5.0 Implementation of the Big Darby Creek TMDL

A key objective for preserving or restoring the high quality aquatic communities in the Big Darby Creek watershed is to determine ways for human activities to proceed without disrupting the existing natural system. Human intervention usually happens on a local scale. A small swale or ditch is often viewed locally as a conduit for exporting water so that the products of human pursuits can be maximized. But the system as a whole has a finite capacity. The cumulative impact of local interventions in the system has grown to the point that the system can no longer assimilate the changes, particularly in the upper Big Darby Creek watershed, Treacle Creek, Robinson Run and Hellbranch Run. These local interventions are happening from all aspects of our society, as such, solutions will need to come from all aspects of our society. This chapter of the TMDL report outlines the ways to implement the guidelines and loading reductions provided in Chapter 4. Achievement of these are necessary to maintain the Big Darby Creek watershed as a high quality aquatic system.

5.1 Implementation Mechanisms

Stream integrity concepts are discussed in Chapters 3 and 4, as well as the establishment of allowable loads for pollutants, and effluent limitations for point source dischargers. A variety of mechanisms will be evaluated and used to achieve these loading reductions. These mechanisms are discussed in more detail below.

5.1.1 Storm Water Control

Storm water control is largely achieved through the issuance of general permits under the ***NPDES*** program. These permits are issued for construction activities, and for industrial activities, and are issued to control storm water that is discharged from a discrete conveyance, such as pipes or confined conduits. NPDES individual and general permits are issued to individuals, private entities, and local government entities. These permits function together to form a web of state and local authority under which storm water is controlled.

General Permits For Construction Storm Water
Ohio EPA has issued a draft general permit for runoff associated with construction activity that is specific to the Big Darby Creek watershed. Ohio EPA has used existing permit terms and conditions and has included new types of permit terms and conditions to ensure, to the extent authorized by law, that loading targets developed in Chapters 3 and 4 are achieved for storm water. These permit terms and conditions include

NPDES stands for National Pollutant Discharge Elimination System, and is the system for controlling and permitting point source discharges to the waters of the United States. Established under the Clean Water Act, the NPDES permit program mainly regulates point source discharges through individual permits, and storm water discharges using a general permit for the activity generating the storm water.

management practices, effluent targets, infiltration requirements necessary to support stream base flows and stream setbacks necessary to protect the stream channel. The goal is to issue a permit that is protective of the aquatic life uses in the Big Darby Creek watershed.

As is the case with the existing construction storm water general permit, construction companies will be expected to be co-permittees along with developers. This condition of the permit will be an area of emphasis by Ohio EPA in evaluating compliance with the general permit for storm water from construction activity.

Phase I and Phase II MS4 Permits For Local Jurisdictions
Federal storm water regulations call for the issuance of Phase I NPDES storm water permits to large municipalities, and the issuance of Phase II NPDES storm water permits to smaller municipalities. As with the general permits for construction storm water, Ohio EPA intends to revise the MS4 permits, to the extent authorized by law, so as to achieve the loading limitations established in Chapter 4 of this TMDL for storm water. Ohio EPA expects to exercise its authority to designate additional Phase II communities within the Big Darby Creek watershed and to ensure that the permits issued to those jurisdictions are protective of the aquatic life uses.

5.1.2 Point Source Discharge Control

Point sources of pollutants are issued individual NPDES permits for the discharge of pollutants to the Big Darby Creek watershed. Chapter 4 establishes appropriate effluent limitations for point source discharges to the watershed. During State Fiscal Year 2006, all NPDES permits in the Big Darby Creek watershed will be reviewed for compliance with the effluent limitations in Chapter 4. Where the limits are not sufficiently restrictive, the permit will be reissued or modified to include the new effluent limitations, and an appropriate schedule established to bring those point sources in compliance with the new limits.

In the upper Big Darby Creek major sub-watershed there is an impact due to the poor water quality emanating from Flat Branch. Honda's extensive manufacturing facilities are located in this minor sub-watershed. The source of the pollutants contributing to the poor water quality in Flat Branch has not yet been defined. No violations of existing permit conditions by Honda or any other source have been identified. Ohio EPA intends to continue to work collaboratively with Honda to identify sources of pollutants that may be contributing to the impairment of upper Big Darby Creek and to determine appropriate corrective action upon completion of further studies.

Ohio EPA expects that any noncompliant facilities in the Big Darby Creek watershed would come into compliance by October 1, 2005 or be under an enforceable schedule by that time. To the extent that Ohio EPA uses enforcement action to obtain compliance, the sensitive nature of this watershed will be a factor in how Ohio EPA

evaluates the severity of the violations, in choosing the level of enforcement and in assessing civil penalties.

5.1.3 Animal Feeding Operations

Ohio EPA is currently responsible for issuing NPDES permits to animal feeding operations (AFO) that meet the definition of a concentrated animal feeding operation (CAFO). The Big Darby Creek watershed does not have any large CAFOs (e.g., greater than 700 dairy cows) that are required to obtain a NPDES CAFO permit at this time. However, there is one medium sized operation that has been required to apply for an NPDES CAFO permit, and others may be required to apply for a permit in the future if they have a discharge from their production area. Ohio EPA will continue to make every effort to investigate operations where discharges are alleged, and determine if a NPDES permit is needed. Most operations in the Big Darby watershed will not be eligible for general permit coverage, and will be required to obtain an individual NPDES permit. Once issued, these permits are expected to result in nutrient reductions since both the production area and land application activities will be more closely regulated and restricted. In addition, most permittees will be required to attend training related to water quality and manure handling as a condition of their permit.

Permit conditions and requirements are not expected to change significantly when the NPDES authority for CAFOs is transferred to the Ohio Department of Agriculture. Ohio EPA will continue to work closely with the Department of Agriculture in establishing requirements to protect water quality, especially in critical watersheds such as Big Darby Creek.

The most critical aspect of minimizing water quality impacts from any size animal feeding operation is the proper management of manure. All operations should have updated manure management plans and make every effort to avoid land application of their manure during wet weather and during the winter when runoff is more likely to occur. Ohio EPA is committed to responding promptly to complaints, and we will strive to work with our partners to inform producers about emerging technology and BMPs as well as updates to the technical standards for manure handling and application. Continued efforts by local Soil Water Conservation District (SWCD) and Natural Resource Conservation Service (NRCS) staff to work with producers and update plans will be critical as well.

5.1.4 Managing Drainage Needs, Channel Erosion and Flood Reduction Work

Agricultural land use and crop productivity throughout large portions of the Big Darby Creek watershed depends upon adequate soil drainage. Agricultural productivity of the land has been enhanced by maintaining a system of subsurface tile drains and adequate outlets for these artificial drainage systems. Over 86 maintained county ditches and many more tile mains are present in the Big Darby watershed, many concentrated in low gradient Darby Plains landscape where channels were dug in the

nineteenth century when the land was first farmed. These ditches have their outlets at points in the landscape where the natural gradient increases near the valleys of Big and Little Darby creeks and their larger tributaries (see Figure 5.1 for an example from middle Big Darby Creek). Furthermore, stream bank modifications in the form of levees and armament have been constructed at some locations throughout the watershed for erosion protection and flood reduction efforts.

Previous chapters of this report have established that the ecological health of the Big Darby Creek is dependent upon the preservation and improvement of stream hydrology and geomorphological features through the use of stream setbacks. Chapters 3 and 4 provide targets and allocations or recommendations regarding sediment bedload, habitat and stream setbacks designed to protect the Big Darby Creek system. The water quality benefits to be realized by attaining these targets can be summed up as increasing the natural filtering of pollutants, providing in-stream habitat and shading, increasing the assimilative capacity of the system, and providing a flood plain where sediment and stream flow energy dissipate.

Left unmanaged on a watershed scale, agricultural drainage, erosion control and flood reduction practices are threats to the ecological health of the Big Darby Creek system. Ohio EPA studies have documented that the cumulative impacts of the water, energy and sediment delivered to Big and Little Darby creeks from all the ditch systems, and the more recent disturbances caused by road construction and industrial development along the northern edge of the watershed, are responsible for declines in indicators of biological health of the system. Additional stress to the system has been added by the activities of private landowners and public agency projects to control stream bank erosion and flooding in localized areas.

The challenge of implementing the TMDL recommendations, specifically those steps necessary to meet the sediment bedload, habitat and flood plain widths targets established in Chapter 4, will be to find acceptable methods that simultaneously manage and meet the human needs for agricultural drainage, erosion protection and flood reduction work and the ecological needs of the Big Darby Creek system. Recent scientific evidence suggest these dual objectives can be compatible (Ward et al., 2002).

Ohio EPA has identified four implementation mechanisms that can consider the dual objectives in the evaluation of drainage practices and certain channel erosion and flood reduction projects.

First, in some circumstances, the United States Army Corps of Engineers (US ACOE) issues permits for dredging and placement of fill in a stream below the ordinary high water mark. The determination of when a Section 404 permit is needed is made by the US ACOE and may involve the consideration of comments from Ohio EPA and others. When a 404 permit is needed, Ohio EPA is responsible for reviewing Section 401 water quality certifications and isolated wetland applications for this activity and certifying that

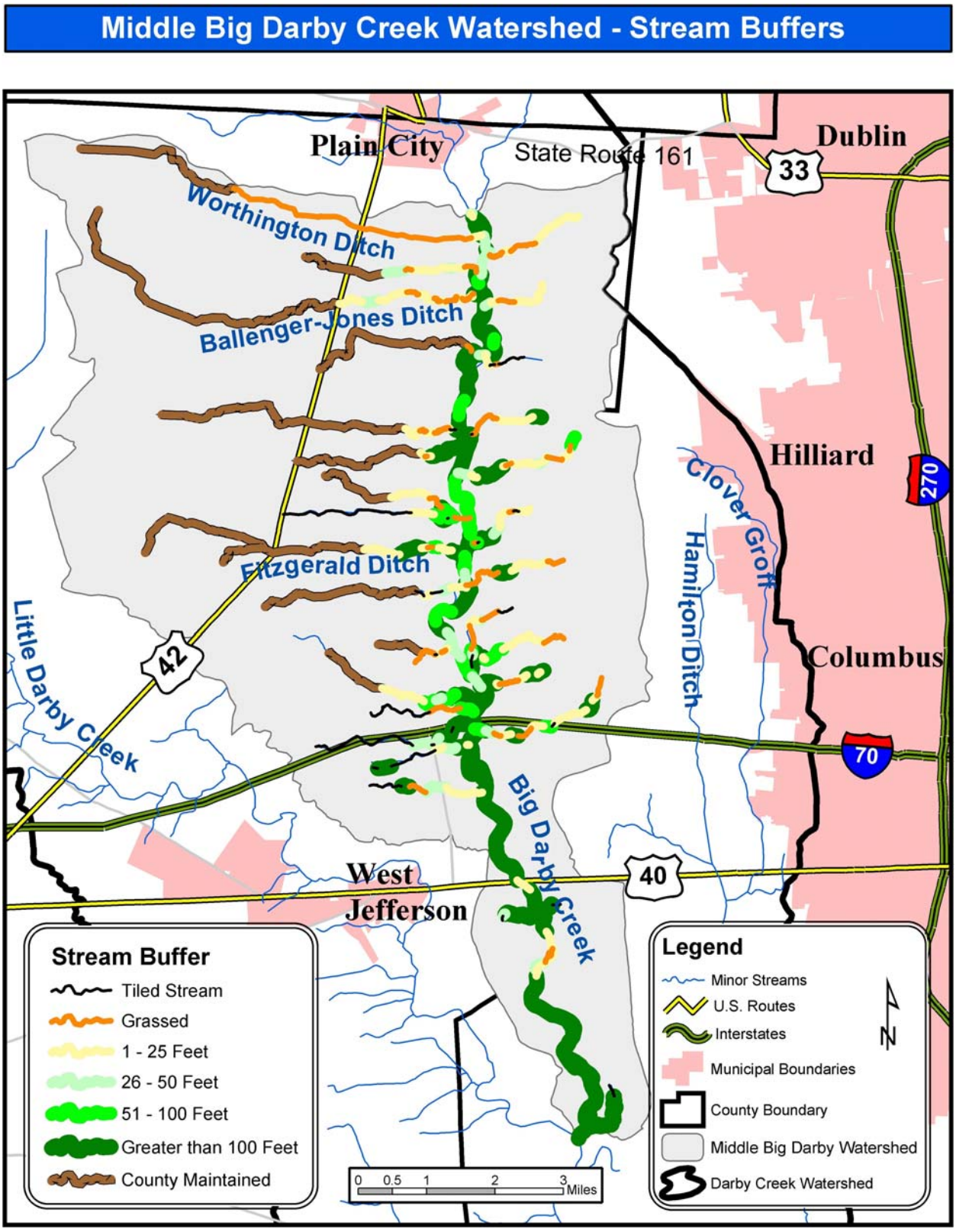

Figure 5.1 Examples of low gradient, county maintained streams in the middle Big Darby Creek sub-watershed, and the buffer conditions at their outlet. Graphics courtesy Ben Webb.

the activity will meet water quality standards. Chapters 3 and 4 of the Big Darby Creek watershed TMDL establish targets for sediment bedload, habitat and flood plain widths in the Big Darby Creek watershed necessary for meeting water quality standards.

Future 401 and isolated wetland certifications by Ohio EPA will include a review for attainment of water quality standards in light of these targets, and where attainment is not possible, the certification will seek mitigation of the proposed activity. Downstream mitigation within the same sub-watershed is highly preferable because it helps the system absorb the increased amount of flood water and erosional energy created when projects fall short of attaining on-site the sediment bedload, habitat and flood plain width allocations and recommendations found in Chapter 4. Where appropriate Ohio EPA will evaluate requiring, as part of the mitigation plan, natural channel design or flood plain excavation to allow the stream channel access to the flood plain.

Many small scale dredge and fill projects are regulated under nationwide permits issued by the US ACOE. Ohio EPA has granted blanket Section 401 certifications for these, in some cases with additional conditions that must be fulfilled by the applicant. As a second implementation mechanism to address better management of drainage, stream bank erosion and flood reduction projects in the Big Darby Creek watershed, Ohio EPA intends to evaluate removing the Big Darby Creek watershed from certification of nationwide permits where appropriate and necessary to continue progress towards meeting sediment bedload, habitat and flood plain widths targets contained in this report. Nationwide Permit number 27, which permits work for natural stream channel design, already contributes to the attainment of the sediment bedload, habitat and flood plain width targets and can be retained and renewed without modification.

The third implementation mechanism is to promote improved drainage through environmentally sound means. An immediate step along this path will occur in January, 2006 as Ohio EPA will participate on a *Rural Drainage Advisory Committee* convened by Ohio DNR Division of Soil and Water Conservation. Other committee participants include environmental groups, county engineers, academia, and federal, state, and local soil and water conservationists. The committee is charged with looking at the current laws and regulations related to ditch construction and maintenance and looking for practical solutions that effectively address drainage needs and protection of water quality. Additional specific outcomes might include State-wide guidelines to assess drainage needs, ditch reconstruction needs and methods, and BMPs for construction and maintenance.

Once further development of some State-wide guidelines are available, the information in Chapter 4 of sediment bedload, habitat and flood plain width targets, allocations and recommendations for many small watershed units will allow a tailored approach to improving conditions within each sub-watershed area of the Big Darby Creek watershed. Petition ditch maintenance work and privately maintained drainage projects on waters designated as Warmwater Habitat (or Exceptional Warmwater) should be performed with an eye towards installing BMPs that would improve sediment bedload,

habitat and flood plain width characteristics *within the ditch outlets (the higher gradient channels not actively "maintained" or cleaned of accumulated sediment and brush)*. Conversion of traditional ditch design and maintenance practices to innovative two-stage channel, flood plain excavation, or natural channel design features should also be encouraged. Cost sharing or other mechanisms of funding these efforts are possible (see sections 5.1.5.3 and 5.1.5.4).

Finally, the fourth means of implementing the sediment bedload, habitat and flood plain width recommendations is possible through action by local government entities. Local jurisdictions through zoning and through their authority to enact flood plain regulations have the ability to protect existing flood plains and to make wooded riparian corridors a preferential land use in those areas. There are a number of locally-derived benefits associated with reaching the sediment bedload, habitat and flood plain width targets provide in this report. Meeting these targets will improve and preserve the water resources and will also keep or restore landscape features that could add to local land use values. In addition, zoning and flood plain regulations that keep new development out of the stream setbacks, within which the stream channel itself is likely to move over the course of time, will reduce public and private costs associated with flood damage and loss of property when stream banks erode.

5.1.5 Agricultural BMPs and Programs

The Big Darby Creek watershed TMDL report establishes loading reductions for phosphorus and sediment in Chapter 4 for nonpoint sources that generally range from approximately 60 to 85 percent. Much of this loading occurs during high stream flow events. The adverse impacts of nutrient and sediment loadings that occur at high stream flows can be attenuated by improving the management of sediment bedload, habitat and flood plain width (see discussion in prior section). However, even with improvement in these factors it will be necessary to make incremental progress in reaching the phosphorus and sediment load reduction targets. This section describes how this can be accomplished through the work of several agriculturally oriented programs that stress voluntary adoption of ***BMPs*** by landowners and operators. Each program can bring to bear a variety of BMPs to improve water quality through the reduction of pollutants delivered to stream systems. Their common features are achieving a reduction in erosion and overland runoff, improving nutrient management practices, and offering education and cost incentives. There are many programs available to help with the funding of voluntary implementation of agricultural best management practices. Some of these are summarized below.

A Best Management Practice (***BMP***) is a practice, procedure, method, or program designed to minimize or eliminate the discharge of pollutants that may arise from a particular activity. Storm water BMPs often involve slowing water down so suspended sediments can settle or by stabilizing barren areas. Agricultural BMPs may involve practices such as minimizing nutrient runoff through no-till or providing for the fencing of livestock out of streams. County SWCDs are a good resource for available agricultural BMPs.

5.1.5.1 Scioto River Watershed Conservation Reserve Enhancement Program (CREP)

The Scioto River Watershed Conservation Reserve Enhancement Program (CREP) is a federally and locally funded initiative that is aimed at creating 70,000 acres in a combination of buffers and wetlands on cropland and marginal pastureland throughout the entire Scioto basin. Although the Big Darby Creek watershed makes up only a part of the entire CREP project area (about 8.5% of the total land area), this program can serve as an important means to addressing non-point source pollutants related to agricultural run-off and production farming in this drainage basin. Buffer strips and wetlands have both been noted in their effectiveness in reducing sediment and nutrient loads to surface waters (Osborne and Kovacic, 1993, Peterjohn and Correll, 1984, and Vellidis, 2003) and may improve infiltration capacity of the soil.

The Scioto CREP is a voluntary, incentive-based conservation program that has emerged out of the 1996 Farm Bill as a part of the older Conservation Reserve Program (CRP). The Scioto CREP officially began in February of 2005 and the enrollment period is expected to continue for two years, or as long as acres remain available (i.e., the 70,000 acre total is not yet reached). There are no county limits to the number of acres that can be enrolled therefore it is hard to predict the extent at which the program's conservation practices will be installed in any given area. Practices that are eligible through this program include both native and non-native grass filter strips, hardwood and coniferous tree plantings, wildlife habitat buffers, wetland restoration, and the installation and use of water table management infrastructure. CREP contracts are for 14 to 15 years in duration and enrollees are under no obligation to maintain those conservation practices after that time.

The buffer widths (i.e., linear distance perpendicular to the direction of channel flow) are likely to vary, which is related to the situational differences in the area of eligible land on a particular farm as well as the preferences of the prospective enrollees. Cropland that is eligible for enrollment includes a riparian area that extends 200 feet from the top of bank of the stream or ditch, while the minimum width for enrollment is 20 feet from the top of bank. Other cropland that is eligible includes the full extent of the 100-year flood plain and, if immediately adjacent to other eligible areas (i.e., the 200 ft riparian and/or the 100-year flood plain), highly erodible land (land with an erodibility index of 12 or greater). Permanent conservation easements for buffer strips are also being promoted through this program, however funding for their purchase (roughly half of the fair market value) is limited. Areas to be enrolled for wetland restoration must have at least 51% of its soil classified as hydric, and there is a 10 acre limit for enrollment per wetland.

This program is being advertised and administered through county Soil & Water Conservation Districts, Natural Resource Conservation Service (NRCS) and Farm Service Agency (FSA) staff. Information regarding this program is available on the web at: http://www.dnr.state.oh.us/soilandwater/sciotocrep/default.htm

5.1.5.2 Environmental Quality Incentives Program (EQIP)

The Environmental Quality Incentives Program (EQIP) is a United States Department of Agriculture (USDA) program that began following the1996 Farm Bill and is administered by the Natural Resource Conservation Service (NRCS). The objective of this incentive based, voluntary program is to increase the use of agriculturally related best management and conservation practices. EQIP is available to operators throughout the entire Big Darby Creek watershed irrespective of whether they own or rent the land that they farm. Through this program operators receive cost share and/or incentive payments for employing conservation management practices. Contracts are five years in length.

There are numerous conservation practices that are eligible for payments. These practices cover broad categories such as nutrient and pesticide management, conservation tillage, conservation crop rotation, cover cropping, manure management and storage, pesticide and fertilizer handling facilities, livestock fencing, pastureland management, and drainage water management among others. However, funding for these practices is competitive and limited to the allocations made to any respective county in Ohio.

Each county in receives a baseline of $100,000 per year (this baseline allocation is subject to change due to budgetary constraints) and may receive more monies, however this is decided at the state level. Interested farm operators are to submit an application for EQIP funding for a specific conservation practice to their county's District Conservationist (NRCS). The District Conservationist ranks each of these applications according to a scoring system that takes into account the type of practice and the size of the area affected by the practice. The priorities reflected by this scoring system are determined both at the state level (through the State Technical Committee) and the local level (Local Workgroup). The state's priorities account for 66% of the total points possible, leaving 33% to be determined by local priorities. Currently state priorities focus on livestock related conservation practices. Operators are ultimately funded based upon their ranking and the availability of EQIP dollars in the county.

More information on this program is available on the NRCS website at www.nrcs.usda.gov.

5.1.5.3 Section 319 Nonpoint Source Grants

Section 319 of the 1987 Clean Water Act created a national program to control and prevent nonpoint source pollution of the Nation's surface and ground water resources. The Ohio EPA, Ohio's designated water quality agency, is responsible for administering the program in Ohio. A goal of 80% aquatic life use attainment for Ohio waters by 2010 is a state priority. In concert with this goal, the Section 319 Implementation Grant program is designed to provide financial assistance to projects that eliminate or reduce

water quality impairments caused by nonpoint source pollution (NPS) and prevent future NPS related impairments.

A clear, strong rationale for project work is required for each award along with a match of local resources. This rationale directs Ohio 319 awards to watersheds with state endorsed watershed plans, Acid Mine Drainage Abatement - Treatment Plans, and late stage TMDLs. In each case, demonstrable aquatic life use impairments due to NPS pollution must be addressed by the project.

Project categories that will be funded include: 1. Stream Restoration and or Renaturalization Projects. 2. Acid Mine Drainage Abatement and AML Reclamation Projects. 3. Agricultural Best Management Practices and Projects * 4. Riparian Restoration Projects. 5. Riparian Protection and Conservation Easement Projects. 6. Source Water (public water supplies) Protection Implementation Grants. Other projects may be funded particularly if they are highly effective and innovative means to eliminate NPS pollutants and restore impaired waters.

Applicants may apply for a maximum of $500,000 for a three year period. Each project funded must provide an additional 40% matching share. The total federally funded share of project costs may not exceed 60%.

Since inception, Ohio's program has funded over 225 local and state level NPS projects. In April 2005, the Franklin Soil and Water Conservation District was completing a project in Hellbranch Run. This effort has focused on easement purchase within this rapidly developing tributary shed of the Big Darby.

The latest Ohio EPA 319 Grant program Request for Proposals and Application Package can be found on the Agency's website:
http://www.epa.state.oh.us/dsw/index.html

* Section 319 grant funds may not be used to cost share practices that duplicate or supplement traditional Farm Bill program funded practices and activities. Neither may Section 319 Grant funds be used to cost-share for tillage and/or other agricultural equipment purchase.

5.1.5.4 The Ohio Water Pollution Control Loan Fund (WPCLF)

The Ohio EPA's Division of Environmental and Financial Assistance (DEFA) administers the Water Pollution Control Loan Fund. The WPCLF provides financial and technical assistance for numerous types of nonpoint source pollution control actions, and for treatment works improvements, such as wastewater treatment plant expansions and upgrades, new and replacement sewers, correction of clean water inflow and infiltration into sewers, combined sewer overflows (CSOs), and sewer separation projects.

Ohio EPA, through the WPCLF, has awarded over $3.0 billion in loans state-wide since 1989. Within the Big Darby Creek watershed, the Pickaway County Commissioners

received a WPCLF loan for the Darby Township Sewer Improvement project. Also, Ohio EPA is currently working with the villages of Plain City and North Lewisburg on wastewater treatment improvement projects, which are under consideration for WPCLF financing in 2005.

Low Interest Rate Financing

The WPCLF awards low interest loans for a wide variety of projects to protect or improve the quality of ground water, rivers, streams, lakes, and other water resources. For example, while conventional long-term financing as of April 2005 may be 4.75%, the standard WPCLF rate is 3.25 %. WPCLF pre-award interest rates are adjusted quarterly to maintain this discount.

The WPCLF offers even lower interest rates to small or hardship communities. A small community is defined as any incorporated area with a population of 5,000 or less, or any unincorporated area that has a current project service population of 5,000 or less and that charges the entire debt for the project solely to the project service population. Currently, small communities receive an interest rate of 2.75 %. Hardship communities, defined as a service population equal to or less than 2,500 and a median household income of $45,500 or less, will receive an interest rate of 0.0 %. Communities with a service population between 2,500 and 10,000 and with a median household income of $38,000 or less will receive an interest rate of 1.0 %.

Interest rates may be further reduced if a community utilizes any of the several discount programs offered by the WPCLF, including construction of septage receiving and treatment facilities, conversion of Class B to Class A sludge, and participation in the Water Resource Restoration Sponsor Program (WRRSP).

Water Resource Restoration Sponsorships

The WRRSP funds the reasonable cost of nonpoint source projects that fully protect and/or restore critical surface water and wetland habitats. This may include several kinds of actions that may be specified within a TMDL. By advancing a portion of the estimated amount of interest due from the loan of a sponsoring WPCLF recipient, Ohio EPA can provide assistance to the WRRSP project which, unlike a loan, is not required to be repaid.

The amount of funds available and projects to be funded by the WRRSP are identified in DEFA's annual Program Management Plan. In the past, approximately $15 million per year has been made available through the WRRSP. Projects previously funded through the WRRSP, or anticipated to be funded in 2005, within the Darby Creek watershed include acquisition and preservation in perpetuity of the riparian corridor along Darby Dan Farm, a portion of the Little Darby Creek riparian corridor, and the headwaters of Big Darby Creek.

Linked Deposit Loans

The linked deposit program is a mechanism for financing nonpoint source projects to be implemented by private organizations and individuals. Linked deposits are a different type of loan, because instead of borrowing directly from the WPCLF, a borrower receives the loan through a private lending institution at a below market interest rate. The interest rate for the loan is reduced through a subsidy provided by a WPCLF-funded certificate of deposit placed with the lender.

Linked deposits can be used with a wide variety of projects, such as source water protection, agriculture best management practices, animal feeding operations, urban storm water runoff control, stream corridor restoration, non-discharging home sewage treatment system replacements, and forestry/ land development best management practices.

To establish a WPCLF linked deposit loan program in a watershed, Ohio EPA and an interested party, such as a county Soil and Water Conservation District or a local health department, enter into an agreement which sets the terms and conditions under which linked deposit loans will be made. The local party then oversees the development of a management plan for the linked deposit borrower's project. Finally, to establish the sources of financing, local banks are invited by Ohio EPA, the borrower, or the local party to participate in the linked deposit program. The financing arrangements are documented in a participating bank agreement among Ohio EPA, the Ohio Water Development Authority, and the local bank.

When the agreements are in place, individual linked deposit loans can then be awarded. For example, a homeowner first submits a proposal to the local health department for a project to upgrade or replace a failing home sewage treatment system. Once the health department has approved the linked deposit project, the homeowner then applies for a loan from any of the local participating linked deposit banks. The homeowner must be deemed credit-worthy by the participating bank to receive the linked deposit loan. If approved, the homeowner will receive the bank's applicable interest rate for the loan, minus the interest rate reduction that the WPCLF linked deposit has subsidized.

Within the Big Darby Creek watershed, a linked deposit program for agricultural BMPs has been in place since 1995. The Big Darby Creek watershed is one of 10 Ohio watersheds with an established agricultural linked deposit program through the WPCLF. In the span of time that the linked deposit program has been available within the Big Darby Creek watershed, Ohio EPA has financed approximately $3.6 million in agricultural BMPs through 94 linked deposit loans. The majority of the BMPs financed have been for conservation tillage practices.

Assistance for Contaminated Sites

The WPCLF also provides financing to both public and private entities for waste disposal remediation activities, including contaminated site assessments, brownfield remediation, landfill closures, and hazardous waste disposal. These projects must demonstrate a benefit to surface or ground water resources, and do not include the cost

of site redevelopment. The loans are normally made at the WPCLF's standard rate for a term of up to 10 years with a maximum amount of $3 million, and are subject to common commercial lending practices.

5.1.6 Local Authorities

Local authorities exist that will play very important roles in the implementation of loading reductions contained in this TMDL. Local health departments have a clear and direct role in regulating of discharging household sewage treatment systems (HSTSs). The regulation of those systems in accordance with state regulations will play an important role in accomplishing the pathogen and phosphorus loading reductions identified in this TMDL. Local expertise and effort will be pivotal in achieving the loading reduction targets.

Recent changes in Ohio law expanding and strengthening the role of health departments in regulating home sewage disposal and small flow disposal systems will make the role of local health departments all the more pivotal.

Ohio EPA encourages local health departments and local government to work collaboratively to develop general plans for HSTS control. Such general plans should identify the location of HSTSs and whether the systems are functioning as designed, and whether the systems are on-lot or off-lot systems, and necessary strategies to repair or replace failing HSTSs as necessary to meet the loading reductions identified in Chapter 4 of this TMDL.

County Soil and Water Conservation District and Natural Resource Conservation Service staff have a key role in setting the tone for achieving pollutant load reductions from nonpoint sources of pollution especially from the agricultural sector. While serving in primarily an advisory role, these local authorities provide key support to land owners who are interested in controlling the impacts from their operations. Assurances that implementation of nonpoint pollution reductions would occur would be impossible without the efforts of these authorities.

5.1.7 208 Plans

Authorized under Section 208 of the Clean Water Act, 208 plans provide the framework to develop a comprehensive approach for the treatment of wastewater and for controlling water pollution from all point and non-point sources in a geographic area. TMDLs provide the specific analysis of water quality conditions and the allocation of pollutant loads to attain Clean Water Act goals. TMDL reports become part of the State's Water Quality Management Plan when they are completed and approved.

Initial 208 plans were prepared in the 1970s and were a key product necessary for the operation of the construction grants program which provided federal funds for the design and construction of sewage collection and treatment facilities. The State of Ohio

is responsible for maintaining the 208 plan applicable in 64 counties, including all of the Big Darby Creek watershed. Ohio EPA Division of Surface Water currently has the role of compiling 208 plan content for the Governor's certification as part of the State Water Quality Management Plan. In 2005, the Division is reshaping the State WQM Plan and the 208 plan content for all 64 counties. Existing 208 plan content will be examined and outdated documents and plan material will be replaced with current information. The Franklin County portion of the Big Darby Creek watershed was included in a State 208 plan update in 2002 (entitled Water Quality Management Plan Scioto River Basin and Blacklick Creek, a.k.a. Central Scioto Plan Update or CSPU). Specific parts of the CSPU must be updated in 2005 (see below).

The State 208 plan and the Big Darby Creek watershed TMDL report findings interface in several ways and will generate new 208 plan content along the lines listed below. Because the State WQM Plan is required by federal regulations to be reviewed and updated annually, it provides a built-in method to implement additional technical findings and program modifications.

1. Address specific issues set out by the CSPU (the last 208 plan for Franklin County portion of the Big Darby Creek watershed)

    a. Use the TMDL findings to help evaluate the recommendations of the External Advisory Group for the Environmentally Sensitive Development Area (Hellbranch Run and other portions of western Franklin County); appropriate recommendations to protect the water quality of the Big Darby Creek system will be included in the next State 208 plan; these recommendation will need to be implemented in order to secure Ohio EPA approval of central sewer projects.
    b. Opt out request from Prairie Township and Ohio-America Water Company (to be considered in next 208 plan update if received by June 30, 2005) -
    Per the framework in the CSPU (see Section 5.03.02), use the TMDL findings and other modeling work to evaluate if the proposal meets water quality standards and protects the downstream superior high quality water (special antidegradation classification) segment of Hellbranch Run, the proposed EWH use designation for Hellbranch Run, and the Big Darby Creek.

2. 208 Plan for Madison County

    The Madison County Commissioners have prepared a water quality plan that could serve a number of purposes, including the technical basis for new and detailed municipal wastewater facility planning areas in the State's 208 plan. This TMDL report serves as the water quality protection reference point to ensure that the master sewer plan and the future plans for Publicly Owned Treatment Works within the Madison County portion of Big Darby Creek Watershed meet applicable water quality standards. Management of storm water, individual home sewage treatment disposal systems, and special riparian habitat needs of the Big Darby Creek system are also appropriate subjects for the State's 208 plan for Madison County.

3. 208 Plan for remaining counties in Big Darby Creek watershed

   The 2005 State WQM Plan will include templates and 208 plan content for the remaining counties in the Big Darby Creek watershed (Champaign, Logan, Union and Pickaway). The 208 plan will include the State's assessment of water quality conditions and any associated directives to address regional planning for municipal sewage collection and treatment needs because of water quality threats. The 208 plan for each of these counties will also cover management of storm water, individual home sewage treatment disposal systems, and special riparian habitat needs of the Big Darby Creek system.

5.2 Sectors of Society and the Big Darby Creek TMDL Recommendations

Based on the results of a detailed physical, chemical, biological and mathematical evaluation, the Big Darby Creek watershed is found to be under stress from all aspects of our society. Agriculture, construction, development, industrial activity, and municipal and private point source discharges (in alphabetical order) are among the sectors of our society that have impacts on the Big Darby Creek watershed. This section of the TMDL report outlines how some sectors of society may be influenced by the implementation mechanisms that are available to achieve the pollutant load reductions that are outlined in Chapter 4.

5.2.1 Agriculture

The agricultural sector has responsibility for pollutant loading reductions in phosphorus, sediment, and pathogens that arise from agricultural operations. Implementation mechanisms that will be applied to this sector are voluntary agricultural BMPs, riparian and flood plain setbacks, and NPDES permits for large animal feeding operations or those with discharges, and 401 certifications for those dredge and fill operations that are regulated under the Clean Water Act. To aid in this implementation effort, there are a variety of cost sharing and grant programs to offset costs involved with voluntary action.

The phosphorus, sediment, and pathogen load reductions outlined in Chapter 4 will be achieved by voluntary action often under the guidance of local Soil and Water Conservation District staff. BMPs on upland areas are important for reducing pollutant loads from the landscape. Riparian set backs and wooded buffers are practices along the stream that aid in pollutant load reduction and improve assimilative capacity. Habitat improvements to meet QHEI targets are directly correlated with improvements to the aquatic biota, the ultimate arbiter of success of a TMDL project.

5.2.2 Construction Activity

Construction activity within the Big Darby Creek Watershed is regulated under the NPDES storm water program. Pollutant loading reductions will be implemented through the issuance of a new general permit for storm water related to construction activity that

is specific to the Big Darby Creek Watershed. New characteristics of this permit will be the inclusion of water quality based effluent targets designed to protect sensitive aquatic life uses in the Big Darby Creek watershed. In addition, Ohio EPA will evaluate new permit terms and conditions pertaining to the achievement of geomorphological targets, which will be necessary in addition to the construction BMPs to reduce sediment loading to downstream reaches of the Big Darby Creek watershed.

The impact of these changes on the construction sector may be significant. Construction companies will be expected to be co-permittees on storm water permits. Failure to abide by the general permits for storm water associated with construction activity that are issued for the Big Darby Creek Watershed could potentially lead to direct enforcement against construction companies and contractors who violate the permit. Planning for, and execution of construction activities in this watershed will have to be done in strict compliance with legal requirements. Construction site supervisors will need to ensure their employees are aware of the need to comply, and ensure that compliance is maintained.

5.2.3 Development

Development is the conversion of land from one use to another. It often results in an increase in impervious surface, which creates more runoff and reduces ground water recharge. The Big Darby Watershed TMDL report establishes targets to be achieved for maintaining the ground water recharge rate and the runoff to baseflow ratio as the land is developed. Implementation mechanisms for those targets are NPDES general permits for storm water related to construction activity and Permits to Install for central sewer systems, which must comply with the requirements outlined in the Central Scioto Water Quality Management Plan Update (208 Plans). The hydrologic targets help to control amounts of storm water that are discharged, which is directly related to achieving sediment reduction targets established in Chapter 4 of this report.

In planning for and execution of development in the Big Darby Creek watershed, consultants and developers will be expected to adhere to the conditions of the Central Scioto 208 Plan, and the NPDES General Permit for Storm Water Associated with Construction Activity Located in the Big Darby Creek Watershed, or in some cases, an individual NPDES permit. Sediment controls and the project's effect on ultimate volume of flow will all need to be accounted for in the planning and design of a development. Particular care will need to be taken with regard to stream buffers, and stream channel morphology when planning a development, in order to achieve sediment reduction targets established in this watershed. Obtaining necessary permits in the Big Darby Creek watershed is critical. Planning for development should allow for the time necessary to accomplish complicated permitting activities, that may require public involvement.

5.2.4 Industrial Activity

Industrial activity is having an influence on water quality in the upper Big Darby Creek watershed. However, existing information is not adequate to support implementation of corrective measures at this time. Ohio EPA intends to continue gathering data, and improving the predictive tools available to assess the situation with the assistance of companies such as Honda. Geomorphological targets have been set to establish conditions necessary to minimize storm water impacts from industrial activity.

5.2.5 Municipal Point Sources

Effluent limitations for municipal point source dischargers will be included in NPDES discharge permits for control of phosphorus, ammonia, bacteria sediment and to ensure that sufficient dissolved oxygen is present in the stream. Table 5.2.5 provides a reference point for locating effluent limitations in the development chapter.

For the proposed expansion of the North Lewisburg WWTP, Ohio EPA is evaluating relaxing the ammonia limit slightly in exchange for activities that will protect a wooded riparian corridor which is deemed essential to protecting the Cold Water Habitat use designation of Spain Creek. Both sets of limits are listed in Chapter 4 and implementation will be dependent upon whether or not North Lewisburg institutes a growth plan that will ensure riparian corridor protection.

Table 5.2.5 Reference to Effluent Limitations for Municipal NPDES Permits

Entity	NPDES Permit Number	Table Reference
Logan County Flat Branch	1PP00006	4.1.1.2
North Lewisburg	1PB00039	4.1.3.2
Mechanicsburg	1PB00037	4.3.1.2
Plain City	4PB00016	4.1.4.2
West Jefferson	4PB00024	4.3.7.2
Pickaway Correctional Institute (regional)	4PP00003	4.4.3.2
Darbydale	4PH00012	4.4.2.2

Another type of municipal point source are municipal separate storm sewer systems (MS4). Load allocations are established in Chapter 4 for Hellbranch Run for MS4s that discharge to that watershed. In the manner, and to the extent allowed by existing procedures and laws, these loading limitations will be included in the Phase I and Phase II NPDES storm water permits for the effected MS4s. Municipalities may expect that a Phase II MS4 General Permit for Storm Water to be issued specific to the Big Darby Creek Watershed that will contain loading limitations and monitoring requirements

necessary to achieve those loads. Ohio EPA will evaluate designating additional communities as being required to obtain coverage under the Phase II permit.

5.2.6 Private Point Sources

There are two types of private point sources in the Big Darby Creek watershed. One type are private point sources that are regulated by Ohio EPA, which have NPDES permits issued for their discharges. These permits have loads allocated to them in Chapter 4 to protect Big Darby Creek and its tributaries. Those loading reductions necessary for facilities regulated by Ohio EPA will be implemented through the NPDES permit program.

The other type of private point sources are home sewage treatment systems (HSTS) that fall under the jurisdiction of the local health departments – these sources have loading reduction targets for phosphorus, sediment, and pathogens. Chapter 4 includes necessary loading reductions by minor sub-watershed for these sources. Action by the local health departments will be critical in achieving reductions of these pollutants from these sources.

The important role of local health departments will include identifying the areas of greatest load, and devising means for achieving the loading reduction targets established, whether it be through sewering of the areas, or through improved operation and maintenance of these installations. Private home owners have a major responsibility in ensuring that their home sewage treatment system is operating effectively, and for upgrading the systems as necessary to achieve the loading reduction targets, under the direction of the local health department.

5.3 Endangered Species Protection

Reduction in sediment loads has been identified as critical to endangered species protection in the Big Darby Creek watershed. The recovery plan for the Clubshell mussel (*Pleurobema clava)* states “The clubshell . . . cannot tolerate mud or slackwater conditions, and is very susceptible to siltation” (USFWS, 1994). The Big Darby Creek TMDL establishes sediment reduction targets in Chapters 3 and 4 that are protective of sensitive aquatic communities. In the absence of specific numeric criteria for protection of the Clubshell mussel, it is believed that these targets, if achieved, will be protective of existing populations, and could potentially lead to range expansions. The implementation mechanisms discussed above, especially Storm Water Control and Managing Drainage Needs, Channel Erosion, and Flood Reduction Work are important means of controlling sediment export to the downstream areas inhabited by the Clubshell Mussel.

Key to reduction in sediment loading in the Big Darby Creek watershed is the attainment of geomorphological targets such as the stream setbacks established in Chapter 4. These targets are particularly important during high flow events, which is the focus for

sediment reduction efforts in Big Darby Creek. An intact flood plain allows for storage of excess water, and reduced flow velocities, minimizing damage to endangered species habitat.

In addition to the geomorphological targets, an intact, wooded riparian corridor is necessary to protect habitat for endangered mussel species. This need is critical in middle Little Darby Creek, where the endangered Clubshell mussel currently resides. Ohio EPA has documented the complete destruction of mussel habitat due to removal of trees in this section of Little Darby Creek. The increased sunlight, interacting with high nutrient loads from upstream cause concretion (cementing) of the bottom due to changes in pH instream driven by increases in algal productivity.

A critical need for endangered species protection in Little Darby Creek is a meaningful incentive program for landowners to protect existing wooded riparian corridor. Current agricultural incentive programs will not necessarily pay for preservation of this critical habitat. In addition to this need, nutrient loadings from upper Little Darby Creek, Treacle Creek, and Proctor Run must be reduced to eliminate the nutrient driven pH changes that destroy mussel habitat in the event of a loss of riparian corridor. Phosphorus loading reduction targets are established for these sub-watersheds in Chapter 4.

Ammonia has been identified as having a detrimental effect on the Clubshell mussel and Northern Riffleshell mussel. In order to account for this influence, instream water quality models were conducted at several locations (see Chapter 3 and 4). In the lower Big Darby Creek mainstem, ammonia allocations have been established for municipal wastewater treatment plants. In upper Little Darby Creek, water quality models have been performed, and point source allocations have been established. Elevated sediment ammonia in Little Darby Creek downstream of Treacle Creek is likely agricultural in origin. Animal husbandry is one potential source for organic and ammonia inputs to this section of the stream. It is recommended that the Champaign, Union and Madison County SWCDs make this problem an area of focus for ensuing proper handling of animal manure, silage, and other waste products from livestock operations.

5.4 Stream Setbacks and Water Quality

The Big Darby Creek TMDL contains many references to stream setbacks as an important factor contributing to water quality. The intent in identifying stream setbacks is to provide protection for future natural movement by the stream channel and to increase stream assimilative capacity for sediment and nutrients by providing for export of these materials from the channel. The stream setbacks should be considered to be an area of land/water interface, where weather patterns will dictate the degree to which the interface area will be used by the stream. In terms of human activity, it is important to understand that high water levels are to be expected at times, even though it may not happen annually.

Another important concept concerning the stream setbacks is that within the setback zone, the closer you are to the stream, the more important the area is to stream function. Where human activity intrudes into the setback zone, those activities that provide for intensively managed land uses in areas adjacent to the stream result in the greatest pollutant loads to the stream, as well as the greatest reductions in assimilative capacity. Conversely, where human activity results in less intensively managed land uses, such as forested riparian corridors, pollutant loads are lower, and stream assimilative capacity is higher. An important restoration goal for this TMDL is that when current human activity is resulting in highly managed uses near the streams of this watershed, that there be a gradual shift to less highly managed land uses in the stream setback zone. If this shift can be accomplished, it will directly aid in achieving pollutant reduction goals established in this TMDL.

Riparian Setbacks and Development

Development that consists of the conversion of farmland or natural areas into impervious surfaces within the setback zone is very detrimental to water quality. Development by its nature results in storm water discharges that the stream channel must now convey. Development in the setback zone reduces the overall capacity of the stream system to convey water, while directing more water to the system. The inevitable consequence of this practice is reduced water quality, primarily by increasing sediment loads from runoff and bank erosion, and by reducing the capacity of the system to export this material. In order to appropriately address this issue, Ohio EPA has proposed the NPDES General Permit for Storm Water Related to Construction Activity Located in the Big Darby Creek Watershed. This NPDES permit has conditions contained in it to address protection of the stream setback zone during land development.

Riparian Setbacks and Agriculture

So long as certain conditions are adhered to, agriculture can be a land use in the riparian setback zone that can be consistent with maintaining good water quality. The following are conditions that should be considered by agricultural land managers.

- Relatively frequent flooding will occur in this zone.
- The setback zone is a zone to protect long term for natural movement of the stream channel.
- Grass buffers are not a good substitute for forested buffers. Where forested buffers already exist, they should be preserved. Where no buffer exists, grass buffers are an incremental improvement. (Note: grass buffers will not limit sunlight impinging on the stream).
- Where agricultural practices occur in the setback zone very close to the stream (less than 100 feet), land managers should focus on a long-term decision making process to move production away from the stream. A slow withdrawal of production from this zone over a period of 3 - 8 years will accomplish many of the goals of this TMDL. Programs that aid this course of action (e.g., CREP) are beneficial, and may offset costs incurred by agricultural land managers.

So long as agricultural land use is compatible with frequent flooding, and is amenable to changes in channel location, water quality impacts from this land use will be minimized. Where a forested buffer equal to or greater than the setback zone is maintained, and is not short circuited by tile drainage, agricultural land uses should have little or no impact on water quality.

Agricultural practices that focus on elimination of flooding in this zone in the interest of routine crop production or animal husbandry are typically detrimental to maintaining good water quality, and should be avoided.

5.5 Dam Removal

Dams are known to impact river systems by altering several key parameters, including flow regimes and physical habitats, channel shape, sediment transport, water temperature and chemistry, and populations of algae, benthic macroinvertebrates, riparian vegetation, and resident and migratory fish (Poff and Hart, 2002). Dams are a type of hydromodification that greatly affect the flow and sediment transport regimes of streams. Upstream of the dam, riffle-pool habitat is converted into long reaches of homogenous pool habitat. This reduction of habitat type and quantity can reduce biological diversity within the stream and substantially shift species composition from those adopted to flowing lotic systems to lentic systems. In addition, dam pools decrease the ability of the river to assimilate organic wastes, and increase in-stream temperatures, and decrease dissolved oxygen. Dams also adversely affect downstream habitat by altering the types and percentages of sediments being transported.

Since upstream transport of juvenile mussels, as glochidia, is often dependent upon fish populations, structures that inhibit fish migration, such as dams, also have potential to impact endangered species distributions. Because of all of these factors, Ohio EPA recommends that the addition of any dams to the Big Darby Creek watershed should be strongly discouraged. In addition, those structures that currently exist should be evaluated for removal to improve aquatic life habitat and to reduce owner liability due to the known public safety hazards that a dam presents.

5.6 Mineral Extraction in the Stream Setback

One of the main purposes for establishing stream setbacks is to provide protection for future, natural, movement of the stream channel. In several instances, mineral extraction in the form of quarries, has been placed within the stream setback zone. At least one of these operations currently poses a high risk for capture by the stream channel. Capture of the stream channel by an abandoned quarry pit will destroy the aquatic life use of that section of the stream, as the lake-like environment of the abandoned quarry is not suitable for flowing water species currently resident in this system. In addition, capture of the stream channel by quarry pits will jeopardize

continued existence of endangered mussel species by creating a barrier for normal dispersion of host species. Any mineral extraction proposed within the stream setback zone must demonstrate protection against capture of the stream channel in perpetuity. In addition, such activities should allow for continued function of the flood plain, instead of deflecting higher stream flows onto downstream properties.

5.7 Implementation Strategy and Reasonable Assurances

As part of an implementation strategy, reasonable assurances provide a level of confidence that the load allocations in this TMDL will be implemented by federal, state, or local authorities. Implementation of the Big Darby Creek Watershed TMDL will be accomplished by both state and local action on many fronts. State implementation of the TMDL will be through action on NPDES permits for both point sources and storm water and through the 401 water quality certification program, as outlined earlier in this section. In addition, the state will be updating the 208 plan for the Central Scioto River Basin, including the Big Darby Creek watershed in 2005. TMDL recommendations will be included in the 208 update, as well as ongoing technical development on the Big Darby Creek watershed.

Locally, a Community Based Watershed Plan is being developed through the Darby Creek Joint Board of Supervisors and Katherine Skalak, the Darby Creek Watershed Coordinator (Ben Web is the former coordinator). This watershed action plan, funded by local match money and 319 funding, is well poised to evaluate and implement TMDL recommendations through a locally driven process. Extensive public involvement for several years has been happening through this process. At present, the community based watershed plan is targeting impairments documented in Robinson Run and will address other sub-watersheds soon.

In the Hellbranch Run watershed, the Hellbranch Watershed Forum is a public group developing a watershed action plan. In conjunction with the US Army Corps of Engineers, the Hellbranch Watershed Forum is developing predictive build out models based upon the development pressure that is facing the Hellbranch Run sub-watershed.

Locally, the City of Columbus, Franklin County, the City of Hilliard, Brown Township, Prairie Township and other local jurisdictions have embarked upon a joint land use planning effort to plan for development that will take into account loading reductions required by the Big Darby Creek Watershed TMDL, as well as recommendations from the Environmentally Sensitive Development Area - External Advisory Group (ESDA-EAG) which was formed to determine methods of development that would be protective of the Big Darby Creek watershed. Columbus, Franklin County, and other local jurisdictions have joined in establishing a building moratorium until the end of 2005 so that the planning mentioned above can be completed, and the watershed protected. Since the public notice of this report, the moratorium has been extended by City of Columbus to June 2006.

At the federal level, funding provided through CREP, EQIP, and Section 319 provide cost share dollars to implement voluntary activities in the watershed.

It is clear that at all levels of government in Ohio that there is a commitment to protecting the Big Darby Creek watershed. This TMDL is a part of that commitment, and it will work in conjunction with other efforts to ensure that pollutant loading reduction targets are met and that clear guidelines for future protection of the Big Darby Creek Watershed have been established.

5.8 Process for Monitoring and Revision

Monitoring of the Big Darby Creek watershed will be necessary to ensure that the pollutant reduction targets and habitat improvements are accomplished so as to ultimately result in attainment of the Biological Criteria, which will result in restoration of the aquatic life uses in this basin. A tiered approach to monitoring progress and validating the TMDL will be followed:

1. Confirmation of completion of implementation plan activities
2. Evaluation of attainment of chemical water quality criteria
3. Evaluation of biological attainment.

A TMDL revision will be triggered if any one of these three broad validation steps is not being completed or if the WQS are not being attained after an appropriate time interval. Once the majority of or the major implementation plan items have been carried out and/or the chemical water quality has shown consistent and stable improvements then a full scale biological and chemical watershed assessment would be completed to evaluate attainment of the use designations. If chemical water quality does not show improvement and/or waterbodies are still not attaining water quality standards after the implementation plan has been carried out, then a TMDL revision would be initiated. The Ohio EPA would initiate the revision if no other parties wish to do so.