

# *Improving Water Quality*

- Addressing Rural and Agricultural Issues
- Rural and Agricultural: Agency Responsibilities
- Rural and Agricultural: Project Implementation & BMPs
- Rural and Agricultural: Cost Sharing and Technical Assistance Programs
- Addressing Urban and Storm Water Issues
- Urban and Storm Water: Agency Responsibilities
- Urban and Storm Water: Project Implementation & BMPs
- Urban and Storm Water: Cost Sharing and Technical Assistance Programs

There are many different approaches that can be taken to improve water quality. The recognized and proven methods are considered best management practices (BMPs). This term “refers to a practice that is determined after examination of alternative practices to be practicable and most effective in preventing or reducing the amount of pollution generated by a nonpoint source to a level compatible with water quality goals.”<sup>1</sup> The general criteria for selecting BMPs are:

- A BMP should be effective in reducing water pollution from non-point sources;
- A BMP should be effective in helping waterways meet Clean Water Act “fishable and swimmable” goals;
- A BMP should be practicable.<sup>2</sup>

Protection of water quality requires that we know the region and understand the natural environment’s processes. If we understand the limitations and capabilities of the place, and adapt policies to them, we will continue to have an excellent water supply and recreation on Lake Erie that will draw visitors from nationwide.

**Addressing Rural and Agricultural Issues**

We can reduce impacts from sewage by treating it and discharging clean effluent. Reducing impacts from diffuse nonpoint sources is a matter of prevention through BMPs. A reduction in rural and agricultural runoff can be made through the installation or use of BMPs, and by utilizing funding and resources of the state and federal agencies responsible.

Ohio EPA and ODNR manage Ohio’s nonpoint programs. The *Nonpoint Source Assessment*<sup>3</sup> provided background and data on nonpoint source water pollution in Ohio. It was followed by the *Nonpoint Source Management Program*,<sup>4</sup> which identified sources of nonpoint pollution and policies to guide state programs. Ohio DNR developed its Ohio’s Coastal Nonpoint Pollution Control Program specifically for the protection and restoration of Lake Erie and its coastal zone.<sup>5</sup>

The Ohio Lake Erie Buffer Team, a coalition of conservation agencies whose goal is to encourage landowners to put conservation buffers into practice and help meet agricultural phosphorus and sediment reduction targets. In particular, the team has made a concerted effort to use cost-share conservation buffer programs. Continued use and expansion of conservation buffers will bring the counties of the Maumee AOC and headwater areas closer to their agricultural phosphorus reduction targets. The acres put into conservation buffers since 1997 are given in the following table.

**Acres Placed in Conservation Practices since 1997<sup>6</sup>**

<b>County</b>	<b>Continuous CRP Acres</b>	<b>CREP Acres</b>	<b>319 Watershed Project Acres</b>	<b>Wetland Reserve Acres</b>	<b>Total Agricultural Conservation Buffer Acres</b>
Lucas	119.4	29	0	0	148.40
Ottawa	242.7	93	186.7	636.8	1,159.20
Wood	2,203.6	649	71.4	56	2,980.00
Total	2565.7	771.00	577.1	692.80	4606.6

## **Rural and Agricultural: Agency Responsibilities**

Federal, state, and county agencies have well-established roles and working relationships with agricultural conservation programs. Generally, agencies use a voluntary approach with technical assistance, incentives, and cost-sharing to encourage use of agricultural BMPs. A variety of agencies and organizations have cooperative roles in promoting BMPs.



### **US Department of Agriculture (USDA)**

USDA is the country's largest conservation agency, encouraging voluntary efforts to protect soil, water, and wildlife on the 70 percent of America's lands that are in private hands. In the Maumee AOC and headwater areas USDA commonly provides technical assistance and funding through two agencies: Farm Services Agency (FSA) and the Natural Resources Conservation Service (NRCS)

The mission of FSA is stabilizing farm income, helping farmers conserve land and water resources, providing credit to new or disadvantaged farmers, and helping farm operations recover from the effects of disaster. FSA was set up under a unique system by which Federal farm programs are administered locally. Farmers who are eligible to participate in these programs elect a three- to five-person county committee, which reviews county office operations and makes decisions on how to apply the programs. This grassroots approach gives farmers a much-needed say in how Federal actions affect their communities and their individual operations.<sup>7</sup>

Since 1935, the Natural Resources Conservation Service (originally called the Soil Conservation Service) has provided leadership in a partnership effort to help private landowners and managers conserve their soil, water, and other natural resources. NRCS provides technical & financial assistance for many natural resource conservation activities. Participation in NRCS programs is completely voluntary.<sup>8</sup>

### **US Environmental Protection Agency (US EPA)<sup>9</sup>**

US EPA leads the nation's environmental science, research, education, and assessment efforts. They work to develop and enforce regulations that implement environmental laws enacted by Congress. US EPA is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance.



In recent years, between 40 and 50 percent of US EPA's enacted budgets have provided direct support through grants to State environmental programs, like Ohio EPA and ODNR. US EPA also issues competitive and non-competitive grants to States, nonprofits, and educational institutions to support high-quality research that will improve the scientific basis for decisions on environmental issues.

One of the programs under US EPA that benefits the rural and agricultural community is the Nonpoint Source Pollution Program under §319 of the Clean Water Act. Ohio EPA administers these funds in Ohio; a portion of which are distributed through a cost-share grant programs. These nonpoint source grants are often called "319 grants" because they provide cost-share and funding and technical assistance through §319 of the Clean Water Act.

## Ohio Environmental Protection Agency (Ohio EPA) and Ohio Department of Agriculture (ODA)

The role of the Ohio EPA is to protect human health and the environment by establishing and enforcing standards for air quality, drinking water and stream water quality, wastewater treatment, and solid and hazardous waste disposal, and to provide comprehensive environmental education. These roles are carried out through: issuing permits to install and operate facilities; providing oversight through inspections and sampling; monitoring and reporting on environmental quality; providing environmental education and technical assistance to industry and the general public; providing assistance in pollution prevention; and taking enforcement actions against violators. One of Ohio EPA's responsibilities is issuing Permits to Install and NPDES permits for discharges to waters of the state. Ohio EPA administers federal Clean Water Act §319 Nonpoint Source grants to abate nonpoint sources of pollution.<sup>10</sup>



The mission of the ODA is to provide regulatory protection to producers, agribusinesses, and the consuming public; to promote Ohio agricultural products in domestic and international markets; and to educate the citizens of Ohio about our agricultural industry. One of ODA's regulatory programs includes Animal Feeding Operations (AFFs), also known as Animal Feeding Operations (AFOs). These two state agencies, Ohio EPA and ODA, work in tandem to provide technical assistance and regulation to the agricultural industry.<sup>11</sup>

## Ohio Department of Natural Resources (ODNR)<sup>12</sup>

ODNR licenses all hunting, fishing, and watercraft in Ohio and is responsible for overseeing and permitting all mineral extraction, monitoring dam safety, managing water resources, coordinating the activity of Ohio's 88 county soil and water conservation districts, mapping the state's major geologic structures and mineral resources, and promoting recycling and litter prevention through grant programs in local communities. As an umbrella organization for such diverse interests, the department pulls all these activities into four fundamental mission components: 1) Resource management, 2) Economic development, 3) Recreation, and 4) Health and safety. The Resource Management mission is most closely related to the projects and activities identified in this plan. Although each of the 11 divisions that address this mission typically has its own mandates and responsibilities, they often combine their efforts, working together on various management projects to achieve similar goals.



## Ohio State University Extension<sup>13</sup>

Ohio State University (OSU) Extension fulfills the land-grant mission of The Ohio State University by interpreting knowledge and research developed by the Ohio Agricultural Research and Development Center, The Ohio State University, and other land-grant universities, so that the scientifically based information can be used to better lives, businesses, and communities. The OSU Extension program focuses on four areas including: 1) family and consumer sciences, 2) 4-H youth development, 3) community development, and 4) agriculture and natural resources.



OSU Extension conducts research and educational programs, and provides extensive technical recommendations to the agricultural community. OSU Extension's Agriculture and Natural Resources section is most applicable to the issues, problems, and projects in the Maumee AOC and headwater areas. Through this program farmers, gardeners, landowners, and businesses are encouraged to strengthen their businesses through the adoption of new technology

that can improve efficiency while protecting the environment. Landowners are assisted in the management of woodlands for the protection of area streams and watersheds. They also work with green industries, from turf grass management to landscape and nursery companies to encourage the use of BMPs.

### **Soil and Water Conservation Districts (SWCDs)**

The Soil and Water Conservation Districts are political subdivisions of the state and are organized for all 88 counties. Their primary function is to assist the agricultural community with conservation practices. They provide technical assistance and conduct educational programs at the local level, working directly with landowners. They are the principle implementing agencies for encouraging farmers to adopt BMPs. The SWCDs in Lucas, Ottawa, and Wood counties are very active in the Maumee AOC often partnering with the Maumee RAP to implement projects.

### **Watershed Councils**

The Maumee RAP and Duck and Otter Creeks Partnership, like most watershed councils, provide mechanisms for public involvement with natural resource and water quality issues for river basin areas. They have led the development of several multi-county BMP projects by coordinating agencies at the watershed level.

### **Rural and Agricultural: Project Implementation & BMPs**

Agriculture is a vital part of our region's economy, lifestyle, and tradition. Much of the area is highly productive and classified as prime agricultural land. Productive farming in most of the Maumee AOC and headwater areas requires drainage via field tiles and ditches. Protecting the environment while allowing a prosperous farm community requires stewardship and careful management.

Agricultural runoff is caused by precipitation, which erodes soils and carries nutrients, pesticides, and herbicides away from their point of origin and throughout the watershed. During large storms, the runoff to surface water and infiltration to ground water increases and so does the rate of pollutant movement. Agricultural environmental programs recommend a series of "Best Management Practices" (BMPs) designed to meet Clean Water Act goals. BMPs are implemented through technical assistance, educational outreach, and voluntary incentives.

Rural and agricultural BMPs include ditch maintenance, outlet protection structures, contour farming, floodplain set asides, and grassed waterways to collect and dispose of excessive runoff water at non-erosive velocities. These practices have been and continue to be an important part of erosion control in Northwest Ohio, where drainage is necessary for productive farming. Some of the possible BMPs for agricultural pollution abatement, are summarized below. Not all of these practices will be useful in all areas of the Maumee AOC. Selection of specific BMPs should be based on site and local conditions for each watershed.

### **Conservation Tillage**

Leaving crop residue on the surface before and during planting protects topsoil and reduces erosion. Pieces of crop residue shield soil particles from rain and wind. No-till and conservation tillage techniques that leave at least 30 percent residue cover are recommended practices. In our region conservation tillage is important because phosphorus attaches to fine silt and clay particles. Techniques that control erosion are therefore also effective in reducing phosphorus loadings that ultimately reach Lake Erie. Conservation tillage is a highly recommended agricultural BMPs.

## **Nutrient Management**

Manure and nutrient management is managing the sources, rates, forms, timings, placements and utilization of manure, other organic by-products, bio-solids, and other nutrients in the soil and residues. The goal is to apply manure to agricultural land at an agronomic rate, efficiently using its nutrients to supply soils and plants to produce food, forage, fiber, and cover while minimizing the transport of nutrients to ground and surface water and environmental degradation.

Comprehensive Nutrient Management Plans (CNMP) plans are highly recommended for livestock operations. A CNMP is a detailed, specific plan designed for a particular farm with guidelines set by NRCS, and may be prepared through county SWCDs. The CNMP is a component of a farm's conservation plan. It is used in conjunction with crop rotations, residue management, pest management, conservation buffer practices, and/or other practices needed on a site-specific basis to address natural resource concerns and landowner objectives. A CNMP helps to reduce or eliminate the amount of manure runoff when applied to cropland, the amount of feedlot runoff from a livestock feeding operation, maximize nutrients from manure, minimize the amount of fertilizer needed, and address aesthetics and odor concerns.

## **Filter Strips**

Vegetative strips along waterways trap a portion of sediment and other pollutants in runoff water that would otherwise flow into neighboring streams, carrying nutrients with it. The term "filter strip" usually refers to a grassed area between the agricultural field and stream. Its purpose is to remove pollutants from field runoff but not necessarily provide riparian habitat. Grassed filter strips should be at least 20 feet wide to be effective. They are recommended wherever possible on both sides of streams and ditches in agricultural areas.

## **Riparian Buffer Areas**

A riparian buffer filters sediment, nutrients, pesticides, and pathogens out of field runoff like a filter strip, but they also provide habitat. Forested riparian areas especially absorb nutrients from field runoff water. Even narrow riparian forest strips on flat land are effective filters. A strip as narrow as 50 feet can remove a significant amount of nitrogen and phosphorus from surface and subsurface runoff. Wider buffer zones are desirable for other benefits, such as wildlife habitat.

Riparian buffers play an important role in aquatic habitat as well. Forested banks help make streams suitable for fish and other aquatic creatures. Tree roots help stabilize streambanks and provide cover for fish and the macroinvertebrates that form the base of the food chain. Leaves that fall into the stream are the primary food source for small aquatic animals such as insect larvae. Branches overhanging streams also helps maintain proper water temperature to support aquatic life. In the summer, the shade keeps water temperature cool; cold water holds more dissolved oxygen, supporting more aquatic life.<sup>14</sup>

## **Windbreaks**

Windbreaks are rows of trees and shrubs protecting fields from wind erosion, while also providing wildlife habitat. Multiple rows of coniferous trees or a combination of coniferous and deciduous trees are planted to protect a farmstead, field, or feedlot from wind and snow. One or two rows of shrubs are also beneficial. An established windbreak slows wind on the downwind side for a distance of 10 times the height of the trees. The rows of trees also act as a snow fence. Windbreaks should be planted on at least the north and west sides of the area to be protected.

The Northwest Ohio Windbreak program is an interagency effort of USDA, ODNR, and county SWCDs to assist landowners in establishing field windbreaks in the area. Applications may be made through the county SWCDs or Ohio DNR Divisions of Forestry or Wildlife. The program provides cost-share funds to landowners for establishing windbreak vegetation. This program covers a total of 15 counties on a rotating basis. The program is available in Ottawa and Sandusky counties during even years, and in Lucas and Wood counties every year.

### **Wetland Restoration/Enhancement**

Although wetlands are often wet, a wetland might not be wet year-round. In fact, some of the most important wetlands are only seasonally wet. Wetlands are the link between the land and the water. They are transition zones where the flow of water, the cycling of nutrients, and the energy of the sun meet to produce a unique ecosystem characterized by hydrology, soils, and vegetation—making these areas very important features of a watershed. Using a watershed-based approach to wetland protection ensures that the whole system, including land, air, and water resources, is protected.<sup>15</sup>

Wetlands filter out nutrients, chemicals, and sediment from runoff water and help keep them out of ground and surface water. Restoration of former wetlands and oxbows and the enhancement of existing wetlands are encouraged, especially along streams and in floodplains. Wetlands control and reduce pollutants from agricultural runoff, provide aquatic and riparian habitat, and can serve as floodplains to reduce flooding problems. Fortunately, wetland restoration is a growing activity that can improve water quality and wildlife habitat in the Maumee AOC and across the nation.

### **Streambank Protection**

Channelization often straightens and deepens a stream. Water flows much faster through the altered channel, resulting in increased erosion and flooding downstream. Channelizing can strip streambanks of vegetation, making them more prone to erosion. Although channelization may appear to solve a problem in the short term, the stream will constantly work to return to its natural shape. This short-term solution can result in long-term problems and high, recurring costs.

Streambanks should be stabilized and protected against scour and erosion by planting vegetation and/or using structural means to reduce sediment loads and pollution. Vegetative methods are preferred over structural means because vegetation provides habitat and some nutrient uptake in addition to protecting streambanks. Livestock should be excluded from streams and streambanks to prevent soil compaction and loss of vegetation. In addition, livestock exclusion will prevent manure deposition in the stream.<sup>16</sup>

### **Wetland Reservoir Sub-Irrigation**

Productive agriculture in northwest Ohio requires drainage to remove excess water, often using a tile system. Conventional practice is to drain the water to a ditch or river, and ultimately Lake Erie. Tile drainage water can be a significant source of nitrates.

Sub-irrigation is an alternative practice that stores runoff water in wetland and reservoirs near the fields. During dry periods, water is pumped back through the tile system. The agricultural benefits are to aid crop production by reducing drought stress, and serving as a source of nitrate. The wetland and reservoir system can reduce the amount of sediment and nitrates that reach streams, and provide wetland habitat. Testing data from Iowa indicates a reduction of nitrates from drainage water from 40 to 98 percent.<sup>17</sup>

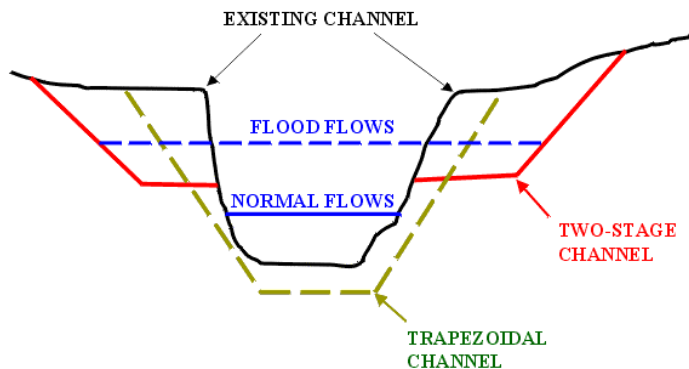
Test data indicates sub-irrigation may be effective in reducing nitrate loadings. Tests were conducted throughout Ohio in 1997 at subsurface drain outlets from February through May. The average

nitrate concentrations in the waters sampled were roughly 50 percent lower when sub-irrigation was used during the previous growing season than when it had not been applied.<sup>18</sup>

### Natural Channel Design

Streams naturally tend to form channels based on the amount of flow, the grade, and how much energy the water has. A stream whose channel is straightened may erode its banks as it dissipates energy and seeks to restore a stable flow regime. The result can be sedimentation, requiring future sediment removal.

Research and demonstration projects has been conducted in Northwest Ohio on alternative stream channel designs that may be more stable and do not cause future sedimentation.



**Two-Stage Channel**

One such technique is the “two-stage ditch design.” Conventional ditch design is a trapezoidal cross-section with the stream at the bottom of the channel and straight sloping banks. The two-stage design uses a wider bottom. The normal flow channel takes up only part of it; the rest is a floodplain “bench.” The stream may meander across this bench area, but during normal flow, the bench itself is dry. During high flow, the stream overflows onto the bench and may reach bank full flow<sup>19</sup>.

The goal of research and demonstration of alternative channel designs is to identify designs that will provide drainage required for productive agriculture, but need less maintenance, and cause less erosion and sedimentation.

### **Rural and Agricultural: Cost Sharing and Technical Assistance Programs**

Many different agencies and organizations cooperate and jointly provide conservation assistance to farmers through a number of programs. Each focuses on a specific aspect of nonpoint pollution control or habitat restoration. These programs use two techniques to implement their goals. One technique is to provide technical expertise from professional staff that advise farmers on what BMPs to use and how to use conservation that will help make farming profitable while protecting the environment. The second technique is providing financial incentives for landowners that voluntarily use BMPs, known as cost-sharing.<sup>20</sup>

### **Conservation Reserve Program (CRP)**

The Conservation Reserve Program is a voluntary program for agricultural landowners. Through CRP farmers can receive annual rental payments and cost-share assistance to establish long-term, resource conservation practices on eligible farmland. This program provides land rental payments to farmers who are willing to sign long-term contracts converting cropland into filter strips, riparian forest buffers, wetland restorations, or windbreaks. USDA Farm Services Agency (FSA) administers the CRP and CREP (see below) contracts in close cooperation with USDA NRCS, Ohio DNR, and the county SWCDs.



### **Conservation Reserve Enhancement Program (CREP)**

The State of Ohio offers an enhanced CRP program, which provides increased incentives to install conservation buffer practices and extending the reserve period. CREP is a special program in Ohio available only in the Lake Erie basin. All of the Maumee AOC is eligible to participate in this program. Practices include filter strips along waterways, wildlife habitat along waterways, wetland restoration, field windbreaks, riparian buffers, and tree plantings.

### **Wetlands Reserve Program (WRP)**

The Wetlands Reserve Program (WRP) is a voluntary program to restore and protect wetlands on private property. It is an opportunity for landowners to receive financial incentives to enhance wetlands in exchange for retiring marginal or sensitive agricultural land. Landowners can establish conservation easements or can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land and 100 percent of the wetland restoration cost. The program is administered by USDA FSA with technical support from NRCS through partnerships with state agencies (OEPA, ODNR), US Fish and Wildlife Service (FWS), and Ducks Unlimited.

### **Clean Water Act §319 Nonpoint Source Grants<sup>21</sup>**

The Ohio Nonpoint Source program focus is identifying and supporting implementation of BMPs and measures that reduce pollutant loadings, control pollution added from nonpoint sources, and improve the overall quality of waterways. Without such additional actions to control nonpoint sources of pollution, watersheds cannot reasonably be expected to attain or maintain applicable Ohio water quality standards.

Ohio EPA administers cost-share programs to encourage BMPs with US EPA §319 Nonpoint Source grant funds. These nonpoint source grants are often called “319” because they provide cost share and funding and technical assistance through §319 of the Clean Water Act. The 319 program provides funds projects that will reduce or eliminate nonpoint source pollution such as, two-stage channel ditch conversion, livestock exclusion practices, establishing riparian wetland areas as drainage retention areas, tree planting in riparian buffer areas, and removing drain tile to restore natural drainage and flow and other innovative practices designed to reduce agricultural sources of nonpoint pollution.

Ohio relies heavily on watershed management plans, like this *Stage 2 Watershed Plan*, to identify and outline actions to correct water quality problems caused by nonpoint source pollution. Most watershed management plans are developed locally with input and support from Ohio EPA, Ohio Department of Natural Resources (ODNR), Natural Resources Conservation Service (NRCS), and other agencies.

### **Addressing Urban and Storm Water Issues**

The problem with urban storm water runoff is that the pollution sources are diffuse and not easily identified. Historically, water pollution control has focused on the more obvious point sources: municipal wastewater treatment plants and industrial discharges. The water pollution potential for storm water runoff was not fully appreciated until repeated studies revealed that urban nonpoint sources seriously threaten water quality and can exceed the impact of municipal sewage discharges.

Nonpoint source pollution problems are both water quality and quantity based. In urban areas a variety of created surfaces now cover much of the landscape. Many of these surfaces are impervious and therefore prevent rainwater and snowmelt from following their natural course into the soil. Roofs and pavement prevent infiltration completely, while even suburban lawns absorb far less than

natural areas. Impervious surfaces therefore increase the rate and volume of storm water runoff, resulting in higher flows and more frequent floods. Other negative impacts include increasing the receiving waters temperature, changing habitat, and decreasing stream flow stability.

Most land use activities deposit detrimental and sometimes hazardous materials on the impervious surfaces: sediments, toxic metal particles, pesticides and fertilizers, petroleum products, harmful bacteria, salt, pet waste, and trash. As rainfall and snowmelt move rapidly across this transformed landscape, these pollutants are carried to surface and underground collection systems. Eventually these polluted flows reach waters that we use for drinking, swimming, fishing, and recreation.

### **Urban and Storm Water: Agency Responsibilities**

As storm water regulations have come into place and the awareness of urban nonpoint source pollution increases, the roles and responsibilities of federal, state, and county agencies has become more defined. Unlike the voluntary efforts to reduce agricultural runoff, there is a regulatory effort to reduce many urban runoff impacts that is complimented by voluntary efforts.



### **US Environmental Protection Agency (US EPA)<sup>22</sup>**

US EPA leads the nation's environmental science, research, education and assessment efforts. They work to develop and enforce regulations that implement environmental laws enacted by Congress. US EPA is responsible for researching and setting national standards for a variety of environmental programs, and delegates to states and tribes the responsibility for issuing permits and for monitoring and enforcing compliance.

In recent years, between 40 and 50 percent of US EPA's enacted budgets have provided direct support through grants to State environmental programs, like Ohio EPA and ODNR. US EPA also issues competitive and non-competitive grants to States, nonprofits and educational institutions to support research that will improve the scientific basis for decisions on environmental issues.

The National Pollutant Discharge Elimination System (NPDES) is a part of the Clean Water Act that US EPA has authorized Ohio EPA to implement. As NPDES delegated state, Ohio EPA is currently implementing the federal storm water program in Ohio. US EPA continues to provide technical and financial support to the state agencies responsible for implementing the program.

### **Ohio Environmental Protection Agency (Ohio EPA)**

The role of the Ohio EPA is to protect human health and the environment by establishing and enforcing standards for air quality, drinking water and stream water quality, wastewater treatment, and solid and hazardous waste disposal, and to provide comprehensive environmental education. These roles are carried out through: issuing permits to install and operate facilities; providing oversight through inspections and sampling; monitoring and reporting on environmental quality; providing environmental education and technical assistance to industry and the general public; providing assistance in pollution prevention; and taking enforcement actions against violators.<sup>23</sup>



Ohio EPA's Division of Surface Water is responsible for restoring and maintaining the quality of Ohio's rivers and streams. The Division of Surface Water accomplishes this mission by monitoring the aquatic environment, permitting, enforcing environmental laws, using and refining scientifically sound methods and regulations, planning, coordinating, educating, providing technical assistance and encouraging pollution prevention practices. As a delegated State, Ohio EPA is responsible for

implementing the NPDES federal storm water, TMDL, §319 Nonpoint Pollution, and §401 Water Quality Certifications programs.

### **Area Wide Water Quality Management**

The Areawide Water Quality Management Plan (AWQMP) is a regional document mandated by Congress under Section 208 of the Clean Water Act. Overall, the “208 Plan” is a statement of how Northwest Ohio will restore our waterways to fishable and swimmable conditions. TMACOG is responsible for updating and maintaining this plan for four Counties in Ohio (Lucas, Wood, Ottawa, and Sandusky) and the southern three Townships in Monroe County, Michigan (Whiteford, Bedford, and Erie). Ohio EPA and Michigan DEQ use this plan in reviewing and approving permit applications. The current 208 Plan is available on TMACOG’s web site ([www.TMACOG.org](http://www.TMACOG.org)) and was frequently consulting during the development of this *Stage 2 Watershed Plan*.

### **Soil and Water Conservation Districts**

The Soil and Water Conservation Districts (SWCDs) are political subdivisions of the state, and are organized for all 88 counties. The primary function of SWCDs is to assist the rural and agricultural communities with conservation practices, however Lucas County is a very urbanized county. In light of the large and rapid increase of portions of Lucas County, the Lucas SWCD also has staff to address the urban storm water issues in Lucas County. They provide technical assistance and conduct educational programs at the local level, working directly with landowners, contractors, and developers. They also are able to provide technical and field assistance to governmental agencies relating to storm water issues and work very closely with the Storm Water Coalition.

### **Watershed Councils**

The Maumee RAP and Duck and Otter Creeks Partnership, like most watershed councils, provide mechanisms for public involvement with natural resource and water quality issues as well as project implementation. Both of these organizations are explained in detail in the Introduction chapter and in the Appendices.

The Storm Water Coalition (SWC) was formed in 1997 to voluntarily coordinate storm water management efforts and BMP installation for numerous jurisdictions in the metro-Toledo area. Although the name as changed overtime, the group has continually worked on building regional collaboration for storm water management. Since its creation the SWC has conducted feasibility studies for the formation of a watershed/regional utility, developed a regional storm water standard manual, and created on a regional multi-media educational campaign for residents and businesses.

### **Urban and Storm Water: Project Implementation & BMPs**

In some areas of the Maumee AOC and headwater areas, urban development is rapidly overtaking the agricultural and natural lands. This increase in impervious areas impacts our area’s water quality and can diminish the water quantity available for drinking and sustaining natural features such as wetlands.

Urban runoff is caused by precipitation which carries pollutants such as pesticides and herbicides from lawns and golf courses, oils and metals from parking lots, and soils from construction sites, straight to our local streams through storm sewers and ditches, untreated. Whenever possible, best management practices (BMPs) should be implemented to reduce the impact by utilizing technical assistance, educational outreach, and voluntary incentives.

Urban BMPs includes sand or bio-filters, outlet protection structures, low impact development practices, riparian setbacks, floodplain preservation, and extended detention/retention structures to collect and dispose of excessive runoff water at non-erosive velocities. These practices have been and continue to be an important part of runoff control in Northwest Ohio

Some of the BMPs for urban runoff pollution reduction and prevention are summarized below. Not all of these practices will be useful in all areas of the Maumee AOC. Selection of specific BMPs should be based on site and local conditions for each watershed.

### **Low Impact Development**

Low impact development (LID) is an ecologically friendly approach to site development and storm water management that aims to mitigate development impacts to land, water and air. The approach emphasizes the integration of site design and planning techniques that conserve natural systems and hydrologic functions on a site.<sup>24</sup>

Conservation site design or cluster development utilizes these LID concepts. This site design technique concentrates buildings in a compact area in one portion of a development site in exchange for providing open space and natural areas elsewhere on the site. Setbacks and frontage distances are relaxed in order to create additional open space at the site.

Open space designs have many benefits in comparison to the conventional developments. They can reduce impervious cover, storm water pollutants, construction costs, grading, and the loss of natural areas. However, many communities lack zoning ordinances to permit open space development, and even those that have enacted ordinances may need to revise them to achieve greater water quality and environmental benefits.

The more BMPs that are combined, the more low impact a development can be. For example, the benefits of open space design can be amplified when combined with other site design techniques such as narrow streets and alternative turnarounds. This practice involves promoting the use of narrower streets to reduce the amount of impervious cover created by new development, and in turn, reduce the storm water runoff and associated pollutant loads. Currently, many communities require wide residential streets that are 32, 36 and even 40 feet wide. In most residential settings, streets can be as narrow as 22 to 26 feet wide without sacrificing emergency access, on-street parking or vehicular and pedestrian safety. Even narrower access streets or shared driveways can be used when only a handful of homes need to be served.

Developers, however, often have little flexibility to design narrower streets, as most communities require wide residential streets as a standard element of their local road and zoning standards. Revisions to current local road standards are often needed to promote more widespread use of narrower residential streets. Residential street design requires a careful balancing of many competing objectives: design, speed, traffic volume, emergency access, parking, and safety, to name a few. Communities that want to change their road standards to permit narrower streets need to involve all the stakeholders who influence street design in the revision process.

### **Control the Sources**

The primary goal of source control is to reduce the amount of pollutants entering storm water runoff. Although the accumulation of certain contaminants is inevitable, some of pollutants can be controlled at their source. Measures that can improve runoff quality at the source include litter control, street sweeping, silt fencing, roadway deicing alternatives, and good housekeeping. These measures need to be implemented by the communities as well as private citizens.

Since most storm sewers discharge directly into our waterways, runoff usually receives only simple filtering or screening of larger objects. As a result all types of litter that people toss onto sidewalks or streets are carried to ditches, streams, and lakes.

Landscaping practices can be a significant source of pollutants to urban runoff. Turf management chemicals including fertilizers and pesticides used on private lawns, as well as those used on golf courses and public parks, can add high levels of nutrients or dangerous pesticides to the runoff. While each location is unique and the effects on water quality vary, it is clear that the type, quantity, and timing of materials can make a big difference in the runoff. In order to gain public support and cooperation in reducing these pollutants, an educational programs like Give Water a Hand are necessary to inform the public of what they can do and the potential problems if they do not.

Poor housekeeping at commercial, industrial, and municipal sites can lead to contaminated runoff. Rain or melting snow can erode piles of bulk material such as loose topsoil or salt if it is left uncovered. Similarly, precipitation can wash contaminants off of equipment or dirty objects left exposed to the weather. Improperly maintained landfills can allow toxic contaminants to reach the surface of a landfill, allowing storm water to carry these pollutants to nearby waterbodies.

Most highway and street departments use salts and abrasives to keep roads, parking lots, and sidewalks free from ice during the winter. In excess, the salts can be toxic and abrasives can increase sediment loads. While a certain amount of de-icing is necessary to ensure safety, the easiest way to minimize adverse affects is by using less. The following steps can be useful in curbing application rates: 1) decrease application rates on straight, flat sections, 2) train operators of application equipment, and 3) keep accurate records of applications.

Street surfaces receive a large portion of the litter, chemicals, dust fall, and other contaminants that affect urban water resources. The contaminants that remain after source control measures have been implemented can be partially removed by street sweeping. Increasing the frequency of street sweeping operations can minimize the accumulation and runoff of street surface contaminants. Specially designed street sweepers should be used on a regular basis to remove litter and other debris. Vacuum-assisted type sweepers have achieved high removal effectiveness, including the small particle size range of contaminant material.

Illicit or illegal discharges to the storm sewers from homes and businesses can add harmful contaminants to storm sewer systems. The illicit discharges can be the result ignorance, simple negligence or intentional connection of discharge pipes that should be directed to the sanitary sewer. People who don't understand that storm sewers directly discharge to waterbodies have been known to dump oil, old paint, or household chemicals into storm sewer inlets. Floor drains, dry wells, and cesspools are frequent sources of commercial or industrial discharges and connections. Many communities within the Maumee AOC are actively identifying and eliminating these illicit discharges under NPDES Storm Water permits. The NPDES storm water permits in many communities include dry weather screening requirements of storm sewer outfalls. Coordinated collection drives or managed collection centers for hazardous household wastes such as motor oil, old paint, and caustic chemicals are another method for communities to help eliminate illegal dumping.

### **Erosion and Sediment Control**

Some of the highest storm water pollutant loads occur when development is in its initial construction phase. This is when land is cleared of vegetation and graded to create a proper surface for

construction. The removal of natural vegetation and topsoil renders the exposed area susceptible to erosion, causing a transformation of existing drainage areas and a disturbance of sensitive areas. Erosion control is the prevention of soil from being picked up by runoff, usually by establishing a soil cover. Sediment control is the removal of eroded sediment from runoff therefore preventing damage to watercourses and infrastructure. For guidance on how to address these issues refer to the *Regional Storm Water Management Standards Manual* created by TMACOG, Maumee RAP, and the Storm Water Coalition.

### **Riparian Buffers**

Riparian buffers serve as boundaries between local waterways and existing development that help protect water resources by filtering pollutants, providing flood control, reducing streambank erosion, preventing stream warming, and providing room for natural movement of the stream channel. While there is often overlap between the role of buffers and conservation areas, buffers differ in that they are a specific planning tool to protect stream quality and riparian habitat. For more details on the design and applications refer to the *Regional Storm Water Management Standards Manual* created by TMACOG, Maumee RAP, and the Storm Water Coalition.

### **Runoff Conveyance**

The management of storm water runoff from sites after construction is vital in controlling the impacts of development on urban water quality. The increase in impervious surfaces such as rooftops, roads, parking lots, and sidewalks due to land development has a number of effects on aquatic systems. First, increases in imperviousness create a corresponding increase in the total volume of storm water runoff from a site. Without proper conveyance, this increase in runoff volume can lead to erosion, degradation of stream channel habitat, and increases in the occurrence of flooding.

Urban runoff is most commonly directed as quickly as possible to the storm sewer system via curbs and gutters. However, storm sewers do not provide for energy dissipation, volume control, or pollutant removal. Controls are necessary for each of these issues if water quality is to be protected. One BMP to achieve these goals is the use of open grass channels to convey storm water runoff. The grass channels are designed to meet runoff velocity targets for large storms and provide water quality treatment for smaller storms. Grass channels are generally not an option in ultra-urban areas and runoff may still need to be directed to detention or retention facility for further treatment. For more details on the design and applications refer to the *Regional Storm Water Management Standards Manual* created by TMACOG, Maumee RAP, and the Storm Water Coalition.

### **Runoff Detention/Retention and Treatment**

Detention/retention and treatment BMPs can be used to achieve four broad resource protection goals including: flood control, channel protection, groundwater recharge, and pollutant removal. The BMPs should be designed to function together as a system to ensure that the volume, rate, timing, and pollutant load of runoff remains similar to that, which occurred under natural conditions. This can be achieved through a coordinated network of structural and nonstructural methods, designed to provide both source and site control. In such a system, each BMP by itself may not provide major benefits, but when combined with others becomes very effective.

To manage both water quantity and quality, storm water facilities must be designed to capture and treat two different storm events:

1. Large storm events: Flood attenuation
2. The first flush (first ½ to 1-inch of runoff from the watershed): Water quality

Controlling both extremely large events to prevent flooding, and more frequent events to mitigate water quality impacts and control stream erosion, can be achieved through the proper design of detention/retention facilities. Among the alternatives, wet ponds and constructed marsh systems can be effective for achieving control of both storm water volume and quality. Alternative Best Management Practices (BMPs) providing flood attenuation and treatment of the “first flush” and are also acceptable. For more details on the design and applications refer to the *Regional Storm Water Management Standards Manual* created by TMACOG, Maumee RAP, and the Storm Water Coalition.

### **Public Involvement and Education**

For proper storm water management practices to be implemented people need to know about them. The general public and the business community need to understand the importance of good storm water management and how it can benefit them. This won't happen however, if there isn't a significant public involvement and education program about the subject.

The public needs to be educated to accept responsibility for the operation of the storm water management system. Even though they may not have any direct problems, everyone should understand that storm water does flow into the drainage system from their yard, roof, driveway, patio, and sidewalk. Further, they should develop an understanding of how each piece of real estate contributes to water pollution and flooding problems. The Give Water a Hand residential and business campaigns are helping to accomplish this.

An informed and knowledgeable community is crucial to the success of a storm water management program since it helps to ensure greater support and greater compliance. Public support is particularly beneficial when communities attempt to institute new funding initiatives for the program or seek participation and buy-in to help implement the program.

### **Urban and Storm Water: Cost Sharing and Technical Assistance Programs**

There are many types of projects to correct a multitude of urban and storm water pollution issues. How these projects are funded and implemented often depends on the requirements of the funding source, as well as the interest of the implementing agency or organization

The most successful projects are usually those that are conducted in a collaborative and cooperative manner, involving many different agencies and organizations recognizing the strengths and weaknesses of each partner. The funding sources listed below are just a few that could be used by local partners.

### **Coastal Management Assistance Grants** <sup>25</sup>

ODNR's Coastal Management Assistance Grants are funds awarded to help preserve, protect and enhance Ohio's Lake Erie coastal resources. Grants are awarded on a competitive basis, with applicants providing a minimum of 50 percent of the project costs. The Coastal Management Assistance Grant program is a reimbursement grant program whereby the project sponsor is expected to make the initial outlays for the project and then request reimbursement from OCM. The National Oceanic & Atmospheric Administration provides funding for the Coastal Management Assistance Grant Program.



The main goal of the Ohio Coastal Management Program and its grants is to promote a sustainable coast and lake. Comprehensive community planning, watershed planning to address coastal

nonpoint pollution, and balanced growth have been given priority for grant funding. The goal is to promote coastal community and watershed planning that will address enhanced public access, hazard mitigation, natural resource protection and restoration, economic viability and sustainable coastal development issues. If coastal communities and watersheds draining into Lake Erie can develop long-term plans for sustainability, a healthy maintainable coast and lake will result.

### **Erosion Control Loans<sup>26</sup>**

Owners of property in the Coastal Erosion Area (CEA) designated along the shore of Lake Erie may be eligible for a low interest loan to cover the cost of constructing a shore erosion control measure. There are four eligibility requirements for ODNR's Erosion Control Loans including: 1) project area must be in a designated Coastal Erosion Area, 2) project must be constructing an Erosion Control Structure, 3) construction must be after June 1, 1998, and 4) all permits and authorizations must be obtained. Erosion Control Loans can be used to cover the costs of preparing construction documents for the installation of an Erosion Control Structure, costs incurred in obtaining the necessary authorizations, and the costs of materials, earthwork, labor, and equipment needed to construct the Erosion Control Structure.

### **Ohio Environmental Education Fund (OEEF)<sup>27</sup>**

Ohio EPA's Ohio Environmental Education Fund (OEEF) awards approximately \$1 million annually in grants for education projects targeting pre-school to university students and teachers, the general public, and the regulated community. OEEF funds projects to enhance the public's awareness and understanding of issues affecting environmental quality in Ohio. The OEEF does not fund projects that are required by permit or enforcement. These highly competitive grants are awarded in amounts of up to \$50,000 each. There are two grant cycles annually; deadlines are January 15 and July 15. Monies credited to the Environmental Education Fund consist of half of all penalties collected by Ohio EPA air and water pollution control programs, as well as gifts, grants, and contributions.



### **Clean Water Act §319 Nonpoint Source Grants**

The Ohio Nonpoint Source program focus is identifying and supporting implementation of BMPs and measures that reduce pollutant loadings, control pollution added from nonpoint sources, and improve the overall quality of waterways. Without such additional actions to control nonpoint sources of pollution, watersheds cannot reasonably be expected to attain or maintain applicable Ohio water quality standards.

Ohio EPA administers cost-share programs to encourage BMPs with US EPA §319 Nonpoint Source grant funds. These nonpoint source grants are often called "319" because they provide cost share and funding and technical assistance through §319 of the Clean Water Act. The 319 program provides funds for projects that will reduce or eliminate nonpoint source pollution such as, natural stream channel reconstruction, bio-engineered stream bank stabilization, low-head dam removal and/or modification and/or other projects that restore natural stream ecology, morphology and flow channelization.

Ohio relies heavily on watershed management plans, like this *Stage 2 Watershed Plan*, to identify and outline actions to correct water quality problems caused by nonpoint source pollution. Most watershed management plans are developed locally with input and support from Ohio EPA, Ohio Department of Natural Resources (ODNR), and other agencies.



### **Water Pollution Control Loan Fund (WPCLF)**

Ohio EPA's Water Pollution Control Loan Fund (WPCLF) provides financial and technical assistance for a wide variety of projects to protect or improve the quality of Ohio's rivers, streams, lakes, and other water resources. Planning, design, and construction assistance is available for both public and private applicants. The WPCLF offers below market interest rate loans. Direct loans are made to most public and large private borrowers, while smaller borrowers usually receive indirect loans through the linked deposit program. Special discounted interest rates are available for qualifying projects (see WRRSP section).<sup>28</sup>

The WPCLF offers a variety of funding opportunities to help communities meet the requirements for the NPDES Programs. WPCLF loans for storm water activities are available to public entities - villages, cities, counties, and sewer districts. Storm water activities that directly address water quality problems (rather than water control/flooding problems) are eligible for WPCLF funding.<sup>29</sup>

### **Water Resource Restoration Sponsor Program (WRRSP)<sup>30</sup>**

Ohio EPA has started to focus more money and effort into reducing nonpoint source pollution that jeopardizes the health of Ohio's water resources. This increased focus created the Water Resource Restoration Sponsor Program (WRRSP). This program provides an opportunity for WPCLF funding recipients to finance planning and implementation of additional projects that address nonpoint source pollution. Funding and completion of these projects helps to protect or restore water resources. Restoration activities may range from the preservation and protection to intensive repair and recovery of affected stream and aquatic habitats. WPCLF recipients can initiate projects themselves or sponsor approved projects planned by another group, such as a land trust, park district or other entity with the ability to protect and manage such resources.

The WRRSP project is funded by providing the sponsor with an advance refund of its interest payments on the WPCLF loan for its wastewater treatment facilities. To further encourage participation in the program, the interest rate on the sponsor's loan is discounted by 0.1 percent. In return, the sponsor uses the refunded interest to either implement the project or provide the money through a sponsorship agreement to another entity which implements the project.

## **Bibliography**

“208” *Areawide Water Quality Management Plan*, TMACOG, 2003-2004.

## **References**

- <sup>1</sup> Quoted from US EPA National Water Quality Strategy stated in “Conservation Districts and Nonpoint Source Pollution Control,” NACD, October 1975.
- <sup>2</sup> Adapted from *Draft Guidelines for State and Areawide Water Quality Management Program Development*, US EPA, February 1976.
- <sup>3</sup> *State of Ohio Nonpoint Source Assessment*, Ohio EPA, 1990.
- <sup>4</sup> *Ohio Nonpoint Source Management Program*, Ohio DNR and Ohio EPA, 1993; and *Ohio Nonpoint Source Management Program Update*, Ohio DNR and Ohio EPA, 1999.
- <sup>5</sup> *Ohio Coastal Nonpoint Pollution Control Program Plan*, Ohio DNR, September 2000.  
<http://www.dnr.state.oh.us/soilandwater/coastalnonpointprogram.htm>.
- <sup>6</sup> USDA NRCS, 2001 with data through 4/13/2001
- <sup>7</sup> USDA Farm Services Agency website: <http://www.fsa.usda.gov/pas/aboutus.htm>.
- <sup>8</sup> USDA Natural Resources Conservation Service website: <http://www.nrcs.usda.gov/about>.
- <sup>9</sup> US EPA website: <http://www.epa.gov>.
- <sup>10</sup> Ohio Environmental Protection Agency website: <http://www.epa.state.oh.us/new/aboutepa.html>.
- <sup>11</sup> Ohio Department of Agriculture web site: <http://www.ohioagriculture.gov/pubs/aboutus.stm>.
- <sup>12</sup> Ohio Department of Natural Resources website: <http://www.dnr.state.oh.us/aboutus.htm>.
- <sup>13</sup> Ohio State University Extension website: <http://extension.osu.edu/about/index.php>.
- <sup>14</sup> *Ohio’s Streamside Forests*, Ohio DNR Division of Natural Areas and Preserves, 1991
- <sup>15</sup> *Wetlands Overview Fact Sheet*, US EPA, Dec. 2004  
<http://www.epa.gov/owow/wetlands/pdf/overview.pdf>.
- <sup>16</sup> Maumee RAP Recommendations for Implementation, 1991
- <sup>17</sup> *Reducing Nitrate in Water Resources with Modern Farming*
- <sup>18</sup> Agricultural Drainage Bulletin 871, OSU Extension; page 14, 1998.
- <sup>19</sup> Graphic courtesy of Finkbeiner, Pettis, & Strout, Ltd. Used by permission.
- <sup>20</sup> *Ohio Lake Erie Buffer Program Strategic Plan 2000-2004*, Lake Erie Buffer Team, a coalition of 21 cooperating organizations and agencies
- <sup>21</sup> Ohio EPA Division of Surface Water Nonpoint Source Program website:  
<http://www.epa.state.oh.us/dsw/nps/index.html>.
- <sup>22</sup> US Environmental Protection Agency website: <http://www.epa.gov/epahome/aboutepa.htm>.
- <sup>23</sup> Ohio Environmental Protection Agency website: <http://www.epa.state.oh.us/new/aboutepa.html>.
- <sup>24</sup> *Builder’s Guide to Low Impact Development Brochure*, NAHB Research Center, Maryland.  
<http://www.nahbrc.org>.
- <sup>25</sup> Ohio Department of Natural Resources website: <http://www.dnr.ohio.gov/coastal/grants/cmag.htm>
- <sup>26</sup> Ohio Department of Natural Resources website:  
<http://www.ohiodnr.com/coastal/regs/factsheets/cmguide7.htm>.
- <sup>27</sup> Ohio EPA Environmental Education Fund website:  
[http://www.epa.state.oh.us/oeef/about\\_oeef.html](http://www.epa.state.oh.us/oeef/about_oeef.html).
- <sup>28</sup> Ohio EPA Division of Environmental and Financial Assistance website:  
<http://www.epa.state.oh.us/defa/wpclf.html>.
- <sup>29</sup> *Ohio Water Pollution Control Loan Fund Fact Sheet*; Ohio EPA Division of Environmental and Financial Assistance, March 2002.  
[http://www.epa.state.oh.us/dsw/rules/wpclf\\_storm\\_water.pdf](http://www.epa.state.oh.us/dsw/rules/wpclf_storm_water.pdf).
- <sup>30</sup> Ohio Environmental Protection Agency website:  
<http://www.epa.state.oh.us/pic/wrrsp/html/wrrsp.html>.