

Chapter 8. Coastal Management Measures

Purpose

In this chapter, the reader will find a review of the applicability of management measures specified in the Coastal Nonpoint Pollution Control Program and implementation strategies to address those measures within the Old Woman Creek watershed. Many objectives address more than one management measure. To simplify this review process, only primary objectives are listed for each measure. A table at the end of this chapter identifies where overlap in the objective strategies exist. For a summary and description of the 6217 program and authorities please refer to Chapter 3.

Chapter Acknowledgements

This chapter was prepared utilizing sections from *The Ohio Coastal Nonpoint Pollution Control Plan* and by the watershed coordinator and the FCT partners.

COASTAL NONPOINT POLLUTION CONTROL IN OWC

As stated in Chapter 3, the Coastal Nonpoint Pollution Control Program (CNPCP) is a nonpoint source management program specified for restoring and protecting coastal waters from specific categories of nonpoint source pollution. Administered by the ODNR Division of Soil and Water Conservation, the Division requires Watershed Action Plans being developed for Lake Erie watersheds under the Watershed Coordinator Grant Program to include implementation strategies to address management measures identified within CNPCP.

Old Woman Creek watershed is a sub-basin of the greater Lake Erie watershed. As such, the land use and overall health of the watershed has direct impact on the integrity of Lake Erie. Although Old Woman Creek is mostly an agricultural watershed, there is also a low density urbanized area near the center of the basin (Berlin Heights). Management measurements in this section will address both agricultural and urbanized areas of the entire watershed with an exception to household sewage treatment systems which will focus on the area of highest density (Berlin Heights and surrounding development in Berlin Township).

Applicable Management Measures

- New Development
- Watershed Protection
- Site Development
- Existing Development
- New Household Treatment Systems
- Operating Household Treatment Systems
- Planning, Siting, Developing Road, Highways, and Bridges
- Bridges (Local Only)
- Road, Highway, and Bridge Operation and Maintenance (excludes Inter and Intrastate)

- Road, Highway, and Bridge Runoff Systems (excludes Inter and Intrastate only)
- Operation and Maintenance Program for Existing Modified Channels - Protect Surface Water and Restore In-Stream and Riparian Habitat
- Eroding Streambanks and Shorelines

Non-Applicable Management Measures

- Road, Highway, and Bridge Operation and Maintenance (Inter and Intrastate only)
- Road, Highway, and Bridge Runoff Systems (Inter and Intrastate only)
- Dams- Protection of Surface Water Quality and In-Stream and Riparian Habitat

Inter and Intrastate highways, and bridges maintained by ODOT or the Ohio Turnpike Commission are considered an MS4 by the Ohio EPA and thus must comply with the NPDES Phase II program. All areas under a Phase II permit are considered exempt from the CNPCP. Although these transportation corridors transect the watershed, they will not be addressed in this section. Information about ODOT's Stormwater Management Program can be accessed at <http://www.dot.state.oh.us/stormwater/Pages/default.aspx>, a copy of the Ohio Turnpike Commission Stormwater Management Plan can be accessed at http://www.ohioturnpike.org/about/storm_water/. The Old Woman Creek watershed does not have any man-made impoundments impacting surface water quality or in-stream and riparian habitat thus exempting it from the management measure addressing dams.

New Development Management Measure. This management measure is intended to accomplish the following: (1) decrease the erosive potential of increased runoff volumes and velocities associated with development-induced changes in hydrology; (2) remove suspended solids and associated pollutants entrained in runoff that result from activities occurring during and after development; (3) retain hydrological conditions to closely resemble those of the predisturbance condition; and (4) preserve natural systems including in-stream habitat.

Approximately 80% of the watershed is located within Erie County, which is considered a Phase II Community by the Ohio EPA. Although, the watershed itself is not located within the permitted urbanized area of the Phase II program, stormwater regulations that are administered by the County Engineer are ubiquitous for areas under jurisdiction of the county. Recently the Erie County stormwater regulations for pre and post-construction stormwater management have been revised to include measures to maintain and improve water quality of developed sites where applicable. This document stresses preserving the use of natural hydrology in the stormwater design, maintaining or improving hydrology as not to negatively impact the receiving waters, and utilize structural and non-structural BMPs for reducing erosion and sedimentation that may result from the development. These regulations currently cover unincorporated areas of the county which include

much of the Old Woman Creek watershed. The regulations do not cover the areas of the watershed within the Village of Berlin Heights or Huron County. Adoption of these regulations or similar documents by the unregulated communities would fully address this management measure within the watershed.

Primary Objectives

- Implementation of upgraded Stormwater Regulations for Erie County
- Adoption of Erie County Stormwater Regulations (or similar document) by Village of Berlin Heights and Huron County

Additional Strategies

- Hold one educational event for public officials and professionals to increase knowledge of stormwater program significance and steps initiating a stormwater program
- Identification of local and regional watershed approach stormwater trainings. Encourage a representative from each district attend at least one event yearly.

Watershed Protection Management Measure. The purpose of this management measure is to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants that result from new development or redevelopment, including the construction of new and relocated roads, highways, and bridges. The measure is intended to provide general goals for States and local governments to use in developing comprehensive programs for guiding future development and land use activities in a manner that will prevent and mitigate the effects of nonpoint source pollution.

Develop a watershed protection program to:

1. Avoid conversion, to the extent practicable, of areas that are particularly susceptible to erosion and sediment loss;
2. Preserve areas that provide important water quality benefits and/or are necessary to maintain riparian and aquatic biota; and
3. Site development, including roads, highways, and bridges, to protect to the extent practicable the natural integrity of waterbodies and natural drainage systems.

To accomplish the goals of this measure, the partners of the FCT will utilize several strategies to protect critical areas to maintain water quality in Old Woman Creek and work with local communities to guide development in a way that is ecologically and economically sustainable.

Riparian and Wetland Setbacks

The adoption and use of riparian and wetland setbacks will be developed by reviewing the applicability of existing models for use by the local communities. The setbacks will be based on drainage area, with a minimum size of 25 feet, but may also be expanded to include areas of highly erodible soil, steepness of slope, and floodplain width.

Critical Area Protection

Priority areas of conservation have been identified in OWC NERR Conservation Strategy, which include areas surrounding the Reserve boundary and the entire riparian corridor. Vernal pools areas, which have not be specifically identified within the document are also of interest for conservation. The FCT partners, including the Western Reserve land Conservancy, OWC NERR, Erie SWCD and Huron SWCD, will develop land conservation options which may include easements or acquisition of areas identified as critical to maintaining water quality in Old Woman Creek.

Watershed-based Comprehensive Planning

The FCT partners will assist in the creation of a comprehensive plan based on a watershed scale which will utilized the principles established in the Ohio Balanced Growth Program. The comprehensive plan will center future development on the existing resources of the Berlin Heights area which will allow for preservation of both cultural and natural heritage unique to the watershed.

Primary Objectives

- Adoption of riparian and wetland setbacks
- Watershed-based comprehensive plan
- Land conservation through easements and land acquisition

Site Development. The goal of this management measure is to reduce the generation of nonpoint source pollution and to mitigate the impacts of urban runoff and associated pollutants from all site development, including activities associated with roads, highways, and bridges. Management Measure II.C is intended to provide guidance for controlling nonpoint source pollution through the proper design and development of individual sites. This management measures differs from Management Measure II.A, which applies to post-development runoff, in that Management Measure II.C is intended to provide controls and policies that are to be applied during the site planning and review process. These controls and policies are necessary to ensure that development occurs so that nonpoint source concerns are incorporated during the site selection and the project design and review phases. While the goals of the Watershed Protection Management Measure (II.B) are similar, Management Measure II.C is intended to apply to individual sites rather than watershed basins or regional drainage basins. The goals of both the Site Development and Watershed Protection Management Measures are, however, intended to be complementary and the measures should be used within a comprehensive framework to reduce nonpoint source pollution.

Plan, design, and develop sites to:

1. Protect areas that provide important water quality benefits and/or are particularly susceptible to erosion and sediment loss;
2. Limit increases of impervious areas, except where necessary;

3. Limit land disturbance activities such as clearing and grading, and cut and fill to reduce erosion and sediment loss; and
4. Limit disturbance of natural drainage features and vegetation.

As stated in the New Development Management Measure, the Erie County stormwater regulations for pre and post-construction stormwater management have been revised to include measures to maintain and improve water quality of developed sites where applicable. This document stresses preserving the use of natural hydrology in the stormwater design, maintaining or improving hydrology as not to negatively impact the receiving waters, and utilize structural and non-structural BMPs for reducing erosion and sedimentation that may result from the development. These regulations currently cover unincorporated areas of the county which include much of the Old Woman Creek watershed. The regulations do not cover the areas of the watershed within the Village of Berlin Heights or Huron County. Adoption of these regulations or similar documents by the unregulated communities would fully address this management measure within the watershed.

In addition to the updated stormwater regulations, site plan reviews conducted by the SWCD will provide better assessment of potential environmental impacts of a proposed development. Technical expertise of the SWCDs will provide local communities insight to additional governing regulatory considerations developed through state and federal programs and provide alternative stormwater techniques to reduce run-off pollution potential of the finished development. SWCDs will need to formalize technical assistance agreements with local communities and or the governing agencies for the site plan review process.

Primary Objective

- Site plans review process to include environmental considerations (wetlands, riparian corridors, TMDL reports, etc.)

Existing Development Management. The purpose of this management measure is to protect or improve surface water quality by the development and implementation of watershed management programs that pursue the following objectives:

1. Reduce surface water runoff pollution loadings from areas where development has already occurred;
2. Limit surface water runoff volumes in order to minimize sediment loadings resulting from the erosion of streambanks and other natural conveyance systems; and
3. Preserve, enhance, or establish buffers that provide water quality benefits along waterbodies and their tributaries.

The Berlin Heights sub-basin of the Old Woman Creek watershed currently has the highest amount of impervious surface of the 5 sub-basins. Installation of stormwater BMP retrofits within the Berlin Heights sub-basin would best concentrate efforts to reduce negative impacts affecting the creek. Opportunities for such retrofits need to

be identified within the community and implemented with the purpose to reduce potential run-off impacts and increase individual stewardship of the creek.

In conjunction to reducing stormwater related impacts within the urbanized area of the watershed, the FCT partners will seek out individual partnerships with local landowners to increase the preservation and enhancement of the creek's natural corridor. Natural corridors provide many essential benefits to the integrity of the stream: flood storage, pollutant assimilation, and habitat. Approximately 43% percent of the stream corridor (150 feet each side) contains woody vegetation. To increase the amount of natural woody corridor of the creek, the FCT seeks to promote a Riparian Buffer Restoration Program within the east branch. Initial focus of the program will be to connect existing corridors on the east branch based on landowner interest.

Primary Objectives

- Identify opportunities and develop cost/benefit report for stormwater retrofits possible within the Berlin Heights area.
- Riparian Buffer Restoration Program

New On-Site Disposal Systems (OSDS). The purpose of this management measure is to protect the Coastal Zone management area from pollutants discharged by OSDS. The measure requires that OSDS be sited, designed, and installed so that impacts to waterbodies will be reduced, to the extent practicable. Factors such as soil type, soil depth, depth to water table, rate of sea level rise, and topography must be considered in siting and installing conventional OSDS.

1. Ensure that new Onsite Disposal Systems (OSDS) are located, designed, installed, operated, inspected, and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives: (a) discourage the installation of garbage disposals to reduce hydraulic and nutrient loadings; and (b) where low-volume plumbing fixtures have not been installed in new developments or redevelopments, reduce total hydraulic loadings to the OSDS by 25 percent. Implement OSDS inspection schedules for preconstruction, construction, and postconstruction.
2. Direct placement of OSDS away from unsuitable areas. Where OSDS placement in unsuitable areas is not practicable, ensure that the OSDS is designed or sited at a density so as not to adversely affect surface waters or ground water that is closely hydrologically connected to surface water. Unsuitable areas include, but are not limited to, areas with poorly or excessively drained soils; areas with shallow water tables or areas with high seasonal water tables; areas overlaying fractured bedrock that drain directly to ground water; areas within floodplains; or areas where nutrient and/or pathogen concentrations in the effluent cannot be sufficiently treated or reduced before the effluent reaches sensitive waterbodies;

3. Establish protective setbacks from surface waters, wetlands, and floodplains for conventional as well as alternative OSDS. The lateral setbacks should be based on soil type, slope, hydrologic factors, and type of OSDS. Where uniform protective setbacks cannot be achieved, site development with OSDS so as not to adversely affect waterbodies and/or contribute to a public health nuisance;
4. Establish protective separation distances between OSDS system components and groundwater which is closely hydrologically connected to surface waters. The separation distances should be based on soil type, distance to ground water, hydrologic factors, and type of OSDS;
5. Where conditions indicate that nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from ground water, require the installation of OSDS that reduce total nitrogen loadings by 50 percent to ground water that is closely hydrologically connected to surface water.

Currently the Erie County General Health District follows more stringent rules for reviewing and approving the installation of new Home Sewage Treatment Systems (HSTS) (Chapter 29-01 thru 29-17, adopted June 26th, 2007, revised July 31st, 2007 and December 11th, 2007), which can be accessed online by the following link: http://eriecohealthohio.org/downloads/environmental/sewage_regsdec2007.pdf.

These new rules establish criteria for prohibiting systems in environmentally sensitive areas such as setbacks from surface waters, protective separation distances from HSTS system components and groundwater, etc. However, the Berlin Heights area is unique in landscape, population density, and soil conditions suggesting that addition, replacement, or upgrading of HSTS may not serve as the most acceptable way to treat wastewater while allowing the village to grow. Instead, alternative centralized wastewater treatment needs to be explored.

Primary Objectives

- Revise current HSTS regulations to include wetland setback provision
- Complete cost/benefit analysis for improved wastewater treatment of the Berlin Heights area
- Develop wastewater treatment improvement plan for the Berlin Heights area

Operating On-Site Disposal Systems. The purpose of this management measure is to minimize pollutant loadings from operating OSDS. This management measure requires that OSDS be modified, operated, repaired, and maintained to reduce nutrient and pathogen loadings in order to protect and enhance surface waters. In the past, it has been a common practice to site conventional OSDS in coastal areas that have inadequate separation distances to ground water, fractured bedrock, sandy soils, or other conditions that prevent or do not allow adequate treatment of OSDS-generated pollutants. Eutrophication in surface waters has also

been attributed to the low nitrogen reductions provided by conventional OSDS designs.

1. Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants to the surface of the ground and to the extent practicable reduce the discharge of pollutants into ground waters that are closely hydrologically connected to surface waters. Where necessary to meet these objectives, encourage the reduced use of garbage disposals, encourage the use of low-volume plumbing fixtures, and reduce total phosphorus loadings to the OSDS by 15 percent (if the use of low-level phosphate detergents has not been required or widely adopted by OSDS users). Establish and implement policies that require an OSDS to be repaired, replaced, or modified where the OSDS fails, or threatens or impairs surface waters;
2. Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing;
3. Consider replacing or upgrading OSDS to treat influent so that total nitrogen loadings in the effluent are reduced by 50 percent. This provision applies only:
 - o where conditions indicate that nitrogen-limited surface waters may be adversely affected by significant ground water nitrogen loadings from OSDS, and
 - o where nitrogen loadings from OSDS are delivered to ground water that is closely hydrologically connected to surface water.

The Erie County Health District currently has the authority to initiate an Operations and Maintenance Program that requires residents to have a service contract for operating and maintaining their system properly. However, the ECHD does not have a central digital database of existing systems in Erie County which has halted the progress of this program. Most inspection of presumed failing HSTS is by complaint or in response to several consistent water contamination advisories obtained from the beach monitoring program. Creation of this database would streamline the review process of maintenance and performance of existing systems and reduce costly source investigation.

Primary Objectives

- Complete central database of HSTS in the Erie County area
- Initiate Erie County Health District Operations and Maintenance Program as defined in Chapter 29 -15.1 of the Home Sewage Treatment System Rules.
- Develop an education campaign for proper maintenance of HSTS and use of low-flow plumbing fixtures to reduce discharge of pollutants

Planning, Siting and Developing Roads and Highways (Local Only).
The best time to address control of NPS pollution from roads and highways is during

the initial planning and design phase. New roads and highways should be located with consideration of natural drainage patterns and planned to avoid encroachment on surface waters and wet areas. Where this is not possible, appropriate controls will be needed to minimize the impacts of NPS runoff on surface waters.

Plan, site, and develop roads and highways to:

1. Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;
2. Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and
3. Limit disturbance of natural drainage features and vegetation.

To address this issue pollution prevention and habitat loss minimization should be performed in the form of proper stormwater regulations and zoning setbacks. As previously described, Erie County has already updated their Stormwater regulations for the county. Further adoption of these regulations need to take place at the township and village level as well as in Huron County. Please refer to management measures New Development, Watershed Protection, and Site Development for appropriate strategies.

Bridges (Local Only). This measure requires that NPS runoff impacts on surface waters from bridge decks be assessed and that appropriate management and treatment be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies. The siting of bridges should be a coordinated effort among the States, the FHWA, the U.S. Coast Guard, and the Army Corps of Engineers. Locating bridges in coastal areas can cause significant erosion and sedimentation, resulting in the loss of wetlands and riparian areas. Additionally, since bridge pavements are extensions of the connecting highway, runoff waters from bridge decks also deliver loadings of heavy metals, hydrocarbons, toxic substances, and deicing chemicals to surface waters as a result of discharge through scupper drains with no overland buffering. Bridge maintenance can also contribute heavy loads of lead, rust particles, paint, abrasive, solvents, and cleaners into surface waters. Protection against possible pollutant overloads can be afforded by minimizing the use of scuppers on bridges traversing very sensitive waters and conveying deck drainage to land for treatment. Whenever practical, bridge structures should be located to avoid crossing over sensitive fisheries and shellfish-harvesting areas to prevent washing polluted runoff through scuppers into the waters below. Also, bridge design should account for potential scour and erosion, which may affect shellfish beds and bottom sediments.

Site, design, and maintain bridge structures so that sensitive and valuable aquatic ecosystems and areas providing important water quality benefits are protected from adverse effects.

According to the Erie County Metropolitan Planning Organization Long Range Transportation Plan and consultation with the Erie County Engineers Department, there are no planned bridge projects occurring within the Erie County portion of the

Old Woman Creek watershed in the next 5 years. The plan may be accessed on the Erie Regional Planning website

http://www.erie-county-ohio.net/planning/plan_pdf/lrtp_final_draft_2005.pdf. There are also no planned bridge projects listed on the Huron County Engineers website for the Huron County portion of the watershed <http://www.huroncountyengineer.org/>.

Operation and Maintenance of Roads, Highways and Bridges. Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters. Substantial amounts of eroded material and other pollutants can be generated by operation and maintenance procedures for roads, highways, and bridges, and from sparsely vegetated areas, cracked pavements, potholes, and poorly operating urban runoff control structures. This measure is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters. The program to be developed, using the practices described in this management measure, should consist of and identify standard operating procedures for nutrient and pesticide management, road salt use minimization, and maintenance guidelines (e.g., capture and contain paint chips and other particulates from bridge maintenance operations, resurfacing, and pothole repairs). Incorporate pollution prevention procedures into the operation and maintenance of roads, highways, and bridges to reduce pollutant loadings to surface waters.

Maintenance of transportation corridors within the Old Woman Creek watershed is performed by the either ODOT, the Ohio Turnpike Commission, the County, or local township. These agencies, particularly ODOT, the Ohio Turnpike Commission and the Erie County Engineer, must follow good housekeeping measures for reducing nonpoint pollution in relation to general maintenance of the roads as part of their NPDES Phase II permit obligations. To expand the best management measures of roadway maintenance to include township roads and Huron County roads, the FCT partners will assist the local townships and the County Engineer in reviewing current operation standards and methods and provide suggestions for improving good housekeeping practices to reduce water pollution.

In addition to improving good housekeeping practices, the FCT will also develop an Emergency spill response plan for the watershed. Old Woman Creek has several major transportation corridors transecting the watershed used to transport hazardous materials. The FCT partners plan to expand the initial hazardous response plan that was developed for the Reserve and expanding it to include the entire watershed. In conjunction to the plan, countermeasures such as a spill control boom, will be placed at strategic bridge crossings to contain hazardous materials that could negatively impact the creek from the result of an accidental spill.

Primary Objectives

- Review current transportation corridor maintenance operation practices performed by local townships within the watershed
- Develop Emergency Spill Response Plan for the entire watershed

Runoff Systems for Roads, Highways, and Bridges. Develop and implement runoff management systems for existing roads, highways, and bridges to reduce runoff pollutant concentrations and volumes entering surface waters.

This measure requires that operation and maintenance systems include the development of retrofit projects, where needed, to collect NPS pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. Poorly designed or maintained roads and bridges can generate significant erosion and pollution loads containing heavy metals, hydrocarbons, sediment, and debris that run off into and threaten the quality of surface waters and their tributaries. In areas where such adverse impacts to surface waters can be attributed to adjacent roads or bridges, retrofit management projects to protect these waters may be needed (e.g., installation of structural or nonstructural pollution controls). Retrofit projects can be located in existing rights-of-way, within interchange loops, or on adjacent land areas. Areas with severe erosion and pollution runoff problems may require relocation or reconstruction to mitigate these impacts. Runoff management systems are a combination of nonstructural and structural practices selected to reduce nonpoint source loadings from roads, highways, and bridges. These systems are expected to include structural improvements to existing runoff control structures for water quality purposes; construction of new runoff control devices, where necessary to protect water quality; and scheduled operation and maintenance activities for these runoff control practices. Typical runoff controls for roads, highways, and bridges include vegetated filter strips, grassed swales, detention basins, constructed wetlands, and infiltration trenches.

1. Identify priority and watershed pollutant reduction opportunities (e.g., improvements to existing urban runoff control structures; and
2. Establish schedules for implementing appropriate controls.

Although most pollutant loading occurring in Old Woman Creek is a result of agricultural run-off, there are several bridge crossings where concentrated flows have eroded the streambank. The FCT partners will categorize these areas where stormwater improvements will protect the bank and reduce sediment loading to the creek and develop associated costs for implementing various control features.

Primary Objectives

- Identify opportunities and develop cost/benefits analysis report for stormwater retrofits for inter/intrastate transportation infrastructure transecting the watershed for the purpose of reducing run-off related pollution

Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters). The purpose of this management measure is to ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters that may occur as a result of the proposed work. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure B (In-stream and Riparian Habitat Restoration) of this section. For existing projects, the purpose of this management measure is to ensure that the operation and maintenance program uses any opportunities available to improve the physical and chemical characteristics of the surface waters. Changes created by channelization and channel modification activities are problematic if they unexpectedly alter environmental parameters to levels outside normal or desired ranges. The physical and chemical characteristics of surface waters that may be influenced by channelization and channel modification include sediment, turbidity, salinity, temperature, nutrients, dissolved oxygen, oxygen demand, and contaminants.

Implementation of this management measure in the planning process for new projects will require a two-pronged approach:

1. Evaluate, with numerical models for some situations, the types of NPS pollution related to in-stream changes and watershed development.
2. Address some types of NPS problems stemming from in-stream changes or watershed development with a combination of nonstructural and structural practices.

Channelization and Channel Modification (In-stream and Riparian Habitat Restoration). The purpose of this management measure is to correct or prevent detrimental changes to in-stream and riparian habitat from the impacts of channelization and channel modification projects. Implementation of this management measure is intended to occur concurrently with the implementation of Management Measure A (Physical and Chemical Characteristics of Surface Waters) of this section.

Contact between floodwaters and overbank soil and vegetation can be increased by a combination of setback levees and use of compound-channel designs. Levees set back away from the streambank (setback levees) can be constructed to allow for overbank flooding, which provides surface water contact to important streamside areas (including wetlands and riparian areas). Additionally, setback levees still function to protect adjacent property from flood damage. Compound-channel designs consist of an incised, narrow channel to carry surface water during low (base)-flow periods, a staged overbank area into which the flow can expand during design flow events, and an extended overbank area, sometimes with meanders, for high-flow events. Planting of the extended overbank with suitable vegetation completes the design.

Preservation of ecosystem benefits can be achieved by site-specific design to obtain predefined optimum or existing ranges of physical environmental conditions. Mathematical models can be used to assist in site-specific design. In-stream and riparian habitat alterations caused by secondary effects can be evaluated by the use of models and other decision aids in the design process of a channelization and channel modification activity. After using models to evaluate secondary effects, restoration programs can be established.

There is only one day-lighted ditch currently under maintenance in the Old Woman Creek watershed. Future ditch maintenance projects petitioned through the SWCD or county engineer will be conducted in collaboration with the appropriate committee's of the FCT to provide technical assistance to protect the water quality of the watershed.

Additionally, the FCT Tribes Team volunteer monitoring program will provide valuable water quality data of various locations within the watershed that may serve as baseline water quality standard to monitor project impacts.

Primary Objectives

- Riparian and wetland enhancement
- Complete one demonstration project for natural channel design
- Watershed monitoring program

Eroding Streambanks and Shorelines. Several streambank and shoreline stabilization techniques will be effective in controlling coastal erosion wherever it is a source of nonpoint pollution. Techniques involving marsh creation and vegetative bank stabilization ("soil bioengineering") will usually be effective at sites with limited exposure to strong currents or wind-generated waves. In other cases, the use of engineering approaches, including beach nourishment or coastal structures, may need to be considered. In addition to controlling those sources of sediment input to surface waters which are causing NPS pollution, these techniques can halt the destruction of wetlands and riparian areas located along the shorelines of surface waters. Once these features are protected, they can serve as a filter for surface water runoff from upland areas, or as a sink for nutrients, contaminants, or sediment already present as NPS pollution in surface waters

As listed in Chapter 7, there are several areas in need of streambank stabilization. Changes in hydrologic patterns and channel morphology have subsequently altered downstream portion of the watershed particularly in the Till Plains region. These alterations combined with higher gradient and highly erodible soils make stabilization of stream banks in this area a two-tailed process of reducing the shear force of the stream on the bank and improving vegetation to increase the tensile strength of the bank.

The FCT will seek financial assistance to stabilize and eroding bank by utilizing natural channel design. The use of natural channel design allows greater interface between water and vegetation which helps filter out pollutants and disperse high energy of peak flows as well as reduce streambank erosion.

Primary Objectives

- Riparian Buffer Restoration Program
- Watertable management program to restore natural flow regimes in watershed

Table 52: Summary of implementation strategies associated with the Coastal Nonpoint Pollution Control Program Management Measures.

Strategies	Coastal Non-Point Pollution Control Program Management Measure											Implementation			
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal Systems	Planning, Siting, Developing Roads and Highways	Bridges	Operation and Maintenance of Roads, Highways, and Bridges	Run-off Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (In -stream and Riparian Habitat)	Timeline	Cost (estimates)	Reference WAP Chapter 6 & 7
Site plan reviews to include environmental considerations (wetlands, riparian corridors, TMDL reports, etc.)		X										2010-ongoing	\$10,000		Erie Co. Engineer
Adoption of Riparian and Wetland Setback Regulations		X	X				X	X				2010-2012	\$8,195	√	Townships BHVC
Comprehensive planning for the Berlin Heights area utilizing Balanced Growth Principals		X	X	X			X	X				2011-2014	\$12,210	√	BHVC ERPC
Land conservation through easements and land acquisition utilizing areas outlined in the Old Woman Creek Conservation Strategy		X	X	X								Dependent on willing sellers	Site specific	√	WRLC ESWCD HSWCD
Identify opportunities and develop cost/benefit report for stormwater retrofits possible within the Berlin Heights area.				X								2012-2014	\$10,000		ESWCD

Strategies	Coastal Non-Point Pollution Control Program Management Measure												Implementation				
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal Systems	Planning, Siting, Developing Roads and Highways	Bridges	Operation and Maintenance of Roads, Highways, and Bridges	Run-off Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (In-stream and Riparian Habitat)	Timeline	Cost (estimates)	Reference WAP Chapter 6 & 7	Lead Agencies	
Riparian Buffer Restoration Program				x						x	x	2012-2013	\$76,315	√	ESWCD HSWCD		
Revise current HSTS regulations to include wetland setback provision					x							2010	n/a		EGHD		
Complete cost/benefit analysis for improved wastewater of the Berlin Heights area					x							2009	\$20,997	√	EGHD		
Develop a wastewater treatment improvement plan for the Berlin Heights area					x							2011-2012	\$25,905	√	BHVC ERPC		
Complete central database of HSTS in the Erie County area					x	x						2009-2010	\$10,000		EGHD		
Initiate Erie County Health District Operations and Maintenance Program for existing HSTS					x	x						2011	n/a		EGHD		

Strategies	Coastal Non-Point Pollution Control Program Management Measure												Implementation			
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal Systems	Planning, Siting, Developing Roads and Highways	Bridges	Operation and Maintenance of Roads, Highways, and Bridges	Run-off Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (In-stream and Riparian Habitat)	Timeline	Cost (estimates)	Reference WAP Chapter 6 & 7	Lead Agencies
Develop education campaign for proper maintenance of HSTS and use of low-flow plumbing fixtures					X	X						2010-2014	\$15,000		ESWCD EGHD OWC NERR	
Expand good housekeeping measures found within Erie County Phase II Plan through adoption of similar methods by Huron County, watershed Townships and Village of Berlin Heights.								X				2012	n/a		Erie Co. Engineers Huron Co. Engineers Townships BHVC	
Develop Emergency Spill Response Plan for watershed									X			2010-2011	\$6,325	√	EMA OWC NERR	
Identify opportunities and develop cost/benefit report for stormwater retrofits possible for inter/intrastate transportation infrastructure transecting the watershed (particularly for the reduction of storm driven flow/salt/ and sediment)									X			2013-2014	\$10,000	√	ODOT Erie Co. Engineer Huron Co. Engineer Townships	

Strategies	Coastal Non-Point Pollution Control Program Management Measure												Implementation				
	New Development	Watershed Protection	Site Development	Existing Development	New On-Site Disposal System	Operating On-Site Disposal Systems	Planning, Siting, Developing Roads and Highways	Bridges	Operation and Maintenance of Roads, Highways, and Bridges	Run-off Systems for Roads, Highways, and Bridges	Channelization and Channel Modification (Physical and Chemical Characteristics of Surface Waters)	Channelization and Channel Modification (In-stream and Riparian Habitat)	Eroding Streambanks and Shorelines	Timeline	Cost (estimates)	Reference WAP Chapter 6 & 7	Lead Agencies
Watershed Monitoring Program (Biological, Chemical, Physical parameters)							X	X	X	X	X	X		2009-2014	\$46,100	√	ESWCD OWC NERR BGSU- Firelands
Watershed management program to restore natural flow regimes in watershed											X	X	X	2010-2013	\$96,415	√	ESWCD HSWCD
Riparian and wetland enhancement											X	X	X	2011-2014	\$10,136	√	ESWCD HSWCD
Complete at least one demonstration project utilizing overwide/two stage ditch design for stabilization of identified eroding streambanks											X	X	X	2009-2010	\$35,400	√	ESWCD HSWCD