

# EXECUTIVE SUMMARY

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Brighton Lake Photo: HRWC

## Huron Chain of Lakes Watershed

The Huron Chain of Lakes Watershed covers 253 square miles of the 908-square-mile Huron River Basin, draining an area from just below the Kent Lake dam on the Oakland County/Livingston County border to two miles below Portage Lake in Washtenaw County. Within this area, the Huron River flows southwest for 27 miles through a series of wetland complexes and large glacial kettle lakes. Eight major tributaries and numerous smaller streams provide an estimated 593 miles of streams, which comprise the eight “creeksheds” in the Huron Chain of Lakes Watershed. Over 22,000 acres of wetlands remain in the Watershed as of 2000, comprising over 13% of the total watershed area, along with 172 lakes greater than 5 acres in size. The watershed contains a number of protected natural areas including Island Lake State Recreation Area, Huron Meadows Metropark, Gregory State Game Area, Brighton State Recreation Area, portions of Pinckney State Recreation Area and Hudson Mills Metropark. These areas contain high quality habitat and biological diversity, including several threatened and endangered species.

The majority of the watershed lies within Livingston County, with eastern portions in southwest Oakland County and southernmost areas in Washtenaw County. All or portions of 20 local communities are situated in the Huron Chain of Lakes Watershed, of which the largest portions are within the townships of Brighton, Genoa, Lyon, Green Oak, Hamburg, and Putnam, as well as the Village of Pinckney, the City of Brighton, and the City of South Lyon. Other communities with smaller areas in the watershed include the townships of Highland, Hartland, Oceola, Milford, Marion, Unadilla, Salem, Northfield, Webster, and Dexter, as well as the City of Novi. The Huron Chain of Lakes Watershed is experiencing intense development pressures from a growing economy and urban sprawl. Livingston County has been the fastest growing county in Michigan for the past decade, and most of the County’s growth over the next 30 years is expected to take place in the Huron Chain of Lakes Watershed.

## Purpose of the Watershed Management Plan

The Huron Chain of Lakes Watershed Management Plan is part of an effort undertaken by the communities of Huron Chain of Lakes Watershed seeking the NPDES Wastewater Discharge General Permit MIG619000 (watershed-based). As that permit states “the permittee shall participate in the development and implementation of

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a Watershed Management Plan (WMP). The purpose of the WMP is to identify and execute the actions needed to resolve water quality and water quantity concerns by fostering cooperation among the various public and private entities in the watershed.... The emphasis of the WMP shall be to mitigate the undesirable impacts caused by wet weather discharges from separate storm water drainage systems.” This Watershed Management Plan is a strategy document that is intended to define the state of the watershed by describing its natural resources

A TMDL refers to a lake or portion of a stream that has been determined by the MDEQ as failing to meet the State’s minimum water quality standards due to excessive pollutant loads.

As required by the General Permit, this Plan also will address Total Maximum Daily Loads (TMDLs) established within the Huron Chain of Lakes Watershed. A TMDL refers to a lake or portion of a stream that has been determined by the MDEQ as failing to meet the State’s minimum water quality standards due to excessive pollutant loads. TMDLs in the Watershed are addressed by detailing appropriate actions specific to storm water controls to meet the TMDLs. To date, three phosphorus TMDLs have been established in the watershed for Brighton, Strawberry, and Ore Lakes. Six TMDLs for other pollutants and impairments are scheduled by MDEQ for future establishment in the watershed.

The permit holders that were involved in the development of this Plan are committed to protecting the sensitive natural areas of the watershed, mitigating the impacts of stormwater discharges and preventing future increases, and restoring degraded areas. While compliance with the NPDES Phase II permitting process is the Plan’s primary and mandatory function, the authors intend for the Plan to fit into a broader context of watershed management planning by laying the groundwork for a comprehensive, long-term effort to restore and protect the Watershed’s water resources for future generations.

## Huron Chain of Lakes Steering Committee

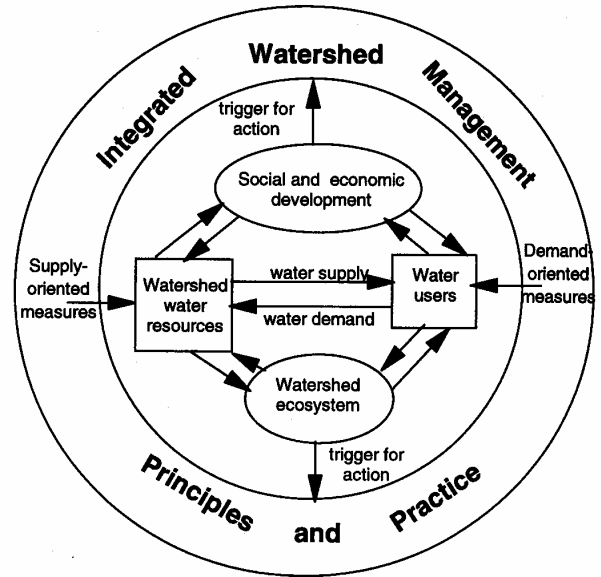
Since December 2002, the Livingston County Drain Commissioner has sponsored monthly meetings to facilitate a coordinated effort among watershed-based Phase II permit holders in Livingston County. These county-wide meetings address administrative and procedural issues common to all watershed-based permit holders. In February 2004 a group of eight local governments and county agencies located within the Huron Chain of Lakes Watershed formed the Huron Chain of Lakes Steering Committee to coordinate the study, development, preparation, and timely filing with the MDEQ of a Huron Chain of Lakes Watershed Management Plan as part of the required NPDES Phase II stormwater compliance. Core members of the Steering Committee represented the following communities and agencies:

City of Brighton	Livingston County Drain Commissioner
Brighton Township	Livingston County Road Commission
Genoa Township	Village of Pinckney
Green Oak Township	Putnam Township

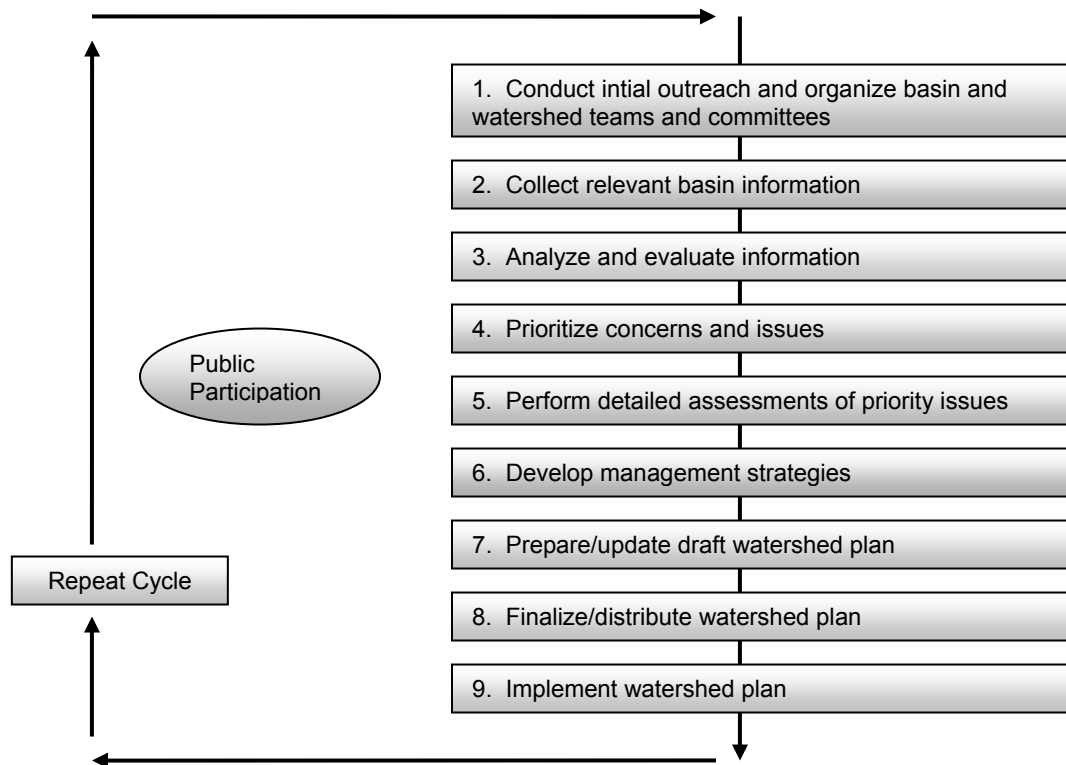
Other communities and agencies located in the Watershed, as well as individual residents, also attended regular meetings of the Steering Committee. The Huron River Watershed Council was commissioned by these same eight local governments and county agencies to work with the Steering Committee to facilitate the development of, and write, the Huron Chain of Lakes Watershed Management Plan.

## The Watershed Planning Process

A watershed is a complex integrated system with the whole being greater than the sum of its parts. This complexity stems from the ever-changing interaction of social, economic, and biophysical forces. The interplay of these forces, as shown in the diagram to the right (from *Integrated Watershed Management* by Isobel W. Heathcote), is the basis for the concept of integrated watershed management.



The Huron Chain of Lakes Watershed Management Plan is rooted in the concept of integrated watershed management and was developed following the process outlined in “Developing a Watershed Management Plan for Water Quality – an Introductory Guide” which was developed by the Michigan State University Institute of Water Research, MSU Extension, and MDEQ. The diagram below outlines a schematic for the general steps of a watershed planning process.



Throughout the nine steps described in the diagram, ongoing public involvement is key to developing a plan that addresses the needs and concerns of the watershed’s residents. The last step of repeating the cycle illustrates the iterative nature of watershed planning. A watershed management plan must be updated and revised as new information becomes available and the successes and shortcomings of implementation efforts are realized over time.

## Designated and Desired Uses

According to the Michigan Department of Environmental Quality, the primary criterion for water quality is whether the waterbody meets designated uses. Designated uses are recognized uses of water established by the state and federal water quality programs. In Michigan, the goal is to have all waters of the state meet all designated uses. It is important to note that not all of the uses listed below may be attainable, but they may serve as goals toward which the watershed can move.

All surface waters of the state of Michigan are designated for and shall be protected for all of the following uses. Those that apply to the Huron Chain of Lakes Watershed are in boldface:

Designated uses are recognized uses of water established by the state and federal water quality programs.

- **Agriculture**
- **Industrial water supply**
- **Public water supply at the point of intake**
- Navigation
- **Warmwater fishery**
- **Other indigenous aquatic life and wildlife**
- **Partial body contact recreation**
- **Total body contact recreation between May 1 and October 31**
- Coldwater fishery

Due to human impacts throughout the Huron Chain of Lakes Watershed, not all of the designated uses are fulfilled. Warmwater fishery is impaired due to elevated levels of PCBs in Whitmore Lake and Woodland Lake and high mercury levels in fish tissue samples from Bishop Lake. Other indigenous aquatic life and wildlife is also impaired due to poor macroinvertebrate communities in portions of Honey Creek and Horseshoe Lake Drain, and low levels of dissolved oxygen in a small segment of Yerkes Drain between the South Lyon Wastewater Treatment Plant and Nichwagh Lake. Partial and total body contact recreation uses are threatened throughout the watershed due to high nutrient loads that can cause nuisance algal blooms in non-riverine environments – most notably in Brighton, Ore, and Strawberry Lakes, for which phosphorus TMDLs have been established.

In addition to state-designated uses are uses of the watershed that are desired by its residents but not yet achieved. The Steering Committee that developed this Watershed Management Plan identified the following desired uses:

- **Coordinated development**  
Promote a balance of environmental and economic considerations through intentional community planning and coordinated development within and among the Huron Chain of Lakes communities
- **Hydrologic functions of natural features**  
Protect and enhance natural features related to water quantity and quality, including wetlands, floodplains, riparian buffer zones, and stream channels that regulate the flow of stormwater runoff, protect against flooding, and reduce soil erosion and sedimentation
- **Open space and greenways**  
Protect priority natural habitat, recreational areas and trails, and agricultural lands from development in order to maintain their natural functions, preserve rural character, and enhance recreational opportunities for present and future generations

## Challenges to the Health of the Huron Chain of Lakes Watershed

The Steering Committee spent one year gathering the information necessary to understand the impairments, or pollutants, to the Watershed, and their sources and causes. While the Huron Chain of Lakes Watershed contains several areas of high quality natural habitat, aquatic ecosystems, and recreational opportunities, analysis of existing data indicate that the Huron Chain of Lakes Watershed also has stretches of medium- and low-quality waterways that require mitigation of existing impairments.

Although the partners who authored the Huron Chain of Lakes Watershed Management Plan intend to address all of these challenges in the long term with targeted programs, it is important to prioritize and identify the most pressing concerns in the watershed so that resources can be spent cost-effectively in a phased approach. The impairments have been prioritized based upon analysis of existing data, the results of the road stream crossing inventory, and contributions from Steering Committee members and citizens. This information was used to prioritize the impairments from greatest threat to least threat. The sources and causes are not prioritized but known causes (k) are listed above suspected causes (s). As additional information is obtained that indicates a lower ranked impairment, source or cause should be elevated in priority, the ranking should be adjusted to reflect the new information. The following table identifies the challenges to the health of the watershed, and their sources and causes.

It is important to prioritize and identify the most pressing concerns in the Watershed so that resources can be spent cost-effectively.

### Prioritized Impairments, Sources and Causes in the Huron Chain of Lakes Watershed

Impairment: High Nutrient Loading (k)	
Sources	Causes
Excessive runoff from developed areas (k)	Lack of BMPs at existing development areas (k) Impervious surfaces (k) Poor storm drain maintenance (s)
Failing septic tanks (k)	Old units are too small or don't meet codes (k) Lack of a required maintenance program (k) Poor maintenance/lack of education (s)
Fertilizers from residential, commercial, and golf courses (k)	Lack of buffers (k) No ordinance in place (k) Overuse/improper application of fertilizers (s)
Illicit discharges (k)	Aging sanitary sewer infrastructure (s) Inadequate inspection/detection and repair due to cost (s) Illegal septic application and trailer waste disposal (s)
NPDES permitted facilities (k)	Nutrients in effluent (k)
Agricultural runoff from fertilizers/livestock waste (s)	Lack of BMPs (upland and riparian buffers) (s) Exposed soils (s)
Pet and wildlife waste (s)	Improper disposal of pet waste (s) Ponds increase habitat for waterfowl, wildlife (s)

<b>Impairment: Altered Hydrology (k)</b>	
<b>Sources</b>	<b>Causes</b>
Runoff from developed areas (k)	Lack of BMPs at existing development areas (k) Impervious surfaces (k) Removal of woodland/forest, wetlands, and other pervious areas (k)
Runoff from construction sites, new development (k)	Removal of woodland/forest, wetlands, and other pervious areas (k) Rerouting channel for development (k) Lack of resources for enforcement/inspection (s) Site exemptions (s) Lack of education on alternatives (s)
Engineered drains and streams (k)	Loss of connection between stream and floodplain from channelization (k) Removal of riparian buffer (k)

<b>Impairment: Sedimentation, Soil Erosion (k)</b>	
<b>Sources</b>	<b>Causes</b>
Eroding stream banks and channels (k)	Flashy flows (k) Channelization (k) Drain maintenance (k) Eroding crossing embankments (k) Clear cutting/lack of riparian buffers (k)
Construction sites (k)	Clear cutting/lack of riparian buffers (k) Lack of resources for enforcement/inspection (s) Lack of soil erosion BMPs and BMP education (s) Exposed soils (s) Site exemptions (s)
Developed areas (k)	Lack of BMPs at existing development areas (k) Impervious surfaces (k) Clearcutting/lack of riparian buffers (k)
Dirt, gravel roads (k)	Poorly designed/maintained road stream crossings (k) Poor road maintenance (s)
Agricultural field runoff (s)	Lack of BMPs (upland and riparian buffers) (s) Exposed soils (s)

<b>Impairment: Pathogens (k)</b>	
<b>Sources</b>	<b>Causes</b>
Failing septic tanks (human waste) (k)	Old units are too small or don't meet codes (k) Lack of a required maintenance program (k) Inadequate enforcement by Health Departments (s) Poor maintenance/lack of homeowner education (s)
Illicit Discharges (k)	Aging development sanitary sewer infrastructure (k) Illegal septic application and trailer waste disposal (s) Inadequate inspection/detection and repair due to cost (s) Lack of education (s)

<b>Impairment: Pathogens (k)</b>	
<b>Sources</b>	<b>Causes</b>
Pet and waterfowl waste (s)	Improper disposal of pet waste (runoff from paved areas) (s) Ponds increase habitat for waterfowl, wildlife (s)
Illegal/improper septage application (s)	Lack of adequate septage disposal facilities (s)
Livestock waste from agricultural operations (s)	Lack of BMPs (s)

<b>Impairment: Salts, Organic Compounds and Heavy Metals (k)</b>	
<b>Sources</b>	<b>Causes</b>
Developed areas (k)	Lack of stormwater BMPs (k) Illegal dumping (s) Illicit connections (s)
Roads (k)	Auto emissions (k) Lack of BMPs during road de-icing (s) Poor road maintenance (s)
Existing in-stream pollution (k)	Illegal dumping (s) Oil spill in Yerkes Drain in 1970s (k) PCBs in Whitmore Lake and Woodland Lake (k) Excessive mercury in Bishop Lake (k)
NPDES permitted facilities (s)	Inadequate inspection (s) Lack of BMPs (upland and riparian buffers) (s)
Turfgrass chemicals from residential, commercial lawns (s)	Improper lawn care (s) Illegal disposal (s)
Agricultural runoff (s)	Lack of BMPS (upland, riparian buffers) (s)

<b>Impairment: High Water Temperature (k)</b>	
<b>Sources</b>	<b>Causes</b>
Directly connected impervious areas (k)	Heated stormwater from urban areas (k)
Eroded soil areas (s)	Soil erosion from channel and upland (k)
Solar heating (s)	Lack of vegetated canopy in riparian zone (k)

<b>Impairment: Debris/Litter (k)</b>	
<b>Sources</b>	<b>Causes</b>
Roadways, parks, urban areas, residential areas (k)	Illegal littering/dumping (s) Unsecured garbage containers and vehicles (s) Inadequate refuse containers (s)

## Goals and Objectives for the Huron Chain of Lakes Watershed

The designated and desired uses for the Huron Chain of Lakes Watershed, along with the watershed's impairments, sources, and causes, provide a basis from which to build long-term goals and objectives. Long-term goals describe the future condition of the watershed toward

The designated and desired uses for the Watershed, along with the watershed's impairments, sources, and causes, provide a basis for developing long-term goals and objectives

which the permittees will work. Long-term goals are not expected to be met within the first five years of plan implementation, but are to be met at some time beyond the first five years of implementation. 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

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

collectively protect and improve the water quality, water quantity and biology of the watershed. The permittees will strive together to meet these long term goals to the maximum extent practicable, by implementing a variety of BMPs over time. Selection and implementation of applicable BMPs will vary among communities or agencies according to specific priorities, authority, and resources.

### Goals and Objectives for the Huron Chain of Lakes Watershed, and the Designated and Desired Uses They Address

Long-Term Goal	Short-Term Objective	Uses(s) Addressed
1. Increase public awareness of their role in protecting water resources	a. Increase opportunities for public involvement in protection of watershed resources	Designated Uses: all  Desired Uses: all
	b. Promote education, incentive, and stewardship programs that encourage individual source control of pollutants	
	c. Promote coordination among local units of government in educational program development and implementation.	
d. Encourage partnerships between public and private entities in funding and promoting educational messages and activities		
	<b>Long-Term Objective</b>	
	e. Reduce pollution impacts to the Watershed by providing practical knowledge to key audiences	
2. Reduce nonpoint source nutrient loading	<b>Short-Term Objective</b>	Designated Uses: Warmwater fishery; Aquatic life and wildlife; Partial and total body contact recreation  Desired Uses: Hydrologic functions of natural features
	a. Support establishment of water quality monitoring programs to measure progress toward phosphorus TMDL goals.	
	b. Develop ordinances, strategies, and/or programs for reducing nutrient loading.	
	c. Promote implementation of structural and vegetative BMPs at new and existing developed areas.	
	<b>Long-Term Objective</b>	
	a. Meet established TMDL goals for Brighton, Ore, and Strawberry lakes.	

3. Reduce flow variability	<b>Short-Term Objective</b>	Designated Uses: Warmwater fishery; Aquatic life and wildlife;  Desired Uses: Hydrologic functions of natural features
	a. Establish current stream flow dynamics through established monitoring strategy b. Increase the use of Low Impact Development (LID) principles c. Develop ordinances, strategies, and/or programs to manage peak flow rates	
	<b>Long-Term Objective</b>	
	d. Protect and increase storage in wetlands, floodplains, groundwater, and other pervious areas with infiltration capacity	
4. Reduce soil erosion and sedimentation	<b>Short-Term Objective</b>	Designated Uses: Warmwater fishery; Aquatic life and wildlife; Industrial water supply; Public water supply  Desired Uses: Hydrologic functions of natural features
	a. Establish baseline data for sediment desposits in monitored streams through established monitoring program b. Improve application and enforcement of soil erosion and sedimentation controls (SESC) c. Increase education of BMPs among property owners and the building community	
	<b>Long-Term Objective</b>	
	d. Increase clarity in surface waters	
5. Protect and mitigate loss of natural features for indigenous riparian and aquatic animals and plants	<b>Short-Term Objective</b>	Designated Uses: Warmwater fishery; Aquatic life and wildlife; Industrial water supply; Public water supply  Desired Uses: Hydrologic functions of natural features; Open space and greenways
	a. Integrate natural features mapping data into land use planning decisions b. Develop policies that protect natural areas c. Monitor water quality and biota to measure progress d. Educate local decision makers and the public about the benefits of critical habitat protection e. Consider groundwater recharge data when identifying priority natural features protection areas	
	<b>Long-Term Objective</b>	
	f. Maintain or improve the aquatic community, including meeting TMDL goals for poor macroinvertebrate communities in Horseshoe Lake Drain and Honey Creek. g. Increase areas of natural features, including wetlands, woodlands, riparian buffers, and floodplains	
6. Protect existing open space and agricultural land	<b>Short-Term Objective</b>	Designated Uses: Warmwater fishery; Aquatic life and wildlife;  Desired Uses: Hydrologic functions of natural features; Open space/greenways
	a. Identify and prioritize key opportunities for protection of undeveloped lands b. Develop policy and planning tools that address urban sprawl c. Facilitate regional coordination in preserving open space corridors, especially riparian corridors d. Work with land conservancies and other land preservation groups to facilitate use of land protection/conservation tools	
7. Protect and enhance recreational opportunities	<b>Short-Term Objective</b>	Designated Uses: Partial and total body contact recreation; Warmwater fishery;  Desired Uses: Open space/greenways; hydrologic functions of natural features
	a. Identify and reduce sources of pollution that inhibit recreational activities b. Increase regional coordination of recreational planning efforts c. Research and pursue grant opportunities for recreational planning efforts	

8. Increase monitoring of water quality, water quantity, and biological indicators	<b>Short-Term Objective</b>	Designated Uses: all
	a. Develop a monitoring strategy b. Secure funding and develop partnerships to conduct short-term and long-term monitoring of key indicators c. Implement and maintain Illicit Discharge Elimination Program (IDEP) investigations	Desired Uses: all
9. Balance environmental and economic benefits in the subwatershed	<b>Short-Term Objective</b>	Designated Uses: all
	a. Integrate stormwater management in planning and site plan review process b. Educate land use decision makers and developers on long-term economic benefits of stormwater BMPs, impacts of development on the watershed, and tools for low impact development c. Increase coordinated planning efforts and implementation among local units of government	Desired Uses: all
10. Attain full plan implementation	<b>Short-Term Objective</b>	Designated Uses: all
	a. Establish financial and institutional arrangements for WMP fulfillment b. Ensure the long-term viability of the Huron Chain of Lakes Steering Committee to guide watershed-wide planning decisions. c. Increase public awareness of progress in WMP implementation	Desired Uses: all

## Watershed Management Alternatives (Best Management Practices)

After establishing goals and objectives for the watershed, the Steering Committee discussed various management alternatives, also known as Best Management Practices (BMPs), that could be employed to fulfill them. A stormwater BMP is a technique, measure, or structural control that is used for a given set of conditions to manage the quantity and quality of stormwater runoff in the most cost-effective manner. BMPs fall into one of three categories:

**Structural BMPs** are engineered and constructed systems that improve the quality and/or control the quantity of runoff such as detention ponds and constructed wetlands. Structural BMPs are inherently site-specific and are designed to treat or manage stormwater at a specific location.

**Vegetative BMPs** are natural processes that preserve existing vegetation or establishes ground cover to minimize soil erosion. Vegetative BMPs are sometimes considered as a sub-set of structural BMPs.

**Non-structural BMPs**, also known as **Managerial BMPs**, are institutional, educational or regulatory pollution prevention practices designed to limit the generation of stormwater runoff or reduce the amounts of pollutants contained in the runoff. These BMPs focus on modifying behaviors and practices through a wide variety of activities such as adopting new policies and ordinances, providing watershed education to residents, conducting studies and inventories, and tracing illicit connections.

No single BMP can address all stormwater problems. Each practice has certain limitations based on drainage area served, available land space, cost, pollutant removal efficiency, as well as a variety of site specific factors such as soil types, slopes, depth of groundwater table, etc. Careful consideration of these factors is necessary in order to select the appropriate group of BMPs for a particular location or situation.

Nintey-six management alternatives, are presented in the Action Plan at the end of Chapter 4 as actions that will help achieve the goals and objectives for the Huron Chain of Lakes Watershed.

Where applicable, each management alternative in the Action Plan is presented with which goals it

addresses, level of effort, estimated capital and maintenance costs, technical and/or financial resources, and intent of the permittees to employ the actions.

A stormwater BMP is a technique, measure, or structural control that is used for a given set of conditions to manage the quantity and quality of stormwater runoff in the most cost-effective manner

## Watershed Management Plan Implementation, Coordination and Evaluation

A successful watershed plan is ultimately defined not by what is written on the pages, but by how the recommended plans and programs are put into action. A successful plan for implementation also recognizes that the state of the watershed changes over time. As such, evaluating the effectiveness and appropriateness of the actions taken to implement the Plan, as well as the ability to adapt these actions to the changing conditions of the watershed, is critical.

While individual Phase II permit holders are required to provide the State with annual reports on their NPDES Phase II-related activities, which includes efforts to implement the Watershed Management Plan, a well-organized framework for implementing and revising the Plan on a watershed-wide level still is needed to keep the Steering Committee on track toward achieving the broad goals of water quality and natural resource protection and improvement. To ensure successful implementation, nine key elements should be addressed, as shown below.

### Key Elements of Successful Watershed Plan Implementation

1. Appoint a single lead agency to act as an advocate and facilitator for the plan with the community and with political representatives.
2. Strong linkages to existing programs, including local and regional land use planning processes, water quality and flow monitoring programs, and similar programs, to optimize use of available information and minimize duplication of effort.
3. Clear designation of responsibilities, timetables, and anticipated costs for project actions.
4. Effective laws, regulations, and policies to provide a framework for the tasks identified in Element 3.
5. Ongoing tracking of the degree of implementation of management actions and of the success of those actions once implemented.
6. Ongoing monitoring and reporting of progress, both to assess the effectiveness of individual actions and to sustain public and political interest in and enthusiasm for the plan.
7. Ongoing public education and communication programs to consolidate and enhance the social consensus achieved in the planning process.
8. Periodic review and revision of the plan.
9. Adequate funding for these activities.

## Advisory Committee Structure

To facilitate implementation of the Huron Chain of Lakes Watershed Management Plan over time, a framework for a series of working groups will help to provide a useful feedback loop for determining how, and the extent to which, the goals and objectives of the Plan are being successfully implemented. These working groups would ideally be comprised of the following groups of stakeholders:

- Managers, planners, coordinators, and their staff members
- Boards and steering committees
- Volunteers (citizens and watershed stewards)
- Environmental Interest Groups
- Funding Groups

These groups of stakeholders should ultimately allow for input and implementation assistance from a broad cross-section of all stakeholder and interest groups in the watershed, as outlined in the Huron Chain of Lakes Watershed Public Participation Plan (see Appendix H).

Expansion of the existing committee structure into two tiers is recommended to oversee the implementation and evaluation of the Plan. In addition to a steering committee, a set of advisory committees and/or sub-committees could be established to allow focus on specific aspects of the plan, such technical, scientific, or public involvement. The steering committee might be comprised of stormwater program managers and staff. The advisory committees and/or subcommittees might be staffed by land use planners, commissions, boards, interested citizens, environmental group advocates, scientists, etc. that would pull together various aspects of the data and results during the implementation phases of the Plan (i.e. water quality data, public education initiatives, illicit discharge investigations, etc.). The Livingston County Drain Commissioner's Office will provide support for, and oversight of, the activities of the Steering Committee and smaller committee/ subcommittee levels.

The importance of public representation and broad stakeholder involvement throughout any advisory committee structure must be stressed, as these individuals are in a position to explain and influence community opinion and help to build support for needed changes. One of the first tasks of the Livingston County Drain Commissioner's Office and current members of the Huron Chain of Lakes Steering Committee should be to begin developing an advisory committee structure that allows for involvement by a broad range of stakeholders as discussed above.

## Evaluation Methods

Measurement and evaluation are important parts of planning because they can indicate whether or not efforts are successful and provide a feedback loop for improving project implementation as new information is gathered. The ability to demonstrate measurable results increases support for the Plan from the partnering communities and agencies and local decision makers, and also increases the likelihood of project sustainability and success. Monitoring and measuring progress in the watershed necessarily will be conducted at the local level by individual agencies and communities, as well as at the watershed level, in order to assess the ecological affects

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of the collective entity actions on the health of the Watershed.

Because achievement of water quality standards is the ultimate goal of plan implementation, direct measurement of environmental improvements through instream monitoring is ideal. Such methods are beneficial in monitoring the long-term progress and effectiveness of the cumulative watershed efforts in terms of water quality, water quantity and biological monitoring. Examples of direct measurement of environmental improvements include:

- 1) Measuring specific water quality or chemistry parameters, such as phosphorus loadings or *E. coli* levels;
- 2) Physical and hydrological indicators such as physical habitat monitoring, flooding frequencies, or changes in stream shape due to erosion and sedimentation; and
- 3) Biological indicators such as macroinvertebrate or fish assemblages.

However, directly measuring environmental indicators requires large investments of time and resources. Benchmarks of existing conditions and future targets must be established in order to ascertain improvements in the health of the Watershed.

In addition to directly measuring physical improvements in the environment, progress in implementing various programs or individual program elements can also be measured. Although such methods of measuring progress are not tied directly to measurements in the river, it is fair to assume that the success of these actions and programs, collectively and over time, will impact positively on the instream conditions in the Watershed. Examples of indicators that can be used as surrogates for direct environmental improvement include:

- 1) Social indicators, such as public awareness surveys and tracking of public involvement in stewardship and monitoring efforts;
- 2) Programmatic indicators, such as tracking the number of illicit connections identified/corrected, number and types of ordinances adopted/amended, number of structural BMPs installed, and quantities of public education materials distributed;
- 3) Site indicators, such as BMP performance monitoring at specific sites.

Such indicators provide relatively easy-to-measure and cost-effective alternatives to direct environmental measurements that can be costly and time-consuming. These types of indicators provide a means for measuring interim or short-term progress of individual or specific programs or actions.

The dynamic nature and complex interaction of social, economic, and biophysical forces in the Watershed require a continuous cycle of evaluating the effectiveness of the management alternatives in meeting the Plan's goals and objectives.

### **Watershed Management Plan Revision Process**

Implementing the Huron Chain of Lakes Watershed Management Plan in a way that follows the principles of integrated watershed management requires continuous evaluation of the effectiveness of the management alternatives in meeting the Plan's goals and objectives. The concept of "adaptive management" is central to successful implementation of the Plan. Adaptive management incorporates research into conservation action. Specifically, it is the integration of design, management, and monitoring to systematically test assumptions in order to adapt and learn.

The goals and recommendations of this Plan are based on the understanding of the conditions of the natural watershed ecosystem at the time this Plan was developed. However, both the conditions of the watershed and the goals and actions will

change over time as new information is collected, available resources for implementation are assessed, and the values and needs of the watershed's residents evolve.

Changes in social and economic forces can trigger changes in watershed management practices. Similarly, changes in a watershed's ecosystem can indicate a need for altered watershed management practices. Adaptive management recognizes the dynamic interplay of these forces, which implies a need to continually evaluate progress toward the meeting the Plan's goals and objectives.