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Chapter 4: Action Plan for the Middle Huron Watershed, Section 1

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Watershed management planning provides the opportunity for communities and other stakeholders to assess the current condition of their watershed, and to peer into the future to see what the watershed will look like if they simply maintain the status quo. The quality of life that a community desires for its future residents often does not coincide with the realities of the direction in which the community is headed.

This chapter details a set of goals and objectives to ensure that the designated and desired uses in the watershed will be met. Because surface water quality is ultimately a function of what water carries off of the land, much of the discussion will focus on how human activities impact the land and actions that can be taken to improve human land use from a water quality/quantity perspective.

4.1 Goals and Objectives for the Watershed

The designated and desired uses for the Watershed (Chapter 1) provide a basis from which to build long-term goals and objectives. Long-term goals describe the future condition of the Watershed toward which the communities will work. No single community or agency is responsible for achieving all of the goals or any one of the goals on its own. The goals represent the desired end product of many individual actions, which will collectively protect and improve the water quality, water quantity and biology of the watershed. The communities of the Watershed will strive together to meet these goals to the maximum extent practicable by implementing a variety of BMPs over time, as applicable to the individual communities and agencies, relative to their specific priorities, individual jurisdictions, authority, and resources.

Due to the complex ecological nature of the response of watersheds to management practices, it is difficult to predict when these goals will be met. Ultimately, long-term goals can never be said to be fully achieved, because there is always more that can be done. The stakeholder communities will continuously strive to meet these goals by implementing best management practices (BMPs) that are recommended for addressing the goals. The stakeholder communities will understand what progress is being made to achieve these goals by using an iterative process of implementing recomendationss and evaluating the effects by regularly monitoring the river or population for change and degree of improvement. Much progress has been made since this WMP was originally drafted in 1994 and then updated in 2000, 2008, and now 2022.

The long-term goals and objectives as agreed upon by the Advisory Committee are presented in Table 4.1. Short-term objectives are presented for each goal, which are achievable and measurable. Progress has already been made toward the achievement of many of these objectives at this point.

The goals and objectives are listed in priority order. These priorities were determined in discussion with the Advisory Committee after reviewing the previous version of this plan, progress made to date, and the current list of priority impairments, sources and causes, all of which is based on analysis of relevant data as presented in previous sections of this plan. The Committee determined that the combined actions implied by these goals and objectives would be the most effective way to address high-priority watershed impairments.

*Table 4.1. Prioritized Goals and Objectives for the Watershed, and the Designated and Desired Uses they address. The objectives are not in any particular order of priority.*

|  |  |  |
| --- | --- | --- |
| **Long-Term Goal** | **Short-Term Objective** | **Uses Addressed** |
| **1. Reduce flow variability** | a. Adopt County and local stormwater management requirements that minimize flow fluctuations in receiving waterways, and associated bank erosion, channel widening and habitat destruction. | Designated Uses:  Warmwater fishery, Aquatic life and wildlife  Desired Uses:  Coordinated development; Hydrologic functions |
| b. Encourage local ordinances, strategies and programs that:  1. Prevent unnecessary modification of the Huron River, its tributaries and adjacent riparian areas. |
| 2. Maintain and restore hydraulic function of floodplains and floodways by discouraging their alteration and encouraging restoration. |
| c. Promote local site planning review standards that favor utilization of stormwater as an on-site resource. |
| d. Monitor flow dynamics of the river and tributaries through established monitoring program. |
| **Long-Term Objectives** |
| e. Preserve natural infiltration and the recharge of groundwater, by protecting and restoring open spaces and natural recharge areas, installing infiltration BMPs, and reducing the amount of impervious area. |
| **2. Reduce nonpoint source loading and reduce soil erosion and sedimentation** | **Short-Term Objective** | Designated Uses: Warmwater fishery; aquatic life and wildlife; partial and total body contact recreation;  industrial water supply; public water supply  Desired Uses:  Coordinated development; hydrologic functions |
| a. Adopt County and local stormwater management requirements that minimize pollutant loading to receiving waterways by capturing and treating or infiltrating the smaller, more frequent storm event. |
| b. Encourage local ordinances, strategies and programs that:  1. Minimize the adverse effects of stormwater runoff from new highways and streets. |
| 2. Encourage the use of native landscapes and reduced dependence on chemical applications. |
| c. Promote local site planning review standards that foster a hierarchy to guide the selection of stormwater management approaches and favors source reduction. |
| d. Maintain stable oxygen levels in the hypolimnion of Ford and Belleville Lakes |
| e. Improve application and enforcement of soil erosion and sediment controls both during and after construction activity. |
| f. Identify and repair the most eroded and susceptible stream channels and banks. |
| g. Maintain water quality monitoring programs to measure progress toward TMDL goals. |
| h. Maintain baseline monitoring of sedimentation in the River and tributaries. |
| i. Increase education on BMPs among property owners and developers. |
| **Long-Term Objectives** |
| k. Meet TMDL goals for phosphorus concentration in Ford and Belleville Lakes |
| l. All streams meets meet their designed uses |
|  |
| **3. Protect and mitigate loss of natural features for stormwater treatment and wildlife habitat** | **Short-Term Objectives** | Designated Uses: Warmwater fishery; aquatic life and wildlife; industrial water supply; public water supply  Desired Uses:  All |
| a. Encourage local ordinances, strategies, and programs that:   1. Preserve natural infiltration and the recharge of groundwater, by protecting and restoring open spaces and natural recharge areas and reducing the amount of impervious area. |
| 2. Promote buffering of waterways from the direct impacts of stormwater-related pollution. |
| b. Monitor water quality and biota to measure progress. |
| c. Educate local decision makers and the public about the benefits of critical habitat protection. |
| **Long-Term Objectives** |
| d. There is enough redundancy in these natural systems to protect them against current and future climate alterations and development. |
| **4. Increase public awareness and involvement in protecting water resources** | **Short-Term Objectives** | Designated Uses: all  Desired Uses: all |
| a. Conduct on-going programs to raise the public and practitioners’ awareness of watershed management and nonpoint pollution issues and solutions. |
| b. Increase opportunities for public involvement in the protection of watershed resources. |
| **Long-Term Objective** |
| c. Reduce pollution and hydrologic impacts to the watershed by increasing public awareness and behavior change. |
| **5. Gain broad implementation of watershed management plan and associated plans** | **Short-Term Objective** | Designated Uses: all  Desired Uses: all |
| a. Promote intergovernmental coordination and cooperation in land use planning, natural resource protection, nonpoint source pollution control and stormwater management. |
| b. Establish financial and institutional arrangements for WMP fulfillment |
| c. Ensure the long-term viability of the Middle Huron Partnership Initiative. |
| d. Increase public awareness of progress in WMP implementation. |
| **6. Continue monitoring and data collection for water quality, water quantity and biological indicators** | **Short-Term Objectives** | Designated Uses: all  Desired Uses: all |
| a. Maintain an adaptive monitoring strategy that yields data to measure progress toward achievement of WMP goals and objectives. |
| b. Develop a comprehensive database, using the best available and most appropriate technology, to serve the stormwater management, flood control and water quality planning and monitoring information needs of the watershed. |
| c. Track and report on short- and long-term maintenance of public and private stormwater conveyance and storage facilities. |

4.2 Recommended Actions to Achieve Watershed Goals and Objectives.

4.2.1 Recommendation Prioritization Scheme

To best achieve the long-term goals above, which were first developed in 1994, and in consideration of the new data and problems that have arisen and been laid out in Chapter 1-3 of this plan, the 2022 authors and stakeholders have developed a series of recommendations for implementation from 2022-2032. The table on the next several pages is a series of actions organized by stakeholder and category.

**HRWC actions** are those that HRWC can and should take the lead on, though often these actions require support from other plan stakeholders. As HRWC is the author and likely primary user of this management plan, these are presented first. They are broken into three categories: Study, Policy and Education, and Maintenance and Restoration. The order in which they are presented does imply a certain amount of priority, where actions listed first within each category are expected to be able to be implemented first and most easily, in some cases with money and programs already on hand and established. Recommendations harder to implement due to cost or being less developed, more conceptual ideas are listed more closely to the bottom of each category.

**Stakeholder actions** are those that are the primary responsibility and priority of the non-HRWC stakeholders of this plan, such as the County, Cities, and Townships within the Watershed. HRWC often serves in an advisory or partnership role for these recommendations. These are actions are not listed in any particular priority or category.

If all recommendations are implemented, it is anticipated that, over time, all TMDLs will be reached, watershed functions will be restored, and the goals above will be met.

Each of the actions are described more specifically below the table.

*Table 4.2. Summary of 10-Year Watershed Improvement Strategy, 2022-32*

| **Activity** | **Impairment/ Source Reduced** | **Implementation Timeframe** | **Cost Estimate 2022-2032** | **Lead Agency\*** | **Success Measures** |
| --- | --- | --- | --- | --- | --- |
| **HRWC—Study** |  |  |  |  |  |
| S1. Targeted Monitoring in AUID areas that fail to meet designated uses | All | 2022-2032 | $75k-$100k | HRWC, EGLE | # pollution sources found |
| S2. Conduct bacterial source identification | Bacteria/ multiple | 2022-2029 | $120k | HRWC, municipalities | # human sources IDed and remediated; reduced bacteria concentrations |
| S3. Assessment and Prioritization of Natural Areas | All | 2022-2032 | $100k | HRWC | # natural areas assessed; prioritization scheme created |
| S4. Conduct a stream crossing structure study to prioritize infrastructure fixes | Altered flow regimes, habitat destruction | 2022-2027 | $60k | AATU, HRWC, WCWRC | Prioritized list of restoration targets |
| S5. Develop a long-term temperature, precipitation, and flow network | Altered flow regimes | 2027-2032 | $175k upfront, $30k/yr for upkeep | HRWC, University of Michigan | # automated stations developed; continuous real-time flow, precip, temperature data |
| **HRWC—Policy and Education** |  |  |  |  |  |
| PE1. Review and comment on all new discharge permits in TMDL area | Phosphorus/ new sources | 2022-32 | Unknown | HRWC, partners | No newly permitted dischargers of phosphorus effluent |
| PE2. Incentivize agricultural practices to reduce nutrient loading | Nutrients | 2022-32 | $430k | HRWC, RCPP, farmers | Modeled phosphorus loss reduction |
| PE3. Pass and Enforce River Friendly Ordinances | All/Multiple | 2022-32 | $180k | Municipalities, HRWC | Ordinances and policies passed |
| PE4. Septic Inspection, Education and Remediation Program | Pathogens/ Human | 2024-32 | $200K | WC Environmental Health, HRWC | Inspection call rate; annual septic remediations |
| PE5. Develop and implement a Green Stormwater Infrastructure strategy and program | All/ Runoff | 2022-24 plan 2024-32 implement | $200k - $20M | HRWC, Municipalities, Washtenaw County | Reduced impervious surfaces; Increased baseflow and reduced flow variability; reduced nutrient and bacteria concentrations and loading; monitoring |
| PE6. Buffer Enhancement Program | All/ Runoff | 2024-27 | $65K | HRWC, Washtenaw County, municipalities | Linear feet established; % streams properly buffered; monitoring |
| **HRWC—Maintenance and Restoration** |  |  |  |  |  |
| MR1. Targeted stream channel restoration | Biota/ sediment | 2022-32 | $500k - $5M | HRWC, municipalities, WCWRC | Increased DO levels; improved channel morphology; biota monitoring |
| **HRWC Recommendation Summary** | **Total** | **2022-32** | $2M-$8M | HRWC |  |
|  |  |  |  |  |  |
| **Stakeholder Recommendations** |  |  |  |  |  |
| A. Maintain and implement stormwater management plans | All/ stormwater | 2022-32 | $1M-$10M | Municipalities, county agencies, | Numerous. See individual stormwater plans; references provided in 1M section. |
| B. Enforce rules, standards and ordinances for stormwater management | All/ new stormwater | 2022-32 | $1M - $5M | WCWRC | Reduced runoff and nutrient/bacteria concentrations; monitoring |
| C. Natural Areas Protection | All/Multiple | 2027-32 | $10M | Municipalities, land conservancies | # of acres of natural areas put into permanent protections from development |
| D. Implement infrastructures fixes at stream crossing structures. | Biota/ sediment/ altered flow regimes | 2025-2032 | $100k-$1M | WCWRC, WCRC | # of Road Stream crossing fixes implemented |
| E. Pet waste ordinance education and enforcement | Pathogens/ Pet waste | 2025-32 | $18,000 | Municipalities | Resident knowledge from survey; call volume; violation # |
| F. Place doggie bag stations at target locations | Pathogens/ Pet waste | 2025-32 | $27,500 | County, municipalities | Stations established; use rate; pounds removed; monitoring |
| G. Targeted enforcement of phosphorus fertilizer law | Nutrients/ runoff | 2027-2032 | $7,000+ | EGLE, municipalities | Violations eliminated; lbs TP removed; TP monitoring |
| H. Climate Action Planning | Altered flow regimes/ Nutrients/ Runoff | 2022-2032 | $1M-$1B | Municipalities | # of ordinances adopted to reduce GHG emissions and increase climate resilience; Reduction of impervious surfaces |
| **Priority 2 Activities Summary** | **Total** | **2022-32** | $13M -$25M plus costs of H |  |  |

\* Agency Acronyms:

AATU: Ann Arbor Trout Unlimited

HCMA: Huron Clinton Metropark Authority.

HRWC: Huron River Watershed Council

RCPP: Resource Conservation Partnership Program

WC: Washtenaw County

WCWRC: Washtenaw County Water Resource Commissioner

WCRC: Washtenaw County Road Commission

4.2.2. HRWC- **S**tudy Recommendations

S1. Targeted Monitoring in AUID areas that fail to meet designated uses

In section 2.5, the authors have highlighted critical areas in the Watershed that fail to meet the entirety of their designated uses. These areas include Honey Creek (bacteria), Mill Creek (bacteria), Huron River (PFOS), Pleasant Lake Tributaries (Habitat/Flow Alterations), and Letts Creek (pollutant unknown). Furthermore, through HRWC monitoring efforts, issues have been found in Boyden Creek phosphorus levels.

Monitoring should be conducted for these specific problem areas to elucidate sources and illuminate possible solutions.

WMP stakeholders should keep EGLE informed of areas of recurring foam suspected of containing high levels of PFOS, will recommend state sampling in those areas, or should pursue independent sampling through qualified service providers. Continued attention needs to be paid to the river below the Dexter-Sweepster-Chysler-Palladin plant to verify EGLE findings and remediation plans, and to make sure risks are adequately communicated to nearby residents. Periodic sampling at the mouth of Mill Creek may help understand any transient nonpoint sources of PFAS to the Huron River, such as runoff from agricultural fields on which biosolids containing PFAS were applied.

HRWC’s Chemistry and Flow program monitoring will continue at Honey and Mill Creek sites to track bacteria trends. Bacteria source tracking (BST) has already distinguished human source areas from other sources (i.e. pet waste and manure) in these creeksheds. Additional investigative sites should be added in Letts creekshed. BST could be useful to identify human and other sources contributing to Boyden Creek. More detail on bacteria follow-up can be found in recommendation PE4.

At Lett’s Creek, which suffers from “pollutant unknown”, a broad swathe of parameters could be considered here to pinpoint problems. At a minimum, sensors could be installed measuring continuous flow, conductivity, temperature, and dissolved oxygen. HRWC’s Chem/Flow program should make Lett’s Creek a investigative site for the 2022-2023 spring-fall monitoring. The macroinvertebrate monitoring program should ensure that regular monitoring is conducted here.

*Timeframe:* 2022-2032

*Milestones:*

* 2022-2024: Develop monitoring plans and process results from first efforts.
* 2024-2032: Continue monitoring and follow up results with conversations with EGLE and other relevant regulators.

*Cost: PFOS:* Approximately $600 per sample. $60,000 over a multiyear period could be expected. *HRWC Chem/Flow Program:* $4,000 annually per monitoring sites; estimated 4 new sites needed. Total: 75k-100k

*Potential funding sources:* Section 319, Middle Huron Partnership

*Success Measures:* Letts Creek is given a known pollutant in the next EGLE integrated report. Amounts and sources are further quantified in the other problem areas.

S2. Conduct bacterial source identification

In section 2.5.2.2 and 2.5.2.3, the authors show that Honey Creek and Mill Creek are listed for on bacterial impairment. While much effort has been put into understanding the bacterial inputs in Honey Creek (Appendix B, H,) over the last ten years, there is more to be done here as well as in Mill Creek (Chapter 2.5.2.3) An implementation plan was created and carried out for Honey Creek, but an implementation should yet be written for Mill Creek.

This project aims to determine the presence, absence, and sources of bacteria in the watershed through a suite of potential monitoring techniques. By utilizing genetic analyses, canine source detection, and ambient water sampling, the project will evaluate fecal indicator bacteria sourcing. For any positive human detections, HRWC and WCWRC and the Washtenaw County Department of Environmental Health will contact any suspected homeowner to remediate any failing septic systems or illicit connections.

HRWC and local partners can also execute outreach and education strategies to property owners in the impaired creekshed on pathogen problems as well as home and pet owner remediation actions. This would be made much easier if remediation funding is available to subsidize a portion of this sometimes-burdensome cost on the homeowner. These recommendations are described more fully in 1I.

*Timeframe:* 2023-2029

*Milestones:*

* 2023-2024: Write a Mill Creek *E.Coli* monitoring and implementation plan
* 2024-2026: Identification of bacteria impairments
* 2028-2029: Conduct follow-up monitoring

*Cost:* Staffing costs for planning and writing; fecal indicator bacteria monitoring, analysis, source identification, and follow-up: $120,000;

*Potential funding sources:* Section 319

*Success Measures:* Number of human sources identified and remediated; bacteria monitoring (see chapter 5)

S3. Assessment and prioritization of natural areas for conservation and protection

As discussed, in section 2.1.3.2, the Watershed’s remaining natural areas are of utmost importance to protect for their ecosystem services. Of the 37,000 acres of natural areas in the Watershed, only 8000 acres are protected as public and park lands. HRWC has used GIS methods to determine the relative importance of these natural areas (Figure 2.6) but has only visited a small number of them to conduct on-the-ground assessments of their plant communities, hydrological characteristics, and other important components. Many more field visits of likely high quality natural areas are possible (Figure 2.7). In addition, more GIS modelling opportunities have been developed to provide ecosystem services valuation on a per-parcel basis. There exists a need to add further GIS and field-based prioritization to show which of the natural land parcels are most important to preserve in order to retain the ecosystem services they provide. HRWC should request that EGLE conduct the Landscape Level Wetland Functional Assessment (LLWFA) for the whole Watershed area. The LLWFA results could be added to HRWC’s prioritization scoring methods.

*Timeframe:* 2022-2027

*Milestones:*

* 2022-2023: Enhance GIS modelling to provide ecosystem services valuation by parcel in the Watershed
* 2022-2025: EGLE conducts LLWFA and HRWC incorporates results in prioritization scoring
* 2022-2025: Conduct natural area surveys in the Watershed
* 2027: Develop a set of recommendations for the WMP stakeholders that map and list the priority natural areas in the watershed.

*Cost: $100k*

*Potential funding sources:* NRCS (Regional Conservation Partnership Program), Clean Water Act section 319, Clean Water and Drinking Water State Revolving Loan Fund, foundations

*Success Measures:* # of field assessments; ranking model or scheme; final prioritized list developed

S4. Conduct a road-stream crossing study to prioritize infrastructure fixes

Throughout the Watershed, stream crossing structures (culverts and bridges) are in various states of functionality. In the last two years (2020-2022), the creeks have had water levels consistently higher than the long-term median, and due to climate change, this is a trend that is going to continue. However, it is largely unknown to what extent culverts and bridges restrict water flow and fish passage with the current high flows. Furthermore, improperly sized or failing road-crossing structures have upstream and downstream erosive effects.

Mill Creek stakeholders, in particularly Trout Unlimited, have a vested interest in fish passage throughout the creekshed, as they seek to manage trout and other fish populations in the creek. Furthermore, the WCWRC and WCRC have interest in maintaining water quality, reducing erosion, and preventing flooding throughout the Watershed.

A methodical survey should be established to visit and assess the conditions of every road crossing in the creekshed and from that information an ordered list built that can be shared with the WCWRC and the Washtenaw County Road Commission to help with prioritization of fixes. HRWC has experience in conducting such surveys. In 2016 HRWC used the Great Lakes Road Stream Crossing Inventory protocol[[1]](#endnote-2) to survey Norton Creek. The same process could be conducted for Mill Creek along with the other creeksheds in the Watershed as funding permits. This is a different study than the results from the BANCs analysis (recommendation 1L) as it focuses on the area immediately surrounding road crossings and the results are most applicable to hard engineering and construction.

*Timeframe:* 2023-27

*Cost:* $60k

*Potential Funding Sources:* NRCS, 319, Trout Unlimited

*Success Measures:* # of road crossings assessed, prioritization list created

S5. Develop a long-term temperature, precipitation, and flow network across the Watershed.

As discussed in Chapter 3.4.1.2, preparing for future storms is challenging for communities without mandates in state or federal regulation, without critical data, and without available funding for large infrastructure projects. Some communities in the Middle Huron watershed currently use available historical data for designing infrastructure to handle storms that are not accurate with a changing climate. This is a particular challenge for dam operators, as mentioned in Chapter 3.4.3, who need real-time flow data and modern communication tools to properly watch for floods and upstream dam failures. Furthermore, with greater rainfall comes more erosion, which causes greater sediment and nutrient flow through the waterways.

Therefore there exists a need to collect current weather and flow data with more accurate, modern approaches that will give us the ability to make decisions on how to best manage humans systems, watersheds, and streams. More robust and sustainable approach is needed to quantify needs in specific watersheds and reliably fund large infrastructure projects.

We recommend create an observational network of weather and water condition observational stations that allows the coupling of climate and hydrologic data or long periods of time. That will improve our understanding of the watershed response to various weather patterns. A goal should be to quantitatively understand how the watershed responds at the creekshed scale when a major precipitation event occurs in the watershed. That connection, based on quantitative, observational data collected over time, will establish the observational basis for tailoring climate and hydrologic models to the watershed. This coupled climate-hydrologic model would allow us to assess existing conditions in the watershed and project how climate change will alter hydrologic conditions in the future. That information can be used to inform decisions around infrastructure and ecological vulnerability.

*Timeframe:* 2027-2032

*Milestones:*

* 2027: Install the first weather monitoring station or successfully collect and utilize data from existing weather observing stations in the watershed. Improve currently existing HRWC flow station at North Territorial Road to allow wireless connection, user friendly websites, and automatic data processing.
* 2032: Expand the network across the whole Huron River Watershed, with 1 weather station per county within the watershed, and with 1 flow sensor at the mouth of every major tributary and multiple along the main branch of the Huron River. Existing weather observing stations that collect the relevant data may be used to reduce costs or improve watershed coverage.

*Cost:* $2,500 for weather stations; $400 for flow devices; plus $150k for staff time to write computer code and process data. Total: $175k total for the Watershed. Costs of network implementation are high, and ongoing maintenance and staff time will be required of about $30k per year.

*Potential funding sources:* GLRI, Foundations, NRCS

*Success Measures:* # of automatic stations, continuous real-time flow data, precipitation, and temperature.

4.2.3. HRWC - **P**olicy and **E**ducation Recommendations

PE1. Review and comment on all new discharge permits in TMDL area.

The TMDL for Ford Lake and Belleville Lake concludes that there is excess phosphorus entering the lakes from current sources. The policy establishes phosphorus loading limit goals for all identified sources as well, and in some cases states how EGLE staff believe that the sources can be reduced to the stated goals. These targets are then used as guidelines to set limits within NPDES discharge permits. Given that the lakes exceed the TMDL, the addition of new phosphorus sources within the TMDL watershed would be counterproductive. It is imperative to the success of all the phosphorus reduction activities going forward that no new sources be added to counteract these nutrient reduction efforts. To prevent new sources from being added, HRWC and partner agencies commit to participate fully in public response to new permit applications. In this public response, the partners will request that EGLE give full consideration of the effort made within the watershed to control existing phosphorus sources and uphold the goals of the TMDL by rejecting any new source permits.

*Timeframe:* 2023-2032

*Milestones:* Review and comment on all discharge permit applications.

*Cost:* HRWC and partner staff time. Likely a negligible cost.

*Potential funding sources:* General staffing budgets.

*Success Measures:* Zero new phosphorus discharge permits; monitoring (see chapter 5).

PE2. Incentivize agricultural practices to reduce nutrient loading

As indicated in chapter 2, 44% of the Watershed is under agricultural production. Chemistry monitoring indicates that, in the creeksheds with large areas of agriculture (i.e. predominantly Mill Creek, but also parts of Honey and Boyden Creeks), total phosphorus concentrations remain high. Agriculture is likely a significant source of nutrient loading, as fertilizers are applied annually to increase crop yields. HRWC has had some limited success in encouraging some changes in agricultural practices through the [Whole Farms for Clean Water Program](https://www.hrwc.org/wholefarms/). Program staff have learned anecdotally that area farmers have not received good enough information about the nutrient content of their soils. Further, practices such as targeted fertilizer application and subsurface injection have allowed farmers to reduce overall application and significantly reduce phosphorus loss (by >80% on some fields). Continued education and outreach to farmers is necessary to increase participation and further funding is necessary for “pay-for-performance” incentives based on phosphorus loss reductions.

*Timeframe:* 2023-2028

*Milestones:*

* 2023-2024: Publish program report with results. Begin distribution to local farmers, especially those working large acreage in areas modeled to show high phosphorus loss potential (Figure 4.1). Seek continued program funding.
* 2024-2026: Adapt outreach based on farmer response. Establish new incentive contracts and verify results.
* 2026-2028: Adapt programming based on farmer participation and practice results. Summarize modeling and monitoring results in program report. Seek continued program funding if results continue to be positive.

*Cost:* Implementation of marketing and outreach plan: $30,000; Incentive payments: $300,000; Technical assistance: $100,000, Total: $430,000

*Potential funding sources:* Section 319, GLRI, Foundations, NRCS, Resource Conservation Partnership Program (RCPP)

*Success Measures:* Modeled phosphorus loss reduction; total phosphorus monitoring (see chapter 5)

*Figure 4.1. Total Phosphorus loading rates from SWAT model (in kg/ha)*

Table

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PE3. Pass and Enforce Water Friendly Ordinances

To protect water, you need to protect the land the water drains from. This fact is a constant struggle in a world that tries and often fails to balance ecosystem needs with the demands of a human civilization. People need places to live and work, but people and animals need clean water and clean land. Fortunately, local governments have regulatory tools at hand to allow development while protecting the important natural areas that are mandatory in maintaining water quality and other important ecological functions (see 2.1.3.2).  Tools include wetland, woodland, riparian buffer, and other natural feature protection ordinances; and, regional planning to direct development away from natural areas.

We recommend that all local governments in the Watershed adopt the following local government policies for water quality protection:

1. Identify high priority natural areas
2. Adopt land protection funding program
3. Master planning to direct development away from sensitive areas
4. Overlay zoning of areas that need extra protection,
5. Setbacks and buffers from natural features like waterways, wetlands, woodlands,
6. Wetland protection ordinance
7. Reduce impervious surfaces through site design
8. Green Stormwater Infrastructure requirements to mimic ecosystem services of natural green infrastructure that was destroyed by development.
9. Pet waste pickup

HRWC has previously (2006) developed a Cost and Ordinance Worksheet (COW) to determine which local municipalities have which of these ordinances. HRWC will need to revise these COWs by conducting a survey of the Watershed’s municipalities to see where they have these policies and where they don’t.

HRWC will work with municipalities in getting new policies passed, by sharing model policies and advocating and educating local decision makers. To accomplish this, HRWC will recruit motivated individuals from local Watershed governments or citizenry for a series of trainings that provide intensive technical assistance including how to conduct an audit of current policies and will give recommendations on adopting necessary policies to provide clean water and natural area protections.

HRWC has run such activities in recent years for other areas of the Huron River Watershed under our “Change Makers” program. Based on our experience, we estimate it takes about $15,000 per municipality to conduct audits of their master plans, hold trainings which consist of multiple in person sessions over a one year period, and work directly with each Community in providing technical advice.

*Timeframe: 2022- 2032*

*Milestones:*

* 2024-2032: Run highly motived government elected official, employees and/or citizens from each of the 12 Core Communities (Table 1.1) in the Watershed through HRWC Change Maker’s program
* 2032: Every municipality in the Watershed has policies that cover these eight priority areas.

*Cost:* $180k ($15,000 per Core Community)

*Potential funding sources: Foundations, HRWC general operations*

*Success Measures: # of new ordinances or policies adopted*

PE4. Septic Inspection, Education and Remediation Program

While many homeowners in the Watershed are connected to wastewater infrastructure provided by Ann Arbor, Dexter, Chelsea, or a neighborhood sewer system, there are numerous homes outside municipal boundaries that rely on individual septic treatment.  Septic System Inspection Programs are meant to identify and correct failing septic systems that discharge human waste into groundwater or on the surface, and directly or indirectly into surface water HRWC’s. monitoring has shown that failing septic systems are causing *E.Coli* in Honey Creek (Appendix H) , but there hasn’t been a good process yet set in place for dealing with this issue.

Washtenaw County’s “Time of Sale” Ordinance requires that prior to any residential property transfer: 1) the septic system must be inspected by certified inspectors, 2) a report must be submitted to the Environmental Health Regulation Department and 3) the seller must receive an authorization letter from the Department. For properties where the “Time of Sale” ordinance has not triggered an inspection and authorization, county health officers are more limited in their ability to identify and inspect septic systems.  Over 4,300 systems have been evaluated annually, countywide, with over 540 septic system corrections documented to date.

HRWC recommends a behavior-change based education program among homeowners to increase voluntary frequent maintenance and inspection of septic systems and repair and replacement of those identified to have problems. Behavior-change projects involve using observational research, focus groups, surveys and other data to identify the barriers that  property owners face in regard to implementing a change in their actions. The desired target behavior for septic systems is more frequent voluntary inspections (not just a Time of Sale) and maintenance. Possible barriers, which would be determined as a part of the behavior change research, are cost of maintenance to property owners, lack of understanding the importance of maintenance, how to maintain their system, remembering to maintain it, and who to call for help, concern regarding ordinance violations and penalties, funding for replacement costs, among others. After identifying specific actions and barriers, HRWC and the County would develop and pilot test strategies that help residents overcome these challenges. Successful strategies could be implemented on a larger scale. Some possible strategies are included below:

Washtenaw County’s exisiting Time of Sale program can serve as the basis for an expanded effort to reach residents who are new homeowners with septic systems to increase inspections and remediate those that are failing. Additionally, HRWC and the County could use results from IDEP inspections and canine source detection confirmations to then target residents for expanded programming that initiates or increases inspections and maintenance of septic systems.

This new program could remove barriers such as cost and expertise by providing inspections free of charge to residents in target areas and a list of qualified contractors to remediate failing systems. An additional element to the program should be added to help finance failing systems for residents who lack the means to pay for expensive fixes. The availability of assistance may help to address barriers on the part of homeowners to participate in the inspection program. The program could host workshops on septic system care and maintenance that would be promoted by direct mail and offer a free “Water Efficiency” kit for those who attend.

HRWC and partners in the health department could also map the actual location of septic tanks and drain fields to update and convert records to Geographic Information Systems or other digital tools. Systems could be built to automatically send emails and educational reminders to homeowners that include messaging and material targeted to program participants to increase awareness about septic systems and their effect on water quality, and educate watershed residents on best practices for maintaining, and identifying and correcting failed septic system. Such a tool could also be used to track the oldest and most likely to fail systems.

Projects that use behavior change marketing techniques to address failing septics could have great impact on reducing E.coli, but will not be without significant challenges. Concerns regarding costs to correct violations required by Ordinance and fear of penalties will make voluntary participation in research and evaluation by the target audience very difficult.

*Timeframe:* 2024-2032

*Cost:* Behavior-change based educational program: $150,000 for surveys, staffing, and material development. Resident-monetary assistance for inspections, maintenance and remediation of unknown number of connections $100,000 total. Digitizing records; building educational tools. $50,000. Total $300,000

*Success Measures:* Differential in number of inspection requests (pre-post information distribution), number of septic remediations in target areas, survey results, monitoring (see chapter 5).

PE5. Develop and Implement a Green Stormwater Infrastructure (GSI) Strategy and Program

As mentioned in chapter 3.4.1.3, Green Infrastructure, under the reality of climate change and the ever-growing need to attenuate stormwater, runoff, and flooding effects, built infrastructure like will always be at least partially static and likely to become obsolete in the future. In many cases, building infrastructure to manage future storms and floods will be impossible or impractical, either due to costs or the rate of change in design storms. However, natural ecosystems are inherently dynamic. The use of green infrastructure and natural areas conservation should be incentivized wherever possible to mitigate the pace and magnitude of future changes.

HRWC developed a process to incorporate available geographic, aerial and other remotely collected information to identify opportunities for Green Infrastructure projects for stormwater treatment.[[2]](#endnote-3) Figure 4.1 shows a map of GSI opportunities in the Chelsea area. Opportunities are identified for streets, large lots, and roofs. Projects and programs already exist in the watershed, such as Washtenaw County’s residential Rain Garden Program,[[3]](#endnote-4) and numerous public and private GSI projects that are inventoried across the county.[[4]](#endnote-5) The Huron Clinton Metropark Authority has Stormwater Management Plans with GSI components for each of the Metroparks in the Watershed (Hudson-Mills, Dexter-Huron, Delhi) (Appendix I)

Across the plans and programs, hundreds of projects have been identified of many types including residential rain gardens, community rain gardens, native restoration, green roofs, water quality units, and infiltration practices.

So many GSI efforts are already underway, but there is plenty of space for growth in this arena. A program to incorporate key GSI retrofit designs along key roads or other publicly owned properties based on targets identified in the GSI Opportunities Map should be developed, as well as large business properties. Public and private property owners or managers would need to participate as willing partners. New and redevelopment projects in the watershed should also be encouraged to use GSI approaches. This program would promote the use of designs that slow and settle runoff waters from impervious surfaces like roads, drives and sidewalks and infiltrate as much of the runoff as possible. Slowing run-off waters will reduce stream flashiness, addressing the top long-term goal of reducing flow variability in the Watershed. This also allows a greater portion of runoff to be filtered through groundwater, removing pollutants, and where bacteria will not reproduce, thus reducing stormwater runoff sources of contamination. Research on bacteria reduction indicates that few structural BMPs work to significantly reduce bacteria levels in stormwater runoff. However, properly designed detention or retention basins have been shown to reduce bacteria in outflow. Existing detention ponds and stormwater systems in critical areas of the watershed should be evaluated for retrofit opportunities to capture, settle and treat stormwater runoff, as well.

Ideally, all impervious surface within the watershed would be captured and treated at some level, whether it be detention ponds, underground storage or GSI. Based on an analysis of the watershed, there are about 10.23 mi2 or 6,550 acres (5%) of impervious surface. At a conservative 7:1 ratio of impervious surface to treatment area, **an appropriate goal would be to** **develop at least 936 acres or 41 million square feet of GSI or other treatment in the watershed.** Based on standard designs, this implies the need for 61.5 million cubic feet of total storage capacity. EGLE 319 funding may have additional requirements for BMPs beyond the 7:1 ratio.  Furthermore, this 936 acres is a conservative estimate as this value is based on current conditions and as additional areas are developed the number should be adjusted to match.

Achieving the benchmark of 936 acres (41 million square feet of GSI) will not occur without significant effort— more than what can be provided by the WMP stakeholders alone.  Fully implementing GSI in this part of the watershed means more than increasing the adoption of rain gardens and other GSI on residential properties and on public land and parks. Targeting commercial property owners, churches, and non-profit property owners to install rain gardens as a means of controlling stormwater runoff and beautifying their landscapes would provide an additional untapped avenue of community engagement and GSI implementation. We recommend an outreach campaign using a behavior change marketing approach to increase the voluntary adoption of rain gardens among these target groups.  Each target group would need its own marketing strategy.

At its core, behavior change marketing requires significant understanding of the target audience. This includes observation-based research, focus groups and surveys of the target demographic to understand their current knowledge levels and their barriers to implementation, which could range from costs, lack of knowledge, motivation, and access to resources among other things. With this data as guide, the educational campaign would develop and pilot test strategies to reduce or eliminate identified barriers and increase motivation for adopting the desired behaviors. Some possibilities include educational materials that use beautiful photography and appeals to GSI’s benefits to the community and low-cost maintenance; trainings on how to plan, implement, and maintain GSI; tours of beautiful and successful GSI; increasing access to contractors that provide GSI design, installation and maintenance; identifying and supporting early adopters and influencers; establishing peer-to-peer social networks; and more. Successful strategies would then be used on a larger scale. One challenge to this educational campaign is that business owners are not necessarily properly owners, but are often renters, and the motivation of a renter versus a property owner will likely vary. Possible target locations for this project are both downtown areas of Dexter and Chelsea, where multiple local businesses are congregated closely to each other, or commercial suburban spawl, like the hundreds of businesses stretching multiple miles along Jackson Road in Honey Creekshed.

*Timeframe:* 2022-2032

*Milestones:*

* 2022-2023: Estimate current treatment area (or storage capacity) and set a 10-year goal for new development
* 2022-23: Identify primary GSI project targets and develop a strategy
* 2022-2023: Develop a marketing strategy for primary and secondary targets
* 2023-24, develop a self-funding program to identify, fund, design, install, and maintain GSI projects
* 2025-2030: Conduct a multiyear education campaign targeted at businesses
* 2024-2032: Implement program and install projects

*Cost:* Highly variable, depending on project, but usually lower than conventional cost of construction or reconstruction and maintenance. $20k to form and launch program. Up to 150,000 for a multiple year educational campaign with surveys, staffing and products.

*Potential funding sources:* Section 319, local government match, local agency or private investment

*Success Measures:* Reduced runoff volume, pollutant concentrations, and bacteria concentration measured from projects compared to conventional development*,* monitoring

*Figure 4.2. Green Stormwater Infrastructure opportunities in the City of Chelsea and surrounding area. (Colors represent different types of GSI)*

**Map

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PE6. Develop a buffer enhancement program

Vegetated stream buffers are valuable permanent measures for water quality and habitat enhancement. Buffer zones are strips of undisturbed native vegetation, either original or reestablished, bordering a stream, river, or wetland. These buffer zones also are known as riparian buffer zones, referring to the zone along a waterway or waterbody where the water meets the shore. The trees, shrubs and plants, and grasses in the buffer provide a natural and gradual transition from terrestrial to aquatic environments

To reap all the benefits of buffers, they should be at least 100 feet wide on either side of a stream – both intermittent and perennial. Though not optimal even buffers 10 feet wide could provide many benefits, and this could be a possible solution in highly urbanized or agricultural regions.

These areas are critical for wildlife habitat, storing water during periods of high-water flow, and protecting lakes and rivers from physical, chemical, and biological pollutants. Establishing buffers that protect riparian corridors, especially floodplains, wetlands, and steep slopes, offers a way to filter material with active microbes before they enter the stream. Restoring natural vegetation in bacteria hot spots also discourage Canadian geese populations from congregating. Planting and maintaining native grasses and sedges at common geese or animal access areas to replace some of the turfgrass will help reduce E. coli counts.

As mentioned in 3.3.2.1, Changes in Bird Nesting and Migration Patterns, climate change is shifting bird’s migration patterns among other effect, and in light of these challenges, buffer zones are all the more important for providing critical oasis habitat corridors, especially in agricultural dominated areas like Mill Creek.

Since relatively little of the Watershed is covered in impervious area, there are a lot of opportunities for buffers. Much of the land is managed in agriculture use, so the buffers will need to be voluntary through practice incentives or purchased as easements. Some buffers could be added in conjunction with streambank restoration (see 1N above). Buffers should be targeted along stream reaches that are impaired by bacteria or for biota.

We recommend starting a stream based, behavior-change based, buffer enhancement educational program. Many of the best management practices for stream shorelines are a variation of what HRWC and EGLE already teach about lake shorelines, however, these stream landowners may not necessarily see that connection or even be familiar with the concept and are likely to have different motivations and barriers to adopting best shoreline practices. The approach would include techniques such as observation based research, focus groups and surveys to identify the motivations for and barriers to   creating and maintaining buffers, be it roadblocks like costs, aesthetics, lack of information, knowledge, or motivation. The educational program would then develop and pilot test strategies to best mitigate these challenges and inspire stream landowners  to build buffers and keep and restore protective riparian buffers. Successful strategies that are identified could then be implemented on a larger yet targeted scale to measure results in the targeted group. Follow up surveys would show change in knowledge and behaviors and follow up monitoring could show direct physical results. This educational program would start small by directly targeting streamside property owners on specific properties, like those who live on streams assessed by BANCs for example, but the products and ideas from this program could eventually be scaled to cover the whole Huron River Watershed.

Property owners in agricultural, urban, and suburban areas face different challenges and the education program would have to distinguish between these. There are some resources that already exist for agricultural property owners to utilize. The Wildlife Habitat Incentive Program (WHIP) is available through the Natural Resource Conservation Service (NRCS). The Conservation Reserve Enhancement Program (CREP) offers additional incentives to encourage landowners to implement practices that will help reduce sediment and nutrients and will improve wildlife habitat, while also removing bacteria and microbes. The USDA Farm Service Agency (FSA) provides an annual land rental payment, including a CREP special incentive payment, plus cost-share of up to 50 percent of the eligible costs to plant grasses or trees on highly erodible cropland, establish vegetated buffers along streams, restore wetlands, provide shallow water areas for wildlife, and restore habitat for rare and declining species. Additionally, the entire watershed is in the target area for HRWC’s Whole Farms for Clean Water program, which provides incentive payments for phosphorus loss reductions, which buffers provide.

*Timeframe:* 2025-30

*Cost:* Multiple year educational campaign, $150,000 for surveys, staff time, and products. Funds could be provided to participants to help kickstart buffers: @ $500/ac for 80 ac: $50,000; mailing, site visits, planning, technical assistance, reporting: $25,000. Total: $225,000.

*Success Measures:* # landowners participating, # and % of riparian acres buffered, monitoring (chapter 5)

4.2.4. HRWC- **M**aintenance and **R**estoration Recommendations

MR1. Targeted stream channel restoration to reduce channel erosion

As noted in Chapter Two, the assessment of stream channels in the Watershed determined that most channels show relatively little evidence of bank erosion risk. However, there are a few stream segments that should be repaired and restored to a more natural state. A restored channel, with a more moderated delivery of stormwater to the river provided by GSI efforts, will accentuate the river’s resiliency to ability handle climate-related impacts. GSI planning and implementation is proposed for the more developed areas in the watershed. This will help to reduce nutrient inputs and slow flows from runoff events to reduce erosion and bed scouring. The added infiltration from GSI practices will increase groundwater flow and even out flows during the longer dry periods that are expected under the changing climate regime.

Stream channel restoration is proposed for the highest priority stream reaches that were identified in the BANCS inventory (Appendix G). Seven priority restoration projects were identified through this process (Table 4.3). Restoration projects should proceed after upstream flow can be shown to be stable, but most of the impacts to these channels are from alterations to isolate the streams from farm fields. The altered hydrology is not likely due to runoff from built-up or impervious areas. While the target reaches would benefit from GSI or other flow control in their contributing areas, bank restoration can be beneficial on its own.

*Table 4.3. Priority Stream Restoration Reaches*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reach ID** | **Stream Name** | **Reach Length (linear ft)** | **Erosion Rate (tons/yr/ft)** | **Total Erosion (tons/yr)** | **Notes** |
| 432 | Mill Creek, SW fork | 1,634 | 0.236 | 384.8 | Banks appear artificially high on the south side of the stream. An easement could be purchased and two-stage bank established, at minimum. |
| 501  427 | Mill Creek, main S fork | 18,850 | 0.212 | 2,062.5 | Two long reaches of mostly straight channel that has been isolated from floodplain. Two-stage banks on both sides should be added in phases in partnership with farmers. |
| 588 | Honey Creek, S branch | 2,543 | 0.153 | 151.8 | Reach has been heavily impacted by the development of I-94 and Jackson Blvd. crossings. Culverts should first be assessed for blockage, failure, or misalignment. Possibly, a realignment or resizing effort may be needed. Ample floodplain is available. |
| 474  401 | Mill Creek, small tributary | 4,106 | 0.123 | 189.2 | Small, often dry, flashy tributary near Dexter that has some evidence of severe bank erosion. May be partially caused by development. Riparian room to stabilize small section at downstream end, though runoff storage/infiltration is also needed. |
| 373 | Honey Creek tributary | 8,019 | 0.107 | 859.4 | Unstable stream W of M-14. Altered hydrology has severely eroded banks in smaller sections, especially at bends, some threatening property. Natural floodplain could offer room for restoration, but all in residential area in need of source control. |
| 368 | Mill Creek, N Fork | 3,483 | 0.104 | 363.6 | Altered channel (straightened and deepened) in area with high water table, cutting across 2 farm fields. Potentially tiled. Restored hydrology and wetland restoration required to reduce bank erosion. |
| 538 | Boyden Creek, W branch | 8,312 | 0.104 | 381.6 | Small stream in mostly good shape, with small segments of high erosion likelihood. Riparian area formerly golf course. Could be stabilized then allowed to restore as floodplain returns to natural. |

Restoring streams to more natural channel configuration provides the template for restored ecosystem function that will support the return of a healthy biological community once flashy flows are mitigated. The existing floodplain should be connected where possible to allow for flooding from smaller as well as larger storms to better establish floodplain communities and provide better riparian habitat. Restoration projects identified for the Honey Creekshed are particularly important as those reaches have impaired biological communities. Some sites in Mill Creek near restoration priorities are also declining and could improve following stream restoration.

Specific restoration projects will need to be identified and restoration designs developed that are based on site-specific survey data that was beyond the scope of the rapid assessment survey. This more detailed survey data can be used to develop a more precise erosion estimate, which can further be used to derive sediment and phosphorus loading reduction estimates from the restoration projects.

All stream restoration projects require EGLE Non-Point Source Division review and approval. Possible stream restoration practices that can improve stream function may include, but not be limited to the following:

* *Grade controls* including the creation of step pools using natural materials such as logs or stone from the surrounding watershed
* *Form-based restoration* that could include the use of anchored deflectors or log jams to deflect energy from eroding banks, slow stream velocity and introduce complexity to stream form. In some cases, native rock and wood can be used to create larger deflection as with “J-hooks.”
* *Connectivity restoration* may be possible in some places by flattening bank slopes and allowing the stream channel to reconnect with available floodplain. Additional flood storage can also be constructed within this floodplain in wetland or oxbow features.
* *Channel complexity* can be added where there is insufficient room to connect to floodplain features or allow a channel to meander. Two-stage channels with periodic or continuous benches along one or both sides of a channel that has over-widened can allow natural features to recover and create needed flow diversity. Natural log benches can be used to stabilize banks and allow low-flow accumulation of sediments.
* *Riparian restoration* can be added to almost any channel corridor by adding a matrix of native grasses, forbs and live stakes to help stabilize banks and provide needed cover.
* *Wetland restoration* can be included where the water table is high by restoring the natural hydrology, breaking drain tiles and removing dikes. Connecting streams to wetlands can slow and cool flows, settle out sediments and filter pollutants and nutrients.

*Timeframe:* 2023-2032

*Milestones:*

* 2023-25: Identify capital improvement and grant opportunities and schedule projects.
* 2024-2032: recommend restoration improvements to development projects.
* 2024-2032: Implement and construct public and private restoration projects

*Cost:* Highly variable, depending on project. A small (~1,000 lf), low construction project is estimated at $50,000, but could range to $100,000 with permitting or construction difficulties. Larger projects with more earth movement required can cost multiple millions of dollars. An estimate for 7 projects is $500,000 to $5,000,000

*Potential funding sources:* Stream restoration grants, local government match; local agency or private investment; mitigation funding.

*Success Measures:* Increased DO levels; improved channel morphology dimensional measures and substrate characterization; biota monitoring (see chapter 5)

4.2.5. Stakeholder Recommendations

A. Maintain and Implement Stormwater Management Plans

As mentioned in 3.3.5.1 and 3.3.6, the recent increase in heavy downpours has contributed to the repeated discharge of untreated sewage to the river or its tributaries in several communities. While communities with combined sewage-overflow systems are more vulnerable to sewage discharges due to extreme precipitation events, communities with separate sanitary and storm sewers are also at increasing risk. As seen with what happened in Dexter in 2011, continued efforts to reduce stormwater leakage into the sanitary sewers are effective for lessening the chances for untreated sewage run off. These actions, as well as priority actions 1E, 1F, and 1G, are all actions that are described more fully in community Stormwater Management Plans (SWMPs).

All MS4s in the Watershed submit completed Stormwater Management Plans (SWMPs) along with permit applications to EGLE every five years. The SWMPs included specific activities conducted by individual MS4s to control and manage the quality and quantity of stormwater flowing through and out of their systems. The inclusion of the SWMPs in this WMP are meant to indicate that these MS4 communities do prioritize proper stormwater management for the betterment of the Watershed’s water quality, and where appropriate, the BMPs within the SWMPs should be considered for funding under 319 dollars.

Readers should refer to SWMPs from individual municipal and county agencies to find activities beyond those specified within this WMP. SWMPs are available for the following municipal organizations in this Watershed: City of Dexter[[5]](#endnote-6), Washtenaw County Water Resources Commissioner[[6]](#endnote-7), Washtenaw County Road Commission[[7]](#endnote-8). The City of Chelsea has elected to use the County’s plan as their guidance.

*Timeframe:* 2022-2032

*Milestones:*

* 2026: Revise plans and resubmit for permits.
* Ongoing: Implement recommendations of each individual SWMP, including:
  + Upgrading aging parts and maintaining system components
  + Implementing GSI projects

*Cost: Permitting:*Development of SWMPs and permit applications: $25k. $50k total.

Costs of Repairs to SW systems: Difficult to estimate. $10k - $100k annually, on average though years with major repairs or upgrades will exceed the average considerably. $1M - $10M total.

*Potential funding sources:* Primarily paid for with general funds, county budgets, stormwater utility funds, and agency budgets. Larger system upgrades should take advantage state and federal grant and low-interest loan programs like the state revolving fund. Municipalities without a stormwater utility should consider the cost of developing one against the cost of upgrading the system to maintain a satisfactory level of service.

*Success Measures:* Monitoring results, % of systems meeting satisfactory or equivalent ratings, # problems corrected, lbs of sediment cleared, wildlife accesses blocked (bacteria source)

B. Enforce rules, standards and ordinances for stormwater management

The Washtenaw County Water Resource Commissioner developed rules and engineering standards for new and re-development to help reduce pollutant concentrations and bacteria in surface water by preventing flooding, modulating flow, treating storm water, and discouraging geese by using native landscape buffers near waterways and ponds. WCWRC’s program provides likely the greatest protection from stormwater impacts from new and re-construction projects across the state. The current standards and rules require infiltration of storms up to the bankfull event, in most cases, and controls flow to pre-development rates. All municipalities in the county have adopted stormwater ordinances which refer to these stormwater standards. WRC staff review development proposals to ensure they meet WRC standards. Projects that do not meet standards must be redesigned or adjusted in order to receive municipal building permits.

*Timeframe:* ongoing

*Milestones:* 2023, 2030:Report on standards outcomes

*Cost:* Not tracked specifically. Estimates are $400 - $4,000 per project, depending on complexity. Annual estimate: $100k - $500k. 10 years: $1M - $5M

*Potential funding sources:* Funded directly by WCWRC.

*Success Measures:* Reduced runoff compared to previous standards, monitoring (see chapter 5)

C. Natural Areas Protection.

Stakeholder partners, including municipalities and land conservancies throughout the Watershed, should pursue acquisition, conservation easements or otherwise preserve natural areas.

Through the use of HRWC’s existing prioritization and the accomplishment of Recommendation S3 (field assessments and enhanced ranking system), high ranking natural areas should be permanently protected through acquisition and conservation easements.

Current land protection programs include the City of Ann Arbor’s Greenbelt program, Scio, Webster, and Ann Arbor townships’ land preservation programs, and Washtenaw County’s Natural Areas Protection Program. These programs are funded through a land protection millage levied on property taxes. These kinds of protection programs should be implemented by all municipalities in the Watershed

Other protection funding includes Clean Water Act Section 319, State Revolving Loan Programs, Carbon off sets purchased by companies and municipalities with carbon neutrality goals, NRCS funding through their Regional Conservation Partnership Program, and foundations.

Conservation easements purchase can run from $5000 an acre to $15,000 an acre, depending on the location of the property and assessed value of the property.

*Timeframe: 2022-2032*

*Milestones:*

* By 2032: At least 1000 new acres of the highest priority natural areas in the Watershed is purchased or put into a conservation easement.

*Cost:* $5000- $15,000 an acre for easements; approximately $10M for 1000 acres.

*Potential funding sources: see text above*

*Success Measures: # of acres protected*

D. Implement infrastructure fixes on stream crossing structures

As discussed in 3.3.6, as we proceed into the future, infrastructure, bridges, pipelines, and other infrastructure that cross streams, will become increasingly vulnerable to scouring and erosion due to increasing storm size.[[8]](#endnote-9) The Middle Huron Watershed includes many urbanized areas that have a significant number of intersections with aging infrastructure. These intersections may be a substantial risk factor for the river over decades without attention or intervention.

With the results from recommendation S4, and other preexisting knowledge and data, WCWRC and the Washtenaw County Road Commission should design, install/reinstall, and maintain stream crossing structures to provide for aquatic passage, habitat connectivity, and fluvial geomorphic functions, all within the lens of climate change effects.

*Timeframe:* 2022-32

*Cost:* $100k- $1M per road crossing depending on severity of fixes needed.

*Success Measures:* # of road crossing intersection fixes successfully implemented

E. Pet waste ordinance education and enforcement

Pet waste ordinance development was suggested as a River Friendly policy in recommendation PE3.

After such ordinances are passed, and in areas where the ordinance already exists, we recommend an educational campaign to educate the general public on the impacts of pet waste on surface water quality and the existing local regulations concerning pet waste. Efforts will work to increase public awareness of local pet waste ordinances and drive behaviors to reduce pet waste entering storm drains. In addition, HRWC will work with other watershed municipalities on the development, adoption and implementation of ordinances requiring the removal and proper disposal of pet waste with fines for infractions, through the sharing of educational materials.

*Timeframe:* 2022-2032

*Milestones:*

* 2022-23. Draft ordinance developed, revised and passed in Scio Township
* 2024. Education Materials distribution.
* 2025-2032. Ordinances in other municipalities enacted.
* 2026-2032. Follow-up education and surveys.

*Cost:* Elected official time in review and enactment: $15,000.

*Potential funding sources:* Section 319, local government match

*Success Measures:* Ordinance enactment, volume of calls about ordinance, ordinance enforcement rate, monitoring (see section 5).

F. Place doggie bag stations at target locations

Local municipalities and park systems, including the County, Townships, and HCMA should install pet waste stations at local parks, frequently recreated public areas, and other likely high-concentration areas to reduce bacteria contamination of stormwater. This should reduce pet waste in high traffic areas, subsequently reducing the amount of E. coli entering the watershed via pet waste. Local municipalities and homeowner associations to install pet waste stations, including free bags and trash receptacles, and ensure proper maintenance. Based off use of stations and feedback from station managers, the property owners should modify the placement of the stations or expand the network. This activity should be done in conjunction with activity E.

*Timeframe:* 2022-2032

*Cost:* 50 dog waste stations @ $150 ea.: $7,500; technical assistance, installation, maintenance labor: $20,000. Total: $27,500

Success measures: Number of stations installed, bag volume utilized, pounds of feces removed

G. Climate Action Planning

Chapter 3 describes the changes in climate already occurring and those to come, and the impact on all the sources of impairments addressed in this watershed management plan. Each municipality and resident in the Watershed must take action to reduce greenhouse gas emissions to the greatest extent possible and as quickly as possible, to avoid the most catastrophic impacts. Municipalities must act build to resilience against the inevitable increased flooding, extreme temperatures, habitat degradation, and other impacts the Watershed is already suffering.

The City of Ann Arbor has created an ambitious plan, A2Zero, for city operations and the entire community to reach carbon neutrality by 2030. Washtenaw County has pledged for its municipal operations to reach neutrality by 2030 and for community-wide neutrality by 2035. The county is creating its carbon neutrality plan currently. Other municipalities, businesses, institutions, and residents throughout the Watershed should engage with the county planning process and use the resulting climate action plan as a guide and resource to enact climate action policies.

*Timeframe:* 2022-2032

*Cost:* Highly variable depending on actions, $1M-$1B

*Success Measures:* municipalities creating climate action plans, enacting policies that will reduce community greenhouse gas emissions, enacting policies to increase climate resilience.4.3. Impairment Loading Implications

4.3.1. Ford Lake and Belleville Lake Phosphorus Impairment

The TMDL for Ford Lake sets a maximum load goal for total phosphorus at 36,020 lbs/year entering the lake, not counting the internal lake load, or 36,500 lbs/yr with the internal load. The most recent loading analysis using river flow and monitoring data estimates, which account for source reduction activities up to the current date, estimates the current loading rate into Ford Lake is 37,384 lbs/yr. If all primary actions are within the more proximate Middle Huron River, Section 2[[9]](#endnote-10) plan are fully implemented, HRWC estimates that an additional 3,241 lbs will be prevented annually from entering the lake, bringing the total phosphorus load to 34,143 lbs/yr. This load reduction would be more than sufficient to meet the TMDL load target. The further activities recommended in this upstream, Section 1 plan will provide a sufficient margin of safety, and the plan is thus quite conservative for addressing the phosphorus nutrient impairment. It may still require many years at these low loading levels for the internal load within the lakes to decrease significantly, and therefore reduce mean TP concentrations to water quality targets.

4.3.2 Honey Creek and Mill Creek Bacteria Impairment

As indicated in chapter 2, no specific loading targets were set for the *E. coli* TMDL since it is concentration based. It is quite difficult to estimate loading reductions for pathogen impairments. It also is not entirely appropriate to focus on load reductions since the impairment itself is based on point counts or concentrations. The focus is better placed on activities to reduce *E. coli* sources.

The E. coli TMDL Implementation Plan for Honey Creek was developed to establish an effective strategy to reduce potential sources through a set of implementation activities. Please refer to that plan found in Appendix B for more details on activities, impacts, schedules and cost estimates.

1. Michigan Department of Natural Resources. 2011. Great Lakes Road Stream Crossing Inventory. <https://www.michigan.gov/documents/dnr/Great_Lakes_Road_Stream_Crossing_Inventory_Instructions_419327_7.pdf>. Access June 2022. [↑](#endnote-ref-2)
2. Huron River Watershed Council. 2014. Green Infrastructure Opportunities. <https://www.hrwc.org/our-watershed/protection/surrounding-land/green-infrastructure/green-infrastructure-opps/> [↑](#endnote-ref-3)
3. Washtenaw County Water Resources Commissioner. Undated. Rain Gardens. <https://www.washtenaw.org/647/Rain-Gardens>. [↑](#endnote-ref-4)
4. Washtenaw County Water Resources Commissioner. Undated. Green Infrastructure. <https://gisappsecure.ewashtenaw.org/public/greeninfrastructure/>. [↑](#endnote-ref-5)
5. City of Dexter, 2022. Stormwater Management Plan,

   <https://www.hrwc.org/wp-content/uploads/MH1-WMP-DexterDPW-SWPPP-Mester-draft-.pdf>. Accessed June 2022 [↑](#endnote-ref-6)
6. Washtenaw County Water Resources Commissioner. 2022. Stormwater Management Plan.

   <https://www.washtenaw.org/DocumentCenter/View/23657/SWMP-WC-1116>. Accessed June 2022. [↑](#endnote-ref-7)
7. Washtenaw County Storm Water Management. <https://www.wcroads.org/storm-water-management/>.

   Accessed June 2022. [↑](#endnote-ref-8)
8. Maxwell, K., S. Julius, A. Grambsch, A. Kosmal, L. Larson, and N. Sonti, 2018: Built Environment, Urban Systems, and Cities. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 438–478. doi: 10.7930/NCA4.2018.CH11 [↑](#endnote-ref-9)
9. Huron River Watershed Council. 2020. Middle Huron River Watershed Management Plan, Section 2. <https://www.hrwc.org/what-we-do/programs/watershed-management-planning/middle-huron-WMP-section-2/> [↑](#endnote-ref-10)