

# Fredonia-Newburg Area Watershed-Based Plan

Including North Branch Milwaukee River, Town of Fredonia - Milwaukee River,  
& Village of Newburg - Milwaukee River watersheds



## EXECUTIVE SUMMARY



October 2019



Applied Ecological Services, Inc.



Aqua Vitae



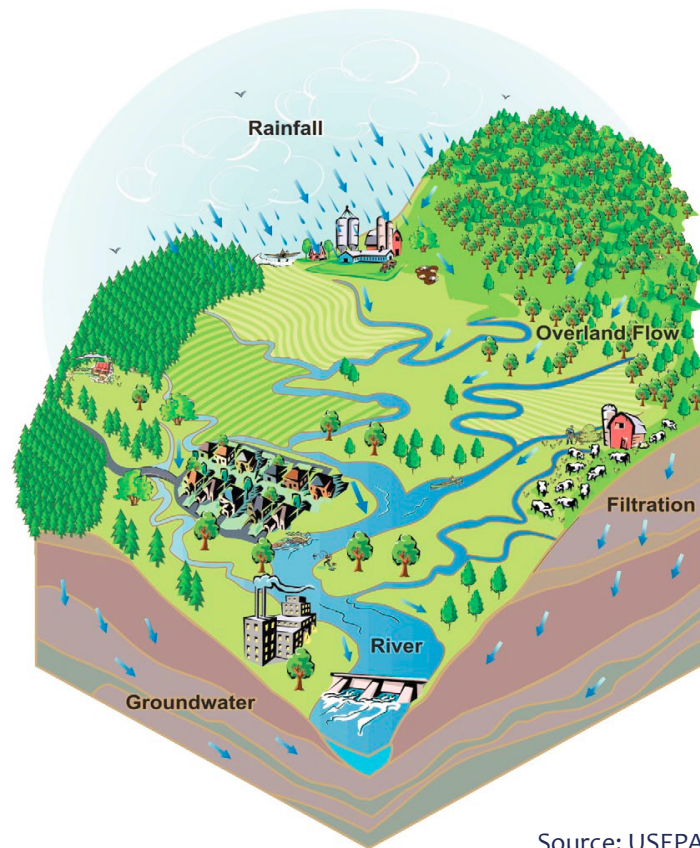
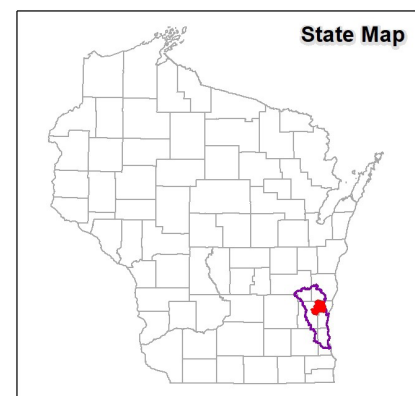
# INTRODUCTION

People live, work, and play in areas of land known as watersheds. A watershed is best described as an area of land where surface water drains to a common location such as a stream, river, or lake (see image, right). The source of groundwater recharge to aquifers, streams, and lakes is also considered part of a watershed. Watersheds are complex systems because there is interaction between natural elements such as climate, surface water, groundwater, and vegetation and human elements. Human influences can produce polluted stormwater runoff, increase impervious surfaces, alter stormwater flows, and degrade or fragment natural areas.

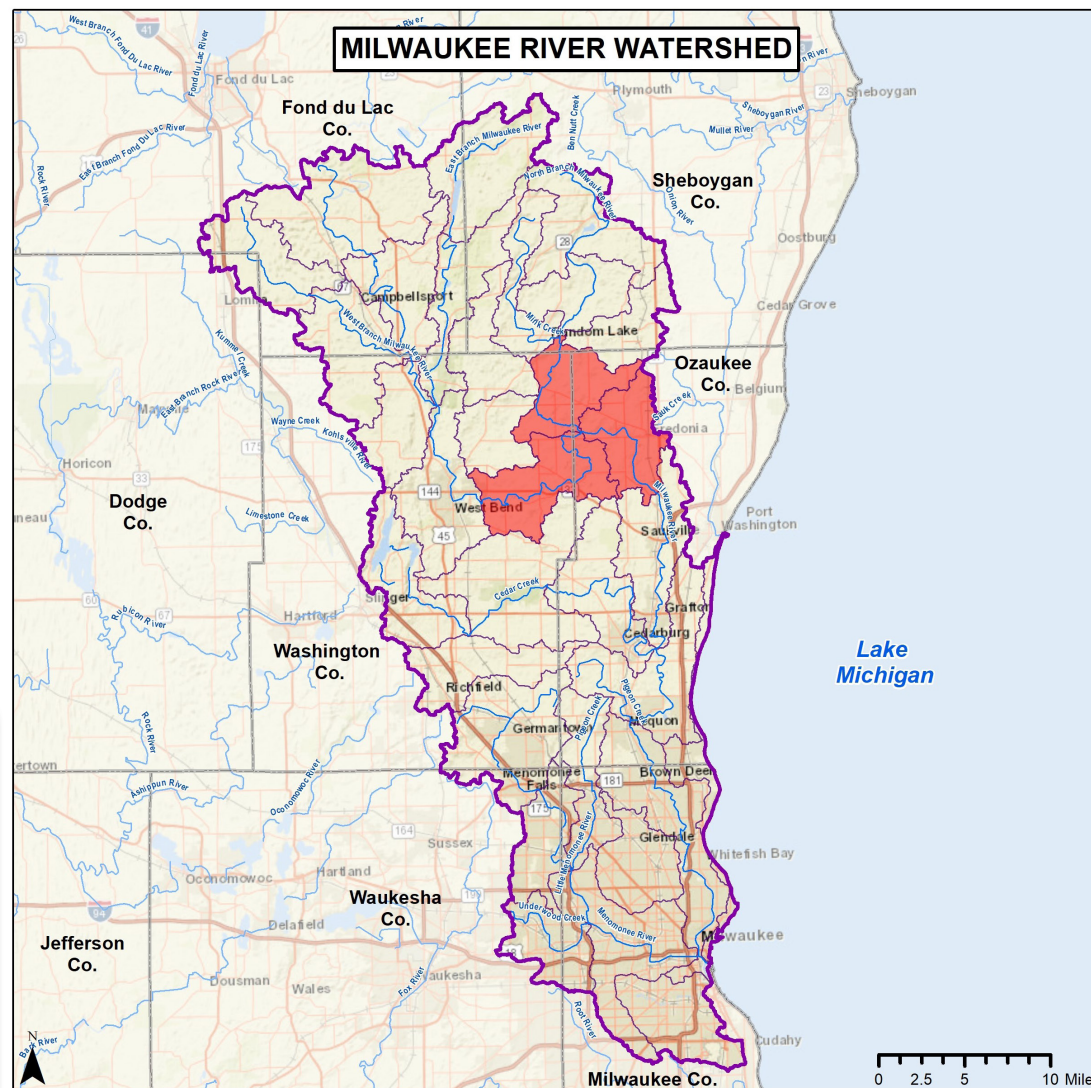
The Fredonia-Newburg Area watersheds planning area encompasses three HUC 12 watersheds: Town of Fredonia-Milwaukee River (HUC: 040400030602), Milwaukee River North Branch (HUC: 040400030107), and Village of Newburg-Milwaukee River (HUC: 040400030209). The planning area is located in southeast Wisconsin between Milwaukee and Sheboygan. Together, the three watersheds drain nearly 47,000 acres (73 square miles) of land surface.

Collectively, there are 378,341 linear feet or 71.6 miles of stream miles and 8,441 acres of wetlands in the Fredonia-Newburg Area watersheds. Three counties and four municipalities comprise the watershed. The watershed is split almost evenly between Ozaukee and Washington Counties, with a small portion extending into Sheboygan County, and includes the Town of Fredonia, Village of Newburg, unincorporated Waubeka and the southeastern portion of West Bend.

- Legend**
- Project Area
  - County Boundary
  - Milwaukee River 8-Digit HUC
  - 12-Digit HUC Boundaries w/ in Milwaukee River Watershed



Source: USEPA



# WATERSHED PLANNING

Watershed planning is a collaborative approach to address natural resource issues and improve water quality protection. This approach allows stakeholders to share information, better target limited financial resources, and address common water-related challenges. These challenges can include improving water quality, preserving and protecting groundwater resources, managing stormwater, reducing flooding, conserving open space, protecting wildlife habitat, supporting opportunities for economic development, and other issues of concern.

Goals were drafted from the concerns expressed by watershed stakeholders during a May 7, 2019 workshop. Participants were given the opportunity to vote across eight goal topics as to which they felt were most important. Then, a facilitator led successive groups of stakeholders through questions and prompting around the mission statement and each goal, taking notes on stakeholder ideas and feedback. This information was then used to refine the mission, the goals, and the objectives of the plan.

# MISSION

*The communities of the Fredonia-Newburg Area watersheds are dedicated to the protection, preservation, and improvement of our area watersheds through planning, implementation, education and stewardship for shared health and area wellbeing.*



# GOALS

- Goal 1:** *Improve surface water quality to meet water quality standards.*
- Goal 2:** *Encourage agricultural techniques and soil conservation practices that will protect and conserve topsoil and bolster our water resources.*
- Goal 3:** *Increase stakeholder awareness of watershed issues through education and stewardship.*
- Goal 4:** *Protect groundwater quantity & quality.*
- Goal 5:** *Increase communication and coordination among stakeholders.*
- Goal 6:** *Manage and mitigate for existing and future structural flood problems.*
- Goal 7:** *Protect and manage natural and cultural components of the Green Infrastructure Network, including fish and wildlife habitat.*



Example of the pre-settlement landscape. Source: Riveredge.

## THE WATERSHED OVER TIME

A diverse network of forests, prairies and wetlands remained intact in the Fredonia-Newburg Area watersheds until European settlers began to alter significant portions of the watershed's natural landscape, hydrology and wetland processes in the 1800s. Where it was feasible, trees were cleared, prairies were tilled under and wet prairie and marsh communities commonly found in floodplain areas were drained, streams channelized, and existing vegetation cleared to farm the rich soils. Today, the Fredonia-Newburg Area watersheds are collectively approximately 46% agricultural and 30% open space.

While these changes increased the agricultural productivity of the watershed, they created other problems resulting from the channelization of streams and removal of riparian buffers. Functional wetlands and

riparian buffers do more for water quality improvement and flood reduction than any other natural resource. In addition, intact wetlands and riparian buffers typically provide habitat for a wide variety of plant and animal species. They also provide groundwater recharge, filter sediments and nutrients, and slowly discharge to streams thereby maintaining water levels in streams during drought periods.

Channelization is detrimental for the health of streams and rivers because it increases the speed and force of water through a channel, eliminates suitable in-stream habitat for fish and wildlife and limits the number of natural in-stream features such as pool-riffle sequences in the channel. In many locations, a berm comprised of historic side-cast dredge spoils cuts off the stream channels from the floodplain.

## LAND USE

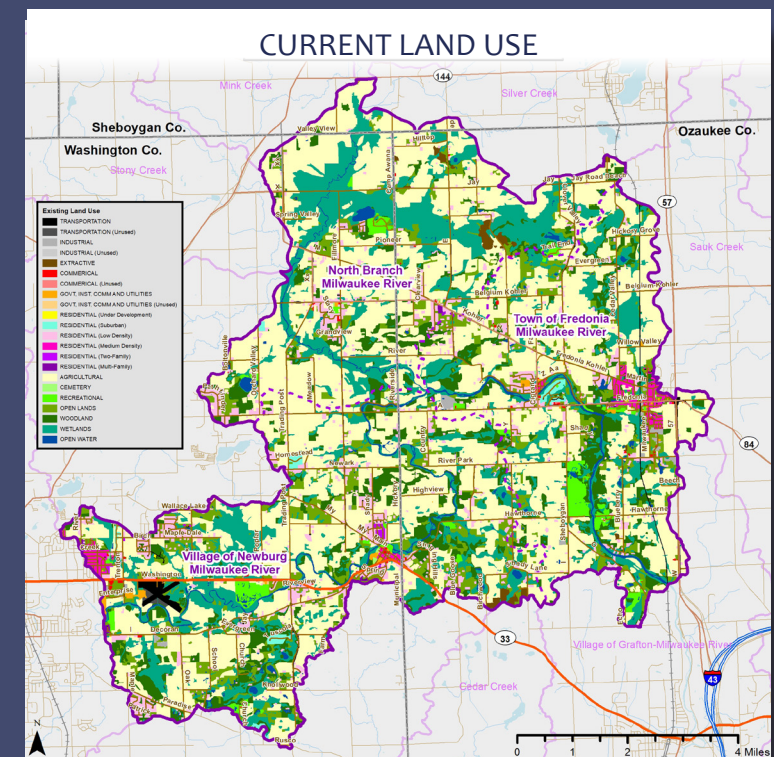
In all three watersheds agriculture is far and away the most prevalent land use. In the Village of Newburg, Town of Fredonia, and North Branch Milwaukee River watersheds this amounts to 8,390.6 acres (44.9%), 7,154.7 acres (50.7%), and 7,499.2 acres (53.1%) respectively. This includes row crop agriculture (largely corn and soybean) as well as livestock (largely dairy).

Wetlands make up the next most abundant land use. The wetland areas are largely adjacent to the Milwaukee River and accompanying floodplain areas, as well as a large lowland area in the North Branch watershed. The Village of Newburg, Town of Fredonia, and North Branch Milwaukee River watersheds this amounts to 3,117.7 acres (16.7%), 1,929.9 acres (13.7%), and 3,392.9 acres (24.0%) respectively.

Within the Town of Fredonia and North Branch watersheds the third largest land use results from woodland areas. These account for 822.2 acres (5.8%) and 1,327.4 acres (9.4%) respectively. These woodland areas are also largely adjacent to the Milwaukee River. Woodlands are the fourth largest land use type within the Village of Newburg watershed spanning 1,877.2 acres (10.1%).

The third largest land use within the Village of Newburg is open land which makes up 1,980.9 acres (10.6%); this is generally defined as undeveloped land which has no discernable natural resource type. Open land is the fourth

largest land use in both the Town of Fredonia and North Branch watersheds, covering 1,308.2 acres (9.3%) and 742.7 acres (5.3%) respectively.



## CHALLENGES & THREATS

During the planning process a number of challenges and threats to water quality were identified in the Fredonia-Newburg Area watersheds. These challenges and threats were identified while documenting existing conditions and assessment of the watershed and by stakeholders throughout the planning process. They include:

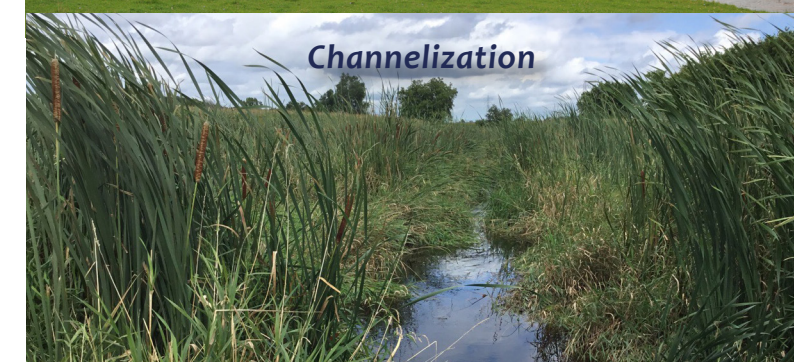
- Degraded or missing riparian areas and management
- Agricultural runoff
- Channelization of tributaries
- Funding challenges for large scale water quality, habitat, and flood prevention projects
- Funding challenges for implementation of additional agricultural management practices
- There is a gap in science and knowledge on how to cost effectively monitor water quality using *E. coli* as the indicator for bacteria-based surface water impairments.



Agricultural Runoff



Riparian Condition



Channelization

# AGRICULTURAL LAND MANAGEMENT

While Wisconsin is known for its food production, how this land is managed can have a significant effect on water quality. According to the Environmental Protection Agency's National Water Quality Inventory, "agricultural nonpoint source (NPS) pollution was the leading source of water quality impacts on surveyed rivers and lakes... Agricultural activities that cause NPS pollution include poorly located or managed animal feeding operations; overgrazing; plowing too often or at the wrong time; and improper, excessive or poorly timed application of pesticides, irrigation water and fertilizer."

Agricultural land can be a significant contributor of nutrients, sediment, and bacteria to local streams when practices such as filter strips, grass swales, no or reduced tillage, waste (manure) management, and fencing to restrict livestock access to streams are not in place. Some agricultural parcels within the watershed are already utilizing appropriate conservation practices, including no-till farming, vegetated swales, or cattle fencing in order to reduce nutrient and sediment loading to streams. Most farmers understand the inherent value in reducing soil and nutrient losses on their farms and consider it good business practice to do so. For those parcels where conservation practices appeared to be lacking, potential recommendations were noted during the watershed field inventory.

Since roughly half of the Fredonia-Newburg Area watersheds are used for agricultural purposes, the use of additional conservation practices on agricultural land is imperative to ensure the protection and improvement of water quality in the watershed. Selecting specific locations for agricultural BMPs is complicated and involves many considerations including owner willingness to participate, land configuration, and crop management practices already in place. Individual land owners are encouraged to work with NRCS and the Counties to appropriately manage nutrient and sediment loss on their lands.

The Watershed-Based Plan includes a list of general practices that should be implemented throughout the watershed where practicable.

Recommended agricultural BMPs include:

- Conservation crop rotation
- No-till or Conservation tillage
- Grass waterways
- Filter strips
- Fencing
- Injection
- Nutrient management plans
- Waste (manure) management

More information on all of these practices can be found in the full watershed plan document.



Source: USDA NRCS



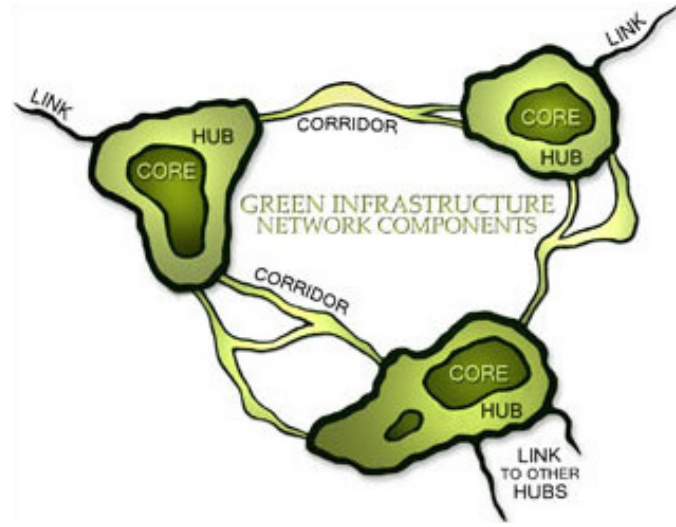
Source: USDA NRCS

Images: Background - Conservation Tillage (no till) farming. Source: farmprogress.com.

Right, top to bottom - Stakeholders developing and prioritizing goals. Conservation crop rotation, and grass waterways.

# GREEN INFRASTRUCTURE & YOUR BACKYARD

A Green Infrastructure Network is a connected system of natural areas and other open space that conserves natural ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to wildlife and people. The network is made up of hubs and linking corridors. Hubs generally consist of the largest and least fragmented areas such as Huiras Lake, Fellenz Woods, Kratzsch Conservancy, Mayhew Preserve, and Riveredge Nature Preserve. Corridors are generally formed by private agricultural or residential parcels along the Milwaukee River and its tributaries as well as along the primary SEWRPC Environmental Corridors. Corridors are extremely important because they provide habitat conduits between hubs. However, most parcels forming corridors are not ideal green infrastructure until landowners embrace the idea of managing stream corridors or creating backyard habitats.



Source: greeninfrastructure.net

If a portion of a stream runs through your backyard, here are some tips to help properly manage your piece of the green infrastructure network:

- 1. A NATURAL, MEANDERING STREAM IS A HAPPY STREAM**  
Work with experts to restore degraded streams.
- 2. REMOVE NON-NATIVE SPECIES**  
Identify and remove plants that are out of place (see photo guide, right).
- 3. PLANT NATIVE VEGETATION**  
Plants adapted to the Midwest climate can help control erosion by stabilizing banks.
- 4. NO DUMPING**  
Avoid dumping yard waste and clear heavy debris jams.
- 5. MANAGE CHEMICAL USE**  
Avoid over fertilizing or spilling/dumping chemicals near waterways.



Any property owner can improve green infrastructure. Create a safe place for wildlife by providing a few simple things such as food, water, cover, and a place for wildlife to raise their young. The National Wildlife Federation's Certified Wildlife Habitat® and the Conservation Foundation's Conservation@Home programs can help you get started.

Creating a rain garden, or a small vegetated depression, to capture water is another way of promoting infiltration while beautifying your yard and providing additional habitat. Disconnecting your roof downspouts and capturing that runoff in rain barrels not only reduces the amount of runoff entering streams, but also serves as a great source of water for irrigating your yard.



REMOVE THESE NON-NATIVE AND INVASIVE SPECIES

COMMON REED



BUCKTHORN



REED CANARY GRASS



PURPLE LOOSESTRIFE



GARLIC MUSTARD



TEASEL



# ACTION PLAN

The Fredonia-Newburg Area Watershed-Based Plan includes an Action Plan developed to provide stakeholders with recommendations to address plan goals. The Action Plan includes programmatic and site-specific recommendations. Programmatic recommendations are general watershed-wide remedial, preventative, and regulatory actions. Site-specific recommendations include actual locations where projects can be implemented to improve water quality, green infrastructure, and aquatic and terrestrial habitats.

## Programmatic recommendations include...

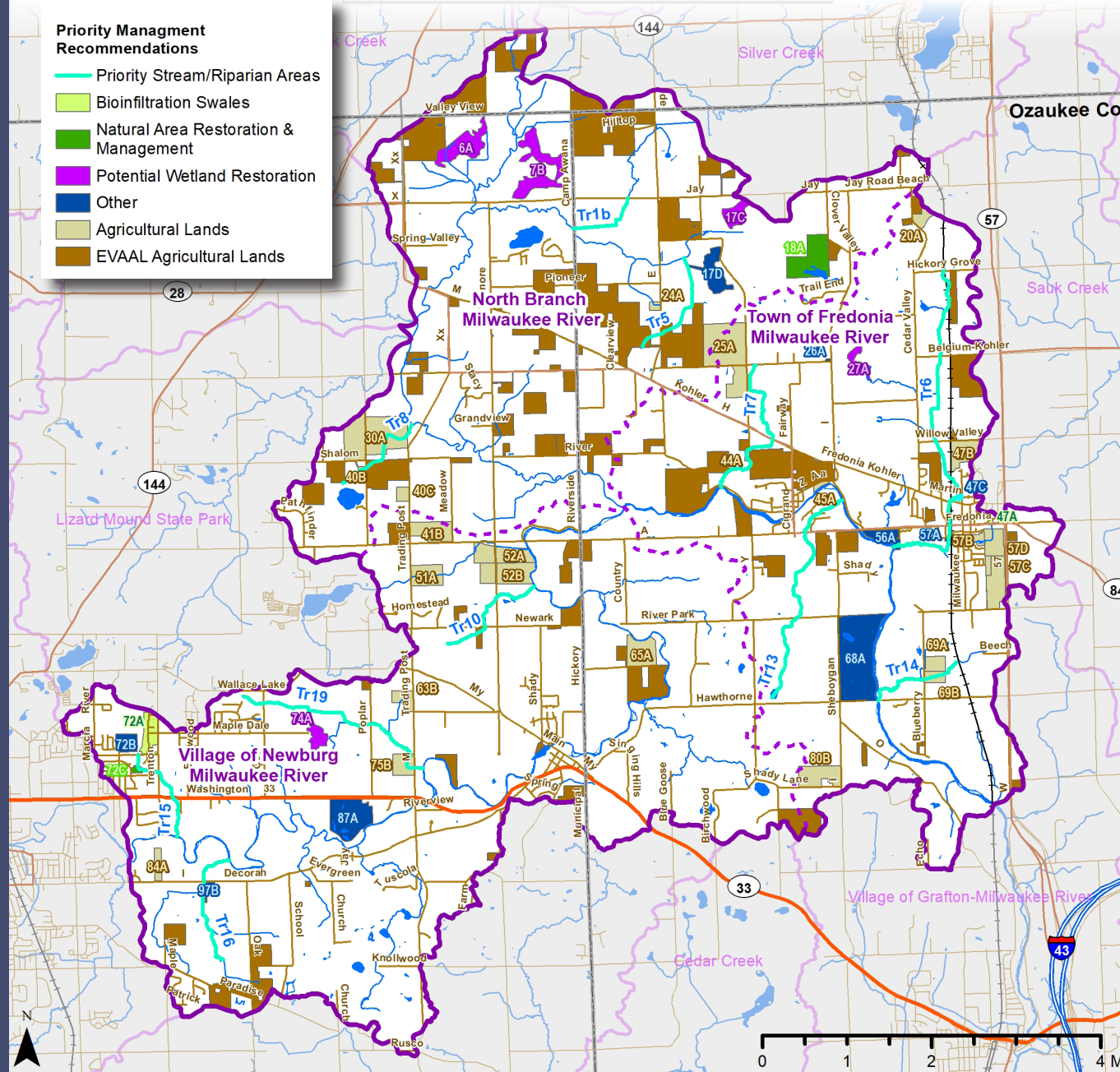
- Ordinance and Policy Recommendation
- Rainwater Harvesting & Re-use
- Native Landscaping
- Street Sweeping
- Septic System Maintenance
- Green Infrastructure Planning
- Conservation Design & Low Impact Development
- Water Quality Trading & Adaptive Management

## Site-specific recommendations include...

- Stream & Riparian Area Restoration
- Agricultural Management Practices
- Other Management Measures:
  - Wetland Restoration
  - Natural Area Restoration
  - Bioinfiltration Swales
  - Golf Course Naturalization
  - Rain Gardens

The recommended programmatic and site-specific management measures provide a solid foundation for protecting and improving watershed conditions over time but should be updated as projects are completed or other opportunities arise. Key implementation stakeholders are encouraged to organize partnerships and develop various funding arrangements to help delegate and implement the recommended actions. More details on the action plan and implementation can be found in the full watershed plan document.

# PRIORITY AREAS



# MILWAUKEE RIVER TOTAL MAXIMUM DAILY LOAD (TMDL) STUDY

For the Fredonia-Newburg Area watersheds, reduction targets for total phosphorus and total suspended solids were based on the Milwaukee River Total Maximum Daily Load (TMDL) pollutant load allocations for the corresponding watersheds within the Fredonia-Newburg watersheds, under the guidance of WDNR. In order to meet the Milwaukee River TMDL requirements, we need to reduce the total load of ...

## Phosphorus by

- 45% for Newburg (MI-7)
- 33% for North Branch (MI-13)
- 51% for Fredonia (MI-15)

## And total suspended solids by

- 68% for Newburg (MI-7)
- 66% for North Branch (MI-13)
- 57% for Fredonia (MI-15)

For fecal coliform, no percent reductions were developed under the TMDL, there was not enough existing water quality data to determine an annual load reduction target, and available models could not calculate load reductions.

A water quality monitoring plan is an essential part of any watershed plan to evaluate plan implementation outcomes. Physical, chemical, and biological data will be collected over time to track progress towards achieving the TMDL targets.



Source: D. Johnson



Stream & Riparian Area Restoration



Agricultural Management Practices



Natural Area Restoration



Wetland Restoration

# WHERE DO WE GO FROM HERE?

Historical land uses have played a significant role in the degradation of water resources in the Fredonia-Newburg Area watersheds. Fortunately, there are actions outlined in the plan that can be taken to mitigate existing issues and prevent additional problems. The future health of the watershed is largely dependent on how the landscape and stormwater are managed. That includes implementing proven and environmentally-conscious landscape practices and approaches to stormwater management, such as those identified in this executive summary, to improve water quality and stream health in the watershed.

There is no single fix for the water quality and landscape challenges in the Fredonia-Newburg Area watersheds. These problems are the cumulative result of decisions made since people moved to the watershed in the 1800s. It will take all stakeholders and actions at every scale in order to positively impact watershed resources. This watershed-based plan is the first step in helping watershed residents and stakeholders understand what can be done to restore the valuable resources of the Fredonia-Newburg Area watersheds.

Milwaukee Metropolitan Sewerage District (MMSD) is a regional government agency that provides water reclamation and flood management services for more

than one million people across the Greater Milwaukee region. MMSD is a leader in protecting public health and the drinking water through their wastewater treatment, flood management, and green infrastructure programs. Funding for this watershed planning process was made possible through a WDNR aid agreement with MMSD and is funded by a Great Lakes Restoration Initiative Nearshore Nonpoint Source grant. The findings and recommendations herein are not necessarily those of the funding agencies.

**For more information  
on how you can help, contact:**

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**All photos by AES unless otherwise noted.**

