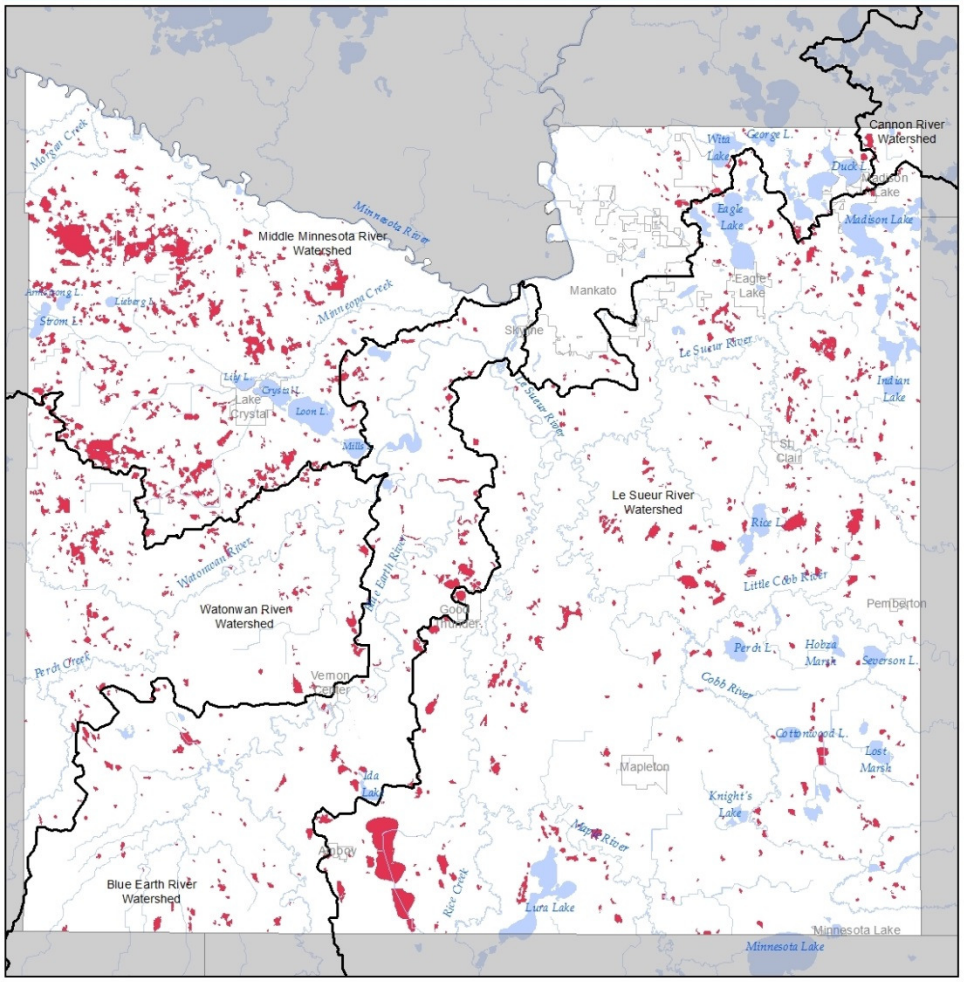
Priority Areas and Watersheds

Water storage is an important function in all watersheds in the county. Small watershed catchments such as ravines and lakes as well as watersheds at the minor (HUC 10-12) and major (HUC 8) watershed scale are affected by altered hydrology as a result of lost water storage. Every local unit of government in the county has been affected by flooding. Every municipality and most townships in the county have been affected by flooding or flash flooding.

Reduced water storage contributes the following water management concerns:

- Flooding in developed areas, roadways.
- Near channel erosion and channel incision in ravines, intermittent streams and rivers; significant sources of erosion and sedimentation downstream.
- Elevated water levels and negatively impacted aquatic vegetation and aquatic life in lakes and wetlands. Naturally fluctuating water levels best support maintenance of healthy aquatic and wetland vegetation.

Potentially Restorable Basins that can Store the 10-Year 24-Hour Rain Event (4.37 inches)



0 5 10 Miles

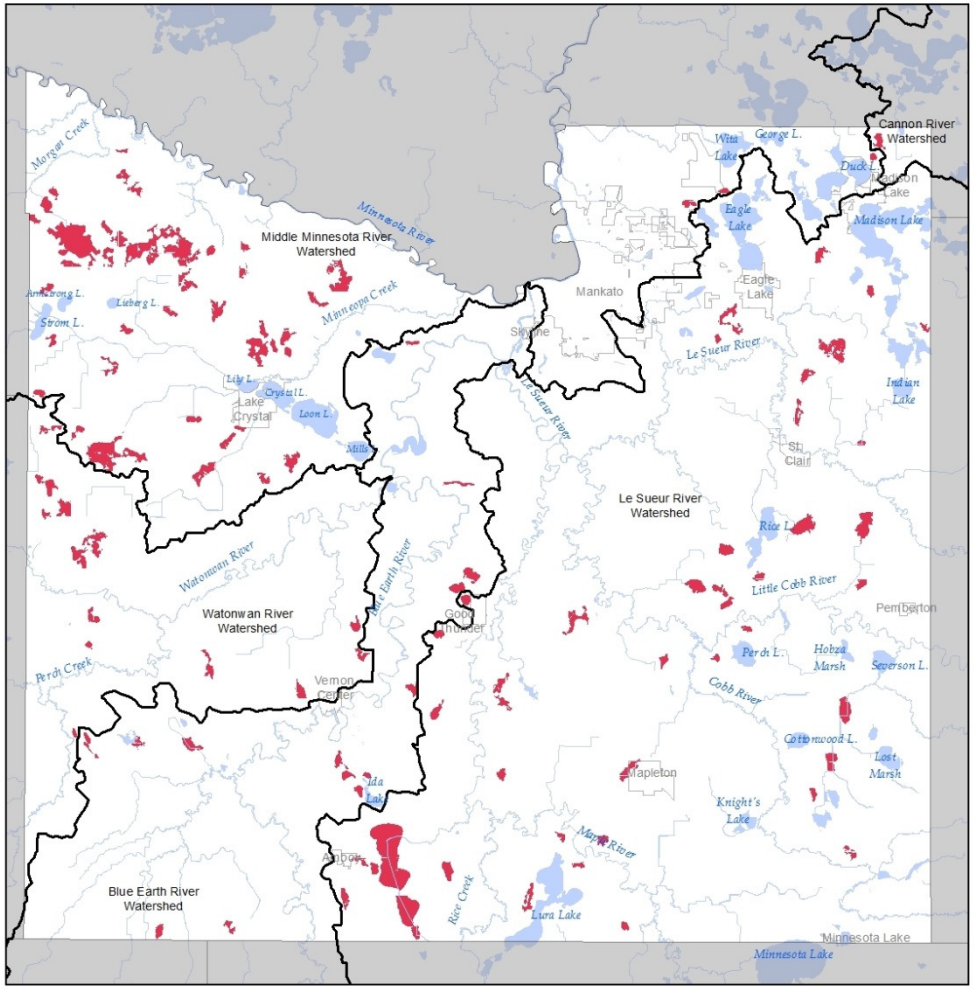
Potentially Restorable Basin that can Store the 10-Year 24-Hour Rain Event

Major Watershed (HUC 8)

Prepared By: Blue Earth County Environmental Services 2017

Source: Potentially Restorable Basin LiDAR Terrain Analysis - Houston Engineering Inc. 2015

Potentially Restorable Basins that Have a Volume of 100 Acre-Feet or More



0 5 10 Miles

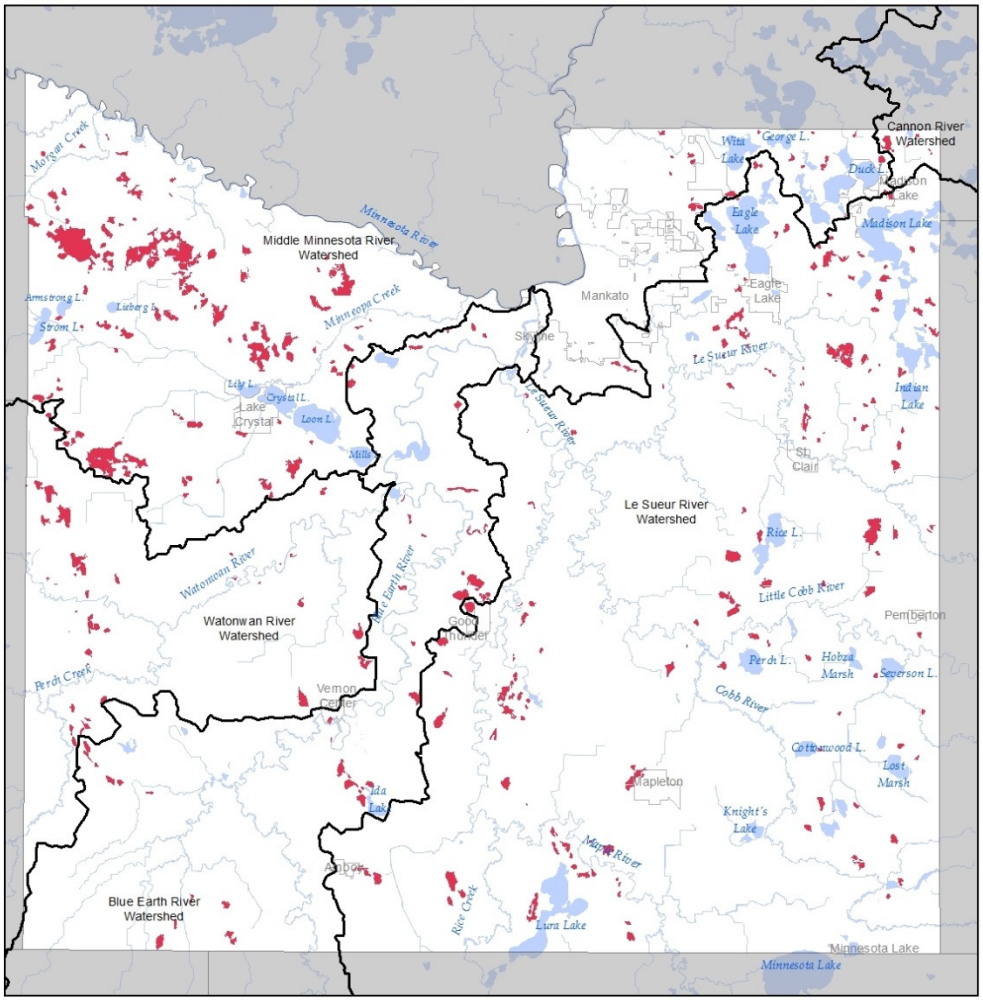
Potentially Restorable Basins that have A Volume of 100 Acre-Feet or More

Major Watershed (HUC 8)

Prepared By: Blue Earth County Environmental Services 2017

Source: Potentially Restorable Basins LiDAR Terrain Analysis - Houston Engineering Inc. 2015

Potentially Restorable Basin in the Top 10 percent for Ratio of Volume to Surface Area



0 5 10 Miles

Potentially Restorable Basin in the Top 10-Percent for Ratio of Volume to Surface Area

Major Watershed (HUC 8)

Prepared By: Blue Earth County Environmental Services 2017

Source: Potentially Restorable Basins LiDAR Terrain Analysis - Houston Engineering Inc. 2015

Priority Areas - Water Quality – Nutrient Treatment

Description of Nutrient Treatment Function

The source of the following description of nutrient treatment functions is *A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Prairie Potholes (HGM)*, Army Corps of Engineers.

A wetland's ability to uptake, metabolize, sequester and/or remove nutrients and imported elements from the water is primarily dependent on wetland vegetative conditions. Microbial processing and bioaccumulation are associated with plant cover including floating, emergent or submergent vegetation. Vegetative density can serve as an index of primary production, which is an indicator of nutrient assimilation.

Wetland environments are effective at denitrification. Wetland vegetation needed for removing nutrients survives best in wetlands less than three feet deep. Forested wetlands retain ammonia during seasonal flooding.

Excessive nutrient loading to a wetland can cause nuisance algal blooms and the production of monotypic stands of invasive or weed species. Observed point source or nonpoint source of nutrients may include but is not limited to: fertilized lawns, agricultural runoff, manure storage or spreading, concentrated stormwater runoff, or pet waste inputs.

Phosphorus is removed from the water column in wetlands through plant uptake, immobilization by microorganisms into microbial cells during decomposition of plant material, adsorption of orthophosphate onto clay and oxyhydroxide surfaces, and precipitation with cations such as calcium, magnesium and iron. The best long-term removal process is uptake by growing plants, and the storage of plant remains as peat or removal of plant material by harvest.

There is a limit to the amount of phosphorous that can be adsorbed because adsorption sites can become saturated with phosphorous. Normally, most phosphorus is associated with particulate materials that are removed from the water column as sediments settle. Annual net uptake of phosphorus by growing vegetation, although significant, usually represents a small quantity relative to the soil/sediment sinks of phosphorus.

Prioritizing Potential Sites for Nutrient Treatment

The local technical and stakeholder advisory committee used the Iowa CREP criteria for nitrogen treatment wetlands as a starting point to identify potential sites for nutrient treatment. The number of potential sites that meet the Iowa CREP criteria was too few, so the watershed area and depth criteria were modified to include more potential sites by slightly modifying the ratio of basin to watershed size and removing the minimum watershed size criteria.

Wetland vegetation needed for removing nutrients survives best in wetlands less than three feet deep.

The map on the following page shows potential sites ranked High, Medium and Low for nutrient treatment potential.

To determine whether a site can provide nutrient treatment functions in practice, a more detailed field analysis will be necessary.

Potentially Restorable Basins – Priority Nutrient Treatment Criteria

High Potential for Nutrient Treatment

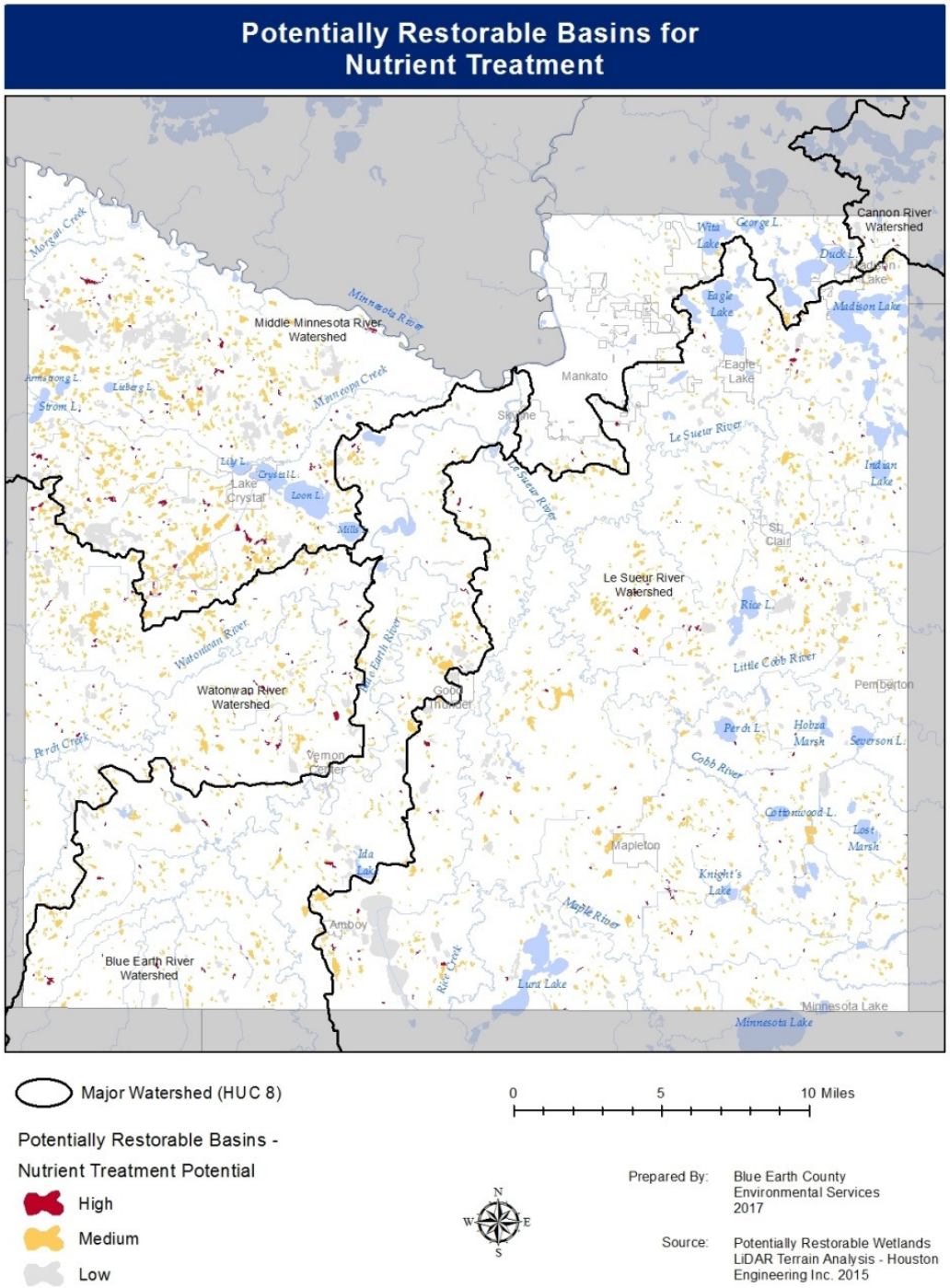
Depth: 75% or more of the basin is less than 3 feet
Ratio of basin to watershed area: Basin 0.4% to 2.5% of the site's watershed area
Size: No minimum watershed size

Medium Potential for Nutrient Treatment

Depth: 75% or more of the basin is less than 3 feet
No other criteria applied

Low Potential for Nutrient Treatment

Depth: Less than 75% of the basin is less than 3 feet
No other criteria applied



Stormwater Wetlands - Attenuation and Water Quality Treatment Functions

Natural wetland restoration is preferred county-wide and is generally preferred by the Wetland Conservation Act (Minnesota Rules part 8420.0522 subpart 5A).

In some watersheds, constructed wetlands or water quality treatment wetlands may best provide wetland functions to achieve watershed goals for improving water quality or flood and stormwater attenuation functions. The WCA design and monitoring requirements for water quality treatment system wetland creations would apply to these sites if constructed.

Priority Areas/Watersheds Floodwater and Stormwater Attenuation

Most rivers and streams have turbidity impairments largely due to ravine, stream bank and bluff erosion. When water quality wetlands are constructed in addition to the required stormwater management systems in municipalities and urbanizing areas of watersheds in the county, they can help buffer the effects of heavy rainfall in their local watersheds and in downstream gullies, ravines, rivers and lakes.

Ideal conditions for natural wetland restoration in urbanizing sub-watersheds of the Middle Minnesota River, Le Sueur River and Blue Earth River near Mankato, Eagle Lake, Skyline and Madison Lake are limited. These watersheds are impacted by loss of water storage and increased runoff, flooding and erosion in downstream channels, ravines, lakes and wetlands.

Near Mankato and Eagle Lake, soils are hydric, have very low infiltration rates (0.05 inches per hour), and the seasonal high water table is very high. This limits the type and effectiveness of stormwater management practices allowed by Minnesota NPDES Construction Stormwater Permit Rules and the MS4 SWPPPs in this area. Shallow depth to bedrock is also a limiting factor for stormwater treatment near Mankato.

Pollution sensitivity is high in areas with shallow depth to bedrock. Properly designed and constructed stormwater wetlands or water quality treatment wetlands could provide groundwater protection and recharge in areas with high or moderate pollution sensitivity.

Priority Watersheds for Water Quality Function

Protecting and restoring water quality and reducing nutrients in all lake watersheds is a high priority.

The Duck and Ballantyne watershed has the lowest percentage of wetland loss in the county. Of the lakes assessed in the county, these lakes have the best water quality. Wetland restoration opportunities in this watershed are limited. Wetlands in these watersheds lack upland buffers. The effect of residential and urban development stormwater quantity and quality and potential loss or impacts to wetlands in the Duck and Ballantyne watershed is a significant concern for protecting water quality in these lakes.

Madison Lake and Lake Crystal are on the MPCA impaired waters list. Both of these watersheds are affected by shoreline and urban development as well as agricultural land uses. The Lake Crystal watershed has a high percentage of drained wetlands. In the urbanizing areas of these lake watersheds there are limited opportunities for natural wetland restoration but stormwater wetlands may provide needed functions.

Wetlands in Urban Watersheds

"Urban development trends generally are detrimental to wetlands. Many wetlands are lost in the process and those that remain are degraded by the high intensity of uses in the urbanized surrounding areas. For example, the almost continuous concrete, asphalt, and rooftops that harden the landscape result in increased levels of stormwater runoff.

Attempts to restore urban watersheds include *softening* the watershed by restoring important resources in locations where their functions will add green structure (i.e., slow down the flow of stormwater and contribute in other ways to the overall improvement of the watershed).

In most situations, wetland restoration projects are planned to provide the highest level of ecological condition possible. Included in this planning tenet is the assumption that the wetlands will also perform their functions at the highest levels possible. Restorations in highly urbanized portions of watersheds can make this standard difficult or impossible to achieve.

The wetlands needed in some parts of urban watersheds end up being planned and implemented to perform functions such as flow attenuation, water quality improvement, and floodwater retention at the expense of overall wetland quality. These working wetlands, because of the constant stress they experience, may be mostly or completely comprised of an invasive species plant community and have poor water quality, high rates of sedimentation, and other indications of degradation. However, their role is not to be pristine examples of wetlands; instead, their mission is to perform their designed functions in a way that maximizes the overall good for the watershed. While these wetlands may not be "pretty to look at," some would consider them "true beauties" when the overall benefits they provide for the watershed are considered."

Source: *Incorporating Wetlands Into Watershed Plans,* EPA Region 5 Wetlands Supplement

Priority Watersheds
Constructed Wetlands or Water Quality Treatment Systems

Constructed wetlands or water quality treatment wetlands can provide important water quality and floodwater/stormwater attenuation functions to provide water quality treatment and/or reduce flooding and downstream flooding and erosion in all watersheds in the county. Priority watersheds where water quality treatment or constructed wetlands might best provide these functions are shown in this table.

Priority Minor Watersheds and 12-digit Hydrologic Unit Codes	Priority Subwatersheds in Minor Watershed	Priority Functions
City of Mankato - Minnesota River HUC12: 070200071102	Indian Creek Watershed County Ditch 98 watershed County Ditch 69 watershed City of Mankato South Bend Township Mankato Township	floodwater/stormwater attenuation
Le Sueur River HUC12: 070200110607 Eagle Lake HUC12: 070200110607	County Ditch 12 watershed County Ditch 43 watershed Drainage ditch watershed west of Eagle Lake city limits	floodwater/stormwater attenuation
Blue Earth River HUC 12:070200091103	City of Skyline City of Mankato South Bend Township	water quality treatment; floodwater/stormwater attenuation
Shanaska Creek HUC12: 070200071104	Duck Lake and Lake Ballantyne watershed City of Madison Lake draining to Duck and Ballantyne	water quality treatment; stormwater attenuation
Madison Lake HUC12: 070200110605	Portion of watershed draining to Madison Lake City of Madison Lake and shoreland areas	water quality treatment; stormwater attenuation
Lake Crystal HUC12: 070200070902	County Ditch 56 watershed and City of Lake Crystal Crystal Lake, Loon Lake and Mills Lake	water quality treatment; stormwater attenuation

Summary of Potential Sites for Wetland Restoration and Wetland Functions

There are ample opportunities for wetland restoration or conservation projects that provide important wetland functions.

The following tables show the number and land area of potentially restorable basins in major watersheds (8 digit HUC) and the priority areas for providing multiple natural resource and aquatic functions in the Greenprint, nutrient treat identified for this plan. Basins with one property owner were identified using GIS and August 2015 land records data. There are 3,285 potentially restorable basins greater than two acres in the county, and 1,436 of those are greater than five acres. There are 1,324 potentially restorable basins in Greenprint priority areas, and 624 of those are greater than five acres.

Potentially Restorable Wetlands over 2-Acres Summarized By Watershed

				Basin with One Owner*	
Watershed	**Number**	**Total Area in Acres**	**Median Area in Acres**	**Number**	**Percent**
Blue Earth	541	4,739	3.99	289	53.4%
Le Sueur	1,311	11,034	4.10	668	51.0%
Minnesota River-Mankato	975	12,139	4.89	514	52.7%
Watonwan	446	3,677	3.99	284	63.7%
Cannon	12	48	4.09	5	41.7%
Total	**3,285**	**31,638**	**4.28**	**1,760**	**53.6%**

*one owner based on 2016 Blue Earth County Taxpayer data Land Records data

Potentially Restorable Wetlands over 2-Acres Summarized By Area of Interest

Area of Interest*	Number	Total Area in Acres	Median Area in Acres	Basin Owned by One Property Owner	
				Number	Percent
Greenprint Wetland Complexes	941	10,338	4.89	506	54%
Greenprint Corridors and 500 feet adjacent to Greenprint**	643	8,032	4.48	324	50%
Total Greenprint Corridors and Wetland Complexes	1,324	14,737			
High or Very High Recharge areas for Buried Sands Aquifer	313	6,671	5.88	139	44%
High or Moderate Pollution Sensitivity	529	8,656	5.39	287	54%
North Central Planning Area	149	1,162	4.38	60	40%
More than 100 feet from a road	2,200	15,628	4.56		

*potentially restorable basins may be in more than one area of interest.

** includes Greenprint corridors plus potentially restorable basins within 500 feet.

Potentially Restorable Wetlands over 5-Acres Summarized By Area of Interest

Area of Interest**	Number	Total Area in Acres	Median Area in Acres	Basin Owned by One Owner*	
				Number	Percent
Greenprint Wetland Complexes	465	8,869	9.5	187	40%
Greenprint Corridors and 500 feet adjacent to Greenprint***	298	6,953	10.7	102	34%
Total Greenprint Corridors and Wetland Complexes	624	12,578	9.62	242	38%
High or Very High Recharge areas for Buried Sands Aquifer	170	6,222	12.48	45	26%
High or Moderate Pollution Sensitivity	280	7,975	11.73	107	38%
North Central Planning Area	66	898	8.8	17	25%

*one owner based on 2016 Blue Earth County Taxpayer data Land Records data
**potentially restorable basins may be in more than one area of interest
*** includes Greenprint corridors plus potentially restorable basins within 500 feet