



GREAT LAKES PROTECTION FUND - FINAL REPORT

RESTORING FLOW REGIMES THROUGH GROWING WATER TRANSACTIONS:
BASIN-WIDE CASE STUDIES
JULY 13, 2007

- GRANT #755 -

Overview

This Growing Water project was originally designed to address the “improvement standard” governing access to Great Lakes water as part of the draft Annex 2001 Implementation Agreement. The expectation was that this “standard” would be adopted as a governing principle by the Great Lakes states and provinces, and that the resulting legal regime would provide the constraints and context to drive stand-alone transactions for growing water in the Great Lakes. This expectation did not materialize. In the absence of a new, Basin-wide governance standard, we found no alternative pre-existing legal or regulatory context in which to structure a robust market in *stand-alone* hydrological improvement transactions in Great Lakes waters. However, the Project Team continued to apply the principle of growing water via market-based approaches and environmental transactions to the four originally proposed case studies. From the initial narrow definition of growing water that emphasized the quantity and quality of hydrological resources, the Project Team expanded the market-based approach to emphasize holistic and ecosystem based management using environmental transactions. From our case studies, we found that where demand exists, markets and transactions can be created under existing regulatory constructs that ultimately achieve desirable ecological outcomes. This final report describes efforts undertaken in Phase I of this project. A Phase II has been envisioned for the project that focuses on communicating Phase I findings to the Great Lakes community and wrapping up select case study elements that will serve as a hand-off to local partners in select applications.

Project Objectives - Progress and Accomplishments

This section highlights the projects and accomplishments for the four case study applications, including the Upper/Middle Cuyahoga River, Ohio; St. Joseph River Watershed, Indiana; Menomonee River Valley, Milwaukee, Wisconsin; and the Great Miami River, Ohio.

Case 1: Upper/Middle Cuyahoga River, Ohio

The centerpiece of the Upper/Middle Cuyahoga River case study was the successful initiation of the “Conservation Properties Safety Net” financing program with the Ohio Environmental Protection Agency (OEPA). This program employs an innovative public/private partnership to finance the preservation and

enhancement of groundwater recharge (“growing water”) through conservation development for expanding urban growth and natural land mitigation and preservation.

Success of this application was realized during the course of this GLPF funded project. OEPA accepted the terms and deal structure for funding a \$17 million land protection program to protect known high value groundwater recharge areas (approximately 1,200 acres) in Streetsboro, Ohio. OEPA initially funded the first phase of this program with a \$1.7 million low interest loan to our project partner’s local development partner. This loan is to be used to secure purchase rights, finalize the land conservation, and restoration plans and conservation development plans for approximately 30% of the land being purchased with OEPA and private funds. The lands and their strategic development will become a profit center to, in part, finance stewardship of the approximately 800 acres of restored lands resulting from this project. Conservation development on approximately 400 acres, along with the possible establishment of sanitary and potable water utilities, wetland banks, environmental credits, and other potentially marketable ecosystem services, are anticipated to create profit to repay loans that can contribute to conservation and water flow protection in the Upper/Middle Cuyahoga River.

The Safety Net financing program includes an agreement with OEPA that ensures a maximum of 30% from each of the parcels included in the protection program can be developed (approximately 400 acres of land). This can serve as a statewide and regional conservation development model using alternative stormwater management and conservation planning, among other elements. The divergence between market price for raw land and entitled value for developed land within the 900 acres of restored open space provides an economic driver that, in part, justifies the OEPA loan and provides OEPA with secure collateral and other sureties. Attachment A of this report is the program proposal to OEPA. The following is a summary of activities.

Negotiate transaction assistance. The Project Team initially approached representatives of the City of Akron for a potential transaction involving trading water flow augmentation and natural land improvement for green space access around the city-owned Lake Rockwell. However, due to the court case on the lake/reservoir release rate, and the pending implementation of the Ohio Supreme Court decision by the appellate court on the fate of these discussions, no further interactions were pursued. Potential value of water augmentations, along with other potential ecosystem services were, however, evaluated based on estimated court established flows from Lake Rockwell (see Attachment B).

Water quality benefits. K&A and AES estimated water quality and quantity benefits of the conservation development plan for the approximately 1,200 acres of land in Streetsboro to be protected by the Safety Net financing program. Calculations were completed to measure the environmental impacts resulting from two alternative hypothetical land use models: a Standard Subdivision Development model and a Conservation Development model. The land use comparison included an evaluation of municipal infrastructure maintenance costs, sediment and contaminant loading estimates, and changes in stormwater volume (surface runoff) resulting from these two development models compared to existing pre-development conditions. A memo based on these calculations was presented to the Streetsboro City Council, demonstrating the probable municipal fiscal impacts of losing the naturally occurring, high quality groundwater recharge and surface water purification services currently being provided by recently identified natural resources in the South Sector of Streetsboro (see Attachment C).

By measuring the increased loading of sediments and contaminants into the potable water supply, and consequently the reduction in the amount of water replenishing (recharging) the aquifer, the Project Team used these calculations to estimate a range of costs associated with the replacement of these existing valuable functions provided by natural resources. This analysis illustrated how losing naturally occurring functions of free services through traditional land use decisions is increasingly more costly to

many communities. This occurs as natural recharge functions are lost, devalued, or degraded over time in the Cuyahoga River watershed and other systems in the Great Lakes Basin.

It was concluded that on a 20-year time frame, conservation development on the 1,200 acres of high value ecological land in Streetsboro would save the city \$180,000 - \$1,080,000 annually in infrastructure and maintenance costs, \$432,000 in costs of recharging groundwater artificially, \$2.55 million in a potential water treatment facility, and \$1-1.7 million in replacing the lost biodiversity and other natural features. Conservation development of the 1,200 acres would provide a net savings of \$4,162,000 to \$5,762,000 compared to the land being developed under the standard subdivision model.

Mitigation banking opportunities. A natural resources inventory and study of restoration potential was completed for the Herrick Fen Nature Preserve by AES in cooperation with TNC. The study identified, mapped, and described the ecological condition of the important natural resource elements in the Herrick Fen Property. These resource elements include the physical features of the landscape, in particular, the unique geological setting, topography and drainages, including plant communities and potential habitat for endangered plant and animal species. In this survey and assessment, a number of critical natural resource issues were identified, resulting from conditions on site as well as conditions in adjacent properties that directly impact the Herrick Fen Property.

This investigation also assessed the potential for using restoration of the Preserve to generate wetland mitigation credits. Once restoration occurs and performance milestones are achieved, credits can be sold to developers and other parties (Highway Department, municipalities, etc.) to offset and compensate for permitted wetland impacts that might be associated with their projects. At this time, it appears that approximately 60 acres of credit may be negotiated and made available at the Preserve. The approach would satisfy what we believe to be TNC's stated goals for the restoration work addressing the entire Preserve. This approach may also assist in generating revenue that could be used with TNC or other partners (e.g., Portage County Park District) to protect and restore lands adjacent to the Preserve.

The protection and restoration of some of the adjacent parcels may be critical for long-term preservation of the groundwater recharge and water quality of the Fen Preserve. AES, Inc. evaluated the costs for the restoration work and it appears that the Herrick Fen Preserve could provide a viable wetland mitigation bank site. Attachment D of this report provides a summary of the Herrick Fen study.

Case 2: St. Joseph River Watershed, Indiana/Michigan/Ohio

The St. Joseph River case study for floodplain and wetland restoration turned out to be a situation where proposed Phase I plans did not materialize. However, lessons learned from the process contrast clearly with those gained from the success of other case studies from these growing water projects. The four main barriers to the success of this case study were identified.

First, there was no regulatory infrastructure or rules in the watershed for floodplain restoration and drinking water protection that create drivers for potential growing water transactions. This was particularly true for the Indiana portion of this three-state watershed. Thus, a major barrier to success in this watershed is due to the fact that the Indiana portion of the study contains the majority of the watershed area and human population.

Second, the demand drivers (e.g., flooding and CSOs in Fort Wayne) for a potential high value market are either too far along in planning for alternative solutions or the benefits were not clearly discernible to local agencies (drinking water treatment). To address flooding issues in downstream urban areas, the City of Fort Wayne and the Army Corps of Engineers are considering a traditional multi-million dollar levy project. Regarding water supply, the City of Fort Wayne uses water from the St. Joseph River for its

drinking water. While the St. Joseph River has sediment and atrazine contamination issues, the City of Fort Wayne would not likely find economic benefits with upstream non-point source controls of agricultural land management improvements. From the supply side, the few growing water project opportunities identified (e.g., 50-acre oxbow floodplain restoration) would not yield cost-effective benefits at a scale to make sufficient ecological impact.

Third, there is a lack of any type of momentum for market-based solutions at the state level (Indiana). Therefore, the Project Team was not able to create transaction opportunities during the project. We also did not identify any near-term opportunities arising in the watershed. On the contrary, potential opportunities for growing water may exist in the St. Mary's River south of the City of Fort Wayne where nitrogen contamination and most flooding problems originate in upstream agricultural areas. In addition, pending implementation for state-wide water quality standards in downstream portions of the Maumee River, Ohio may prompt environmental transactions between landowners and communities in Indiana.

Fourth, after multiple meetings with City of Fort Wayne Utilities and the local watershed organization (St. Joseph River Watershed Initiative) regarding Ecosystem Service District (ESD) applications, the Project Team concluded that there is not currently an organization in the watershed that has the potential to develop into an ESD (refer to the Miami Conservation District case study). The State of Indiana does not have a comparable statute to the Ohio Conservancy Act that can be used to establish a regional service district. A potential Indiana model may be the Northwestern Indiana Regional Planning Commission's model that was established for transportation and environmental planning for three Lake Michigan counties (Lake, Porter, and LaPorte). It was created by a special State legislation in 1965 (Indiana Code Title 36, Article VII, Chapter 7). However, the lack of drivers and leadership in the St. Joseph River watershed does not suggest that the establishment of an ESD via a regional governmental organization would be readily adopted.

The established Soil and Water Conservation Districts (SWCDs) do not have the mandate and incentives to go beyond their current service areas. The nonprofit citizens' organization, St. Joseph Watershed Initiative, has completed substantial efforts in educating the general public, developing watershed management plans, and maintaining a stream monitoring network. However, its status as a non-governmental organization would preclude its role as an ESD.

The City of Fort Wayne Utilities has worked closely with the Initiative and SWCDs in the St. Joseph River basin on watershed planning and water quality monitoring. However, the City of Fort Wayne does not seem to be taking a leadership role in managing the watershed. This is understandable as the City's jurisdiction covers only a small part of the lower reach of the watershed. The City has a direct interest in keeping the St. Joseph River clean (less sediment and atrazine entering the drinking water reservoirs), but as mentioned above, the level or upstream controls necessary to result in substantial drinking water quality benefits would not likely be cost effective. The City of Fort Wayne seemed content with its current drinking water treatment strategy for sediment and atrazine in their water treatment plant.

Without a governmental organization that has resource management responsibility over more than one county in the watershed and without a strong leadership vision for managing the largest portion of the watershed, establishing an ESD in the watershed seems to be a remote possibility. The fact that all three states (MI, OH, and IN) have substantial portions of the watershed further complicates the prospect of applying the ESD concept in the watershed.

Case 3: Menomonee River Valley, Milwaukee, Wisconsin

For this particular application, the Project Team specifically interpreted growing water as the increase of functions of water within appropriate hydrologic pathways, storage, and recharge in ways that generate

identifiable and measurable benefits to the human and natural environment. For instance, redirecting stormwater away from leaking, combined sewer infrastructure into restored wetlands or stormwater parks where the water is cleaned and released to the Great Lakes watershed “grows water” in terms of water quality improvements and support of water-dependent resources.

The Menomonee River Valley case study was undertaken to test the hypothesis that pursuing and realizing opportunities for hydrologic improvements in a dense urban area within the Great Lakes watershed can drive market-based transactions that create both economic and ecological value. These opportunities exist within the immediate Milwaukee metropolitan community and potentially elsewhere in the Great Lakes watershed. The Project Team found in this case study that such opportunities can likely capitalize on existing policies, programs, and financial resources to stimulate real estate transactions. Such transactions have the potential to result in rehabilitated flow regimes, environmental remediation, and infrastructure improvements that provide a reliable, high quality supply of water to streams and rivers in the Great Lakes Basin. A separate and detailed report for this case study is included in Attachment E.

A critical lesson learned that deviated from initial project expectations focuses on the limitations for stimulating stand-alone, market-based transactions in water improvement as a commodities product. This case study suggests that growing water can occur through more traditional transactions that embed water improvements of broader, more traditional transactions. The most realistic outcome of such transactions will be the increase in conventional marketable value of land benefits from this type of restoration project.

When this project began, there was an expectation that an “improvement standard” governing access to Great Lakes water would be adopted as a governing principle by the Great Lakes states and provinces. The resulting legal regime would provide the legal constraints and context to drive stand-alone transactions for growing water in the Great Lakes. This expectation did not materialize. In the absence of the new, Basin-wide governance standard, the project sought and found an alternative to the intended legal or regulatory structure derived from a robust market in a stand-alone hydrological improvement infrastructure for Great Lakes water. There is a scarcity of both legally guaranteed property interests in hydrological improvements and regulatory constraints, procedures, and standards necessary to drive market demand for hydrological improvements as a commodities product. This limitation can restrict the identifiable benefits of hydrological improvements primarily to the realm of non-market values.

Even with this limitation, there are identifiable values in water improvements and interested parties seeking to capture and promote these hydrological values in real transactions. In fact, there are a number of interested parties and a wide range of programs and policies that seek to promote hydrological values. (For a detailed discussion see the Resource Inventory in Attachment F to this report.) Recognition of these values can result in targeted project investments that promote both redevelopment and growing water. These values can be defined and turned into specific investments by aligning the local programs with the appropriate hydrological improvements. By defining hydrological improvement in the early development stages of the transaction, and by quantifying the hydrological and developmental benefits of the improvement up front, it is possible for interested parties to select and invest in growing water transactions. The Project Team considered that a fundamental finding of this case study was placing a defined non-monetary value on hydrological functions can successfully be aligned with legally recognized property interests, while enhancing the property values and resulting transactions. This process promotes the generation of hydrologic improvements in the Great Lakes Basin.

Accordingly, the Menomonee River Valley case study resulted in identification of growing water values that can be promoted through: 1) improvements to the hydrology of the area examined by the case study; 2) identification of parties that recognize those values or can benefit from those values; and, 3) strategies

to align parties, land-use regulations, and resources to drive transactions that realize hydrological value for the immediate water resource and the Great Lakes watershed. The Project Team identified opportunities to significantly improve hydrological values and functions with ecological and economic benefits that can be achieved through real estate transactions and public investments. These hydrological improvements can increase the immediate and long-term value of the transactions themselves, along with the quality of the Great Lakes watershed in which they would occur.

For instance, there are clear hydrological benefits that can be pursued in a brownfield context with failing wastewater infrastructure (see Attachment E). Attention to a site's hydrological attributes increases the immediate and long-term values for rehabilitating an urban site. Among the values created are increased water quality and quantity, aesthetic benefits from open space, increased property values, and habitat restoration.

Existing programs can be tapped to augment privately funded investments in hydrologically-sound infrastructure and improvements. These programs include state, federal and local governmental programs ranging from direct investment to loans and grants. Important to this effort is the alignment of local government capital investments, programs and authorities, including the use of local zoning laws, building codes, and land use regulations. Local government programs and authorities can further direct private investment in ways that enhance hydrological function and infrastructure. Alignment of programs at each level of government can be critical in promoting ecologically sound transactions in property within the Menomonee River Valley.

The Project Team identified three sites in the case study area where options to better leverage hydrological improvements. Each site represented a potential for a classic real estate transaction involving redevelopment, and therefore, the opportunity to understand, recognize, and pursue opportunities to improve hydrologic resources in a manner consistent with the sustainable development approach used in the Menomonee River Valley (i.e., generating balanced improvements to the Menomonee Valley economy, ecology, and community). These sites are attracting investment, and are ready for significant redevelopment, representing the opportunity for actual transactions that can be ecologically and economically enhanced to grow water through the alignment of resources and local governmental drivers.

Outcomes and products of this case study include the following.

- A Resource Inventory that identifies financial resources for promoting hydrological values in urban settings. These resources include loan and grant programs, tax credits and incentives, cooperative agreements, technical assistance, fee collections, and special financial structures. This Inventory will be a valuable tool not only for the Menomonee Valley, but also for all urban communities in need of resources to develop or redevelop in an environmentally friendly manner.
- Brownfield redevelopment incorporating and expanding green infrastructure—specifically, stormwater parks—is a strategy that would grow water in the Menomonee River Valley. Three priority sites to advance the brownfield/stormwater park strategy were identified in the Valley and funding strategies and transaction opportunities were considered.
- Potential benefits of green infrastructure in increasing the value of nearby properties from several similar programs across the country were considered. The Project Team believes similar benefits can be realized in a brownfield/stormwater park strategy identified for the Menomonee Valley.
- Six potential revenue streams to support a brownfield/stormwater park development strategy were proposed for the three priority sites.

Case 4: The Miami Conservancy District, Ohio

The Miami Conservancy District and its Water Quality Trading Program

The focal point of this case study was the successful preparation, initiation, and implementation of the Great Miami River Watershed Water Quality Credit Trading (WQT) program by the Miami Conservancy District (MCD). The value of this project and lessons learned while implementing this effort are readily transferable to other locations in the Great Lakes Basin.

The Project Team examined the functional market elements of this program as it related to potential parallels with an Ecosystem Service District (ESD) model. Credits were solicited by MCD through a “reverse auction” bid process, whereby Soil and Water Conservation Districts (SWCDs) worked directly with farmers to propose BMPs and ultimately verify practice implementation. MCD serves as a broker for credits generated and sold in the watershed. For the first year of WQT for point source/non-point source trading of nutrients (2006), five municipal WWTPs joined the program with contributions totaling more than \$352,000, in addition to the three-year grant (\$938,000) from USDA’s Conservation Innovation Grant program.

For this case study, the MCD trading framework documentation, including program operation manual, credit trade agreements, and policy statements, were reviewed in detail for parallels to an ESD (http://www.miamiconservancy.org/water/quality_credit.asp). This culminated in a white paper (see Attachment G). This white paper and a cross-cut analysis of the MCD and the Upper/Middle Cuyahoga River watershed case studies identified an opportunity to apply the Conservancy District model and the ESD concept in Streetsboro, Ohio. With the successful initiation of the Conservation Properties Safety Net financing program through our project’s Phase I efforts, the next step would be to implement such a model program in Streetsboro.

The commitment and leadership of local landowners and developers was the key to successful initiation of the Streetsboro Conservation Properties Safety Net financing program. Although a remarkable achievement, such a program would be difficult to replicate in other places by individuals. Beyond the approximate 1,200 acres of land included in the Streetsboro Safety Net financing program (and associated preservation and restoration measures), much more will need to be done in the watershed to ensure a balanced development in this fast growing area and beyond.

Therefore, the Project Team concluded that what is now needed is a governmental organization or similar agency with: 1) the mandate to preserve and manage natural lands; 2) the capability of conducting research to quantify the ecosystem services to be protected or restored; 3) the resources and authority to obtain additional public funding to implement conservation measures; 4) the ability to manage the funds (i.e., repay a loan if required, and reinvest in further conservation measures if profit is generated -- in this case, the Safety Net financing program); and, 5) the leadership to create new conservation programs based on local conditions using regulatory or market forces to finance the programs. The MCD case study showed that Conservancy Districts in Ohio have the legal infrastructure and practical precedents to serve as a potential model on which organizations with the five characteristics can be based.

Lessons Learned

The Miami Conservation District (MCD) case study illustrated that under the existing Ohio Conservancy District framework and federal water quality trading policy, market and environmental transactions can be created to improve water quality on a watershed scale. Water quality improvement needs and requirements by the state provide the drive/demand for water quality improvement credits. The leadership by MCD in bringing together multiple public and private stakeholders in the watershed and

working with regulatory agencies at different levels of government was the key to the development and implementation of the Great Miami River Watershed Water Quality Credit Trading program. Although focused on nutrient load reduction, multiple ecological benefits including water quantity (growing water) will be brought about by the program. In addition, through comparative analysis, the Project Team found that the process of developing and implementing the water quality trading program has resulted in key pragmatic elements that could allow it to become an Ecosystem Service District.

The Menomonee River Valley case study found that in a densely populated urban setting, growing water can occur through more traditional transactions that embed water improvements as a lesser-included part of the broader, primary transactions. The most realistic outcome of such transactions will be increased conventional market value of Basin land benefiting from restoration projects.

The Upper/Middle Cuyahoga River case study featured the successful development, funding and initiation of Streetsboro Conservation Properties Safety Net financing program with Ohio Environmental Protection Agency (OEPA). This program uses the traditional and proven funding source of the clean water revolving fund, takes advantage of OEPA's innovative approach of funding non-point source programs using the revolving fund, and focuses on conservation development in a rapidly urbanizing area with significant natural resources. A resource inventory study and cost-benefit analysis conducted by the Project Team provided data that supported the conservation development approach, thus identifying potential demand. Multiple revenue streams are expected to be generated to repay the OEPA loan based on traditional real estate and ecosystem services transactions (e.g., water quality and quantity, wetland banking, and recreational opportunities). It was also clear that the commitment and leadership of the local landowner and developer was key to the successful initiation of the Streetsboro Conservation Properties Safety Net financing program.

The unsuccessful attempt to generate transactions in the St. Joseph River watershed showed the importance of demand, supply, and regulatory infrastructure in creating markets. The lack of strong leadership in the watershed and limited benefits for single transactions also contributed to the absence of growing water opportunities.

The lessons and experience learned from the project's first phase effort have led to Phase II and parallel efforts in selected case study settings to continue work in the Streetsboro Upper/Middle Cuyahoga River case study and the application of the ESD concept and the Ohio Conservancy District model in the watershed.

Based on the Phase I efforts and subsequent discussions with the Great Lakes Protection Fund, the Environmental Trading Network Project Team is looking to synthesize Phase I case study findings into a suite of packaged concepts that can be delivered to other potential users in the Great Lakes basin settings where water and water dependent natural resources are threatened by growth. The objective will be to first identify where these concepts may be applied in the basin such that their systemization, use and institutionalization may have the greatest success and ecosystem benefit at a broader scale. This would build on Phase I case study findings, and most directly on strategies and outcomes surrounding the "Conservation Properties Safety Net" financing program developed in Streetsboro with the Ohio Environmental Protection Agency (OEPA), the ESD concepts from the Great Miami and opportunities discovered in the Menomonee River Valley. Such efforts would also include a Phase II wrap-up and hand-off of preliminary business plans and proformas for the Streetsboro case study associated with the development of an ESD-like structure in the form of a Conservancy District.

Using these and other case study findings, the Project Team would: 1) shop synthesized ideas from Phase I in other Great Lakes locales strategically identified in our Phase II analyses; 2) engage directly with potential customers for peer-review feedback; 3) document our efforts in published reports and website postings; and, 4) have a major roll-out event in the Great Lakes with a basin-wide meeting in late 2008 or

early 2009. Phase II support will also fully fund the ETN for two years of operation per the current Business Plan. Proposal development amongst the Project Team and local partners is ongoing for such Phase II efforts.

Financial Report

Attachment H contains the Great Lakes Protection Fund Financial Report Form completed through June 2007. All of the original \$250,000 budget was expensed. As of our previous report in November 2005, we had \$90,345.99 remaining in our budget to be expensed. Approximately one-quarter of this previously remaining funding was for ETN related budget items while the remainder was largely associated with subcontractors. Since this last reporting, we only accrued minimal additional expenses under the ETN budget. This was largely a function of the ETN not hiring an Executive Director during the course of this project as originally anticipated. This was both a function of the Board of Directors not becoming formalized and the lack of other grant funding support for a full-time position becoming available. (Currently, Phase II proposed efforts are seeking full-time ETN organizational support that should draw interest in this position whereas absent of such funding, options were limited to fill a directorship position.)

Also under the ETN budget categories, Project Team travel expenses were \$2,691.75 over the originally budgeted \$10,000. This was not unexpected given opportunities to present findings at the national scale through invitation and solicitation. Other budget items were partially expended or wholly un-expensed; the latter example being for Advisory Team travel that was not needed or used by peer-reviewers to assist the Project Team. The total un-expensed amount from the ETN budget was \$19,212.11.

For the Project Team, cumulative expenditures have exceeded the original allocations. All team members participated in the project. Some were utilized to a lesser extent than originally envisioned, (such as Dr. Dennis King) since many of the transaction opportunities did not materialize in the absence of an “improvement standard”. Others were slightly under their original budgets (Policy Solutions, Shaw) though their contributions met the proposed scope tasks. Two team members were at their originally proposed levels (EBX, 16th Street Community Foundation) and two exceeded their budgets (AES and K&A). K&A efforts were the most substantial beyond the original budget and related to: the on-going commitment to the local partner in the Upper/Middle Cuyahoga case study following the wrap-up of other case studies; opportunities to convey these project results in national forums beyond the originally targeted project end date; additional analyses to evaluate case study expansion; and project reporting in the absence of an ETN Executive Director.

Based on the un-expensed budget for ETN line items (\$19,212.11) and those for select members of the Project Team (\$10,200.02), a total of \$29,412.13 was re-distributed to AES (\$2,836.36) and the remainder (\$26,575.77) to K&A. K&A hours on the project range well beyond this amount. However, these hours were provided as in-kind and thus, no change in the overall budget amount of \$250,000 was made. The Attachment H table identifies approved “Line Item Transfers” from the original budget and “Budget (adjusted)” line item budgets that account for the shift of a total of \$29,412.13 from un-expensed line items to the two subcontractors.

ATTACHMENT A

Ohio EPA Safety Net Financing Loan Proposal

“Conservation Finance Safety Net” Demonstration Project at Streetsboro Ecological Reserve:

Executive Summary

The Conservation “Safety-Net Financing” is a proposed loan program structured under existing approved OEPA Division of Environmental and Financial Assistance loan programs. The proposed Streetsboro Ecological Reserve demonstration project will refine the approach to working toward the protection of threatened environmentally sensitive lands and accomplishing protection through partnerships with developers, interested communities, other agencies and individuals. The goal: environmentally sound development in high development pressure areas.

Environmentally sensitive conservation lands provide important ecological, hydrological, water quality and water supply functions and contribute to regional biodiversity, public enjoyment and wildlife benefits. But as important as they are, we watch annually as their ecological health and the acreage of these systems declines. In many areas of Ohio, these important lands are losing their viability through ecosystem fragmentation and becoming impaired by land-use changes such as incompatible sprawling land development, which also has significantly reduced the acreage and quality of these resources. This program creates a financing strategy called a “Safety Net Loan” to offer immediate protection and enhancement to environmentally sensitive lands through cooperation with private developers and communities, Park Districts, and other partnering organizations and individuals willing to assume specific land protection, restoration and land management responsibilities, along with a commitment to conservation developments on a relatively small percentage of overall protected acreage. The conservation development strategies that must be included are alternative stormwater management strategies (see Appendix 4), and ecological restoration of degraded and restorable lands (see Appendix 5). This loan program is linked to conservation development to provide an economic engine to add value through the land entitlement process that can be used to secure and collateralize loans, and to secure perpetual conservation outcomes.

Streetsboro is the fastest growing community in Northeast Ohio with intense development pressure. The Streetsboro Ecological Reserve is the first project with a committed developer willing to accept the financing and conservation commitment terms created by this program. This demonstration project would involve the potential protection of ~770 acres of environmentally sensitive lands, and application and demonstration of conservation development practices on approximately 415 acres for a total project area of ~ 1200 acres of important

resources. All lands are contiguous and consequently provide a significant single reserve with the ecological and conservation benefits associated with landscapes of this scale.

Conservation development program requirements within the 415 acres of development land will contribute another 20-40% open space where alternative stormwater management (Stormwater Treatment Trainstm), parks and greenway connections and other cultural and public realm investments will be created by the developer. The land development areas will not be located in environmentally sensitive areas of the properties.

This program appears to exceed the expectations of the Lake Erie Balanced Growth Watershed Pilot Project aspirations derived from the Lake Erie Protection and Restoration Plan. This may consequently serve as an important model for refining the development and implementation of Watershed Balanced Growth Plans and going through the process of identifying Priority Conservation Areas and Priority Development Areas. This proposal meets other program aspirations by including as a foundation stone the development of partnerships for land conservation and development as economic engines.

Introduction

New models for financing conservation are sorely needed in rapidly developing urban areas. Escalating land values price conservation investments out of the realm of local and even national conservation groups and others that do conservation finance. Even in locations with informed community leaders, policy makers, ordinances, and other legal and regulatory instruments, modest or no success has been achieved in land protection. However, in most communities, the regulatory policy and leadership support is not available, as such most land development includes only a perfunctory dedication of open space, often cleared of forest and used for active play fields. Declining ecological resources get minimal conservation and no stewardship. The result is often a net export of environmental assets to the hinterlands to the detriment of urban and suburban areas and may be contrary to protection of "Existing Uses". The result is a de-facto environmental sacrifice zone in and around urban areas.

Statewide and in the Cuyahoga River valley, important conservation lands and environmentally sensitive resources are in serious decline from intense development pressure. The importance of the Cuyahoga River has been well established as a public and ecologically valuable resource providing rare habitats, high quality water supply and numerous other functions. In particular, maintaining the quality of the Upper Cuyahoga Watershed, currently experiencing rapid sprawling development from the Cleveland and Akron urban areas, is critical to the health of the entire river. The City of Streetsboro, in

Portage County, is centrally located in this area of intense land development activity. Recently identified as the fastest growing city in Northeast Ohio, Streetsboro with continued growth will lose most of its environmentally sensitive lands within the next two years to this unplanned sprawling development. Portage County, unlike the other counties in the Cuyahoga Watershed, does not have a well-funded Park District or any dedicated source of public funding for direct land conservation. Unless an alternative conservation finance and protection model can be put into place that encourages and leverages private investment, opportunities to protect large parcels connected natural areas will be lost. There is urgency and immediacy if there is any hope of protecting resources in this community, and the same story can be told in numerous other locations in Ohio, and across the US. In order to ensure land protection, a conservation finance and loan program must be made available to encourage the development community's participation in conservation, especially in areas that have little public funding for conservation. This is the principle strategy being employed by this program.

Elements of a Potential New Model:
The Conservation Finance Safety Net

The original purpose of the Water Pollution Control Loan Fund (WPCLF) was to finance publicly owned wastewater treatment works to reduce pollution. Since the program began, many of the nation's water quality problems from these sources have been addressed. Now, Ohio is starting to focus more money and effort into reducing nonpoint source pollution (runoff) that jeopardizes the health of Ohio's water resources.

The **Water Resource Restoration Sponsor Program** (WRRSP) 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 Water Pollution Control Loan Fund is meant to provide communities with low-interest loans to finance infrastructure improvements that result in improved water quality and quantity. The flexibility of this loan program for conservation development projects will positively impact the achievement of these goals. In rapidly developing areas such as Streetsboro, we view this loan package, and the developer's associated commitments to conservation development as a "Conservation Finance Safety Net". This safety net could be viewed as a tool that

could help provide immediate and initial financing for the protection of environmentally sensitive lands, that otherwise are at risk of being degraded by conventional development. The "Safety Net" would need to include repayment and refinancing strategies with low interest rates that are flexible, with temporally compatible repayment terms and timelines. For example, loan repayment schedules may need to coordinate with a developer's projected cash flow from sales of units in the conservation development, or with take-out strategies by park and conservation partners. The program also requires an assurance that loans are collateralized and that the recipient has the capacity to repay the loan.

The following comprehensive approach to addressing conservation development within the program is proposed as follows:

Task 1: Conduct a natural resources inventory to identify priority conservation areas consisting of the most environmentally sensitive lands and the buffers needed to protect them. Environmentally sensitive lands include:

- Areas that contribute to locally and regionally valuable ground and surface water resources
- Rare and declining ecological communities such as wetlands, natural riparian corridors, and high quality forests
- Habitat for rare, threatened and endangered species
- Steep slopes and eroding soils
- Areas that provide important connections and wildlife corridors

This task ends with the identification of the key high-quality parcels, and locations within each parcel that should be protected, as well as areas in need of restoration with high recuperative potential.

Task 2: Identify economically important development lands, where development would have minimal impacts on the ecological conditions, hydrological conditions and other valuable assets and conditions identified in Task 1. This task uses a series of empirical measures to understand the development value and costs, and then prioritizes the developable parcels. A product of this phase is a map that classifies each parcel based on empirical measures and numerical scores, represented by colored computer graphics.

Task 3: Design conservation development strategies and plans to create sound conservation developments with at least 40% open space, as well as financing strategies (for example, through use and real estate transfer fees, assessments and endowments) that will ensure land restoration, management and perpetual stewardship of protected lands.

Task 4: Create binding relationships between committed developers, conservation partners, local communities and funding entities.

Task 5: Create model templates for other Conservation Finance Safety Net Loan projects in Ohio and across the US by documenting program procedures, refining the process, and evaluating its success, then developing a standardized template for replication.

Proposal

David Gross, owner of Sahbra Farms is a longstanding landowner in Streetsboro who is proposing a very environmentally sensitive conservation development on three hundred acres based on smart growth principles. Mr. Gross is willing to use private dollars to achieve some level of land protection and restoration in his conservation development, which includes his property and potentially an additional 770 acres of adjacent land for conservation. However, he cannot afford to personally finance the protection and stewardship of all of these sensitive lands. Considering that hundreds of acres of critical natural areas are at risk, this would be a perfect application of the proposed 'Conservation Finance Safety Net' that would augment this developer's funding stream and thus enable him to assemble, option, acquire and protect key parcels through fee simple title purchase and conservation easements.

In Streetsboro there is currently significant pressure on these environmentally sensitive lands. Tasks 1-3 of the proposed model above have been completed in the southeastern sector of this community. The natural resources inventory mappings identify the environmentally sensitive areas in the entire City of Streetsboro (see Appendix 3). In a later section of this document are a description of these resources and the benefits of protecting and restoring these lands. Mr. Gross has contributed to significant dialogue in the Streetsboro community about the need for conservation and resource protection. Over the past two years, he has met with City and County officials, the Portage Park District, and numerous other stakeholders at the local, state and federal level to discuss the merits of a proposed conservation town center development. With the aid of some of the country's best professional consultants, he has committed to facilitating an intensive week long public planning process for this high quality development with the goal of master planning the 2,000 acre sector of which his currently owned 300 acres is a part, that will showcase ecological design principles, alternative stormwater management systems, minimal impervious surfaces, and native landscaping. With the goal of permanently protecting and restoring the sensitive land within and adjacent to this 2,000 acre sector, he has been negotiating with these adjacent landowners to protect 770 acres of these sensitive resources. The resulting conservation area in the southeast sector of Streetsboro will create trails and greenway linkages to thousands of acres of

already protected lands. The approximately 770-acres of the project to be permanently protected is referred to as the **Streetsboro Ecological Reserve**.

The proposed *Streetsboro Ecological Reserve Conservation Finance Safety Net Loan Package* meets the funding criteria of the OEPA Division of Environmental and Financial Assistance revolving loan program.

Mr. Gross has created three confidential proformas that illustrate the profitability and financial feasibility of the Streetsboro Ecological Reserve project using very realistic and conservative values for the revenue and costs associated with developing two different development models; a standard "Cookie Cutter" subdivision model versus the proposed conservation development model (see Appendix 2).

1. Existing Conditions on the Land

The natural resources map (see Appendix 3 Exhibit B) of Streetsboro's southern sector identifies the project and surrounding area, the Streetsboro Ecological Reserve, including first order streams, high-quality wetlands and important forested resources.

The nearby Cuyahoga River flows along the course of an ancient river valley, buried by glacial sand and gravel deposits, and now serving as a major aquifer and public water supply. These deep gravel deposits support a ground water dome that provides ground and surface water discharge for both the Cuyahoga main stem and Tinker's Creek watersheds. Aggregate industries along the Cuyahoga corridor have been exploiting the resource for decades. A soon-to-be-closed sand and gravel mining operation within the Reserve area will leave a lake that could serve as additional high-quality surface water supply. Sahbra Farm includes some of the highest producing wells in Portage County, which could also become additional public water supply in this rapidly developing area. Protection of adjacent conservation lands and wellhead recharge zones will be the best way to protect this potable water supply.

Glacial features also yield headwater streams and create rolling topography punctuated by category 3 wetlands such as kettle bogs, buttonbush swamps and marshes that are habitat to a variety of wildlife and waterfowl. The location of the Reserve is also critical to the integrity of the region's ecosystems, situated between several thousand acres of conservation properties including the Cuyahoga River and Lake Rockwell (drinking water supply for the City of Akron) to the east, and to the west/northwest, Herrick Fen, Gott Fen, Beck Fen, Tinker's Creek State Nature Preserve, and the Aurora Wetlands, recently purchased with WRRSP funds.

The Reserve drains both to the Cuyahoga main stem (Lake Rockwell) and to Tinker's Creek. The Ohio EPA has completed TMDL Studies for all sections of the Cuyahoga River. Major stressors to the river have been identified as nutrients and sediments from development and wastewater discharge. Restoration options include habitat restoration and protection, managing reservoir water release and public education.

The forested resources in the Reserve vary from 150-190 year old oak and maple stands with diverse herbaceous vegetation ground cover, to areas with moderate to very young woody growth reinvasion that followed almost 130 years of agricultural row crop production and pasture and hay production uses. Followed at different times, forest stands range from 10-15 years old that are considered poor, while 30-70 year old stands have regained significant diversity in the canopy, shrub and ground story. However, even in the young re-growth areas, some areas were found to still contain significant native ground story populations and numerous seeps and shallow water table areas that support dispersed and heterogeneous acetone areas transitional between wetland and upland settings.

Some old and succeeding fields and partially reclaimed quarry sites dominated by nonnative cool season grasses also are found in the properties. Serious exotic species invasion problems are present in some areas. Tartarian and Mack's honeysuckle, European and glossy buckthorns, garlic mustard, and other exotic plants pose not only a threat to biodiversity, but in areas with dense growth of exotics, this shade suppression has contributed to the collapse of soil-stabilizing ground story vegetation, and serious erosion rills and gullies are present on some properties.

Shade suppression is also contributing to the decline of oaks and some other native trees species that are not able to regenerate in the low quality and quantity of available light. These problems are resulting in topsoil erosion and the loss of its contained seed bank (that represents the insurance policy for restoring these areas). Sediment is accumulating at the margins of wetlands where it is covering and reducing seepage contributions to wetland base flows and displacing native plants. The nutrient rich sediment deposits are being invaded by southeast reed canary grass and purple loosestrife, Southeast Asian giant reed grass among other exotics (For discussions of restoration please see in Appendix 5).

Typical stressors and threats from conventional development to environmentally sensitive ecological resources have been well documented. These include hydrology changes, nutrient and soil and water quality balance and system changes, exotic species introductions, reduced scale and a range of fragmentation stressors, declining diversity from habitat loss, reduced habitat continuity which contributes to population decline and genetic isolation,

increased human activity relationships with impacts, declining wildlife uses, and others.

2. Proposed Protection Strategy

Development of a small percentage of the Reserve would finance the land protection and the initial land restoration practices on each parcel. Land restoration will focus on stabilizing soils, reducing exotics, removal of sediment deposits that have impaired wetland functions, seeps and ground water recharge, and in reestablishing healthy native forest, grassland, wetland, and riparian and stream systems.

Restoration and management and perpetual stewardship plans will be prepared for each protected parcel and incorporated into land development covenants and land protection contracts that would run with deeds and easements that may be eventually transferred to other conservation organizations such as Portage Park District.

3. Role of OEPA in Conservation Development

Conservation Development is viewed to be an important economic engine that generates revenue to pay back the financed loans. The Streetsboro Ecological Reserve proposes a 770-acre central conservation park that would be transferred to the Portage Park District via a "bargain sale". Revenues from development lot sales, along with other probable revenue sources (e.g. assessment district, wetland banking, real estate transfer fees, etc), have been combined by David Gross and partners into a diverse financing strategy to ensure that loan repayments can be made, in addition to establishing an endowment that will contribute to the perpetual stewardship of the protected and restored lands.

The conservative financial analysis completed (see Development Proformas in Appendix 2) for this proposal illustrates the current market forces driving the real estate development industry. The first two "Standard Development Model" examples highlight the financial viability of a developer voluntarily conserving sensitive land when utilizing a commercial lending institution for the acquisition of the land.

In the "Standard Development Model" proforma (A) example, 65% (770 acres) of the land acquired is developed resulting in a healthy profit at the end of a 13 year period. In the "Standard Development Model" proforma (B) only 35% (415 acres) of the acquired land is developed with 65% of the sensitive land being voluntarily protected from development. The substantially increased capital costs associated with the "holding" of this additional environmentally valuable land

(that could legally be mitigated and developed) makes this proposed "Standard Development Model" (B) project a very unappealing investment.

The "Safety Net" financing terms recommended in this proposal and applied in the "Conservation Development Model" proforma (C) exemplify the positive impact the OEPA can have in encouraging voluntary protection of sensitive areas threatened by "Standard Development" practices. The projected profit potential for model (C) is shown to be *greater* than the "Standard Development Model (A)" even though the *Conservation Development Model (C) has 295 less lots being developed on approximately half as many acres.*

Valuable land eligible for the Conservation Safety Net Loan program will have clear use restrictions that will ensure the protection, restoration and management of the lands. Longer-term strategies for conservation protection will include conservation protection commitments through jointly held conservation easements, a dedicated stewardship program and funding vehicle to ensure land health, and a series of other strategies that will be collaboratively developed through the partnership team.

A detailed conservation protection program with example conservation easements, covenants and other documentation will be prepared by the Sahbra farms and partnership team to serve as a template for use in this first project and others around Ohio.

4. Partners

Numerous partners have come together to create this unique project proposal. Letters of support for this conservation model will be provided.

List of Potential Partners:

David Gross, Sahbra farms

Christine Craycroft, Portage Park District

City of Streetsboro

Jim White, NOACA

Kent State University

Steven I. Apfelbaum, Ecologist, President, Applied Ecological Services, Inc.

Kirby Date, The Countryside Program

Portage County Soil and Water Conservation District

5. Summary of Conservation Finance "Safety Net" Terms

Proposed "Safety Net" Conservation Financing Model

- Raw Land Value: The land value is established based on the number of units approved for the conservation development.
- Interest Rate: 2.75% - 3.25% (Determined by the quality and quantity of environmentally protected land in conservation commitment.)
- Collateral: Land being purchased is subordinated by OEPA at a loan to value ratio of 100%. (Any excess land value created as a result of the entitlement process can be subdivided and then used for the equity contribution required by a commercial banking institution for construction financing.)
- Payment Schedule: First five years of interest is deferred and added to principle loan balance (to allow the conservation project time to start generating an income stream.) Each following year, an interest only payment would be due based on that years current loan balance. Each subdivided parcel of the larger conservation project would then subsequently be released from OEPA subordination with a payment on the principle balance equal to the established per acre value based on the number of units/lots entitled to that parcel

6. Benefits

Promoting and Supporting Smart Growth

The proposed Safety Net Conservation Financing Program could be a reliable, attractive, and compelling means of changing the status quo of development, and leveraging private investment to encourage conservation of environmentally sensitive lands. This proactive, cooperative program could provide the necessary incentive (and remove some barriers) for developers to work with the conservation community and local officials in the planning and design phase of developments, instead of the often expensive and adversarial approach of negotiating or litigating zoning variance requests, wetlands impact permits and subdivision requirements due to the constraints of a particular property. This program offers an economic model that enables the developer to reduce the risk

of purchasing additional undevelopable land and empowers local communities to collaborate directly in their growth in a positive, efficient and sustainable manner.

Partnerships and Efficient Conservation Funding

A variety of local and national programs aimed at land and water conservation could benefit from utilizing elements of the proposed Safety Net Program. For example, the Western Reserve RC&D's Countryside Program has been very successful in promoting conservation development through education, presentations and the development and evaluation of model regulations. But creating the policy and regulatory framework gets the community only halfway towards conservation development; in order for a private developer to make this unfamiliar concept reality, incentives are necessary. Likewise, issues regarding wetlands mitigation, stormwater management and open space set-aside can be viewed as opportunities for the developer, if adequate up-front support and financing are available. Conservation programs such as the Wetlands Reserve Program, Clean Ohio Fund, 319 grants, Water Resource Restoration Sponsorship Program, local park and conservancy funds and others, are most efficiently utilized when conservation lands are holistically protected and linked before fragmentation and degradation occurs. Considering that developers are the primary land change agents at this time and place, a tool that encourages smart growth and cohesive conservation of large areas will protect public investment along with natural resources.

Appendix

1. Project scope and financing needs entitled Land Conservation Protection Financing Proposal
2. Development Proformas
 - A. Standard Development Model
 - B. Standard Development Model
 - C. Conservation Development Model
3. Natural Resource Mapping
 - A. City of Streetsboro
 - B. City of Streetsboro's southern sector
4. Alternative stormwater management case studies
5. Ecological restoration case studies
6. Conservation development case studies
7. Applied Ecological Services – the conservation development consultant team leader

ATTACHMENT B

Potential Ecosystem Credit Market Values in the Cuyahoga River

An initial estimate of potential ecosystem credit market values in the Cuyahoga River

This analysis provides some simple estimation on three types of potential ecosystem credit markets in the Cuyahoga River watershed in Northeast Ohio Lake Erie Basin with a potential Conservancy District serving as a credit broker. In addition to offering coarsely quantified monetary values for the potential market values, the analysis also serves as the first step towards a more comprehensive examination of the demand and supply of these potential ecosystem credit markets.

This analysis targets a ten-year period of 2005-2015. It is assumed that a ten-year period can reflect both the short and long term credit demand in the watershed. More importantly, it will allow a credit broker, be it the envisioned Conservancy District or other public or private entities, to establish itself. In addition, ecosystem mitigation projects, such as wetland mitigation, requires more than a single year to physically become ecologically effective.

It should be noted here that this analysis assumes the ecosystem credit markets will come into being under various regulatory requirements (e.g., TMDLs and wetland mitigation). How exactly these markets can be formed, though, is beyond the scope of this analysis. Nevertheless, it should be included in the comprehensive market study that can serve as the basis for actual actions to develop these markets and participate in credit transactions.

Also should be noted is that only three types of potential ecosystem credit markets were studied here: water quality, wetland, and water quantity. Other markets, such as flood storage for CSOs, and conservation banks, were not included. Again, these should be included in the more comprehensive study as they hold potential to greatly increase the credit generating opportunities for a Conservancy District.

Water Quality Trading Market

TMDLs have been established by the Ohio EPA for the Upper, Middle, and Lower Cuyahoga River watersheds (OEPA, 2000, 2003, and 2004). Potential demand for water quality trading credits for total phosphorus (TP) was calculated as the difference between the current loadings from various sources and the TMDL allocations for these sources (see Table 1). The Middle Cuyahoga River TMDL did not establish TMDL allocations for TP.

Table 1. TP load reduction (lbs/yr) required for various sources in the Cuyahoga River Watershed based on TMDLs.

	Point Sources	Nonpoint Sources	Septic Systems	Growth Allowance	CSOs	Lake Rockwell
Upper reach	102	11,006	2,540	2,000	-	-
Middle reach	-	-	-	-	-	-
Lower reach	50,479	105,936	8,650	14,965	29,994	6,196
Total	50,581	116,942	11,190	16,965	29,994	6,196

The total required TP load reduction is 231,868 pounds per year for the entire Cuyahoga River watershed. Assuming an average trading ratio of 2:1 and a credit price of \$5/lb¹, the total market value of TP load reduction credits will be \$2,318,680 per year.

The \$5/lb credit price is essentially the average cost of generating TP load reductions. In a market setting, the selling price will be higher to cover other costs such as negotiation, credit verification, and general market operations. Some of the credit-generating practices, such as stream bank restoration, however, have the capability to make TP load reduction permanent, assuming good design and proper maintenance. As a result, they in fact generate credits continuously without substantial annual additional investment. In these cases, the 10-year profit margin can be as high as the total credit sale for 10 years minus the investment made in the first year.

Other pollutants or pollutant indicators, such as sediment, NH₃ and CBOD₅, are also included in the TMDLs. However, without a more detailed study, it was not possible to discover and analyze relevant data to explore the market values for them.

It should be noted here that details of the potential water quality credit market, such as location and timing of demand and supply, were not considered in this analysis. These considerations are necessary for a more comprehensive understanding of the market that can lead to the successful participation in the market by any brokerage service provider. Again, such considerations are beyond the scope of this analysis and should be part of the more detailed study that this analysis may lead to.

Wetland Mitigation Market

The method used to estimate the total wetland mitigation market value in the Cuyahoga River watershed is based on the urbanization rate of the urban centers in the watershed and the associated wetland loss and mitigation needs. Fulton et al. (2001) estimated that the Cleveland-Akron-Lorain metropolitan area, which lies largely in the Cuyahoga River watershed, increased its urbanized land by 31.7% over the period of 1982-1997. This translates into an annual rate of 1.853%. The USGS national land cover data of 1992 showed there were 136,100 acres of urban land (urban residential, commercial, and recreational land) in the watershed. Using the annual urbanization rate of 1.853%, there were 172,782 acres of urban land in the watershed in 2005. This number will increase to 207,598 acres in 2015. The urban expansion between 2005 and 2015 is thus 34,816 acres.

Using the 1992 wetland area percentage value of about 6 of all the land in the watershed, it can be derived that among the 34,816 acres that will be developed between 2005 and 2015, about 2,089 acres is wetland. Further assuming a 2:1 mitigation ratio, a total of 4,178 acres of wetland need to be created to mitigate the loss of the wetland to urbanization.

The selling price for an acre of wetland mitigation credit was estimated based on information provided on Ohio Wetlands Foundation's website (<http://www.ohiowetlands.org/credits.htm>) and

¹ Based on study conducted for the Great Miami River watershed in Southwest Ohio (see the study report at http://www.envtn.org/docs/Great-Miami_Trading_Analysis.pdf).

average land acquisition price of \$20,000 per acre in the watershed. It was determined that the average price for wetland mitigation credits is \$39,000 per acre at a profit margin of \$3,000 per acre.

With these unit values and the estimated wetland mitigation needs, it was calculated that during the 10-year period of 2005-2015, a wetland mitigation bank at a total market value of \$162.9 million will emerge with a potential total profit margin of \$12.5 million.

It should be noted that here only a gross estimate of potential wetland mitigation needs was conducted in this analysis based on overall urbanization rate for the two major metropolitan areas in the watershed. Within the watershed, urbanization and development are not taking place in a uniform rate and the location of existing wetland in the watershed will influence the loss rate (and the location of mitigation banks) more than the total wetland acreage. Therefore, a more accurate characterization of the wetland mitigation market in the watershed will require more detailed study of these factors.

Water Quantity Market

Calculations for water market values were based on the projected needs for the City of Akron in the watershed. Other communities and large quantity water users may also experience similar water shortage. However, only an in-depth study of the watershed can reveal these needs.

There are two potential situations where Akron may need to obtain extra water. First, according to the Middle Cuyahoga River TMDLs report (OEPA, 2000), it was projected that the City would need an extra 4.8 million gallons water per day (MGD) in the next 20 years to keep up with demand growth. This increased withdrawal will come from Lake Rockwell, a reservoir on the Cuyahoga River serving as Akron's drinking water source. Such an increased withdrawal from a Great Lakes tributary falls under the regulation of the recent signed Great Lakes Charter Annex 2001 Implementing Agreements, which stipulate a set of Environmental Standards to be comply with before such a withdrawal can take place. Among the Standards are studies and plans to examine the potential adverse impacts on natural resources caused by the withdrawal and corresponding mitigation actions. Plans to restore the hydrologic conditions and functions of the source watershed are also required. These requirements by the Annex 2001 Agreements thus have the potential to create the water demand from Akron to compensate its projected increase in water withdrawal from Lake Rockwell, especially considering the low flow conditions downstream of the reservoir during dry days of the year.

Secondly, the pending court case (*Portage County Commissioners v. City of Akron*, Case no. 2004-0783) in the Ohio Supreme Court may end with a ruling requiring the City to release up to 5.9 MGD more water than the current minimum level (5 MGD) from its Lake Rockwell reservoir (http://www.sconet.state.oh.us/Communications_Office/oral_arguments/05/0309/0309.asp) in low flow conditions. The ruling will be handed down soon by the Court. It has the potential to force Akron to increase water storage in Lake Rockwell especially during summer low flow days.

To restore or increase the storage of the Lake Rockwell reservoir, this analysis assumes that the City can achieve that by 1) buying and pumping water from nearby quarry lakes in the watershed to the reservoir or 2) increasing groundwater recharge near the reservoir by building and maintaining recharge basins that collect and infiltrate stormwater runoff from surrounding urban areas. Option 1 is a temporary solution as the reservoir and the quarry lakes are likely hydrologically connected. Nevertheless, because extreme dry conditions generally do not last beyond a month or so in an average year in the watershed and there is a delay between lowering water level in the quarry lakes and the lowering of groundwater water table, getting water from quarry lakes may temporarily enable the reservoir to increase its release rate. A more in-depth hydrogeological study, however, is needed to confirm this assumption. This is beyond the scope of this current analysis.

For Option 1, the market value is the payment the City would make to buy water from the quarry lakes and the pumping cost. For Option 2, the market value is the cost to build and maintain infiltration basins that have the capacity to infiltrate the desired amount of water. Using the average year (1994) data from the USGS Gage Station at Hiram Rapids just upstream of Lake Rockwell, it was found that the low flow conditions² typically last for 37 days annually for the reservoir. Using the lower of the two increased water storage scenarios explained above (4.8 MGD), it was calculated that the City would need a total of 178 MG of water annually either by buying and pumping water from quarry lakes or using infiltration basins.

It was assumed in this analysis that it would cost \$425 per million gallons (MG)³ to buy the water and the pumping cost is \$1,500/MG. For infiltration basins, the capital cost is \$335,000/MG and the operation cost is \$69,000/MG⁴. With these values and assumptions above, it was calculated that in 10 years, the total market value for Option 1 is \$3.86 million and Option 2 \$4.91million. To be conservative, it was concluded that the potential market value for water quantity in the watershed is \$3.86 millions over the 10-year period of 2005-2015.

It should be noted here that the water quantity needs were calculated only for the City of Akron in this analysis. The population growth in the Cuyahoga River watershed will likely increase the water demand from many more communities. In addition, urbanization will also increase the imperviousness of the watershed, potentially leading to lower groundwater recharge, exacerbating water shortage in low flow conditions. All these should be considered in a more comprehensive market study.

Summary

Table 2 summarizes the results from this study. It should be noted that profit margins were calculated only for the wetland mitigation bank market (\$12.5 million) because such markets do currently exist in Ohio (see <http://www.ohiowetlands.org/credits.htm>). For the other two

² Low flow conditions here are defined as where the daily mean stream flow rate is below 90% of all daily flow rates recorded in that year.

³ Akron's current average drinking water rate is \$2,259/MG. Assuming 80% of that goes to treatment and distribution, the raw water price is \$425/MG.

⁴ Values derived from a 1999 EPA infiltration basin BMP document (USEPA, 1999) and other sources.

Table 2. Potential values of three potential ecosystem markets.

	TP market (\$ millions)	Wetland mitigation (\$ millions)	Water quantity (\$ millions)	Total (\$ millions)
First Year	2.32	NC*	0.386	N/A
10-yr Total	23.2	162.9	3.86	190

*Not calculated.

markets, the market values are essentially the cost of generating the credits and/or covering the capital investment. To make viable the concept of a Conservancy District as the broker of the credits or manager of the markets, a price mark-up will be needed during credit transactions to take into account operation and administrative costs of the Conservancy District. If private for-profit entities are involved, a mark-up will be used to generate profits.

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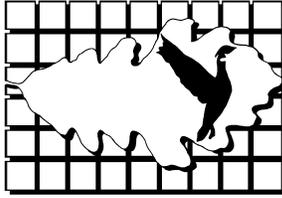
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ATTACHMENT C

**Preliminary Economic Value Analysis of Proposed
Conservation Development in the South Sector
of Streetsboro, Ohio**



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To: Mark J. Pavlick, Mayor, City of Streetsboro
City Council Members, City of Streetsboro
Planning Commission Members, City of Streetsboro
Portage Park District Board of Directors

From: Steven I. Apfelbaum, Applied Ecological Services, Inc.
Andrew Fang, Ph.D., Kieser & Associates

Date: January 6, 2006

Re: Preliminary Economic Value Analysis of Proposed Conservation Development in the South Sector of Streetsboro, Ohio

CC: Great Lakes Protection Fund
David B. Gross, Principal, Sahbra Farms
Ohio Environmental Protection Agency,
Division of Environmental and Financial Assistance

INTRODUCTION

The goal of this analysis is to estimate the probable municipal fiscal impacts of losing the naturally occurring, high quality ground water recharge and surface water purification services currently being provided by recently identified natural resources in the South Sector of Streetsboro.

In order to estimate several of these fiscal impacts resulting from potential land use changes, calculations were completed to measure the environmental impacts resulting from two alternative hypothetical land use models: a Standard Subdivision Development model and a Conservation Development model. The land use comparison conducted here includes an evaluation of municipal infrastructure maintenance costs, sediment and contaminant loading estimates and increases in stormwater volume (surface runoff) resulting from these two development models.

By measuring the increased loading of sediments and contaminants into the potable water supply and the amount of water unable to replenish (recharge) the aquifer, the research team could then use these calculations to estimate a range of costs associated with the replacement of these existing valuable functions provided by natural resources. This analysis illustrates how losing these naturally occurring functions of free services through improper land use decisions are becoming increasingly more costly to many communities as natural recharge functions are lost, devalued or degraded over time in the Cuyahoga River watershed of the Great Lakes Basin.

Funding for this assessment was provided by the Great Lakes Protection Fund, part of a larger program operated by the governors of the Great Lakes states. The Fund supported this assessment in Streetsboro as one of several case studies to document ways to improve the health of the Great Lakes ecosystem. Applied Ecological Services, Inc. (AES), Kieser & Associates, and other project partners received this grant to identify existing conservation efforts that are, or easily could be, generating ecological and water supply improvements in the Great Lakes Basin. This project is focused on determining how market mechanisms, such as the real cost for providing and protecting a clean potable water supply can be incorporated into existing local, state and federal environmental regulations for land use decision-making with regard to infrastructure planning and investment. Although this document, being a part of a larger study in progress, is not in its final form that will be presented for peer review, this preliminary information has been provided at this stage to assist community stakeholders that are elected or appointed to make critical land use decisions in the City of Streetsboro.

This assessment targets land use impacts on naturally occurring functions of natural resources. We keep the analysis narrowly focused and purposely do not explore the expanded range of community benefits and impacts of various land use decisions. Many other sources are available that discuss other economic and health impacts of poor land development decisions that include:

- The degradation of biodiversity resulting from the fragmentation of ecologically important land.
- The increased costs of travel to residents associated with auto dependence.
- The increased risk of respiratory illness caused by the removal of the natural air filtration services provided by forested lands.
- The loss and damage to personal property, roads and parking areas resulting from flooding and erosion.
- The increased municipal costs of maintaining transportation and utility infrastructure arising from the inefficient use of land.
- The social and health benefits received by citizens from having access to contiguous public parks and trails within close proximity of their homes.

Background and Description of Existing Conditions

Two separate surveys have recently been conducted for the purpose of mapping, defining and rating the important natural resources for the entire City of Streetsboro by AES and the Davey Resource Group commissioned by the Portage County Regional Planning Department.

Large areas of the City of Streetsboro, including ~1,200 acres in the South Sector, were identified in these studies as possessing high ecological value for biodiversity, ground water recharge, potable water supply maintenance, flood water control and management, and for providing contiguous open space for greenway and wildlife corridors. Approximately 770 acres (~65%) of these ~1,200 acres in the South Sector of Streetsboro are dominated by moderate to very high permeability substrates, growing forests, wetlands, and brush lands. Consequently, these areas were identified to be included in the proposed Streetsboro Ecological Reserve.

The South Sector is known to contain one of Portage County's highest volume clean potable water supplies, possessing some of the highest producing ground water wells in the County. This clean potable water source combined with the composition of the substrate provides very efficient ground water recharge resources. On the other hand, because of the high recharge rate, the Ohio Department of Natural Resources in recent statewide mapping (Ground Water Pollution Potential Maps & Reports) has identified **the South Sector as highly vulnerable to ground water contamination**. Consequently, it is also critical to protect the South Sector from potential contamination sources, including stormwater runoff.

Testable Hypotheses

The economic value analysis presented in this memorandum designed and conducted to provide a case study test of the following:

1. ***Free environmental services are less expensive to protect than replace.***
2. ***Replaced services not only are more costly, but do not cover the full range of services provided by natural systems that currently exist.***
3. ***Development can be done that does not compromise free services, and actually can improve some existing deteriorated conditions present in the South Sector.***

Two cost assessment models were analyzed to test these hypotheses. The first examines different infrastructure development plans (Model A) and the second, replacement scenarios for ground water recharge functions (Model B).

COST ASSESSMENT MODEL A: DIFFERENT INFRASTRUCTURE MODELS

Two conceptual infrastructure development plans were created for approximately 80% of the South Sector properties; each of which represents a total of ~935 acres. The Standard Subdivision Development model (Appendix 1-A), often referred to as “Sprawl”, is shown with the typical ratio at 80% to be developed and 20% to remain in open space. In this model, approximately 750 acres (80%) represents the land mass to be developed with 185 acres (20%) required to remain in “Open Space” by federal and local regulations.

Alternatively, the Conservation Development infrastructure concept plan permanently preserves ~620 acres (66%) classified as having a high ecological value with the remaining ~315 acres (34%) to be developed by employing scientifically based conservation principles (Appendix 1-B). These proven techniques, such as “Stormwater Treatment Trains,” would be designed to eliminate any negative impact to ground water recharge and surface water quality, free services currently being provided in the project area.

Municipal Infrastructure Costs Comparison of Conservation Development vs. Standard Subdivision Development

The purpose of this analysis is to quantify the variance in infrastructure maintenance costs the municipality would expend based on which of the two alternative infrastructure models are developed. Although the calculations provided here are not inclusive of all the infrastructure costs related to maintaining the municipal roads, stormwater sewers, sanitary sewers and water distribution systems in these models, (e.g., interest paid on capital improvements, design and engineering costs for the replacement of surfaces and systems etc.), it does provide a framework that illustrates the long term fiscal impacts associated with land use decisions made by community stakeholders today.

Infrastructure Cost Analysis

The following measurements are from the conceptual development plans illustrated in Appendix 1A and 1B:

1. Additional Roadway - Conservation development (43,900 lf) will have **48,000 lineal feet (lf) less** roads and utility infrastructure than Standard Subdivision development (91,900 lf).

2. Impervious Surface Area - Conservation Development would consist of **34 acres of less impervious** road pavement than Standard Subdivision Development (25 vs. 59 acres). *(This estimate does not include driveways, parking areas and roof surfaces)*
3. Reduced Earth Moving (Grading) - Conservation Development will result in **~556,745 less cubic yards of earth moving** than Standard Subdivision development.

Based on a survey of Midwestern communities, the cost for road construction were estimated to be in the \$250 - \$350 per lineal foot range. The annual infrastructure maintenance costs for an average public street are 1-5 % of the original installation cost of construction. Using the lower cost estimate of \$250 x (1%-5%), the approximate annual city costs for labor, supplies, technical support and subcontracted services to maintain the cities infrastructure would range from \$2.5-\$12.50/lineal foot/year. When roadways are in need of more intensive repair involving coring and resurfacing, approximately every 7 to 10 years, these costs would range from \$25-\$100 per lineal foot.

- A. Annual Municipal Maintenance Cost:** By reducing 9 miles of roads and utilities using conservation design the cost savings are estimated to range between \$120,000 - \$600,000.

Low end:

$$48,000 \text{ lf} \times \$2.50/\text{lf}/\text{yr} = \$120,000/\text{yr}$$

$$\$120,000/\text{yr} \times 20 \text{ yrs} = \$1,200,000$$

High end:

$$48,000 \text{ lf} \times \$12.50/\text{lf}/\text{yr} = \$600,000/\text{yr}$$

$$\$600,000/\text{yr} \times 20 \text{ yrs} = \$12,000,000$$

- B. Resurfacing Road Repair Cost:** During a 20-year period it is conservatively estimated that the city will need to resurface the roads two times. This would result in an additional cost to the community in the range of \$2,400,000 - **\$9,600,000**.

Low end:

$$48,000 \text{ lf} \times \$25/\text{lf} = \$1,200,000$$

$$\$1,200,000 \times 2 = \$2,400,000$$

High end:

$$48,000 \text{ lf} \times \$100/\text{lf} = \$4,800,000$$

$$\$4,800,000 \times 2 = \$9,600,000$$

- C. Total 20-Year Cost Savings for Maintenance and Resurfacing:**

Range of Total Municipal Infrastructure Costs Savings in 20 years = \$3.6 million to \$21.6 million

$$\text{Low Estimate} = \$1.2 \text{ million}^1 \text{ (Maintenance)} + \$2.4 \text{ million (Resurfacing)} = \$3.6 \text{ million}$$

$$\text{High Estimate} = \$12 \text{ million (Maintenance)} + \$9.6 \text{ million (Resurfacing)} = \$21.6 \text{ million}$$

Range of Annual Cost Savings = \$180,000 to \$1,080,000

(This Midwest location with its severe winter weather conditions experiences maintenance costs in the higher range due to the destabilization of road surfaces from repeated freezing and thawing combined with the accelerated deterioration resulting from constant salting.)

¹ The carrying costs for borrowed money or bonds are not included in these figures. This would suggest that these savings/costs would be increased by the averaged interest rates for money in the open market over the period of time.

Measurable Impacts of Land Use

Using 1,200 acres as the project area, for the Conservation Development versus Standard Subdivision development scenarios, the modeling of ground and surface water impacts was conducted. The research team first analyzed the comparison of stormwater volume and the phosphorus and sediment loads resulting from each of the land development models. These values were then utilized to estimate the likely increased municipal wastewater treatment costs associated with these modifications to the natural hydrology in the project area. These projections are based on the likely future Ohio EPA regulations, which will require under a Cuyahoga River Total Maximum Daily Load (TMDL), a local sanitary treatment plant to make equivalent phosphorus (P) reductions to offset new non-point source loads associated with Standard Subdivision new development with non-treated stormwater. We then determined the cost to re-create the functional level of ground water recharge capacity that would be lost with Standard Subdivision Development versus Conservation Development (see Cost Assessment Model B).

1. Surface Water Impacts: The following calculations and estimated costs summarize the resulting ground water impacts from these two alternative development scenarios, Standard Subdivision Development and Conservation Development in the ~1,200 acre South Sector properties of Streetsboro. The computations in this analysis are included in Appendix 2. It was assumed here that with Conservation Development and its associated stormwater treatment designs, runoff and pollutants from residential areas in this development scenario would be treated and infiltrated on-site and not discharged to the Cuyahoga River. Conservation Development will also include the preservation and/or enhancement of current features on woodlands and agricultural lands. Thus, only limited runoff and pollutant loadings (less than those from the current conditions) would be produced from the preserved and/or enhanced green spaces.

- Stormwater Volume - Use of Standard Subdivision Development will result in an estimated increase in **annual stormwater volume of nearly 620 acre-feet or 200 million gallons** compared to the runoff from Conservation Development. This is based on the estimated runoff from the land that will be converted to residential areas under Standard Subdivision Development (See Appendix 2A). In the case that on-site treatment of stormwater runoff is required, stormwater detention ponds with a total holding capacity of 45 acre-feet would be needed. As such, it is anticipated that this total runoff of 620 acre-feet will be not recharged to the aquifer if Standard Subdivision development occurs on 80% of the high quality resources areas. Moreover, Standard Subdivision Development would *increase* runoff over that from current land uses by 30%; Conservation Development would *reduce* runoff by more than 50% of over current conditions.
- Pollutant Loadings - In Standard Subdivision Development, an **additional 723 to 2,254 pounds** of phosphorus (range depends on the model used—Appendix 2A) and **132,813 pounds (~ 6 tons) of sediment** will leave the developed landscape annually compared to Conservation Development. In Standard Subdivision Development, these pollutants will initially enter detention ponds and then be diverted to surface and ground water resource areas. Detention ponds often quickly seal due to fine silt and clay sediments and thus lose their ability to replenish the ground water resources. This represents a 130-284% increase over Conservation Development in contaminant loads using phosphorus as a surrogate contaminant. Nitrogen, salts, and other materials will typically experience a significantly larger percentage increase than phosphorus. As estimated herein, phosphorus and sediment loading from Conservation Development would be only 5% of that from Standard Subdivision Development, and only 5-15% that of loading from current land uses in the South Sector.

2. Wastewater Treatment Plant Upgrade: In order to compensate for the extra phosphorus and other contaminants resulting from the increased volume of stormwater run-off; a wastewater treatment plant would have to go beyond what they are doing now to meet a 1 ppm phosphorus discharge requirement into the

Lake Erie and its tributaries. Using an average wastewater facility upgrade cost of \$23.37/lb (Appendix 2-B) needed to remove only the additional phosphorus, the increased cost of operating the local wastewater facility would be in the range of ***\$16,800 - \$52,600 per year*** which translates into approximately ***\$0.336 million - \$1.05 million over a 20-year period.***

COST ASSESSMENT MODEL B: REPLACEMENT SCENARIOS FOR GROUND WATER RECHARGE FUNCTIONS

We examine three scenarios to evaluate the costs to replace the recharge functions lost by the Standard Subdivision Development model in the high quality natural recharge areas found in the South Sector of Streetsboro. These are:

- **Replacement Scenario 1:** Constructs an engineered infiltration basin system over an existing high producing well field to receive a pumped supply from a surface water source.
- **Replacement Scenario 2:** Constructs a new drinking water treatment facility using surface waters from the Cuyahoga River and/or large lake(s)
- **Replacement Scenario 3:** Restores the forest and wetland landscapes lost by the Standard Subdivision Development model at an alternative location.

Appendix 3 provides a summary of the calculations for these three scenarios that are detailed as follows.

Replacement Scenario 1: Infiltration Basin over Well Field

This replacement model assumes that water would be pumped from the Cuyahoga River or quarry lakes into created infiltration depressions that are excavated or diked on agricultural lands over a drinking water supply well field. The infiltrated water would then be pumped by ground water well nests into the County/City water supply. An actual field testing of this approach has been conducted by The Portage County Water Resources Department. The results of this experiment showed high suspended solid loads in the river quickly reduced the infiltration function in the test fields. Due to the very high maintenance costs this system would require to successfully operate, Portage County Water Resource Department is no longer conducting this water recharge project.

Similarly, standard detention ponds constructed in larger Standard Development projects often receive little monitoring or maintenance after the initial construction phase. With further federal and state mandated water quality regulations likely, communities will ultimately be responsible for excavating the sediment loading from the detention ponds of poorly designed standard residential, commercial and industrial developments, also referred to as non-point sources.

Although a comprehensive engineering analysis would be required to more accurately determine the full costs and design specifications, the following assumptions were made for the purpose of this analysis:

- About 1.53 acres of undeveloped land is utilized (for a recharge basin with 2 million gallons per day holding capacity) for replacing water recharge functions lost to Standard Subdivision Development in this pumped infiltration basin example.
- This acreage has already been acquired by the public water utility that services this region and is a high quality recharge area.
- The infiltration basin used in this scenario is assumed to be well designed and maintained so that it can achieve the same recharge water quantity and quality as the well-preserved natural resources areas in the South Sector.

- Cost of operation for the infiltration basin is based on an operation cost for a pumping station with a capacity of 1.44 million gallons per day and the annual and scheduled maintenance of the infiltration basin (e.g., sediment removal, grass clippings and erosion control). The maintenance cost of the infiltration basin is assumed to be 20% annually of the construction cost. This is due to the high potential of clogging illustrated by the field testing done by The Portage County Water Resources Department cited above.
- The surface water source being pumped into the engineered water recharge area is 1.44 million gallons daily for 140 days annually to compensate for the lost ~ 620 acre-ft (202 million gallons) per year recharging water due to runoff from residential area under Standard Subdivision Development (See Appendix 2A).
- The infiltration basin construction has been estimated to require an excavation depth of four feet over the project area.
- 1 foot of sediment would need to be excavated every 5 years at \$6 per cubic yard.

The following provides a summary of some of the anticipated costs for replacement of 620 acre-feet of water lost or depleted from surface discharge equal to approximately 202 million gallons resulting from the Standard Subdivision Development model. Calculations are based on a 20-year life for a treatment facility.

Construction Cost of the Infiltration Basin Recharge Project

Total capital cost = \$112,000 + \$482,000 = \$594,000

Pump station cost = \$112,000

Total infiltration basin construction cost = \$385,000 × (1+25%) = \$482,000

Infiltration basin construction unit cost = \$1.44/cf

Infiltration basin capacity = 267,000 cubic feet

Infiltration basin construction cost = \$385,000

Infiltration basin contingency (design, permitting, admin., etc.) = 25% of construction cost

Operations of Infiltration Basin

20-year life cycle cost = \$8.65 million

Average Annual cost of operation = \$432,500

Pumping cost = \$1,500/million gallon × 202 million gallons per year = \$303,000 per year

General infiltration basin maintenance = 20% × \$482,000 = \$96,000 per year

Total operation = \$303,000 + \$96,000 = \$399,000 per year

Four major 1 foot excavations in 20 years at \$6/cy = \$59,000

In 20 years, total cost of operation = \$399,000 × 20 + \$59,000 = \$8.05 million

20-year life cycle cost = \$8.05 million + \$594,000 = \$8.65 million

(This cost does not include pretreatment of solids before they are pumped into the infiltration basin, nor does it include the cost for piping to bring the water source to the treatment site. These conservative estimates also do not include an adjustment for projected growth.)

Replacement Scenario 2: Surface Waters Pumped, Piped and Cleaned by a New Water Treatment Facility

Under the framework of the Great Lakes Charter Annex 2000, decisions are being made regarding future limited withdrawals from Lake Erie (and other Great Lakes and tributary rivers). Because of this, the cost for this water is expected to increase incrementally to a point that is several times the current cost. These economics frame the magnitude of the ground water recharge cost impacts to Streetsboro and Portage County.

An alternative method to replace the lost ground water recharge and associated well fields with another clean drinking water source is to pump surface waters (from quarry lakes) and to run that water through a drinking water treatment facility to clean the water of bacterial, nutrient, and contaminants to meet federal and state drinking water standards. It is estimated by field testing that a 3 million gallon daily capacity is currently available from a well field in the South Sector.

These are the assumptions made for Replacement Scenario 2:

- A 3 million gallon daily capacity is piped from the Cuyahoga River and/or a large quarry lake into a new drinking water treatment facility with a 20-year life cycle.
- Estimated cost for construction of the new surface drinking water plant is ~\$5 per million gallons per day.
- Estimated cost for construction of additional piping and pumping equipment for new water supply is ~\$2 per million gallons per day.
- Estimated cost to operate new surface water treatment facility is \$1,400 per million gallons.

New Surface Water Treatment Facility Construction Costs:

Construction of Treatment Facility = \$15 million
(3 million gallons of daily capacity × \$5 per million gallons)

Additional Piping and Pumping Equipment = \$6 million
(3 million gallons daily capacity × \$2 per million gallons)

Total Cost to Construct New Plant = \$15 million (construction) + \$6 million (additional)
= \$21 million

New Surface Water Treatment Facility Operation Costs:

Operating Costs for New Treatment Facility = \$4,200 per day
(\$1,400 per million gallons per day × 3 million gallons daily)

Annual Cost to Operate Facility = \$4,200 per day × 365 days = \$1.5 million
Operating Cost over 20-year Life = \$30 million

Total Cost for Construction and Operation of Drinking Water Plant (20-year period):

\$21 million (Plant Construction/Equipment) + \$30 million (Operations) = \$51 million

Replacement: Scenario 3: Replacement of Existing Biodiversity & Natural Resource Areas

Under this section we provide a scenario to replace the existing land in Streetsboro's South Sector over a period of 20 years with equivalent high infiltration lands that also have the biodiversity resources present in these same lands. Computations used in creating this scenario are presented below. The wetland and forest restoration costs include design, engineering, permitting, earth moving, planting, management and compliance monitoring. The unit costs are from AES's data and based on real restoration costs for comparable systems installed in the Midwest U.S.

The assumptions made for the following analysis are:

- The biodiversity can be restored to its current functions and services. (Note, however, that there is no scientific evidence available to prove that restoration of high quality resources can be successfully accomplished.)
- 700 acres are available for purchase above or in close proximity to a high producing aquifer that has significant connections to surface geology and recharge.
- The soil substrate composition has a high percentage of sand and gravel deposits on the 700 acres being purchased or already owned by the public water utility.
- 140 acres of high quality wetlands will be created on 700 acres.
- 560 acres of woodlands will be restored on the remaining 700 acres.

Restoration and Land Acquisition Costs:

1. Woodland Restoration - estimated cost of \$20,000 per acre × 560 acres = \$11.2 million
2. Wetland Restoration – estimated cost of \$12,000 per acre × 140 acres = \$1.7 million
3. Land acquisition – Area land values ranges from \$10,000 per acre to \$30,000 per acre

\$13 million (restoration) + \$7 to \$21 million (land acquisition)

Total Replacement of Biodiversity & Recharge Functions/Services = \$20 million to \$34 million

Replacement Scenario Strategy Analysis

Although the three replacement cost scenarios under the Cost Assessment Model B identify some of the monetary costs projected to replicate the services and functions currently being provided for free by the natural landscape, these models do not evaluate all the associated fiscal, social and health related costs of losing important natural resources.

Even though the replacement cost for the infiltration basin in Scenario 1 is the least expensive option in this analysis, these systems are often unsuccessful in removing many harmful contaminants such as salts and pesticides while recharging the ground water resources. Another potential drawback of this model is the project unsightliness and noise generation during routine maintenance excavations. The close proximity of the infiltration basin to any residential housing could negatively impact the value of those residences. Conversely, if the location of the infiltration basin is far removed from the eventual consumer, the higher the cost will be to deliver (piping and pumping) the water to the infiltration site.

None of the interest accrued for the capital costs needed to implement any of these potential replacement strategies are included. These include land acquisition, facility construction, additional equipment/piping, native plant material, and excavation, etc. To illustrate the significance of this point, one can assume the City of Streetsboro had borrowed \$21 million to construct a new drinking water plant as shown in Scenario 2. Assuming that the facility construction loan has an interest rate of 5% and is paid back over a 20-year period,

the total amount paid by the community would equal close to \$31 million. The almost \$10 million of interest in this example represents nearly 50% of the original cost of constructing the new facility.

Of the three replacement strategies, Scenario 3, the restoration of all wetlands and forested land would be the preferred option given its multitude of additional benefits. The restored land would be enjoyed for recreation by the public, re-establish the regional biodiversity and improve the area's air quality with the services provided by the woodlands. Unfortunately, the full restoration of high quality wetlands and forest resources has never completely been achieved to date. There would also be an increased probability of the ground water resources getting contaminated prior to the twenty-year restoration maturation period.

By all counts, the natural resource areas present in the South Sector or Streetsboro are important assets that will increase in economic value as development continues to impair other resources in the community and region. The comparison of these replacement cost scenarios to attain an equivalent stormwater recharge (with the quality and quantity presently infiltrating in the mapped 700+ acres of high quality natural resource lands) suggests that the protection of the existing functions on these 700+ acres would obviously be the most cost effective and practical strategy.

Appendix 1

A. Standard Subdivision Development Infrastructure Concept Plan

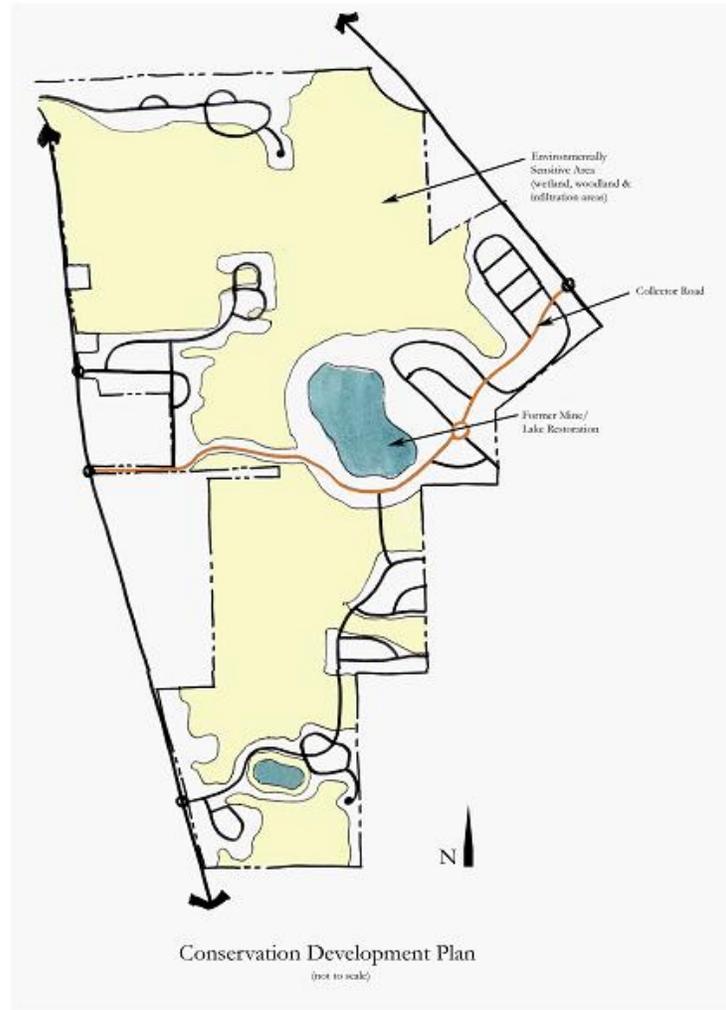


Conventional Development Plan
(not to scale)

The Standard Subdivision Development Infrastructure Plan Contains:

Total lineal feet of road = 91,900 lf.
16,500 lineal feet of collector roads (48 ft) = 792,000 sq. ft.
75,400 lineal feet of local roads (24 ft) = 1,809,600 sq. ft.

B. Conservation Development Infrastructure Plan



The Conservation Infrastructure Plan Contains:

Total lineal feet of road = 43,900 lf.
7,500 lineal feet of collector roads (48 ft) = 360,000 sq. ft.
36,400 lineal feet of local roads (20 ft) = 728,000 sq. ft.

Appendix 2

A. Estimated losses of ground water recharge functions and additional Phosphorus and Sediment loading with Standard & Conservation Subdivision Development

Current land use distribution:

	<u>Water+wetland</u>	<u>Woodland</u>	<u>Agricultural</u>	<u>Quarry, etc.</u>
Area (acres)	157.5	509.3	357.9	144.3
Percentage (%)	13.5	43.6	30.6	12.3
Estimated runoff (acre-ft/yr)	261	123	87	157

Loading calculations

Method 1, Land use-based Empirical Model

Phosphorus (lbs/yr)	57	37	87	160
Sediment (lbs/yr)	4,254	17,099	50,893	38,180

Method 2, Unit Area Loading Model

Phosphorus (lbs/yr)	44	16	192	348
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Standard Subdivision Development Scenario:

	<u>Water+wetland</u>	<u>Woodland</u>	<u>Residential</u>	<u>Quarry, etc.</u>
Area (acre)	157.5	76.3	935.2	0.0
Percentage (%)	13.5	6.5	80.0	0.0
Estimated runoff (acre-ft/yr)	261	18	618	0

Loading calculations

Method 1, Land use-based Empirical Model

Phosphorus (lbs/yr)	57	6	723	0
Sediment (lbs/yr)	4,254	2,562	132,813	0

Method 2, Unit Area Loading Model

Phosphorus (lbs/yr)	44	2	2,254	0
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Conservation Development Scenario:

	<u>Water+wetland</u>	<u>(Preserved & Enhanced) Woodland</u>	<u>Residential</u>	<u>Quarry, etc.</u>
Area (acre)	157.5	696.5	315.0	0.0
Percentage (%)	13.5	59.6	26.9	0.0
Estimated runoff (acre-ft/yr)	261	18	0	0

Loading calculations

Method 1, Land use-based Empirical Model

Phosphorus (lbs/yr)	57	6	0	0
Sediment (lbs/yr)	4,254	2,562	0	0

Method 2, Unit Area Loading Model

Phosphorus (lbs/yr)	44	2	0	0
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B. Costs for Phosphorus reduction at existing Wastewater Treatment Plants

Using chemical precipitation treatment, requiring minor to major wastewater treatment plants (WWTPs) upgrades, the following example costs are provided. . To use these numbers we have assumed that under a Cuyahoga River TMDL, a local WWTP will have to make equivalent phosphorus (P) reductions to offset new non-point source loads associated with new development and the associated non-treated stormwater loads. Three Midwest US examples follow:

1. Faeth, P. "Fertile Ground: Nutrient Trading's Potential to Cost-effectively Improve Water Quality," World Resources Institute, Washington, DC. 2000.

The following costs are for additional treatment to remove P via chemical precipitation or other similar non-structural treatment approaches for municipal WWTPs located in:

Minnesota River, Minnesota: \$19.57/lb. P reduced
Saginaw Bay, Michigan: \$23.89

2. Kieser, M. "Phosphorus Credit Trading in the Kalamazoo River Basin: Forging Nontraditional Partnerships." Water Environment Research Foundation, Project 97-IRM-5c, 2000.

This example is for a single paper plant WWTP upgrade that would include new equipment construction (capital investments) to remove phosphorus.

Paper Plant treatment system upgrade to achieve P discharge requirements to the Kalamazoo River:
\$212/lb.P reduced

3. "Preliminary Economic Analysis of Water Quality Trading Opportunities in the Great Miami River Watershed, Ohio." Report prepared by Kieser & Associates for the Miami Conservancy District, Dayton, Ohio, July, 2004. (Available at http://www.envtn.org/docs/Great-Miami_Trading_Analysis.pdf)

For 109 WWTPs in the Great Miami River Basin (design flow <0.1 to 72 MGD) upgrading to Biological Nutrient Removal technology (i.e., expensive capital improvements) for required P and nitrogen removal under Ohio's forthcoming nutrient standards, costs ranged as follows per design flows of WWTPs:

<0.1 MGD: \$120.01/lb P reduced
0.1-1 MGD: \$33.45
1.1-13 MGD: \$14.35
20-72 MGD: \$25.35

On a watershed-wide basis considering all WWTPs, the average cost is \$23.37/lb P reduced.

Appendix 3

Municipal Costs/Savings of Land Use Comparison Summary

<u>Code</u>	<u>Scenario Name</u>	<u>Municipal Costs (20 years)</u>	<u>Annual Municipal Costs</u>
A1	Infrastructure Costs	\$3.6 - \$21.6 million	\$180,000 - \$1,080,000
B1	Pumped Infiltration Basin	\$8.65 million	\$432,500
B2	Water Treatment Plant	\$51 million	\$2.55 million
B3	Biodiversity Replacement	\$20 - \$34 million	\$1 - 1.7 million

A1 - Municipal Infrastructure Costs:

The municipal infrastructure cost to maintain nine miles of additional roads and utilities on 755 acres that would be developed in the Standard Subdivision Development Scenario will be in the range of **\$8 million to \$21 million** due to the Midwestern climate.

B1 - Pumped Infiltration Basin:

The pumping of water from the Cuyahoga River or a large quarry lake into excavated basins in fields with high producing ground water wells would cost an estimated **\$8.65 million** over twenty years provided the public utility already owns the project area land.

B2 - New Water Treatment Plant:

This proven replacement strategy would mostly be the option chosen by the public utility given its higher rate of success. The total cost of a new water treatment facility of **\$51 million** is very conservative. The cost to purchase the land utilized, the interest on the capital expended and the probable increased chemical treatment costs are not included.

B3 - Replacing All the Natural Resources

The replacement of all the existing wetlands and woodlands will range between **\$20 million to \$34 million**. This cost estimate assumes that the land being purchased is available with sand and gravel resources and the land will not appreciate in value over time.

ATTACHMENT D

Herrick Fen Preserve Feasibility Study

**NATURAL RESOURCES INVENTORY &
RESTORATION POTENTIAL *of*
THE HERRICK FEN NATURE PRESERVE**

~

PORTAGE COUNTY, OHIO

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EXECUTIVE SUMMARY

In this report, Applied Ecological Services identifies, maps, and describes the ecological condition of the important natural resource elements in the Herrick Fen Property. These resource elements include the physical features of the landscape, including the unique geological setting, topography and drainages, including plant communities, and potential habitat for endangered plant and animal species.

In this survey and assessment we also identify a number of critical natural resource issues, resulting from conditions on site as well as conditions in adjacent properties that directly impact the Herrick Fen Property. The following general conditions were found present:

- ?? Most of the wetlands on the site consist of high quality sedge meadow/fen and emergent plant communities.
- ?? Low quality reed canary grass wetlands, shrubby wetland ecotonal areas and drain hydric soil units comprise the remainder of the wetland areas on property.
- ?? Upland maple-beech woodlands comprise the majority of upland areas on the property.

Based on the natural resources and critical resource issues identified during our survey, Applied Ecological Services recommends the following actions be considered in developing a restoration and management program for the property. These recommended actions are also intended to reflect what we understand to be the long-term goals and objectives of TNC: examples... restoring a high level of ecological health to the land, implementing effective and cost effective management strategies, and promoting wise land management.

1. Brushing and herbiciding of all non-native woody species.
2. Develop and implement/management plan for all areas of the Nature Preserves.
3. Restore degraded/dewatered reed canary grass wetlands.
4. Restore degraded/dewatered upland wet mesic prairie/sedge meadows.

Restoration of the Herrick Fen and Wetland Mitigation Credit Generation

This investigation also assessed the potential for using restoration of the Preserve to generate wetland mitigation credit. Once restoration occurs, and performance milestones are achieved, credit can be sold to developers and other parties (Highway Department, municipalities, etc) to offset and compensate for permitted wetland impacts that might be associated with their projects.

The Conceptual Restoration Plan for Herrick Fen includes an inset table that provides a summary of the mitigation credit that may be yielded from successfully conducting the restoration on this Preserve.

At this preliminary time, it appears that up to ~ 60 acres of credit may be negotiated and made available at the Preserve. The approach would satisfy what we believe to be TNC's stated goals for the restoration work addressing the entire preserve. This approach may also assist in generating revenue that could be used with TNC or other partners (e.g. Portage County Park District) to protect and restore adjacent lands to the Preserve. The protection and restoration of some of the adjacent parcels may be critical to offering the ground water recharge and water quality of the Fen Preserve greater protection.

AES, Inc. has evaluated the costs for the restoration work and it appears at this early time that the Herrick Fen preserve could provide a viable wetland mitigation bank site. We look forward to taking about the next steps in such a process.

INTRODUCTION

In August and September 2004, Applied Ecological Services, Inc. conducted a natural resources inventory on the Herrick Fen Nature Preserve located in Portage County, Ohio (Exhibit 1). The survey is an initial task in the development of a comprehensive restoration and long-term management plan for the property. The plan will include restoration goals, techniques and guidelines, to protect the natural resources of the Herrick Fen Nature Preserve into the future. The results of the present survey will inform the restoration and management planning process. This process was undertaken to explore the options for establishing a wetland mitigation bank at Herrick Fen. This could be developed to generate revenue to help finance site restoration and management and perhaps could contribute to protecting some adjacent parcels of land. These could provide buffering to the Fen, water resources, and recharge zones.

METHODS

Information Search and Review

We first conducted a search and review of available resource data and documentation pertaining to natural resources and land uses on the Herrick Fen Nature Preserve. Available materials included recent digital orthophotography and topography.

Land Cover Classification and Mapping

We developed a base map of the project area using orthophotography, applying property boundaries provided by TNC. We then conducted a preliminary in-house review and delineation of major vegetation and land cover types, based on photo interpretation and topographic data.

During the months of August and September, we spent approximately 10 person-hours conducting a ground reconnaissance of the entire property. We identified and mapped the locations of natural and agricultural plant communities, recorded plant species representative of each identified plant community, documented disturbances and general ecological health conditions on the property and on adjacent properties, and identified restoration and management opportunities. We also did agricultural tile surveys in specific locations.

Ecological Health Evaluation & Plant Community Quality Ranking

We assess the ecological health of the natural resources of the Herrick Fen Nature Preserve using a guiding set of ecosystem health principles developed by AES and others (see discussion in Exhibit 3). Based on these principles we identify five degrees of plant community quality, each reflecting the degree of natural community integrity and of disturbance. Numbers associated with each ranking are included in the land cover map code reflecting the general condition of the delineated map units in Exhibit 8.

1: High Quality – Intact, well-buffered native plant community. These are large areas of unbroken native vegetation that are buffered from direct runoff from agricultural and other types of developed land. Natural disturbance regimes are functional, and invasion by exotic species is minimal or non-existent.

2: Moderate Quality – Degraded but solid native plant matrix; moderate to high-diversity native plantings. Disturbances are mostly indirect; remnant native vegetation and conservative plant assemblages are present; contains or has the potential to support rare resources; exotic, invasive species are present, but

not overwhelming; recuperative potential is relatively high, with moderate intervention, such as minimal mechanical and chemical removal of exotics, and in some locations and communities the use of periodic fire, and modest reintroduction of native species. In native plantings, native prairie grasses are well established and the planting contains a diverse mix of native prairie forb species.

3: Low Quality – Invading woody growth and exotic species; shade-suppressed ground cover; low-diversity native plantings. Land use impacts are more severe, such as from over-grazing and logging, and have resulted in the loss of important canopy trees and soil-stabilizing native ground cover vegetation; conditions are further degraded by dense shading resulting from over-developed tree and exotic shrub canopies, increasing the risk of soil erosion on steep slopes; recuperative potential is low, requiring extensive mechanical and chemical removal of exotic woody growths, re-vegetation of bare soils to stabilize eroding soils and provide fine fuel for carrying fire, and re-introduction of native plant propagules to restore native diversity.

4: Very Degraded – Few native species; vegetation converted to non-native trees and grasses. Land use impacts are extremely severe and chronic, such as from complete removal of vegetation, conversions to exotic species cover, loss of top soils or native soil burial through erosion and sedimentation, and complete loss of the native seed bank; recuperative potential is very low, requiring costly mechanical and chemical removal of exotic and invasive species and complete re-introduction of native seed and plant materials.

5: Developed, tilled, scraped land or fill material.

Prioritization of Restoration & Management

During the restoration planning process, we identify clearly defined management units to allow a systematic approach to costing and conducting restoration tasks. Prioritization is based on several factors, including the ecological significance of a given area, or in other words, the ecological risk inherent in a given area. Risks include:

1. Presence of remnant plant communities or critical species habitat, where natural diversity is at risk if restoration intervention is not implemented
2. Areas with exposed or sparsely vegetated steep slopes and highly erodible soils, where severe erosion is occurring, threatening burial of wetland plant communities and down-stream aquatic systems
3. Areas with major exotic plant infestations, that threaten local native diversity
4. Areas that provide critical buffering benefits to remnant native communities

RESULTS AND DISCUSSIONS

Physical Setting

Geology. More than 12,000 years ago, Herrick Fen Nature Preserve was a river valley carved from a bedrock of silt and clay. As the Wisconsin glacier advanced and retreated through the valley, it left a heavy accumulation of ground stone or gravel (dug up from northern origins as the glacier moved south). Cold springs, unable to drain through the impermeable foundation of clay and silt, sprang to life through the gravel and, as in the case of Herrick Fen, fostered the fen environment. The water is rich in both calcium and magnesium, making the natural environment largely alkaline. Ice Age relics, or plants deposited along with the gravel as the glacier retreated, are found at Herrick Fen, including one of the only reproducing tamarack communities in Ohio.

Relief and Drainage. Uplands are gently rocky to steep in some areas. Wetland areas are essentially flat. Tinkers Creek passes through the western portion of the property.

Endangered Resources. We did not conduct exhaustive plant and animal inventories for the purposes of this study, however, Tamarack was observed on site. Tamaracks are conifers, which shed needles every year. Another unique community found at Herrick Fen is the horsetail-sedge fen supporting bayberry, listed in the State of Ohio as endangered. This preserve and its unusual environment support more than two dozen state-listed species. Shrub swamplands, cattail marshes, and beech-maple forests can be visited, and a boardwalk protects the natural environment from our curiosity at its wonders. This preserve is owned by The Nature Conservancy and Kent State University, and it is managed by The Nature Conservancy as a dedicated state nature preserve. It will be important that future restoration efforts on the Herrick Fen Nature Preserve be accompanied by periodic surveys to monitor the effects of restoration, including the potential regeneration and proliferation of rare or unusual species.

Ecological Land Cover Types

Following is a general description of each of the land cover types depicted in Exhibit 2 acknowledged by AES. These were developed to assist in defining the restoration strategies in later sections. Acreages for each cover type is approximated in the legend of the Land Cover Map. We present a summary of the survey data collected at representative locations throughout the project area in Exhibit 6. Some survey locations are identified as numbered GPS Locations on the Ecological Land Cover Map.

Agricultural Field – a small part of the Preserve in the southeastern corner appears to contain a small portion of agricultural field. Quality ranking number 5.

Upland Shrub Scrub – an area near the parking lot contains scattered to dense? shrubby species with a groundstory matrix dominated by reed canary grass. Portions of this area appear to have been cited and subsequently dewatered, allowing for invasive species such as reed canary grass and to some extent woody shrubs. Quality ranking number 3 to 4.

Forested Communities

Upland Woods – Upland woods areas are mostly beech maple woods with scattered subcanopy of native and non-native woody species. In some areas the sub-canopy appears overstocked and is causing shade suppression to groundstory vegetation. Quality ranking number 1 to 2.

Young Woodland (2D) – a small young wood area of green ash, elm and shrubby species is found in the northwest corner near the small parking lot. Quality ranking number 4.

Wetland Communities

Emergent/Wetland – consists of sedge meadow and cattail surrounding an open water complex in the central portion of the property. Quality ranking 2 to 3.

Reed Canary Grass Wetland – an area in the western portion of the site has been drained, most likely farmed in the past and developed into a low quality wetland dominated by reed canary grass. A small area of reed canary grass drainage areas is also found adjacent to the northern gravel road. Quality ranking number 4.

Fens – A substantial portion of the wetland complex consists of high quality fen and shrubby fen. This contains a higher density of native species as well as a number of rare and threatened or endangered species. Quality ranking number 5.

Cattail Marsh – a large portion, mostly on the eastern side of the wetland complex, is dominated by cattail marsh. Quality ranking number 3 to 4.

DISCUSSION

In this report, Applied Ecological Services identifies, maps, and describes the ecological condition of the important natural resource elements in the Herrick Fen Nature Preserve. Restoration of the degraded conditions in the Preserve can be used to generate wetland credit sales through The Clean Water Act and applicable state regulations. This potential is described fully below.

Restoration of the Herrick Fen and Wetland Mitigation Credit Generation

This investigation also assessed the potential for using restoration of the Preserve to generate wetland mitigation credit. Once restoration occurs, and performance milestones are achieved, credit can be sold to developers and other parties (Highway Department, municipalities, etc) to offset and compensate for permitted wetland impacts that might be associated with their projects.

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AES, Inc. has evaluated the costs for the restoration work and it appears at this early time that the Herrick Fen preserve could provide a viable wetland mitigation bank site. We look forward to taking about the next steps in such a process.

RECOMMENDATIONS

Based on the natural resources and critical resource issues identified during our survey (Exhibit 2), Applied Ecological Services recommends the following actions be considered in developing a restoration and management program for the Herrick Fen Nature Preserve (Exhibit 4). These recommended actions are also intended to reflect what we understand to be the long-term goals and objectives for the property: restoring a high level of ecological health to the land, implementing effective and cost effective management strategies, and promoting wise land management by providing a model for ecological restoration, etc. examples.

- 1.0 Restore hydrology to the northwest corner of the property (reed canary grass wetlands, shrub scrub upland and young woods zones) by tile location and abandonment.
 - 1.1 Remove reed canary grass by herbiciding and burning. This will require up to 2 years to control.
 - 1.2 Reseed and replant reed canary grass areas.
 - 1.3 Establish vegetation and hydrological monitoring schedule.
 - 1.4 Establish both short-term and long-term management strategies.
- 2.0 Remove invasive exotic shrubs from the property, including the bush honeysuckles, multiflora rose, hawthorn, black locust and glossy buckthorn.

- 3.0 Control, where possible, herbaceous invasive species such as reed canary grass, especially in other herbaceous species such as Canada thistle, purple loosestrife, sweet clover, remnant sedge meadow and fen communities.
- 4.0 Reduce the forested canopies, removing invading mesophytic trees such as boxelder, ash, and American elm, to increase the light to the ground story, achieving a minimum of 30% of ambient light levels (light of nearby open settings). Target light levels should be adequate to stimulate regeneration and re-invigorate the fine rooted, soil stabilizing ground cover vegetation, including native sedges, grasses, and forbs.
- 5.0 Develop short-term and long-term prescribed management strategy, if not already in place.

EXHIBIT 1. PROPERTY LOCATION MAP

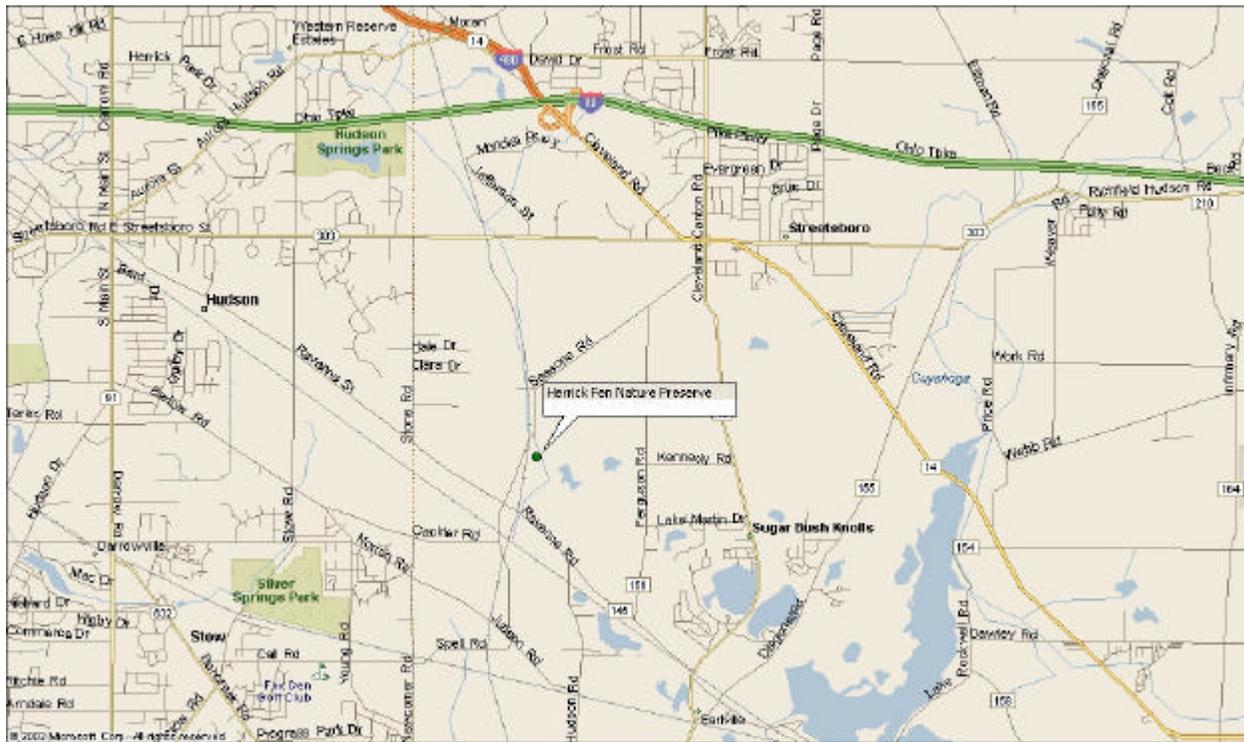


EXHIBIT 2. EXISTING CONDITIONS MAP

EXHIBIT 3. ECOSYSTEM HEALTH PRINCIPLES

The guiding principle Applied Ecological Services, Inc. uses to evaluate the need for management intervention or restoration¹ is “ecosystem health”. It is a concept becoming more widely applied to problems of environmental management, where sustainable systems are achieved through an integration of the biological integrity of ecosystems and the needs and values of humans that use them. The most symbolic and easiest to understand goals for achieving ecosystem health (as defined by this paradigm) are inherent in the following indicators of a healthy ecological system:

1. Stable soils. With few exceptions, all vegetated systems in the world have stable soil systems. In general, unstable soils are a good indicator of failing ecological system health, and can be very costly to repair. In oak woodlands, unstable soils generally result from densely shaded ground that prevents the growth of soil stabilizing herbaceous plants such as grasses and sedges.
2. Predominance of sustainable populations of native plants. Plant communities historically were dominated by species that existed or slowly moved into the various regions of the world, responding to climate change as a principle agent associated with their geographic movement. Now, humans introduce (inadvertently and advertently) plants at rapid rates. Many introduced plants represent a threat to native plant and animal communities.
3. Quality water, at appropriate rates and volumes. Poor water quality and high rates and volumes of runoff are associated with human disturbance of soils and vegetation systems on uplands and drainage of wetlands that hold water and slowly release it. Healthy systems tend to retain water better than degraded areas.
4. Capacity to change and adapt to disturbance. The ability of ecological systems to restructure or reassemble after changes is a key ingredient to healthy systems. Degraded or unhealthy systems tend to become more degraded after disturbance. Although the land may be vegetated, it may be by weedy plants and animal’s rather diverse native plant and animal communities.
5. Diverse plant and animal communities. Native plant communities are in general comprised of many species that contribute to the character and structure of the habitat that supports animal communities. Unhealthy plant communities tend to be low diversity, often dominated by one or a few plant species, and support a depauperate animal community.

Fundamental aspects for successful restoration and management and maintenance of healthy stable ecological systems usually include the following human focused goals:

1. Stewardship relationship and commitment between people and ecological resources – not a status quo, *laissez faire* attitude. It is the connection between people and the ecological resource that will determine the future fate of the resources. In highly altered areas, remaining ecological system remnants are highly vulnerable to impacts by surrounding land-uses. At these locations in particular, humans need to have an active role in the management, restoration, and monitoring of these ecological systems.
2. A commitment of funds and policies to ecological health, restoration, management and monitoring programs. Political will and funding can relate directly to the investment people are willing to make in

¹ Ecological Restoration is defined by the Society for Ecological Restoration as “the process of intentionally altering a site to establish a defined, indigenous, historic (presettlement-like) ecosystem. The goal of this ecosystem is to emulate the structure, function, diversity and dynamics of the specified ecosystem. In other words, the intent is to repair or re-establish entire functioning ecosystems. Ecological Restoration also encompasses management practices that are intended to maintain ecological integrity.

natural resources and stewardship. Successful natural resources restoration and management programs have high levels of support.

3. Adaptability of management strategies to new information. Natural systems may respond favorably, unfavorably, or with no change to management and restoration tasks. Following nature's lead, and modifying the management and restoration program to account for specific responses to the restoration program, provides a basis for an adaptive program. Program changes would be based on monitoring data indicating better approaches to address ecological problems.
4. Designed with prudence, humility, and open eyes, to learn from the ecological system, and not foreclose on future options or needs. Natural systems must be handled carefully and with humility. Programs that are focused on learning from the system are essential. Hard and fast programs with no opportunity to learn or adapt are very dangerous.

EXHIBIT 4. PROPOSED RESTORATION AND ENHANCEMENT COMMUNITIES MAP

EXHIBIT 5. DESCRIPTIONS OF GPS POINT LOCATIONS

Example: GPS Point 1 –Shrub scrub upland.

This area is a moderate to low quality upland community that appears to have had at least portions drain tiled in the past. Historically, this area was most likely wetland in portions as evidenced by the remnant native wetland woody species present (*Cornus racemosa*), *Cornus amomum*; *Fraxinus pennsylvanica subintegerrima*, *Viburnum* species). Also a large area of the herbaceous layer contained the non-native wetland grass, *Phalaris arundinacea*.

Example: GPS Point 3 –Reed canary grass wetland in the northwest corner.

This semi-open wetland is dominated by reed canary grass. Historic drain tiles are believed to be present and dewatering the surface of this area, which favors the non-native reed canary grass. Scattered willows (*Salix*), dogwoods (*Cornus*), box elder (*Acer negundo*), and green ash (*Fraxinus pennsylvanica subintegerrima*) were also observed. A few native remnant herbaceous species such as Joe-pye wed (*Eupatorium maculatum*) remain. Purple loosestrife (*Lythrum salicaria*) an aggressive non-native invasive species was also observed in this area.

Example: GPS Point 4 –Reed canary grass wetland.

This wetland has been dewatered through surface drainage. The dominant species present is the non-native reed canary grass. Scattered, native species such as cattail (*Typha*), blue vervain (*Verbena hastata*), gray dogwood were also observed. An east-west ditch drains water from the eastern wetland area and eventually connects to Tinkers Creek to the west. The down cut creek and ditch are most likely the main dewatering factors. Preliminary drain tile study did not reveal their presence, but still may be present.

Example: GPS Point 5 – Shrub scrub ecotone between reed canary grass wetland and upland woods.

This area contains scattered *Viburnums*, gray dogwood, ash with reed canary grass as a dominant herbaceous species. However a number of native species and some patches of native species still are present in this ecotone.

Example: GPS Point 6 – Upland woods of basswood, shagbark hickory, sugar maple, beech and red oak.

Seepage wetlands, consisting of skunk cabbage and other wetland species, observed along portions of the toe of slope of this community. Shrubby canopy dense in some areas, suppressing native groundstory vegetation.

Example: GPS Point 7 – Open water.

Reed canary grass is found along the woodland edge. Closer to open water are nut sedge and rice cut grass are found, with water lily in open water areas. Areas have a dense mat of duckweed, usually indicative of high nitrogen input. Other species along shoreline zone were, beggar ticks, spike rush, smartweed, bur reed, cattail, wool grass, willows, arrowhead, Joe-pye weed, and great blue lobelia. Areas of beaver activity along adjacent areas of the upland woods were also observed.

Example: GPS Point 9 – Fen.

Highly diverse fen with scattered shrubs. Some reed canary grass observed as well as fen buckthorn. Poison sumac was a noticeable shrub in this community as was buttonbush in some areas, *Spiraea*, and shrubby cinquefoil

Example: GPS Point 10 – Dense shrub-scrub fen area.

This area has been overgrown with a dense shrub canopy of glossy buckthorn, gray dogwood, *Viburnum*, poison sumac and other shrubs.

Example: GPS Point 11 – Edge of pond and more open fen area.

Highly diverse fen area near open water /emergent zone. Scattered shrub of shrubby cinquefoil, glossy buckthorn, elm, nannyberry, dogwoods, alder and bayberry.

Example: GPS Point 12 – Open water.

Open water/emergent area contains a diverse assemblage of plant species. Some reed canary grass invasion observed in spots.

Example: GPS Point 13 – Ecotone between wetlands and upland woods.

Seepage areas are found along toe of slope with scattered reed canary grass, but mostly this area is comprised of native woody and herbaceous species, such as Viburnum, poison sumac, red maple, alder, lobelias, tussock sedge, ferns, Joe-pye weed, skunk cabbage, sedges, fowl manna grass and jewelweed.

Example: GPS Point 17 – Cattail marsh.

This area is dominated by cattails with somewhat higher diversity assemblage found at ecotone between marsh and upland woods.

Example: GPS Point 20 –

Woods consisting of red oak, a lot of black cherry, hickory, sugar maple and hawthorn. Occasional hemlock observed. Portions highly disturbed with black locust.

Example: GPS Point 22 –Upland woods of beech, black cherry, red oak, glossy buckthorn, sawtooth and maples.

Quite shade suppressed in some locales. Boardwalk starts at lower edge near wetland in this area. Occasional sassafras also observed in this area.

Example: GPS Point 25

Boardwalk passes through a small tamarack/bayberry area. Quite diverse with shrubby cinquefoil tussock sedge, Joe-pye weed, cattail, sunflower, dogwood, fen thistle, fringed brome grass, nannyberry, elderberry, Kalm's lobelia, poison sumac and other sedges.

ATTACHMENT E

Menomonee River Valley Case Study

**MENOMONEE RIVER VALLEY CASE STUDY:
RESTORING FLOW REGIMES THROUGH GROWING WATER TRANSACTIONS**

GREAT LAKES PROTECTION FUND GRANT #755

April 5, 2006

Summary of Findings

The project team of Shaw Environmental & Infrastructure, Inc., Policy Solutions Ltd. and the 16th Street Community Health Center (the Project Team) prepared this case study on growing water opportunities in the Menomonee River Valley in downtown Milwaukee, Wisconsin.

The Project Team understands “growing water” to be the maximization of the services, quality and quantity of hydrological resources to the Great Lakes ecosystem and economy. Growing water focuses on the increase of functions of water within appropriate hydrological cycles in ways that generate identifiable and measurable benefits to the human and natural environment. For instance, redirecting stormwater away from leaking, combined sewer infrastructure into restored wetlands or stormwater parks where the water is cleaned and released to the Great Lakes watershed “grows water” in terms of water quality improvements and support of water-dependent resources.

The Menomonee River Valley case study was undertaken to test the hypothesis that pursuing and realizing opportunities for hydrologic improvements in a dense urban area within the Great Lakes watershed can drive market-based transactions that create both economic and ecological value within the watershed and the immediate metropolitan community. We found in the case study that such opportunities can capitalize on existing policies, programs and financial resources to stimulate traditional real estate transactions that can result in rehabilitated flow regimes, environmental remediation, and infrastructure improvements that provide a reliable, high-quality supply of water to streams and rivers that are tributary to the Great Lakes Basin.

A further critical learning point that deviated from initial project expectations focuses on the limitations for stimulating stand-alone, market-based transactions in water improvement as a commodified product. Rather, our case study finds that “growing water” can occur through more traditional transactions that embed water improvements as a lesser-included part of the broader, primary transactions.

When this project began, there was an expectation that the “improvement standard” governing access to Great Lakes water would be adopted as a governing principle by the Great Lakes states and provinces, and that the resulting legal regime would provide the legal constraints and context to drive stand-alone transactions for growing water in the Great Lakes. This expectation did not materialize. In the absence of a new, Basin-wide governance standard, we found no alternative, pre-existing legal or regulatory context in which to structure a robust market in stand-alone hydrological improvements transactions in Great Lakes water. There is a paucity of both legally-guaranteed property interests in hydrological improvements and regulatory constraints, procedures and standards necessary to drive market demand for hydrological improvements as a commodified product. This limitation can restrict the identifiable benefits of hydrological improvements primarily to the realm of non-market values.

Even with this limitation, there are identifiable values in water improvements, and identifiable interested parties seeking to capture and promote these values in transactional exchanges. In fact, there are a number of interested parties and a wide range of programs and policies that seek to promote hydrological values (see the *Resource Inventory* attached as Appendix A). These values can result in specific investment in projects that both promote redevelopment and grow water. The value can be turned into specific investments by aligning local land-use regulations and authorities, broader policies, programs, financial instruments and interests with hydrological improvement. Defining hydrological improvement in the development of the transaction and quantifying the hydrological and development benefit of the improvement makes it possible for interested parties to invest in the transaction. In this context, an observation by Justice Oliver Wendell Holmes, Jr., is helpful: “Property, a creation of law, does not arise from value, although exchangeable – a matter of fact.”¹ With this dictum in mind, the Project Team considers that a fundamental finding of this case study is that hydrological values can successfully be aligned with legally recognized property interests, and the values promoted as part of property transactions in the Great Lakes Basin to generate hydrological improvements to the watershed.

Accordingly, the Menomonee River Valley case study has resulted in an identification of growing water values that can be promoted through improvements to the hydrology of the area focused on by the case study, identification of parties that recognize those values or that can benefit from those values, and strategies to align parties, land-use regulations, and resources to drive transactions that realize hydrological values for the immediate area and the Great Lakes watershed. The Project Team identified opportunities to significantly improve hydrological function with ecological and economic benefits achievable through real estate transactions and public investments. These hydrological improvements can increase the immediate and long-term value of the transactions themselves, along with the Great Lakes watershed in which they would occur.

For instance, there are clear hydrological benefits that can be pursued in a brownfield context with failing wastewater infrastructure, as described in this report. Attention to a site’s hydrological attributes increases immediate and long-term values for rehabilitating an urban site. Among the value created is increased water quality and quantity, open space benefits of aesthetics and increased property values, and habitat restoration.

¹ Mr. Justice Holmes, Concurring opinion, *International News Service v. Associated Press*, 248 U.S. 215 at 221 (1918).

Existing programs can be tapped to fund investment in hydrologically sound infrastructure and improvements. These programs include state, federal and local governmental programs ranging from direct investment to loans and grants. Important to this effort is alignment of local government capital investments, programs and authorities, including the use of local zoning laws, building codes and land use regulations. Local government programs and powers can further direct private investment in ways that enhance hydrological functioning and infrastructure. Alignment of programs at each level of government can be critical in promoting ecologically sound transactions in property within the Menomonee River Valley.

The Project Team selected three sites in the case study area for which we identified options to better leverage hydrological improvements. Each site represents a potential for a classic real estate transaction involving redevelopment, and therefore the opportunity to understand, recognize and pursue opportunities to improve hydrologic resources in a manner consistent with the sustainable development approach used in the Menomonee River Valley (i.e., generating balanced improvements to the Menomonee Valley economy, ecology and community). These sites are attracting investment, and are ready for significant redevelopment, representing the opportunity for actual transactions that can be ecologically and economically enhanced to grow water through the alignment of resources and local governmental drivers.

Background

Decades of waste dumping, industrial uses and significant economic restructuring transformed the Menomonee River Valley from a rice marsh and wetland into an area including Brownfield sites and an abandoned landfill, as defined by the Wisconsin Department of Natural Resources (WDNR). In the late 1990s, the City of Milwaukee, the Milwaukee Metropolitan Sewerage District and the Menomonee Valley Business Association (the Partners) sought to reclaim the Valley by developing a land use plan for its sustainable redevelopment.

The Partners' *Market Study, Engineering and Land Use Plan for the Menomonee Valley* (Land Use Plan), adopted by the Milwaukee City Council in 1998, explicitly recognizes the intimate relationship between the area's land use and its hydrology. The Land Use Plan promotes the integrated application of public and private resources for sustainable, mixed-use development. Specifically, it calls for the remediation of brownfields and use of wetlands and other elements of green infrastructure² to help manage stormwater and improve water quality. A subsequent document, *Sustainable Design Guidelines for the Menomonee River Valley*, describes best management practices (BMPs) that developers should follow to use water more efficiently and manage stormwater on-site. Clearly, the Partners' vision for the Valley is one of economic redevelopment done in a way that reverses a legacy of environmental and hydrological degradation and contamination.

² Green infrastructure uses ecological processes, both natural and engineered, to supplement or replace more traditional "grey" infrastructure, such as stormwater pipes and culverts. Through an intentional combination of vegetation, open space and natural areas, green infrastructure increases water and air quality, promotes biodiversity, and enhances views and recreational opportunities.

When the Project Team was retained to identify growing water opportunities for market-based transactions in the Menomonee River Valley, we began by developing a Resource Inventory of monetary and non-monetary resources available to support both economic and ecological restoration of the Valley (Appendix A). In particular, the Resource Inventory focused on resources that could support brownfield redevelopment and green infrastructure elements, as described in the Land Use Plan, to ensure that resulting transactions would have a direct impact on water quality and quantity in the Valley. The completed Resource Inventory includes local, state and federal government programs, grants, investments and regulatory regimes; multiple sources of potential private investment; and both monetary (e.g., capital budgets, private sources of money) and non-monetary (e.g., regulatory schemes) support. Where possible, the inventory quantifies the resources that are available, and the value or interest that the resource addresses (e.g., regulatory compliance, economic development).

The Project Team analyzed the Resource Inventory for opportunities to increase incentives and combine available resources to promote both development and investments in restoration and water resource improvement. This analysis attempted to quantify the value of possible ecological and economic improvements, and exchange value across the Resource Inventory.³

The Team examined the project area to identify the environmental challenges and negative affects on the watershed imposed by the legacy of past land uses, as well as the impediments these present to investment and transactions in the area. We identified the post-industrial character, soil and groundwater contamination, and failing sewage and wastewater infrastructure as primary “environmental bads” that impose negative environmental impacts on the community and the watershed and present impediments to redevelopment investment and transactions. A strategy to remove or contain the legacy contaminants, prevent the release of contaminated water into the Menomonee River and thus into Lake Michigan, and redirect stormwater away from contact with contaminants and into cleansing systems was identified as a path to address both the environmental and redevelopment goals of the project. We concluded that brownfield redevelopment incorporating and expanding green infrastructure—specifically, stormwater parks⁴—is a strategy that would grow water in the Menomonee River Valley.

Incorporating stormwater parks into urban brownfields redevelopment provides a number of benefits, both financial and ecological. In the course of this case study, the Project Team found that these benefits were most likely to induce public and private investment that would drive

³ Typically, resource allocations and authorities are fragmented and transactions are limited to single-purpose outcomes focused on traditional regulatory authorities and missions. The resource inventory approach has been utilized to move beyond such constraints, particularly in the context of developing brownfield funding strategies, and has successfully leveraged substantial resources and promoted transactions. A resource inventory is useful because it identifies transactions that are achievable but not pursued because of limited understanding of the availability of resources and resource combinations that produce the transactions. The inventory method is a practical and transferable approach to maximize the use of existing monetary and non-monetary resources for growing water transactions. It will be of long-term utility for the Menomonee River Valley because it has identified and prioritized resources that can be brought to bear to implement the sustainable development plan.

⁴ Stormwater parks are an application of green infrastructure designed to help slow, clean and infiltrate stormwater. When adjacent to a river, stormwater parks typically include riparian buffers, shallow marshes, constructed wetlands, bioswales and naturalized detention ponds, but the exact mix of a park’s features will be determined by its topography and adjacent topography and land uses.

growing water transactions in the Menomonee River Valley. That conclusion was based on the following considerations that we consider critical to aligning growing water values to transactional opportunities through application of the Resource Inventory:

- *There is political leadership and support for green infrastructure development.*

In 2005, Milwaukee Mayor Tom Barrett convened the Milwaukee Green Team, a coalition of business, community and environmental leaders charged with providing recommendations on innovative, cost-efficient ways the city and private sector could improve stormwater management, reduce energy costs and create jobs in the environmental industry. The Green Team developed nine strategies for public and private sector entities to reduce the amount of stormwater entering the sewer system, six of which promoted the use of green infrastructure—specifically, bioswales, rain gardens, green roofs, porous pavement, native plants, greenways and open space. The Green Team also recommended that the City implement a stormwater fee based on the amount of impervious surface on each property.⁵

Developers, businesses and other private-sector entities that incorporate green infrastructure in site redevelopment can establish themselves as environmental leaders and responsive corporate citizens, reduce stormwater fees and other regulatory mechanisms likely to be imposed in the future, and benefit from technical assistance and other incentives offered by the City of Milwaukee. These developments coincide directly with the policy recommendations and opportunities our Project Team identified for growing water in the case study area.

- *Stormwater parks lessen the burden on the municipal sewer system, decreasing the likelihood of combined sewer overflows (CSOs) and the need for new sewer infrastructure.*

The Milwaukee Metropolitan Sewerage District (MMSD) has concluded that too much stormwater enters the Milwaukee combined sewer system during major storm events, at times overwhelming MMSD treatment facilities. Sewer overflows can occur, resulting in the release of untreated or partially treated sewage into local rivers, lakes and streams, and backing up into residential basements, threatening human and environmental health.⁶

Increasing localized stormwater infiltration and retention, stormwater parks and other forms of green infrastructure reduce the amount of stormwater that enters the sewer system, decreasing the likelihood of CSOs and basement flooding. When green infrastructure is used to manage stormwater on a large scale (e.g., within a city or town), economic benefits include a reduced risk of legal liability for the municipality and the avoided cost of additional sewer infrastructure to handle stormwater runoff. Individual

⁵ See discussion of the “Stormwater Fee,” below.

⁶ *The Milwaukee Green Team’s Report to Mayor Tom Barrett*, October 2005. Available at http://www.city.milwaukee.gov/display/displayFile.asp?docid=13213&filename=/Groups/cityGreenTeam/documents/88841_LowRes.pdf. See also, “Storm Update – Overflow volumes reported,” MMSD, March 16, 2006 News Release, http://www.mmsd.com/news/news_detail.cfm?id+97.

sites that can demonstrate a reduced level of stormwater runoff due to the use of green infrastructure may be able to reduce the amount and cost of stormwater conveyance infrastructure required on site. Such sites also may reduce or eliminate the risk of legal liability for flooding adjacent properties.

- *Green space increases the value of nearby properties.*

Proximity to a natural or landscaped area increases the value of surrounding properties, according to a number of studies. For example, a survey of home values in Indianapolis found that homes were worth 2% to 15% more when located within a half-mile of a trail or conservation corridor. In Austin, Texas, the value of green space adjacency was between 6% and 12%. In general, the salutary effect of green space on property value appears to apply to properties within a half-mile of the open area and is stronger for green spaces that are publicly accessible and that provide aesthetic or recreational opportunities.⁷

Increased property values benefit not only property owners, but the municipality as well, in the form of property tax revenue. In Indianapolis, the additional taxable property value of properties within a half-mile of eight greenway corridors totaled \$166.5 million. In Austin, the total increase in property value attributable to greenbelt adjacency in two neighborhoods was estimated at \$13.64 million.⁸

In the case study project area, the addition of green space, in the form of stormwater parks, will result in more open space, recreational opportunities and aesthetic improvements to a dense urban community with a need for such amenities.

Examples of green infrastructure benefits are evident in conservation design principles that cluster development around open space designed to reduce stormwater quantity and improve stormwater quality. In conservation developments, the quantity of roads and other impervious surfaces is minimized. Falling rain is not directed to sewers, but to a capture system with release to vegetated swales, rain gardens and constructed wetlands that contain the water until it is absorbed. Native plants are used to filter impurities in the water, helping to maintain ecosystem integrity.

The use of such green infrastructure can be seen in the 667-acre development of Prairie Crossing, Illinois.⁹ This community was designed to limit the impact of stormwater runoff into sensitive habitats, as the area lays at the edge of two watersheds that direct water into the Illinois River and on to the Mississippi down to the Gulf of Mexico. Prairie Crossing uses green infrastructure to treat and store stormwater¹⁰ and remove pollutants using natural vegetation.¹¹ To ensure long-

⁷ All statistics are from *Measuring the Impact of Parks on Property Values*, Sarah Nicholls, Ph.D, March 2004, available at <http://www.nrpa.org/content/default.aspx?documentId=1013>.

⁸ Ibid.

⁹ This development was a combined effort in a public/private partnership including the developer, ecologists, the Liberty Prairie Foundation, the Liberty Prairie Conservancy, and the Lake County Forest Preserve District.

¹⁰ The stormwater treatment plan includes designed landscaping depressions to collect water, move water through natural swales and diffuse it into prairies and wetlands to various lakes and ponds throughout the development.

term financial support to fund the development's open space, home sites include a deed restriction requiring a seller to pay 0.5% of the sales price each time the home is sold.

The Menomonee River Valley case study concluded that this use of green infrastructure to improve and manage water resources can effectively be applied to brownfield redevelopment in a dense urban, legacy site.

To advance the brownfield/stormwater park strategy, the Project Team reviewed the Partner's Land Use Plan to identify and prioritize sites that have been positioned to meet the Land Use Plan's objectives and are best suited to meet the objectives of this case study. We identified three priority sites, and developed funding strategies and transaction opportunities that could be implemented in the sites' redevelopment. A description of the sites follows. The investment strategy for each appears later in this report.

The Properties

Site #1: West End Shops Property

Work on this site is currently underway and is well funded so far. The site is upstream of the Milwaukee Estuary Area of Concern (AOC) boundary.¹² It will include approximately 68 acres of open space, which will provide stormwater management for a 70-acre business park. Additional funding is needed for:

- Support of long-term public and private sector costs associated with operation and maintenance of the stormwater park
- Support of private-sector costs associated with stormwater pre-treatment and conveyance from private properties in the business park to the stormwater park
- Support of public-sector costs associated with creating additional public amenities at the stormwater park (e.g., opportunities for passive recreation, trails, etc.)

Site #2: 25th Street Stormwater Treatment Facility

Work on this site is slated for early 2006 and has some existing monies committed to it. The site is located within the AOC boundaries. It will include two acres of open space that will provide stormwater management for a ten-acre portion of the Canal Street ROW. The two-acre stormwater park could be expanded to treat water from an additional fifteen-acre private property known as Adams Yard. Additional funding is needed for:

¹¹ Pollutants are removed by native plants, which were specified in the landscaping budget and saved the developers \$2 million in costs.

¹² As designated by the International Joint Commission under the terms of the U.S. and Canadian Great Lakes Water Quality Agreement as amended in 1987, and the U.S. Clean Water Act, the Milwaukee Estuary AOC includes the lower portions of the Menomonee, Milwaukee and Kinnickinnic Rivers, Milwaukee Harbor and near-shore portions of Lake Michigan.

- Support of long-term, public-sector costs associated with operation and maintenance of the initial phase of the stormwater park
- Support of the capital costs associated with expanding the stormwater park to accommodate additional private-sector development
- Support of long-term public and private sector costs associated with additional operation and maintenance of the stormwater park in the event that the park is expanded to treat stormwater from nearby Adams Yard
- Support of public sector costs associated with creating additional public amenities at the stormwater park (e.g., opportunities for passive recreation, trails, etc.)

Site #3: Milwaukee Stockyards Redevelopment

Work on this site is under contract for redevelopment and slated for 2006. The site is located within the AOC boundaries. It will include two acres of open space that will provide stormwater management for a ten-acre portion of the former Milwaukee Stockyards Property and a three-acre portion of the Canal Street ROW. The stormwater park could be expanded to receive and treat stormwater from an additional 20 acres of adjacent private property. One million dollars has been budgeted for the initial two-acre park by the City of Milwaukee in its 2006-2007 biennial budget. Additional funding is needed for:

- Support of long-term, public- and private-sector costs associated with operation and maintenance of the initial phase of the stormwater park
- Support of capital costs associated with expanding the stormwater park to accommodate additional private-sector development
- Support of long-term, private-sector costs associated with additional operation and maintenance of the stormwater park in the event that the park is expanded to receive and treat stormwater from 20 acres of adjacent property

Possible Revenue Streams

While there is no overarching regulatory structure to drive growing water transactions in the study area, there are several resources designed to encourage investment in brownfield cleanup and green infrastructure, as well as existing opportunities to develop financing tools. To induce investment in the case study area, the Project Team believes these resources and tools must provide front-end funding, a dedicated source of revenue for debt repayment, and operations and maintenance funding. Front-end funding opportunities identified include federal/state low-interest loan funds for brownfields cleanup and stormwater projects. To access these funds, identification of a repayment strategy is necessary. The Project Team identified a stormwater utility fee as central to a repayment strategy for front-end resources, and one that could provide a permanent source of revenue to maintain the stormwater parks.

Brownfields Cleanup Revolving Loan Fund/WDNR Land Recycling Loan Program

Among the funding sources that should be pursued to leverage cleanup of brownfield sites is the Brownfields Cleanup Revolving Loan Fund (BCRLF). Under this program, the U.S. Environmental Protection Agency (U.S. EPA) gives seed money to the states to capitalize low- or no-interest loan funds for cleanup activities at brownfield sites. In Wisconsin, WDNR administers revolving BCRLF monies through its Environmental Improvement Fund's Land Recycling Loan Program (LRLP).

Use of BCRLF funds is common in remediation efforts, as are needed in the case study area. However, the support, by itself, is not sufficient to achieve the desired outcome of either community rehabilitation or growing water, as proposed in the Menomonee River Valley project. In addition, the State of Wisconsin requires a general obligation pledge to secure the LRLP loan, which further limits the attractiveness of this funding strategy. Accordingly, the Project Team recommends that the BCRLF potential be considered only as a lesser included part of a broader strategy for clean-up and rehabilitation of the case study area.

Wisconsin Department of Commerce Brownfields Grant Program

The Brownfields Grant Program is a \$7 million per fiscal year grant program administered by the Wisconsin Department of Commerce. Funding is available for brownfields cleanup and redevelopment activities that promote economic development and have a positive effect on the environment. Eligible applicants include individuals, partnerships, municipalities, nonprofits and corporations. Up to \$1.25 million may be awarded to any one recipient, and a matching contribution between 20% and 50% of the total project cost is required. Applications are accepted on an ongoing basis.

Because of its emphasis on economic development and improving the environment, the Brownfields Grant Program offers attractive funding opportunities for the redevelopment of brownfield sites in the case study area. A Brownfields Grant could be combined with other sources of funding to remove soil contamination and improve water quality for sites in the case study area.

Clean Water State Revolving Fund

Another funding option is for the City of Milwaukee, the Milwaukee Metropolitan Sewerage District (MMSD) or some other municipal entity to obtain a low-interest Clean Water State Revolving Fund (CWSRF) loan to implement stormwater parks in the case study area. In the CWSRF program, the U.S. EPA gives seed money to the states to capitalize low-interest loan funds for wastewater-related infrastructure projects. Each state also contributes 20 percent to the loan fund. General obligation bonds, wastewater user fees, stormwater utility fees or other sources of municipal revenue typically provide what U.S. EPA regulations refer to as "a dedicated source of revenue" sufficient to service the debt.

The types of projects funded by CWSRF loans are determined by each state according to its own defined criteria and priorities, but CWSRF loans can fund projects that address virtually any type

or category of polluted runoff that is included in a state-approved nonpoint source management plan. Some states have used the loans to improve water quality in innovative ways. The U.S. EPA's CWSRF fact sheet, *Cleaning Up Polluted Runoff with the Clean Water State Revolving Fund*, reports that

- California created stormwater management facilities, including sediment basins and constructed wetlands.
- Minnesota adopted agricultural BMPs to prevent and reduce runoff. The state purchased conservation tillage equipment and implemented soil erosion controls.
- Washington rehabilitated stream banks, riparian corridors and buffers.

In Wisconsin, WDNR administers CWSRF loans through its Clean Water Fund Program (CWFP). The CWFP provides low-interest loans to municipalities for wastewater treatment facilities and urban stormwater runoff projects. The program authority focuses on “structural urban BMPs”, which it defines as “a practice that is determined to be an effective means of preventing or reducing pollutants generated from nonpoint sources of urban runoff, including land acquisition, storm sewer rerouting and the removal of structures.” A review of the program’s funding history reveals that approximately \$3.4 million has been loaned for nonpoint source projects on brownfields in the past five years. While this amount represents a small part of total available funding, it establishes a precedent for use of the funds to support the stormwater management plans of the Menomonee Valley.

Stormwater Utility Fees

Stormwater utility fees are fees charged to property owners to help defray the cost of municipal stormwater infrastructure improvements. Typically, the amount of the fee is based on the amount of impervious surface on a property; the more impervious surface, the higher the fee. Stormwater utility fees are becoming increasingly common due, in part, to the compliance burden imposed by NPDES Phase II Stormwater Program requirements on municipalities of 100,000 or more. NPDES Phase II requires, among other things, that these municipalities obtain NPDES permit coverage for discharges from their municipal separate storm sewer systems. The permit application asks the municipality to describe its plans for addressing the following six minimum pollution control measures:

- Public education and outreach
- Public involvement
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction stormwater management in new development and redevelopment
- Pollution prevention and good housekeeping of municipal operations

Complying with the NPDES Phase II permit requirements has caused some municipalities to increase investment in stormwater infrastructure improvements. Cities have attempted to offset the cost of these improvements by creating a stormwater utility that imposes stormwater utility

fees. According to the League of Wisconsin Municipalities, approximately 30 Wisconsin municipalities have enacted stormwater utility fees. The typical fee is assessed according to the amount of impervious surface on a property. Fee revenues are used to offset the cost of the municipal stormwater management program. The program includes stormwater services and practices to help improve water quality and reduce flooding.

The Milwaukee Stormwater Fee

The City of Milwaukee has taken a significant step in developing the potential of stormwater fees that will ultimately change the way development projects will be asked to address stormwater challenges, and in a manner that can “grow water” by promoting stormwater parks and other green infrastructure strategies. As mentioned previously, the Milwaukee Green Team recommended that the City establish a stormwater fee based on the amount of impervious surface on each property. Acting on that recommendation, the City has created a new stormwater charge, separate from the overall sewer maintenance charge that will go into affect beginning with the July 2006 billing cycle. The Local Sewerage Charge (formerly the Sewer Maintenance Usage Charge) will be reduced from \$1.27 per hundred cubic feet (Ccf) of water used per quarter to \$0.85 Ccf per quarter. The residential charge is based upon winter usage or actual usage, whichever is less. Non-residential is based upon actual usage. The new stormwater management charge is based upon a flat rate of \$8.00 per quarter for residential property and \$8.00 per quarter per 1,610 sq. ft. of impervious area for non-residential property. The new category is demonstrative of the growing trend of wastewater utilities increasingly moving away from stormwater charges based upon potable water consumption.

The new stormwater management charge for non-residential usage will provide real incentives to developers to include as much permeable space as possible within their developments. Moreover, the City is currently in the process of developing an adjustment policy that could further reduce stormwater fees and related infrastructure costs by allowing developers to demonstrate that a new development will not exceed the capacity of the local sewer system during storm events. Consequently, the avoidance of capacity upgrades and reductions in stormwater fees will make the construction of stormwater parks a more attractive alternative stormwater management option for private developers and public projects. For example, the cost of installing 660 feet (one block) of new sewer to handle additional stormwater capacity is about \$250,000. Conversely, the cost of installing one acre-foot of detention (holding over 325,851 gallons of water before absorption) will cost about \$75,000, including costs for permitting, design and construction. Further, centralizing the parks along the river, as proposed in the Menomonee Valley provides an additional value to the area by the creation of open space. The open space, as noted earlier, can increase the value of adjacent property at the same time that it provides important water quality services. Consequently, it provides both the economic and environmental benefits without limiting the use of parcels targeted for new development.

Annual maintenance costs for stormwater retention parks are relatively inexpensive, usually from three to five percent of construction. A one-acre water park will typically cost about \$2,000 to maintain annually. An additional cost will accrue after about twenty years, when the retention basin must be dredged and replanted. Again, this additional cost will be a relatively inexpensive endeavor if a sinking fund is established with a twenty-year maturity as part of a rate structure

paid by the tenants of the development discharging into the retention basin. Assuming a three percent annual cost of inflation, dredging and replanting will cost just over \$135,000 in twenty years. Annual maintenance and amortized dredging costs would, therefore, amount to about \$6,106.00 per year/per acre.

The stormwater parks create additional value that is generally not present with traditional infrastructure. This additional value increases possible investors in the development of the stormwater parks. For example, there could also be a shared cost opportunity if a local park district were to add stormwater park property to its inventory. The owners of the developed property would have an obligation to maintain the stormwater park because of drainage requirements, and the park district would have maintenance responsibilities to the public. A public/private partnership could also be established to share maintenance, and possibly recreational, costs. Additionally, as noted above, the creation of publicly accessible open space can have a measurable positive impact on property values. This value can be captured and used to support both the economic and environmental objectives of the Menomonee Valley through the use of Tax Increment Financing Districts (TIF), a common municipal redevelopment tool. Increases in the value of adjacent property that results from the creation of the stormwater park can be captured within a (TIF) created by the municipality. That revenue stream can be pledged to the repayment of revolving loans and to cover ongoing costs associated with development and operations and maintenance of the parks.

These economic benefits help induce investment in green infrastructure to manage stormwater in a manner that “grows water.” However, these incentives alone are not sufficient to induce private and public development of stormwater parks on a scale necessary to meet public water quality needs for stormwater management. Municipalities, including Milwaukee, are already requiring more retention as a matter of policy in order to avoid Clean Water Act violations. Incentives have to be carefully analyzed and measured against desired outcomes so as not to problematically impact already decreasing utility revenues by directing more resources to the incentives than the utility can sustain.

Great Lakes Legacy Act

In addition to the application of the foregoing funding mechanisms to brownfield cleanup and the development of green infrastructure, the Project Team considers it possible to develop a strategy to pursue Great Lakes Legacy Act (GLLA) funding for the case study area.

There are baseline requirements for seeking funding from the GLLA based on whether the project is for remediation or non-remediation purposes (e.g., assessment). In each case, once the threshold requirements are met, there are funding priorities that have been established. Any entity, public or private, can submit a project for funding in response to the U.S. EPA Great Lakes National Program Office (GLNPO) Request for Proposal. Further, there is a non-federal share requirement that must be in place.¹³

¹³ The non-federal share is 35% of project costs and 100% of operation and maintenance costs, and may include in-kind services, monies and in-kind services under an administrative order on consent or judicial consent decree, but may not include any funds pursuant to a unilateral administrative order or court order. In addition, the Clean Water Act State Revolving Fund may not be used for the non-federal share.

To date, no applicant has sought funding for a source control project that is not directly related to sediment clean up, and the clear intent of Congress is that the GLLA support clean up of contaminated sediments in AOCs. However, the use of green infrastructure and other innovative approaches to AOC clean up is consistent with this intent if it is clearly demonstrated that the focus of the program is on contaminated sediment clean up, and is engineered and designed to prevent further contamination of the clean up area.

Because funding of the GLLA has been and continues to be at a level well below the demand within the Basin, pursuit of GLLA funding for the Menomonee River Valley must be a long-term effort, rather than anticipated as a near term source of support.¹⁴

Additionally, it is critical that the GLLA effort be closely coordinated between the community and local and state officials, to assure that the application is complete, fully supported and documented. The projects funded so far have included finished agreements among the project stakeholders, and have taken between three months and eighteen months from submittal to signed agreement.

Conclusions

The foregoing discussion demonstrates that a significant improvement of water resources is possible, and indeed underway, in the Menomonee River Valley. These efforts have revealed opportunities to realize the economic value of integrating growing water concepts into traditional approaches and designs for real estate transactions, infrastructure investments, and the alignment of federal, state and local policies and authorities to revitalize an urban brownfield area. The alignment of policies and program, particularly through a sustainable redevelopment plan such as the one proposed in the Menomonee Valley, can create concrete opportunities for growing water investments. Utility fees and discharge requirements, state revolving loan programs, TIFs and land use authorities, are examples of existing programs that can be structured to promote investments. The result will be the increase in conventional marketable value of Basin land benefiting from the restoration projects.

The three sites discussed above demonstrate ongoing actual investment as well as continuing potential investment in on-the-ground real estate transactions. These investment opportunities can be expanded because green infrastructure projects, like the stormwater parks, can deliver measurable economic and environmental benefits. These benefits include increases in adjacent property value and management of non-point source pollution. Enactment of local programs such as TIFs and stormwater utility fees and requirements can be used to establish property interests in the creation of these measurable benefits and provide the basis for market transactions. The Project Team considers that more growing water benefits can and will take place in the Menomonee River Valley and the broader Great Lakes Basin, which will mitigate

¹⁴ For FY2004, \$10 million was allocated to funding and GLNPO received 14 requests totaling \$80 million. FY2004 submittals can be considered for FY2005 funding, as there was not enough funding for FY2004. FY2005 had \$22.3 million appropriated in funding. FY2006 had a request of \$50 million and an appropriation of \$30 million. Applications and submittals are considered in the order in which they are received, which means current and future funding may be committed to projects already submitted in years with funding shortfalls.

withdrawals from the Basin in terms of both water quality and water quantity as well as correct flow alteration and ecosystem degradation by restoring flood plain, forest and prairie landscapes.

However, without a concerted effort to further develop the potential, identify growing water opportunities and incorporating them explicitly within a redevelopment/transactional structure, the opportunities will be realized only haphazardly. The Project Team commends t the Menomonee River Valley Partners, the Milwaukee Green Team and the governments of Milwaukee, the MMSD and the State of Wisconsin for aggressively pursuing the development and implementation of their plan for the area. The Project Team makes the following additional recommendations to advance the coordinated effort to secure critical funding and resources. The recommendations support an integrated clean-up and rehabilitation of the Valley and promote investments and development transactions that are attracted to and further foster the improvement of the water and water dependent resources in the Menomonee River Valley.

The priority efforts recommended are:

- Pursue financing from the Wisconsin Clean Water Fund Program, the Brownfields Cleanup Revolving Loan Fund/WDNR Land Recycling Loan Program, and the WDC Brownfields Grant Program. To the extent possible, these funding sources should be combined to support projects that achieve both economic and environmental improvements. The Menomonee Valley Plan and the design of the stormwater parks provide the basis for combining the various sources of money.
- Pursue efforts with the State and City to secure support from the Great Lakes Legacy Act for funding clean up of the study area as it lies within or contributes to contamination loading of the Milwaukee Estuary AOC.
- Demonstrate to City and State authorities that available financing scenarios for water parks are favorable to developers, promote public/private opportunities, and have positive impacts on property values.
- Create an enterprise framework to manage stormwater parks, such as a conservation/ecosystem utility. Stormwater fees, joined with other favorable financing scenarios, can be used to develop a network of centralized stormwater parks.
- Explore additional opportunities to create a partnership to build a public and private operating structure to operate the parks.

The projected outcomes of the approach include:

- Reduction of loading to the presently over-taxed MMSD sewer system, with attendant reduction of Combined Sewer Overflows and associated release of contaminated water into the Menomonee River and Great Lakes watershed.
- Reduction of surface and groundwater contamination from the brownfield sites adjacent to the Menomonee River, and the continued addition of pollutants to the Milwaukee Estuary AOC.
- Creation of open space for the immediate community in the dense urban environment, with benefits to the economic value of adjacent properties and the ecological value of the area.

- Correction of previous flow alterations and ecosystem degradations by restoring flood plain and open space landscapes in the Basin.
- Secure and promote economic value for “growing water” by integrating hydrological improvements into traditional real estate transactions and development designs.
- Increase the conventional marketable value of land within the Great Lakes watershed through restoration projects.

In short, the Project Team concludes that significant opportunities to coordinate resources and stakeholders in the Menomonee River Valley study area, and integrate growing water concepts into the heart of the efforts to clean-up and develop the area, can deliver economic and ecological values that will leverage and enhance significant real estate transactions to the benefit of the community and the Great Lakes watershed.

ATTACHMENT F

Menomonee River Valley Resource Inventory

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Community Development Block Grants/Brownfields Economic Development Initiative	Grant	Land - Planning; Land - Acquisition; Land - Phase I/II Assessments; Land - Emergency Actions; Land - Site Investigation; Land - Demolition; Land - Cleanup; Land - Redevelopment; Land - Marketing	HUD	CDBG entitlement communities; CDBG non-entitlement communities		0	A request for a new Section 108 loan guarantee authority must accompany each BEDI application. BEDI and Section 108 funds must be used in conjunction with the same economic development project.		http://www.hud.gov/offices/cpd/economicdevelopment/programs/bedi/index.cfm
Brownfields Assessment Grants	Grant	Land - Planning; Land - Phase I/II Assessments; Land - Site Investigation	U.S. EPA	General Purpose Unit of Local Government; Land Clearance Authority or other quasi-governmental entity that operates under the supervision and control of, or as an agent of, a general purpose unit of local government; Government Entity Created by State Legislature; Regional Council or group of General Purpose Units of Local Government; Redevelopment Agency that is chartered or otherwise sanctioned by a state; State; Indian Tribe other than in Alaska; Alaska Native Regional Corporation, Alaska Native Village Corporation, and Metlakatla Indian Community		0	Applicant is limited to submitting only one hazardous substance assessment grant proposal and one petroleum assessment proposal.	May be used for community-wide or site-specific assessments.	http://www.epa.gov/brownfields/pg/guidelines_2005_toc_fv05.htm
Brownfields Revolving Loan Fund Grants	Loan	Land - Cleanup	U.S. EPA	General Purpose Unit of Local Government; Land Clearance Authority or other quasi-governmental entity that operates under the supervision and control of, or as an agent of, a general purpose unit of local government; Government Entity Created by State Legislature; Regional Council or group of General Purpose Units of Local Government; Redevelopment Agency that is chartered or otherwise sanctioned by a state; State; Indian Tribe other than in Alaska; Alaska Native Regional Corporation, Alaska Native Village Corporation, and Metlakatla Indian Community		20%	At least 60% of awarded funds must be used to capitalize and implement a RLF that (generally) provides no-interest or low-interest loans for brownfield cleanups.	Provides funding for a grant recipient to capitalize a revolving loan fund and to provide subgrants to carry out cleanup activities at brownfield sites.	http://www.epa.gov/brownfields/pg/guidelines_2005_toc_fv05.htm
Brownfields Cleanup Grants	Grant	Land - Cleanup	U.S. EPA	General Purpose Unit of Local Government; Land Clearance Authority or other quasi-governmental entity that operates under the supervision and control of, or as an agent of, a general purpose unit of local government; Government Entity Created by State Legislature; Regional Council or group of General Purpose Units of Local Government; Redevelopment Agency that is chartered or otherwise sanctioned by a state; State; Indian Tribe other than in Alaska; Alaska Native Regional Corporation, Alaska Native Village Corporation, and Metlakatla Indian Community; Nonprofit Organization		20%	No entity may apply for funding cleanup activities at more than five sites. Applicant must own the property for which they are applying by the time the grant is awarded and no later than 9/30/05. No entity may apply for funding cleanup activities at more than 5 sites. A separate proposal must be submitted for each site. Phase I site assessment must be completed prior to proposal submission.	A Project Cooperation Agreement (PCA) must be executed with the local sponsoring agency.	http://www.epa.gov/brownfields/pg/guidelines_2005_toc_fv05.htm
Brownfields Training Grants and Cooperative Agreements	Cooperative Agreement	Land - Training	U.S. EPA	Governmental entities; tribes; nonprofits; public universities; private universities		0	Must benefit low-income and socio-economically disadvantaged communities. For-profit organizations are not eligible and may not submit "joint" applications with eligible applicants.	Primary outputs include classroom style training, workshops and roundtables, training and curricula modules, computer-based training delivery systems, and other training and educational materials that provide general, specialized and practical knowledge of brownfields problems and solutions.	http://www.epa.gov/brownfields/pg/ta_0205.pdf
Brownfields Research Grants and Cooperative Agreements	Cooperative Agreement	Land - Research	U.S. EPA	Governmental entities; tribes; nonprofits; public universities; private universities		0	Must benefit low-income and socio-economically disadvantaged communities. For-profit organizations are not eligible and may not submit "joint" applications with eligible applicants.	Primary outputs include reports and data analysis, fact sheets summarizing research findings, case studies disseminated by electronic means, and research symposia.	http://www.epa.gov/brownfields/pg/ta_0205.pdf

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Brownfields Technical Assistance Grants and Cooperative Agreements	Cooperative Agreement	Land - Technical Assistance	U.S. EPA	Governmental entities; tribes; nonprofits; public universities; private universities		0	Must benefit low-income and socio-economically disadvantaged communities. For-profit organizations are not eligible and may not submit "joint" applications with eligible applicants.	Primary outputs include documented methods for providing ongoing advice and support to low-income communities and socio-economically disadvantaged communities to help them develop a specific strategy, design a process for identifying and solving complex brownfields-related environmental and financial problems, and planning and implementing solutions for these problems.	http://www.epa.gov/brownfields/pg/rta_0205.pdf
Native Plant Conservation Initiative	Grant	Natural Resources - Habitat Restoration	National Fish and Wildlife Foundation	Eligible applicants include 501(c) non-profit organizations and local, state, or federal government agencies. For-profit businesses, individuals, and USDA staff are not eligible to apply directly to this program, but are encouraged to work with eligible applicants to develop and submit proposals.		100%	All grant funds will need to be matched by non-federal contributions from project partners on at least a 1:1 basis. In-kind contributions of goods or services (including volunteer time) are eligible as match for this program. Funds cannot be used for direct land acquisition costs or political advocacy. Basic research projects unlikely to be funded.	There is a strong preference for "on-the-ground" projects that involve local communities and citizen volunteers in the restoration of native plant communities. Projects that include a pollinator conservation component are also encouraged.	http://www.nfwf.org/programs/npci_application.cfm
Bring Back the Natives: A Public-Private Partnership for Restoring Populations of Native Aquatic Species	Grant	Water - Ecosystem Restoration	National Fish and Wildlife Foundation	Nonprofits; public universities; private universities; tribes; governmental entities	Funds on-the-ground efforts to restore native aquatic species to their historic range.	200%	Funds may not be used for general operating expenses (without NFWF's prior approval), basic research or basic planning without an "on-the-ground" component to the project. This funding requires a \$2 non-federal match for each federal dollar requested by applicants.	Projects should involve partnerships between communities, agencies, private landowners and organizations that seek to rehabilitate streamside and watershed habitats. Projects should focus on habitat needs of species such as fish, invertebrates and amphibians that originally inhabited waterways across the country. Preference is given to projects that focus on keystone or "indicator" species of the health of aquatic communities and those that will keep sensitive or declining species off of the Endangered Species List, or for listed species that have a chance for recovery and de-listing within 5 to 10 years.	http://www.nfwf.org/programs/bbn.cfm
Ozone Transport	Grant	Air - Quality	U.S. EPA	An agency or commission designated by the Governors of the affected States, which is capable of recommending to those Governors' plans for implementation of national primary and secondary ambient air quality standards and which includes representation from the States and the appropriate political subdivisions within the affected air quality control region.	To develop or recommend air quality implementation plans for air quality control regions designated pursuant to Section 106 (interstate pollution) or Section 111 (interstate ozone pollution) of the Clean Air Act of 1990. Funding Priority - Fiscal Year 2006: The Ozone Transport Commission (OTC) provides a forum for the states within the Ozone Transport Region (New England and Middle Atlantic states) to develop and adopt air quality implementation plans for reducing ozone pollution pursuant to Section 106 of Section 111 of the Clean Air Act of 1990.			Eligible beneficiaries are municipalities, intermunicipalities, States, interstate agencies or commissions, and Federally recognized Indian tribes.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.033
Environmental Justice Collaborative Problem-Solving Cooperative Agreement Program	Grant	All	U.S. EPA	Affected community-based grassroots organizations.	To award grants to affected nonprofit community-based organizations who are working on constructive engagement and collaborative problem-solving to address environmental and/or public health concerns in their communities, or who are planning on doing so.	0%	To be eligible, you must be an affected local community-based organization. No funds made available for this program shall be used for the acquisition of real property (including building) or the construction or substantial modification of any building. Grant funds may not be used for lobbying or underwriting legal actions, including the preparation of court testimony and hiring of expert witnesses	These are one-time awards of \$100,000 each to be completed over the course of three years.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.306
Water Quality Cooperative Agreements	Grant	Water - Quality; Water - Watersheds; Water - Trading; Water - Efficiency; Water - Sustainable Infrastructure	USEPA	State water pollution control agencies; interstate agencies; tribes; colleges; universities; individuals; nonprofits; other public organizations	To assist eligible recipients in developing, implementing and demonstrating innovative approaches relating to the causes, effects, extent, prevention, reduction and elimination of water pollution through both permitted and non-permitted areas.	0%	Assistance targeted to entities that commit to specific activities. Eligible activities should be of a relatively short timeframe (1 to 2 years) with tangible results. All projects should achieve and demonstrate results. Grants are not to be awarded to fund ongoing State program activities or construction projects. Funds may be used to advance the knowledge of wet weather pollution problems.	Preapplication coordination with appropriate Regional or Headquarters Office is required.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.463

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Surveys, Studies, Investigations, Demonstrations and Training Grants and Cooperative Agreements 0 Section 104(B)(3) of the Clean Water Act	Grant; Cooperative Agreement	Water - Quality; Water - Watersheds; Water - Nonpoint Source Management; Water - Trading; Water - Wetlands; Water - Ecosystem Restoration	U.S. EPA	Assistance under this program is generally available to States, territories, Indian Tribes, and possessions of the U.S. (including the District of Columbia); public and private universities and colleges; hospitals; laboratories; and other public or private nonprofit institutions and individuals. Nonprofit organizations described in Section 501(c)(4) of the Internal Revenue Code that engage in lobbying activities as defined in Section 3 of the Lobbying Disclosure Act of 1995 are not eligible to apply. For certain competitive funding opportunities under this CFDA description, the Agency may limit eligibility to compete to a number or subset of eligible applicants consistent with the Agency's Assistance Agreement Competition Policy.	To support the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys and studies relating to the causes, effects (including health and welfare effects), extent, prevention, reduction and elimination of water pollution.	0%	Unsolicited proposals generally must be received prior to May 15 for funding in the applicable fiscal year. Unsolicited proposal must be less than \$75,000 or offer unique or innovative ideas for detecting, preventing, etc. water pollution and not resemble the substance of a pending or contemplated competitive solicitation.	USEPA recommends that potential applicants discuss proposed projects with or submit preapplications to staff in the appropriate EPA technical program offices.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.436
Targeted Watershed Grants	Grant; technical assistance - expertise; technical assistance - tools; technical assistance - training	Water - Watersheds	U.S. EPA	States; tribes; municipal agencies; intermunicipal agencies; interstate agencies; intertribal agencies; private universities; public universities; individuals; nonprofits	To support innovative, community-based watershed approaches aimed at preventing, reducing or eliminating water pollution. Also, to build upon the concepts behind the Agency's watershed approach, this grant program focuses on innovative, wide-reaching plans to restore, preserve or protect the nation's waters. The cornerstones of the program include diverse partnerships, ready-to-implement projects, and tangible, measurable environmental results in a short time frame.	25%	Watershed must be nominated by the Governor or Tribal Leader. Governors or Tribal Leaders may nominate two state or tribal watersheds each. There is no limit on the number of interstate or joint state and tribal watershed that can be nominated.	Successful candidates will have a thorough knowledge of their watershed, a specific project to address identified problems or barriers to water quality, broad-based support from a number of public and private entities, and a demonstrated record of managing a watershed project. Eligible activities should be able to show tangible environmental improvement within 1 to 2 years. Candidates must also have a specific monitoring and evaluation plan demonstrating measurable results, and containing a strong outreach and education component.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.439
Regional Wetland Program Development Grants	Grant	Water - Wetlands	U.S. EPA	States; tribes; municipal agencies; interstate agencies; intertribal agencies	To help eligible recipients build capacity to protect, manage and restore wetlands.	25%	Projects that are national in scope are not eligible for funding under this program, but may be eligible for funding under EPA's National Wetland Program Development Grants program	Funded projects support the initial development of a wetlands protection, restoration or management program or support enhancement/refinement of an existing program. Grants encourage comprehensive wetlands program development by promoting the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys and studies relating to the causes, effects, extent, prevention, reduction and elimination of water pollution. Each EPA Regional Office has its own competitive process for awarding WPDGs.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.461
Wastewater Operator Training Grant Program (Technical Assistance)	Grant	Water - Wastewater	U.S. EPA	States; tribes; nonprofits	To substantially enhance the proficiency of personnel engaged in the O&M of treatment works and related activities by financing pilot programs. Grant funds are primarily for on-site technical assistance to address the plant's unique performance-limiting conditions. Classroom training is also provided to improve the skills of wastewater treatment plant operators.	25% - may be waived	An activity that contributes to O&M improvements at publicly-owned treatment works, including pollution prevention activities, may be funded. Legislative history supports using appropriations for onsite O&M technical assistance to publicly owned treatment works of less than 5 million gallons per day of wastewater flow.		http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=66.467
Great Lakes Program	Grant; Cooperative Agreement; Technical assistance - expertise; technical assistance - tools; technical assistance - data	Water - Quality; Water - Ecosystem Restoration	U.S. EPA	Governmental entities; public universities; private universities; tribes; nonprofits; federal agencies.	To restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem.	0%		For FY2005-2006, projects must address Pollution Prevention and Toxics Reduction; Habitat (Ecological) Protection and Restoration, including Habitat Conferences and Printing; Emerging or Strategic Issues, including Invasive Species; Remedial Action Plan (RAP) priorities; or Lakewide Management Plan (LaMP) priorities.	http://www.epa.gov/glnpo/fund/2005guid/
Clean Water State Revolving Fund	Capitalization grant	Water - Quality; Water - Watersheds; Water - Nonpoint Source Management; Water - Wetlands; Water - Ecosystem Restoration; Water - Wastewater	U.S. EPA	States	To establish a Clean Water State Revolving Fund that makes loans for (1) construction of publicly-owned wastewater treatment works; (2) implementing nonpoint source management activities included in State Plans developed pursuant to Section 319; and (3) developing and implementing an estuary conservation and management plan under Section 320.	20%		Beneficiary eligibility - Loans for wastewater treatment facilities may be made to local communities, intermunicipal, State, interstate agencies and Indian tribes. For nonpoint source management programs and estuary activities in approved State Nonpoint Source Management Programs and Comprehensive Conservation and Management Plans - the above public agencies and individuals and programs.	http://www.epa.gov/OW-OWM.html/cwfinance/cwsrf/index.htm

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Wisconsin Coastal Management Program	Grants	Water - Coastal Land Acquisition; Water - Coastal Wetland Protection and Habitat Restoration; Water - Nonpoint Source Pollution Control; Water - Coastal Resource and Community Planning; Water - Great Lakes Education; Water - Public Access and Historic Preservation	WI Dept. of Administration; WI Coastal Management Council	local units of governments, state agencies, colleges and universities, regional planning commissions serving coastal areas, tribal units of government and private, nonprofit organizations	For the management, protection and restoration of Wisconsin's coastal resources, and to increase public access to the Great Lakes	Grants ≤ \$60,000 require a 50% match; grants > \$60,000 require a 60% match	Match may be in-kind, cash or a combination of the two. Match cannot be federal funds except for tribal "self-sufficiency" grants. All projects must demonstrate a need for WCMP funding and that no other viable funding source exists.	Applications for 2006-07 Coastal Management Grant Program were due November 4, 2005	http://www.doa.state.wi.us/pagesubtext_detail.asp?linksubcatid=250
Aquatic Plant Control (Section 104 of the 1958 River and Harbor Act)	Technical assistance - expertise; technical assistance - tools; technical assistance - data	Water- Ecosystem Restoration; Natural Resources- Habitat Restoration; Natural Resources- Native Plants	U.S. Army Corps of Engineers	Non-Federal Government entities	To provide for the control and eradication of obnoxious plants in rivers, harbors, and allied waters.	Total project costs (including development of a plan) and control operations will be split 50% Federal and 50% non-Federal sponsor.		Program is designed mainly for combating weed infestations of major economic significance including such weeds as water hyacinth, alligator weed, hydrilla, elodea, and watermilfoil.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=12.100
Flood Plain Management Services (Section 206 of the Flood Control Act of 1960)	Technical assistance - expertise; technical assistance - data	Water- Storm water Management; Water-non-point source management;	U.S. Army Corps of Engineers	States, Non-Federal public bodies, Municipalities, Municipal Agencies, Intermunicipal Agencies	To promote appropriate recognition of flood hazards in land and water use planning through the provision of flood and flood plain related data, technical services, and guidance.	Services are 100% Federally funded		Available information identifies areas subject to flooding and flood losses from streams, lakes, and oceans and describes flood hazard at proposed building sites. It can be used as a basis for planning flood plain use, for flood emergency preparedness planning, for hurricane evacuation and preparedness planning, for assistance in developing flood plain regulations, for setting elevations for flood proofing, and implementing flood proofing measures, and for indicating areas to be acquired for open space. Activities also include interpretation of technical information and related planning assistance and guidance toward prudent use of flood plains. Services are available to States and local governments without charge, but within annual funding limitations on request. Services are available to Federal agencies on a fully reimbursable basis. Services are available to the private sector on a pay first basis.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=12.104
Planning Assistance to States (Section 22 of the Water Resources Development Act of 1974)	Technical assistance-expertise; technical assistance-data	Water- Planning; Water- Quality; Water-Public Access; Water- Sustainable Infrastructure; Water- Storm water Management; Water- Ecosystem Restoration	U.S. Army Corps of Engineers	States; U.S. territories and	To help states in the preparation of comprehensive plans for the development, utilization, and conservation of water and related resources of drainage basins.	Technical planning services are funded 100% through Federal program funds. The Corps of Engineers collects a contribution from the beneficiary of this program, recovering about 50 percent of the cost of services	The State must have a planning program for the development, utilization or conservation of the water and related land resources underway or laid out in sufficient detail so that the relationship of a State's request for Corps input for some particular aspect of the program may be appraised. All Corps input must be an integral part of the State program. The input from the Corps is to be on an effort or service sharing basis in lieu of an outright grant basis.		http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=12.110
Collaborative Research and Development (Section 7 of the Water Resources Development Act)	Technology transfer; Technical assistance-data; Technical assistance-Expertise	Energy; Land- Redevelopment; Land-Research; Land- Technical Assistance; Water- Efficiency; Productivity Enhancement	U.S. Army Corps of Engineers	U.S. Private Firms; Public Foundations; Private Foundations; Nonprofits; States; Municipalities; Academic Institutions	To facilitate productivity-improving research and development and application of advanced construction technologies through collaborative research and development, field demonstration, licensing agreements, and other means of commercialization and technology transfer.	50% Federal, 50% Industry partner match. 5% of the partner share must be paid in cash for services and supplies that do not originate within the partner organization.	Projects are based on ideas from the U.S. construction industry on how to improve productivity. Industry partners must agree to substantially produce and market products domestically. Corps laboratory must perform a significant portion of each project.		http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=12.114
Partners for Fish and Wildlife	Direct Payments for specified use	Natural Resources- Habitat Restoration; Natural Resources- Native Plants, Water-Ecosystem Restoration; Water- Wetlands; Water- Quality	U.S. Department of the Interior, Fish and Wildlife Service	Native American Tribes; Private Landowners; Local Governments; Educational Institutions; other Public Organizations	Provide technical and financial assistance to private landowners and Native American Tribes interested in voluntarily restoring or otherwise improving natural habitats for fish and wildlife on their lands	50/50 cost share between Federal Government and partner (Non-statutory Goal only)	In general, projects must benefit Federal trust species, involve on-the-ground habitat restoration, and be cost- effective		http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=15.631
Rivers, Trails, and Conservation Assistance	Advisory Services, Counseling	Open Space- Preservation; Water- Quality; Water- Planning; Water- Public Access; Water- Sustainable Infrastructure; Water- Watersheds; Water- Wetlands; Land-Cleanup; Land- Redevelopment; Land-Planning; Natural Resources- Habitat Restoration	U.S. Department of the Interior, National Park Service	Nonprofits; Federal agencies; state agencies; local agencies	To work with community groups and local and State governments to conserve rivers, preserve open space,	0%	None	Assistance is for one year and may be renewed for another if warranted; proposals should be submitted by August 1 for the following fiscal year.	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM_TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=15.921

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Conservation Grants Private Stewardship for Imperiled Species	Project Grants	Natural Resources- Ecosystem Restoration; Land- Cleanup; Land- Redevelopment; Land- Planning; Natural Resources- Habitat Restoration	U.S. Department of Interior- Fish and Wildlife Service	Nonprofits, Small businesses, individuals, specialized groups, sponsored organizations	To provide Federal financial and other assistance to individuals or groups engaged in local, private, and voluntary conservation efforts to be carried out on private lands that benefit species listed or proposed as endangered or threatened under the U.S. Endangered Species Act, or candidate and at-risk species	90% Federal, 10% cost share on the part of the landowner or other non-federal partner		Funds will not be used for the acquisition of real property either through fee title or easements. Grant proposals for FY 2006 were accepted from 11/22/05 to 1/23/06.	http://www.fws.gov/endangered/grants/private_stewardship/index.html
Brownfields Green Space and Public Facilities Grant (s. 292.79 Wis. Stats.)	Grant	Land- Cleanup; Land- Redevelopment; Water- Quality;	Wisconsin Department of Natural Resources	Cities; Villages; Towns; Counties; Redevelopment Authorities; Community Development Authorities; Housing Authorities	To fund environmental remediation of brownfield sites that will be used as green space, as recreational areas, by a local government.	small (<\$50K) = local match of 20%; medium (\$50.1K to \$100K) = 35%; large (\$100.1K to \$200K) = 50%	Brownfields are defined as industrial or commercial facilities or sites with common or multiple ownership that are abandoned, idle, or underused, and have actual (or perceived) environmental contamination which adversely affects expansion or redevelopment.		http://dnr.wi.gov/org/caer/cfa/Grants/brownfields.html
Land Recycling Loan Program (LRLP)	Loan	Land- Cleanup; Land- Redevelopment; Water- Quality; Water- Ecosystem Restoration	Wisconsin Department of Natural Resources	Cities; Counties; Villages; Towns; Redevelopment Authorities; Housing Authorities	Remediating environmental contamination (brownfields) at landfills, sites, or facilities where contamination has affected or threatens to affect groundwater or surface water.		Current interest rate is 0% + .5% servicing fee. Loan term is 20 years, secured by general obligation pledge.	Grants issued annually; must submit "Intent to Apply" form by December 31 prior to fiscal year in which funding is anticipated.	http://dnr.wi.gov/org/caer/cfa/EL/Section/brownfield.html
Brownfield Site Assessment Grant (s. 292.75, Wis. Stats., and ch. NR 168, Wis. Admin. Code.)	Grant	Land- Site Investigation; Land- Phase I/II Assessments	Wisconsin Department of Natural Resources	Cities; Villages; Towns; Counties; Redevelopment Authorities; Community Development Authorities; Housing Authorities	Assessing environmental contamination at brownfield sites	20%	Applicant must be a local government unit that did not cause the environmental contamination at the site. The party responsible for the environmental contamination must be unknown, unable to be located, or unable financially to pay for the grant activities.	Examples of eligible projects include- Phase I/II environmental site assessments, ch. NR716 site investigations, demolition of structures, buildings, or improvements, including necessary asbestos abatement, removal of underground petroleum product storage tank systems and hazardous substance tank systems, and removal of abandoned containers.	http://dnr.wi.gov/org/caer/cfa/Grants/SAG.html
Ready for Reuse Loan & Grant Program	Loan, Grant	Land - Cleanup	Wisconsin Department of Natural Resources	Cities; Counties; Villages; Towns	For cleanup of contamination from hazardous substances or hazardous substances commingled with petroleum, and for cleanup of petroleum contamination that is not eligible for Petroleum Environmental Cleanup Fund Act (PECFa) reimbursement.	22%	Applicant must be a local government unit that did not cause the environmental contamination at the site and cannot have liability under CERCLA. The current property owner, if not the applicant, also cannot have liability under CERCLA and cannot have caused the contamination on the site. Site cannot be listed on the Superfund National Priorities List.	Maximum grant amount is \$200,000 per property. Grants will be given to projects that can be completed in two years.	http://www.dnr.state.wi.us/org/aw/rr/financial/epa_revoinvgloan.html
Clean Vessel Act Program (Section 5604 of the Clean Vessel Act of 1992)	Grant	Land- Cleanup; Land- Training; Water- Education; Water- Quality; Water- Public Access; Waste; Water- Wastewater	Federal Sport Fish Restoration Account of the Aquatic Resources Trust Fund	States	Effort to clean up nation's waterways via projects like construction, renovation, operation, and maintenance of pump-out and dump stations; education and information materials			States are encouraged to subcontract with private marinas/businesses as well as local units of government to construct projects. In Wisconsin, the Regional Community Services Specialist works to identify potential projects	http://12.46.245.173/pls/portal30/CATALOG.PROGRAM.TEXT_RPT.SHOW?p_arg_names=prog_nbr&p_arg_values=15.616
Local Water Quality Management Planning Aids (s. 604 (b), Federal Clean Water Act, s. 281.51, Wis. Stats., and ch. NR121, Wis. Adm. Code)	Grant	Land- Planning; Water- Planning; Land- Site Investigation; Waste- Planning; Water- Education; Water- Quality	Wisconsin Department of Natural Resources	Planning Agencies, Commissions, and Departments (local, county, and regional)	Assist with the development and implementation of area-wide water quality management activities.	0%		Eligible projects include: Sewer service area plans and amendments; local and regional water resource management and watershed planning activities; regional wastewater facility planning initiatives; identification and protection of water quality sensitive environmental corridors.	http://dnr.wi.gov/org/caer/cfa/Grants/localwater.html
Clean Water Fund Program (s. NR 162.003)	Loan	Water - Stormwater Management; Water - Wastewater Treatment	Wisconsin Department of Natural Resources	Municipalities; Public Inland Lake Rehabilitation Districts; Public Inland Lake Protection Districts; Sanitary Districts	For wastewater treatment and urban stormwater projects.	N/A		Most CWF projects receive a subsidized interest rate of either 55%, 65%, or 70% of the Environmental Improvement Fund market interest rate. CWF wastewater projects that meet certain criteria may be eligible to receive Hardship Financial Assistance, which may be in the form of a lower interest rate loan or include a grant.	http://www.dnr.state.wi.us/org/caer/cfa/EL/Section/clean.html
Municipal Flood Control Grant Program	Grant	Water- Stormwater Management; Water- Flood Control	Wisconsin Department of Natural Resources, Bureau of Community Financial Assistance and Bureau of Watershed Management	Cities, Villages, Towns, Metropolitan Sewerage Districts	Recognizing its responsibility to protect life, health, and property from flood damage, WDNR- BCFA and BWM offer grants to sub-units of government concerned with municipal flood control management	0%		Assistance is provided with the availability of Acquisition and Development grants to purchase property or vacant land, structure removal, construction or other development costs and with Local Assistance Grants for providing administrative support activities	http://dnr.wi.gov/org/caer/cfa/EF/flood/grants.html
Municipal Water Safety Patrols State Assistance (s. 30.79, Wis. Stats., and s. NR50.13 Wis. Adm. Code.)	Grants	Law Enforcement; Water- Public Access	Wisconsin Department of Natural Resources	Municipalities; Public Inland Lake Rehabilitation Districts; Public Inland Lake Protection Districts; Sanitary Districts	Providing active and productive enforcement of boating laws, conducting boating education programs, providing search and rescue for live persons	25% applicant share for enforcement costs	Grantees must maintain daily and monthly records and submit an annual claim to the DNR.	Reimbursement of salaries, supplies, and equipment is eligible (capital items valued greater than \$1,000 will be reimbursed at a rate of 20% per year over 5 years)	http://dnr.wi.gov/org/caer/cfa/Grants/safetypatrols.html
Recreational Boating Facilities (s. 30.92, Wis. Stats.; ch. NR7, Wis. Adm. Code)	Grants	Water- Public Access; Water- Sustainable Infrastructure; Water- Recreation	Wisconsin Department of Natural Resources	Counties; Towns; Cities; Villages; Sanitary Districts; Public Inland Lake Protection Districts; Public Inland Lake Rehabilitation Districts; Qualified Lake Associations	Provide assistance in aiding recipients in constructing and operating safe boating facilities with an emphasis on sustainability, water quality improvement, and navigation aid.	50% of eligible costs* (see Notes)		Additional 10% of costs available if municipality conducts a boating safety enforcement and education program approved by the DNR. An Additional 30% may be available if project meets statewide and regional requirements, as established by the Waterways Commission.	http://dnr.wi.gov/org/caer/cfa/Grants/recboat.html

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info...
Recreational Trails Program (1998 Transportation Equity Act for the 21st Century TEA-21)	Grants	Land- Maintenance; Land- Research; Land- Recreation	Wisconsin Department of Natural Resources	Towns; villages; cities; counties; school districts; state agencies; federal agencies; incorporated organizations; tribal governing bodies	Development and maintenance of recreational trails and trail-related facilities for both motorized and non-motorized trail uses.	50%	Funding for program comes from Federal excise tax on fuel by off-highway vehicles	Eligible projects include: Maintenance of existing trails, Development and rehabilitation of trailside and trailhead facilities and trail linkages, construction of new trails, acquisition of easement or property for trails.	http://dnr.wi.gov/org/caer/cfa/LR/SECTION/rectrails.html
Waste Reduction & Recycling Demonstration Grants (s. 287.25, Wis. Stats.; ch. NR 548, Wis. Admin Code)	Grants	Waste; Waste- Planning	Wisconsin Department of Natural Resources	Businesses; counties; Municipalities; Public Entities; Nonprofits; School Districts	Implement innovative waste reduction, reuse and recycling projects on a pilot or demonstration scale.	50% (not to exceed \$150,000)	Applicant must provide evidence of having the technical ability, experience, and financial support necessary to successfully carry out the project.	Eligible costs may include: Wages and fringe benefits, costs of facility and equipment use, general operating expenses and raw materials, and supplies and equipment	http://dnr.wi.gov/org/caer/cfa/EF/recycle/RESOURCE.HTM
River Protection Planning (ss. 281.70 and 281.71, Wis. Stats.; ch. NR 195, Wis. Admin. Code)	Grants	Water- Education; Water- Planning; Water- Management Planning; Water- Research	Wisconsin Department of Natural Resources	Counties; cities; villages; tribes; qualified river-management organizations; non-profits	Collect, assess, and disseminate information on river ecosystems; assist in developing organizations to manage rivers; assist the public in understanding river ecosystems; create management plans for the long term protection and improvement of riverine ecosystems	75% granted, 25% shared (not to exceed \$10,000)	Capital improvements are not eligible for funding under this grant		http://dnr.wi.gov/org/caer/cfa/Grants/Rivers/riverplanning.html
River Protection Management Grants (ss. 281.70 and 281.71, Wis. Stats.; ch. NR 195, Wis. Admin. Code)	Grants	Water- Ecosystem Restoration; Water- Habitat Restoration; Water- Wetlands; Water- Sustainable Infrastructure; Natural Resources- Habitat restoration	Wisconsin Department of Natural Resources	Counties; cities; villages; tribes; qualified river-management organizations; non-profits	Protect and restore rivers and their ecosystems	75% granted, 25% shared (not to exceed \$50,000)	The following projects are NOT eligible for funding under this grant: dam repair and operation; purchase of property on which a dam is located unless for the purpose of facilitating dam removal; dredging; design, installation, operation, or maintenance of sanitary sewers, treatment plants, or onsite sewerage systems	Eligible projects include: Purchase of land or conservation easements. Development of local regulations or ordinances to protect or improve water quality. Installation of practices to control nonpoint source pollution. Restoration projects including in stream or shore land habitat and protection. DNR approved activities needed to implement planning recommendations. Education, planning, and design activities necessary for the implementation of a management project.	http://dnr.wi.gov/org/caer/cfa/Grants/Rivers/riverprotection.html
Nonpoint Source Priority Watershed and Priority Lake Program Grant (s. 281.65, Wis. Stats., and ch. NR 120, Wis. Admin. Code)	Grants	Water- Watersheds; Water- Quality; Water- Cleanup; Water- Nonpoint Source Management; Water- Wetlands; Natural Resources- Ecosystem Restoration	Wisconsin Department of Natural Resources	counties; villages; cities; local government units	Prevent or eliminate nonpoint sources of water pollution in existing, designated priority watershed projects in Wisconsin.	70% grant (reimbursed), 30% shared		Eligible types of projects include (but are not limited to): Cropping practices including nutrient management, pesticide management, grazing rotation, and crop protection, etc.; Field diversions; Terraces; Grassed waterways; Stream and shoreline protection practices including crossing, fencing, shoreline buffers, shaping & seeding, etc; Barnyard runoff management (manure storage facilities, etc); Wetland restoration; Treatment of agricultural or lake sediment basins.	http://dnr.wi.gov/org/caer/cfa/EF/NPS/pwatershed.html
Nonpoint Targeted Runoff Management Program (TRM) (s. 281.65, Wis. Stats., and Ch. NR 153, Wis. Adm. Code)	Grants	Water- Quality; Water- Runoff; Water- Planning; Water- Research;	Wisconsin Department of Natural Resources	Governmental units	Installing Best Management Practices to limit or end nonpoint source (run-off) water pollution.	70% grant (reimbursed), 30% shared	Grant cannot exceed \$150,000. Grants MAY NOT be used for: projects to control pollution regulated under Wisconsin law as a point source, construction site erosion control and post construction BMPs for NEW development, and projects that are not water quality based such as dredging, or projects to solve drainage or flooding problems	Examples of eligible projects include: Barnyard and feedlot protection practices. Design as part of construction. Detention ponds. Livestock waste management practices. Stream bank protection projects. Wetland construction.	http://dnr.wi.gov/org/caer/cfa/EF/NPS/nonpoint.html
Urban Nonpoint Source & Storm Water Grants (Planning Grants) (UNPS & SW) (s. 281.66, Wis. Stats.; ch. NR155, Wis. Adm. Code)	Grants	Water- Storm water Management; Water- Storm water Planning; Water- Planning	Wisconsin Department of Natural Resources	Governmental Units	Limiting or ending sources of urban nonpoint source (runoff) pollution. Funded projects are site-specific and targeted to address high-priority problems in urban project areas.	30% shared, 70% reimbursed by grants (not to exceed \$85,000)	Storm water planning projects must currently be in an urban area or an area projected to be urban within 20 years to be eligible for funding under this program. An urban project area meets one of these criteria: Has a population density of at least 1,000 people per square mile, has commercial land use, is the non-permitted portion of a privately owned industrial site, is a municipally owned industrial site (regardless of ch. NR 216 permit requirements)	Eligible activities include: Urban runoff control planning activities including: Storm water planning for areas of existing development, new development, and re-development. Preparation of local ordinances (such as construction site erosion control, post-construction storm water management, pet waste management, and illicit discharge management) affecting storm water. Evaluating local financing options for storm water programs, including storm water utilities. Urban runoff control implementation activities including: Administration costs (in excess of permit revenues) needed to initiate a local ordinance program. Administration costs associated with initial establishment of local storm water management funding programs (such as storm water utilities). Illicit discharge detection and elimination. Project evaluation activities required by the grant. Public participation, education, and outreach activities.	http://dnr.wi.gov/org/caer/cfa/EF/NPS/urbanps.html

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Urban Nonpoint Source & Storm Water Grants (Construction Grants) (UNPS & SW) (s. 281.66, Wis. Stats.; ch. NR155, Wis. Adm. Code)	Grants	Water- Storm water Management, Water- Nonpoint source management; Land- Acquisition; Water- Wetlands; Water- Storm Sewers	Wisconsin Department of Natural Resources	Governmental Units	Limiting or ending sources of urban nonpoint source (runoff) pollution. Funded projects are site-specific and targeted to address high-priority problems in urban project areas. Control storm water runoff rates, runoff rates, volumes, and discharge quality from nonpoint sources within existing development	50%	Following projects are not eligible for funding under this grant: projects solely focused on new development, projects designed to solve drainage and flooding problems, dredging projects	maximum possible grant is \$200,000, of which \$50,000 is for land acquisition and easements and \$150,000 is for construction activities Eligible Activities Include: Construction of structural urban BMPs such as detention basins, wet basins, infiltration trenches, infiltration basins, or wetland basins. Engineering design and construction services for BMP installation. Land acquisition and easement purchase, including appraisal costs (only when necessary to install the BMP). Storm sewer rerouting and removal of structures (only when necessary to install the BMP). Stream bank and shore land stabilization projects.	http://dnr.wi.gov/org/caer/cfa/EF/NPS/urbannps.html
Safe Drinking Water Loan Program (SDWLP)	Loan	Water- Quality	Wisconsin Department of Natural Resources	governmental units	Build, upgrade, or replace water supply infrastructure to protect public health and address federal and state safe drinking water requirements				http://dnr.wi.gov/org/caer/cfa/EL/Section/drinkingwater.html
Great Lakes Legacy Program (Great Lakes Legacy Act of Congress)	Grant	Water- Quality; Water- Cleanup; Water- Ecosystem Restoration;	Great Lakes National Program Office of the U.S. EPA	States; Cities; Villages; State Agencies; Businesses; Non-Profits;	To promote programs focusing on: Pollution Prevention and Toxics Reduction, Habitat (Ecological) Protection and Restoration, Emerging or Strategic Issues (including Invasive Species), Remedial Action Plan (RAP) Priorities, and Lakewide Management Plan (LaMP) Priorities			Remediation is targeted at EPA- designated Areas of Concern, one of which is in Milwaukee River Estuary and Menomonee River Valley.	http://www.epa.gov/glnpo/fund/gif.html
Milwaukee Economic Development Corporation Site Assessment Matching Grant Program	Grant	Site Assessment; Confirmatory Sampling; Remedial Action Plans; Land- Site Investigation	MEDC Milwaukee	Site Owner, or future Site Owner	Program is designed to encourage the investigation and redevelopment of industrial and commercial properties where expansion or redevelopment is hindered by real or perceived contamination.	Up to 25,000\$ in matching funds	Property must be located in the City of Milwaukee. Applicant either owns or intends to buy the property. Applicant has completed an ASTM Phase I environmental site assessment. The site is to be redeveloped. Applicant agrees to report on results of testing and redevelopment plan. Competitive bids for covered services must be obtained from at least two qualified providers. Applicant must be current on all property taxes and free from code violations	Uses- Phase II site assessments, remedial action plans, risk assessments, confirmatory sampling, DNR fees. (Not to be used in place of PECFA)	http://www.medconline.com/Overview/EnvRemediation/funds.asp
Wisconsin Department of Commerce Brownfield Grants (Section 560.13 Wis. Stats.)	Grant	Land- Acquisition; Job Stimulation; Land- Demolition; Land- Remediation	Wisconsin Department of Commerce	individual, corporation, partnership, limited liability company, non-profit organization, trustee or local unit of government	Program provides funding to brownfield projects that promote economic development and have a positive effect on the environment	50%	Grant funds shall be used for brownfields redevelopment or associated environmental remediation activities; and grant recipients contribute to the cost of the project, and the party that caused the environmental contamination and any person who possessed or controlled the environmental contaminant is either unknown, cannot be located or is financially unable to pay		http://www.commerce.state.wi.us/CD/CD-bfi-grants.html
Tax-Delinquent Brownfield Site Purchasing Program	Incentive	Land- Demolition; Land- Remediation; Land- Cleanup;	City of Milwaukee	Developer	Program works out agreement with developer wherein City of Milwaukee would foreclose on a brownfield (against outstanding property taxes) and assign its right to judgment to beneficiary of this agreement, thus awarding new developer the property		The developer agrees to do environmental cleanup. If the environmental testing shows that there are environmental problems, and, if despite that, the developer still wants to go forward with the deal, they'd have to agree to follow WI Department of Natural Resources (DNR) rules and clean-up the property. While this may sound daunting, DNR now allows for flexible environmental closure so that cleanup standards take into account the future use of the property. In addition, depending on the circumstances, environmental cleanup on these parcels may not be needed, may be minimal in cost, or may be eligible for grants and tax credits.	Developer pays market value of property minus cost of clean up, minus an added incentive discount for risk, plus transaction costs such as administrative fee, testing costs, and certain rare kinds of property taxes that aren't subject to foreclosure. Properties with low market value may be given by the city if the developer simply does the clean-up and improvement of the property and that is adequate compensation	http://www.mkedcd.org/brownfields/bfhowpurch.html
CITY OF MILWAUKEE CAPITAL IMPROVEMENTS- ENVIRONMENTAL BUDGET					Objective of environmental capital program is to enhance the long term environmental health of Milwaukee by reducing lake and river pollution			2004-2009 Capital Improvements Plan provides 299.6\$ million (26% of total funding) for environment related capital projects, making environmental projects the second largest functional category in the six year plan	2004-2009 City of Milwaukee Capital Improvements Plan
Sewers	Capital Budget Spending	Water- Stormwater Management	City Of Milwaukee		Relief and relay sewers, expansion of capacity sewers, and developer financed sewers. The Relief and Relay Program is financed with user fees (*since 2000)			\$166 Million over six years for sewer projects, accounting for 55.4% of funding for all environmental projects	2004-2009 City of Milwaukee Capital Improvements Plan

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Forestry	Capital Budget Spending	Land- Cleanup	City Of Milwaukee		\$1.2 million to replace deteriorated or extend concealed irrigation of landscaping on city boulevards and \$3.6 million for the Tree Planting Program, the majority of which replaces trees in conjunction with the street paving programs			\$4.8 million over six years (1.6% of total environmental funding) for forestry programs	2004-2009 City of Milwaukee Capital Improvements Plan
Water Works	Capital Budget Spending	Water- Stormwater Management; Water-Quality; Water- Planning; Water- Cleanup; Water- Sustainable Infrastructure; Water- Nonpoint Source Management; Water-Education	City Of Milwaukee		\$78.4 million is appropriated for the Water Main Program, which includes distribution and feeder mains.			\$113.8 million over six years (38% of total environmental funding) for water works related programs	2004-2009 City of Milwaukee Capital Improvements Plan
Sanitation	Capital Budget Spending	Land- Waste Management; Waste Planning; Waste- Cleanup; Waste;	City Of Milwaukee		During 2003 and 2004 Department of Public Works assessed the Sanitation organization. Improvements to accommodate the more efficient organization commenced in 2004 using prior year funding. In plan years 2005 through 2009 between \$1.5 and \$2 million is provided annually for continued improvements			\$9.5 million for sanitation related capital improvement (3.2% of the total environmental funding)	2004-2009 City of Milwaukee Capital Improvements Plan
Environmental Remediation	Capital Budget Spending	Land- Remediation; Remedial Action Plans	City Of Milwaukee					\$5.5 million (1.8% of funding) for a variety of environment related capital projects	2004-2009 City of Milwaukee Capital Improvements Plan
FEES									
Sewer User Charges	Fees	Usage Fees	Collected by City of Milwaukee	Structures connected to the sewer infrastructure.	Usage fees collected for sewer costs.			In 2003 the City of Milwaukee collected \$27,489,444 in sewage user fees.	2003 MMSD Comprehensive Annual Budget Report
Listing of 20 largest Sewer Users	Fees	Usage Fees	Collected by City of Milwaukee	Major use of sewage system.	This is a list of the 20 largest companies according to usage fees. This may be helpful if we are trying to find private funding to rehab the Milwaukee Sewer System.			Number 1-Miller Brewing Company (\$2,077,544) The rest of the list is on page 44 of the 2003 Comprehensive Annual Budget Report.	2003 MMSD Comprehensive Annual Budget Report
TAXES AND TAX INCENTIVES									
Tax Levies by the Milwaukee Metropolitan Sewerage District	Tax levy	Tax collection	Collected by MMSD through the City of Milwaukee	City Departments	Collection of taxes are distributed to fund various departments.			In 2003 the MMSD of Milwaukee collected \$71,530,000 in tax levies.	2003 MMSD Comprehensive Annual Budget Report
Property Tax	Municipal tax	Tax collection	Local	Any private property owners.	All real and tangible personal property is subject to taxation unless expressly exempt. Valuation is made by the municipal assessor and is based on the value as of January 1. The Department of Revenue conducts field appraisals of each parcel once every five years.		Exemptions: Machinery and equipment used in manufacturing, merchants' and manufacturers' inventories, pollution abatement equipment, computer equipment.	Except for farmland and agricultural forest land, real property is assessed at full market price. Classes of real property include residential, commercial, manufacturing, agricultural, swamp and waste, productive forest land, and other. Intangible property is not subject to property tax.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Use Tax	State Tax	Tax	State of Wisconsin	Anybody using tangible personal private property or taxable services.	The Wisconsin use tax is a 5% tax imposed on the sales price of tangible personal property or taxable services that are used, stored, or consumed within Wisconsin, but upon which a Wisconsin sales or use tax has not previously been paid.		Exemptions: Manufacturing machinery and equipment, manufacturers' raw materials, pollution abatement, waste treatment and recycling equipment, fuel and electricity used in manufacturing.		http://www.dor.state.wi.us/faqs/pcs/taxrates.html#txrate11
Sales Tax	State Tax	Tax	State of Wisconsin	Anybody using tangible personal private property or taxable services.	The Wisconsin sales tax is a 5% tax imposed on the gross receipts of retailers who sell or lease tangible personal property or provide taxable services in Wisconsin.		Exemptions: Manufacturing machinery and equipment, manufacturers' raw materials, pollution abatement, waste treatment and recycling equipment, fuel and electricity used in manufacturing.		http://www.dor.state.wi.us/faqs/pcs/taxrates.html#txrate11
Sales Tax	County Tax	Tax assessment	Milwaukee County	Anybody using tangible personal private property or taxable services.	For the 58 Wisconsin counties who have adopted a county tax, the county tax rate is a 0.5% tax imposed on the gross receipts from retail sales or rentals of tangible personal property or taxable services in a county with a county tax, with the following exception. Sales of motor vehicles, boats, snowmobiles, mobile homes 45 feet or less in length, trailers, semi-trailers, all-terrain vehicles, and aircraft are subject to the county use tax (rather than county sales tax). Retailers who make sales subject to the 0.5% county tax must collect 5.5% sales tax on their retail sales (0.5% county tax + 5.0% state tax).		Exemptions: Manufacturing machinery and equipment, manufacturers' raw materials, pollution abatement, waste treatment and recycling equipment, fuel and electricity used in manufacturing.	For Milwaukee County there is an additional 0.10% tax rate-Stadium Tax Addition.	http://www.dor.state.wi.us/faqs/pcs/taxrates.html#txrate11
Individual Income Tax	State Tax	Tax	State of Wisconsin	Individuals residing in the State of Wisconsin.	Wisconsin individual income tax rates vary from 4.60% to 6.75%, depending upon marital status and income.				http://www.dor.state.wi.us/faqs/pcs/taxrates.html#txrate11

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Alternate Fuel Tax	State Tax	Tax	State of Wisconsin	Anyone putting fuel bought in Wisconsin in a supply tank.	Effective April 1, 2005 a tax was put in place on Alternative Fuel. This tax (21.9-23.9 cents per gallon) is imposed on the use of fuels put into supply tanks. Additionally, one must obtain an alternate fuel license to supply gas (However there is no charge for this license).			Definitions: Alternate fuel - All combustible gases and liquids, other than motor vehicle fuel or aviation fuel, used for the generation of power to propel a motor vehicle; for example, liquefied propane gas (LPG) and compressed natural gas (CNG) Person - Includes a natural person, sole proprietorship, partnership, limited liability company, corporation, association, the State of Wisconsin or any political subdivision, but not the United States or any of its agencies. Licensee - A person who holds an alternate fuel tax license issued by the Wisconsin Department of Revenue.	http://www.dor.state.wi.us/pubs/mf-106.pdf#search='alternative%20fuel%20tax%20wisconsin'
Baseball Stadium Tax	County Tax	Tax	Counties	Baseball Stadium District (Milwaukee, Ozaukee, Waukesha, Washington, and Racine Counties)	Additional 0.1% added to stadium tax on the sale of and the storage, use, or consumption of tangible personal property and taxable services.				http://www.dor.state.wi.us/faqs/pcs/taxrates.html#txrate11
Milwaukee Metropolitan Sewer District Tax Rate	Tax	Tax	MMSD-Municipal Tax						http://www.mmsd.com
Corporate Income and Franchise Tax	Tax	Tax levy	Corporations doing business in Wisconsin	State of Wisconsin	Tax assessment			7.9% imposed on the Corporations net income (as defined by the Internal Revenue Code (IRC)). See MORE INFO for information on Corporations that conduct business in more than one state.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Recycling Surcharge	Tax	Tax levy	All non-farm businesses grossing more than \$4 million	State of Wisconsin	Service charge at a rate of 3% on gross tax liability and 0.2% of net business income for no corporate business entities. Revenues from the recycling surcharge are deposited in segregated recycling fund, and are used to fund local government recycling and solid waste management programs and private business efforts to develop recycled products or markets related to this project.		Must be a non-farm business grossing over \$4 million.	Maximum surcharge is \$9,800 and the minimum surcharge is \$25. Surcharge does not apply to corporations that are not required to file an income tax return.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
County Delinquent Tax Fund (in accordance with Sec. 74.83 Wisc. Stats.)	Tax incentive	Tax Incentive	Milwaukee County	City of Milwaukee can purchase county delinquent property taxes and real estate tax certificates.	By purchasing the county's delinquent taxes, the City is acquiring an asset and generating revenue by keeping the interest and penalty charges collected on delinquent taxes outstanding.				
Federal Historic Rehabilitation Tax Credit (Internal Revenue Code-Section 47)	Tax credit	Tax Incentive-Credit	Federal	Must be an income producing historic structure as designated and approved by the Division of Historic Preservation of the Wisconsin Historical Society and by the National Park Service. Must undertake a substantial (100% of depreciated value) rehabilitation. Must be on National Registry, within a National Register historic district, or within a locally designated historic district.	To provide financial incentive for the rehabilitation and preservation of historic, income-producing structures.	Must undertake substantial rehabilitation that is valued at 100% of the buildings depreciated value.	Rehabilitation must be in compliance with the Secretary of the Interior's Standards for Rehabilitation.	Both Residential and Non-residential	http://www.wisconsinhistory.org/hp/handouts/hptaxincentivesincome.pdf#search='wisconsin%20historic%20tax' ; http://sovereigncapital.com/frtc.asp
Wisconsin 5% Supplemental Credit	Tax credit	Tax Incentive-Credit	State of Wisconsin	Same as above, but owner must receive National Park Service approval before any physical work (including demolition) is begun on the project. Must be on National Registry, within a National Register historic district, or within a locally designated historic district.	To provide an addition 5% financial incentive for the rehabilitation and preservation of historic, income-producing structures.	See above	Must be approved pre-rehabilitation efforts. Applies only to alterations made to the exterior of buildings.	Both Residential and Non-residential; In 2002, over \$2.2 million was available to 13 C-Corporate taxpayers. Of this amount, \$1.3 million was used by 10 corporations and \$900,000 was carried over for future tax use.	http://www.wisconsinhistory.org/hp/handouts/hptaxincentivesincome.pdf#search='wisconsin%20historic%20tax' ; http://sovereigncapital.com/frtc.asp
Non-Historic Tax Credit	Tax credit	Tax Incentive-Credit	Federal	Buildings built before 1936.	To provide financial incentive for the rehabilitation of buildings built before 1936 that are not designated as historic structures or contributing to a historic district.	Major rehabilitation.	Unavailable to significant buildings or contributing structures in a historic district. Applies only to alterations made to the exterior of buildings.	Non-residential only.	http://www.wisconsinhistory.org/hp/handouts/hptaxincentivesincome.pdf#search='wisconsin%20historic%20tax'
Research Expenditures Credit	Tax credit	Tax Incentive-Credit	State of Wisconsin	Wisconsin corporations	A nonrefundable research credit for noncapital expenditures related to research activities conducted in Wisconsin. Equal to 5% of the excess of qualified research expenses. For the current year over a base period amount.		Must have research that is technological in nature and intended to be useful in the development of a new or improved business component.	The 300 corporations with research expenditures credits represent only 0.28% of all corporations. Of these corporations, 115 used \$11 million of credits to offset tax liability, leaving \$81 million for use in future years.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Research Facilities Credit	Tax credit	Tax Incentive-Credit	State of Wisconsin	Wisconsin corporations	This credit applies to capital investments used to construct and equip new research facilities or expand existing research facilities located in Wisconsin. The credit is equal to 5% of the amount of qualified investments in tangible, depreciable property that is not replacement property.		The credit is nonrefundable, and unused amounts of credit may be carried forward and offset against tax liability for the next 15 years.	In 2002, 60 C-Corporations had \$11 million of credits to offset tax liability. 10 corporations used \$300,000 to offset tax liability, leaving \$10.7 million for use in future years.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Sales Tax Credit for Fuel and Electricity Used in the Manufacturing Process	Tax credit	Tax Incentive-Credit	State of Wisconsin	Businesses using fuel and electricity in the manufacturing process.	An income and franchise tax credit is available for sales tax paid for fuel and electricity used directly in manufacturing operations.			2,300 C-Corporations had \$190 million in credits. Of those, 1000 used \$18 million to offset taxes. In 2006, the current credit will be replaced by a sales tax exemption.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Environmental Remediation Tax Credits	Tax credit	Tax Incentive-Credit	State of Wisconsin	The property must be located in a development zone and be a "Brownfield." The Wisconsin Department of Commerce defines a "Brownfield" as an industrial or commercial property whose redevelopment is complicated by real or perceived environmental contamination. Development zones in Milwaukee include nearly all areas zoned for industrial and manufacturing uses	Up to 50% of testing and remediation costs can be credited against state business income taxes in Milwaukee Development Zones. To offset the costs of investigation and remediation of environmentally contaminated industrial or commercial sites. Costs must include remediation — testing alone does not qualify. The tax credit is not a cash grant. For example, if your company has an income tax liability, the tax credit could be used to offset the current year and carry forward to future years. We recommend your certified public accountant review the specific benefits to your company.				http://www.medcmilwaukee.com/Overview/EnvRemediationCredits.asp
Purchase of Tax Delinquent Brownfield Sites (also known as the 75.106 deal)	Property	Land-Acquisition; Tax incentive-foreclosure	Private property	The City doesn't own the parcels on the brownfield development opportunities list. But, under the right circumstances, the City could foreclose against the outstanding property taxes and assign its right to foreclosure judgment to an individual under state statute section 75.106. By getting the foreclosure judgment, the individual would get the property	Over 200 tax delinquent properties are available for purchase from the City of Milwaukee through state provision 75.106. Back taxes and liens against the property are eliminated as part of the process.		Individual is required to clean up the site.	Tax delinquent brown fields range from several acre parcels with multiple buildings to vacant lots of minimal size. While the City thinks they might be contaminated, they might not be. Only through environmental testing will it be clear if there are any environmental problems. One benefit of this process is that an individual can get the property free and clear of many of the liens that may now affect title (like certain tax liens, mortgages, judgments). Cost? Generally speaking, the individual would pay market value of the property if it were clean minus a credit for environmental cleanup, an added incentive discount for risk, plus transaction costs such as an administrative fee of \$3,500, a portion of testing costs, and certain property taxes that aren't ripe for foreclosure.	http://www.mkedcd.org/brownfields/bfhowpurch.html
Milwaukee Economic Development Corporation (MEDC) Tax Credits and Low Interest Loans	Tax Credit	Tax Incentive-Credit		Businesses that are redeveloping on a Brownfield location.	To assist businesses in the financing of brown fields redevelopment projects for their start-up, expansion or relocation.				http://www.medconline.com/LendingPrograms/TaxCredits/index.asp
Renewal Tax Credits	Tax credit	Tax Incentive-Credit; Tax incentive-Accelerated Depreciation; Tax Incentive-Capital Gains	Federal	Approved businesses	The City of Milwaukee has been recognized under the Community Renewal Act of 2000 as a Renewal Community (RC), a status that gives these designated communities exclusive tax incentives to spur economic development initiatives. The package of tax incentives includes wage credits for businesses hiring RC residents, capital gains exclusions, increased Section 179 Deduction and the Commercial Revitalization Deduction (accelerated depreciation).			The Renewal Community is a targeted area, comprised of 53 census tracts and home to more than 120,000 residents, where businesses have access to special Federal tax incentives. Milwaukee is one of only 40 communities in the country designated as a Renewal Community. The designation will last from 2002 – 2009. Businesses could save thousands through wage credits and deductions available in this target area.	http://www.mkedcd.org/projects/RC/RenewalCommunity.html
Federal New Markets Tax Credits	Tax Credit	Tax Incentive-Credit	Federal	Taxpayers who make qualified for equity investments in designated Community Development Entities (CDEs). To qualify as a CDE, an entity must be a domestic corporation or partnership that: 1) has a mission of serving, or providing investment capital for, low-income communities or low-income persons; 2) maintains accountability to residents of low-income communities through their representation on a governing board of or advisory board to the entity; and 3) has been certified as a CDE by the CDFI Fund.	The New Markets Tax Credit (NMTC) Program permits taxpayers to receive a credit against Federal income taxes for making qualified equity investments in designated Community Development Entities (CDEs). Substantially all of the qualified equity investment must in turn be used by the CDE to provide investments in low-income communities. The credit provided to the investor totals 39% of the cost of the investment and is claimed over a seven-year credit allowance period.				http://cdfifund.gov/programs/programs.asp?programID=5
Renewal Community Wage Credit	Tax credit	Tax incentive-Credit	Federal	Businesses with employees that live and work within the Renewal Community boundaries.	Credit against Federal taxes up to \$1,500 for each year of Renewal Community designation for every employee (existing and new hire) who lives and works in the Renewal Community area. Tax credit for 15% of first \$10,000 in wages per employee may be taken annually through 2009. Unused credits can be carried forward for up to 20 years.				http://www.mkedcd.org/projects/RC/RCTI.html#empcredit

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Commercial Revitalization Deduction	Accelerated Depreciation	Tax Incentive-Accelerated Depreciation	Local	Property owners who are substantially renovating an existing building or developing a new building for commercial use within the Renewal Community.	An accelerated depreciation deduction period for commercial real property, either new construction or substantial (more than the adjusted basis) rehabilitation. The taxpayer/property owner can choose one of two methods to use this incentive: depreciate 50% of qualified capital expenditures in the year the building is placed in service then depreciate the remaining balance over 39 years or depreciate 100% of the qualified capital expenditures over a 120-month period. This incentive is limited to \$10 million per project.		The property owner must receive the allocation of the deduction from the Redevelopment Authority of the City of Milwaukee, who will serve as Milwaukee's Commercial Revitalization Authority. Businesses must submit an application to be considered for the CRD.		http://www.mkedcd.org/projects/RC/RCTI.htm#empcredit
Capital Gain Exclusion	Capital Gains	Tax Incentive-0% Capital Gains Rate		"Renewal Community Business" as defined by the Internal Revenue Code: 85% of property in RC, 50% of gross income from RC, 35% of employees live in RC.	Allows a 0% capital gains rate for Renewal Community assets held for a minimum of 5 years. An asset could include tangible property in the RC, stock, capital interests or profit interests in a Renewal Community Business acquired for cash. The rate applies to gains after December 31, 2001 and before January 1, 2015. The taxpayer is not required to sell the asset in 2015, but must determine and substantiate the gain for that period.				http://www.mkedcd.org/projects/RC/RCTI.htm#empcredit
Increased Section 179 Deduction	Tax incentive	Tax incentive-deductions		"Renewal Community Business" as defined by the Internal Revenue Code: 85% of property in RC, 50% of gross income from RC, 35% of employees live in RC - with less than \$200,000 in new equipment needs annually.	Up to an additional \$35,000 immediate depreciation expense for machinery or equipment, including computers, placed in service in that year. For example, this incentive allows an "RC Business" to take up to a total of \$59,000 "write-off" in 2002 on Form 4562.				http://www.mkedcd.org/projects/RC/RCTI.htm#empcredit
Angel Investment Credit	Tax incentive	Tax incentive-Credit	Federal	Investments for qualified new business ventures certified by the Department of Commerce (Must have headquarter in state, have less than 100 employees (at least 51% of whom shall be employed in the state), and have been in business no more than seven consecutive years. Additionally, a qualified new business venture must be engaged in one of the following industries: manufacturing, agriculture, processing or assembling products, conducting research and development, or developing new products or business processes).	A credit available for individuals for certain investments in qualified new business ventures. A credit equal to 12.5% of the investment may be claimed each taxable year for two years.		Maximum amount that may be used as a basis for credit is \$500,000 for each investment. Total amount of credits that may be claimed is \$3 million per taxable year and \$30 million for all taxable years.		http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Early Stage Seed Investment Credit	Tax incentive	Tax incentive-Credit	Federal	Investments for qualified new business ventures certified by the Department of Commerce (Must have headquarter in state, have less than 100 employees (at least 51% of whom shall be employed in the state), and have been in business no more than seven consecutive years. Additionally, a qualified new business venture must be engaged in one of the following industries: manufacturing, agriculture, processing or assembling products, conducting research and development, or developing new products or business processes).	Available for businesses and individuals for 25% of certain investments paid to a fund manager that are invested in qualified businesses.		The total amount that may be claimed per taxable year is \$3.5 million and \$35 million for all taxable years.		http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
DEVELOPMENT ZONE PROGRAMS									
Development Zone	Tax incentive	Tax incentive-credit	Federal	Businesses in certified Development Zone.	Provides credits to taxpayers that locate or expand a trade or business activity in a development zone.			A development zone credit is available based upon the number of full-time jobs created or retained in the state and on amounts spent for environmental remediation in one of the four zone areas. The Department of Commerce is authorized to designate up to 22 economically-distressed communities as development zones with credits up to %38.155 million. To date, over 530 businesses in the zones have been certified for \$51.3 million in credits. The Zones are in effect for 7-10 years.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'

Resource Name	Resource Type	Media	Source	Eligible Recipients	Purpose	Cost Share	Restrictions	Notes	For More Info....
Development Opportunity Zone	Tax incentive	Tax incentive-credit	Federal	Businesses in certified Development Opportunity Zone.	Corporations, excluding insurance companies, conducting economic activities in a zone may claim development zone credits. Corporations locating or expanding their operations within the development opportunities zone are also eligible to claim an investment credit that equals 2.5% of the purchase price of depreciable tangible personal property (or 1.75% of the price if the property has been expensed under section 179 of the Internal Revenue Code). A capital investment credit is also available for certain businesses located in Milwaukee, equal to 3% of qualified purchases of depreciable tangible personal property and amounts expended to acquire, construct, rehabilitate or remodel qualified real property.				http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Enterprise Zone	Tax incentive	Tax incentive-credit	Federal	Designation is based upon criteria relating high unemployment and poverty, declining property values and declining population, and is for a period of three years.	Areas in which a single business is permitted to operate and receive tax credits. A business planning to conduct economic activity in a certain part of the state can apply to the Department of Commerce to have the area designated as an Enterprise Zone.			The Department of Commerce is authorized to designate up to 79 zones; at least 10 zones must be for environmental remediation. Each zone is allocated a maximum of \$3 million in tax credits.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Agricultural Development Zone	Tax incentive	Tax incentive-credit	Federal	Businesses in certified Agricultural Development Zone	Areas in which credits from development zone and development zone capital investment credits to new or expanding agri-business in the zone.			The Department of Commerce is authorized to designate up to one zone and may certify up to \$5 million in credits.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
OTHER ZONES									
Technology Zones	Tax incentive	Tax incentive-Credit	Federal	Businesses in certified technology zone. Certification is based upon the number of jobs and the amount of capital investment likely, the economic viability of the business, and its potential to attract related enterprises.	New or expanding high-technology businesses in a zone may be certified by Commerce for tax credits that may be claimed for up to 3 years. The amount of credit is dependent on the amount of real and personal property taxes, ten percent of certain capital investments made by the business in the zone, and 15% of the amount spent on the first twelve months of wages created for each job created in a zone of certification.		Each zone has a maximum duration of ten years.	The Department of Commerce is authorized to designate up to eight technology zones in the state with \$5 million in tax credits for each. All eight have been designated and include 54 counties.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'
Development Incentive Zone (DIZ)	Standards and Guidelines	Land-Planning; Public Involvement	Local	Neighborhood creates specific location which must be approved by the City Plan Commission and Common Council.	A zoning overlay category that establishes site-oriented performance standards for selected development areas (Neighborhood residents and businesses help to define the specific land use and planning criteria for future development).	\$375 fee for creation of DIZ district; no fees for projects within the district.	The Council considers all special uses currently defined for the site and makes a determination on whether these uses should become either permitted or prohibited.	The DIZ is designed to stimulate new development by providing more clarity and predictability in the pre-development process while maintaining quality control through the use of the site-oriented performance standards. Knowing what land uses and planning conditions are acceptable to elected officials and the neighborhood provides developers with greater predictability, resulting in savings in time and money.	http://www.mkedcd.org/build/pdfs/devincen.pdf
Site Plan Review Overlay District	Standards and Guidelines	Land-Planning; Public Involvement	Local		Overlay districts provide an opportunity to create new development projects which are more compatible with their neighbors, are designed to be pedestrian friendly in both design and scale, and will encourage creativity, variety and excellence in design and layout.			Not necessarily an economic incentive, but the link provides good information about river remediation in Milwaukee. This document details the City of Milwaukee's emphasis on the full utilization and appreciation of the Milwaukee River. There are guidelines for this district detailed in the document.	http://www.mkedcd.org/build/pdfs/RiverwalkSprod.pdf
Tax Increment Districts (TID)									
Tax Increment Finance Districts (TID)	Financing Structure	Land-Redevelopment; Tax Incentive-TID	Municipal Authority	Any type of municipality approved by review board (representatives from overlying taxing jurisdictions and a public member). This board must assert that this development will not occur without assistance.	Development tool for cities, villages, and for limited projects, towns and counties. TID encourages economic development that would not otherwise occur without assistance. How it works-After improvements and development lead to an increase in property value over its base. The increase is used to pay for public improvements. Thus infrastructural improvements are not paid solely by a municipality, but instead are shared among all taxing jurisdictions.		The area under consideration for TID must be blighted, or is suitable for industrial purposes or for mixed-use development. A blighted TID is one for which at least 50% of the area is blighted or in need of conservation or rehabilitation. A mixed-use TID is one developed for a combination of industrial, commercial, or residential uses.	Pooling of increments--i.e., using the taxes on the increment in one district to pay for expenditures in another district--is permitted if the recipient TID's project costs are for low-cost housing or environmental remediation, or if recipient TID is blighted or in need of rehabilitation. Environmental remediation TID: Since 1997, cities, villages, towns and counties have the authority to create environment remediation tax incremental finance (ER TID) districts to recover the costs of remediation of environmental pollution. Project expenditures for ER TID districts are limited to costs associated with environmental remediation, thus they are expected to be more limited in scope and size.	http://www.dor.state.wi.us/ra/incent04.pdf#search='infrastructure%20tax%20credit%20wisconsin'

ATTACHMENT G

The Ohio Conservancy Districts: A White Paper on Ohio's Conservancy Districts and the Ecosystem Service District Concept

The Ohio Conservancy Districts

A White Paper on Ohio's Conservancy Districts and the Ecosystem Service District Concept

June 30, 2006

Introduction

As one of the case studies of the GLPF Growing Water grant project led by the Environmental Trading Network, the project team compared the concept of an Ecosystem Service District (ESD; Heal, et al. 2001) with the structure and functions of the Ohio Conservancy Districts. The focus of this study is the Miami Conservancy District (MCD or the District), its on-going Great Miami River Watershed Water Quality Credit Trading program as an example of managing some important ecosystem services, and how MCD can build on the water quality trading program to further become a more ecosystem management oriented service district.

The ESD Concept

An ESD is envisioned to be a governmental institution that can provide a coherent and efficient management of ecosystem services (or natural capital) by taking the ecological values of the landscape into account in making economic and social decisions, especially land use decisions. An important feature of ecosystem service management by an ESD is the use of the market to evaluate and guide the distribution of ecosystem services. In order to effectively use the market, an ESD will also need to monitor, quantify, and invest in these services.

As the first step, an ESD will serve two essential functions: coordinating ecosystem related activities across existing jurisdictions and generating information regarding the status and value of ecosystems. To effectively manage the ecosystem, zoning or land use powers and taxation authority may also be necessary.

Ohio Conservancy Districts and the Miami Conservancy District

In the wake of Ohio's Great Flood of 1913, the State of Ohio passed Chapter 6101 of the Ohio Revised Code, known as the Conservancy Act. The primary function of Conservancy Districts is, therefore, flood prevention and control. A Conservancy District is a political subdivision of the State of Ohio. Some key provisions of the Conservancy Act include:

§ 6101.04. Organization and purposes of conservancy districts.

Any area or areas situated in one or more counties may be organized as a conservancy district in the manner and subject to the conditions provided by this chapter for any of the following purposes:

- (A) Preventing floods;***
- (B) Regulating stream channels by changing, widening, and deepening the stream channels;*
- (C) Reclaiming or filling wet and overflowed lands;*
- (D) Providing for irrigation where it may be needed;*
- (E) Regulating the flow of streams and conserving their waters;***
- (F) Diverting or in whole or in part eliminating watercourses;*
- (G) Providing a water supply for domestic, industrial, and public use;***
- (H) Providing for the collection and disposal of sewage and other liquid wastes produced within the district;***
- (I) Arresting erosion along the Ohio shore line of Lake Erie.*

This section does not terminate the existence of any district organized prior to July 19, 1937, entirely within a single county.

The purposes of a district may be altered by the same procedure as provided for the establishment of the district.

§ 6101.17. Dominant right of eminent domain.

The board of directors of a conservancy district, when it is necessary for the purposes of this chapter, shall have a dominant right of eminent domain over the right of eminent domain of railroad, telegraph, telephone, gas, water power, and other companies and corporations, and over townships, counties, and municipal corporations.

In the exercise of this right, due care shall be taken to do no unnecessary damage to other public utilities, and, in case of failure to agree upon the mode and terms of interference, not to interfere with their operation or usefulness beyond the actual necessities of the case, due regard being paid to the other public interests involved.

It is clear from the two parts of the Act cited above that, the main purpose of a conservancy district is to prevent floods. As a result, its authority regarding land and stream modifications, and its dominant right of eminent domain, are all directed to empower the district to take necessary actions to prevent floods.

Because the necessity of approaching flood prevention from a geographic scale of watersheds/basins, Conservancy Districts naturally cover an area of multiple counties within a major river basin. However, it's unclear what authorities a district has over the land outside its main flood watershed but inside its constituency counties.

It seems that the dominant right of eminent domain was designed to facilitate the district in acquiring/using land and other private or public properties for the purpose of building flood prevention projects or any other related general activities.

The organization of a Conservancy District is shown in the following diagram using the Miami Conservancy District (MCD) as an example.

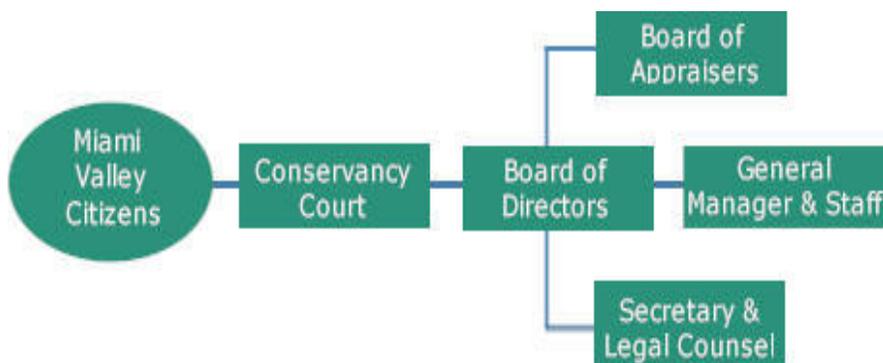


Figure 1. General Organization of a Conservancy District as illustrated by MCD
(Source: www.miamiconservancy.org)

The Conservancy Court is composed of one judge from the Common Pleas Court of each member county in the district. The Conservancy Court appoints the Board of Directors and the Board of Appraisers. The Board of Directors establishes district policy and provides oversight and direction to the Board-appointed General Manager. The Board of Directors makes key decisions with the approval of the Conservancy Court. It is the General Manager's responsibility to implement Board policy and run the day-to-day operations of the district. The Board of Appraisers is responsible of appraising land necessary for work of the district. In MCD, the Board also determines benefits provided by the flood protection system, the groundwater program, and recreational amenities, and approves the methodology used to determine assessments.

Miami Conservancy District (MCD)

The Miami Conservancy District (MCD), established on June 28, 1915, is the oldest and the most active among the 23 existing Districts in the state. The MCD serves 1.5 million people in the Great Miami River Watershed. The District covers 9 counties in the Watershed: Butler, Clark, Greene, Hamilton, Miami, Montgomery, Preble, Shelby, and Warren. However, three counties that have the majority of their jurisdiction located in the Watershed, Logan (upper Mad River and upper Great Miami River), Darke (supper Stillwater River), and Champaign (upper

Mad River), are not represented in the District. The District employs 50 full-time, year-round staff and 20 seasonal and temporary staff.

Initial funding to build the flood protection services was entirely paid for by the people of the Miami Valley. No federal or state funds were used for the design or construction of the system (1918-1922). Construction debt was financed through bonds which were retired in 1949. At that time, assessments were reduced to a level required to provide for the ongoing maintenance of the flood protection system. The current system consists of 5 large scale flood control dry dams and levies on the rivers of major towns and cities.

The system of the dry dams (and flood retarding basins) was designed to take care of a flood 40% greater than that of 1913. It was built in an era of large dam constructions intended to “stimulate basinwide economic development by combining flood control, municipal water supply, irrigation, hydroelectric power generation, recreation and water quality improvement functions within single projects (Goldfarb, 1994)”. Therefore, it is interesting that the MCD flood control dams were designed only for flood relief. During dam design, the MCD found that “the use of the Miami Conservancy District dams for power development would not be advisable from a financial or practical standpoint (MCD, 1922)”, probably referring to the funding source (bond) and the geological conditions of the watershed (flat grades of the main streams in the watershed).

The bulk of all MCD historical and current operation is dedicated to its primary mission of flood protection ensured through maintenance of the 5 dams, their retarding basins, levees, walls, gates, pump stations and related appurtenances. Current activities included a heavy dose of safety upgrades such as installation of relief wells below dams. Roles are expanding as water related needs emerge including water quality monitoring and recreation trails.

MCD maintains real-time monitoring networks to continually update the operation of the flood control system. Updates are posted on the website in the form of press releases indicating status of the dams such as collecting floodwater, holding floodwater, releasing floodwater. It is frequently noted in these releases how often the system has benefited those it was designed to protect (e.g., about 1500 times floodwater stored and released in a controlled rate in the District’s 90 years of existence). In addition, it brings this protection claim down the \$ level by reminding the public that this protection is achieved at a low cost compared to what would happen people instead relied on pricey insurance and flooding was allowed to occur.

Organization

In addition to the general conservancy district organization structure shown in Figure 1, the MCD has the following specific subdivisions:



Figure 2: Subdivisions and Functions of the Miami Conservancy District
(from www.miamiconservancy.org)

Staff members are housed in these subdivisions. There are also several subdistricts within the MCD. Subdistricts can be set up for a specific geographic area within the District (e.g., the Dicks Creek—Little Muddy Creek Subdistrict and the Miami County Subdistrict) or a specific function of the District (e.g., the Water Conservation Subdistrict and the Aquifer Preservation Subdistrict). Subdistricts are staffed by the main district and can borrow from the main district for program development. These subdistricts do not have a physical presence, i.e., a subdistrict office or department in the District’s main office building in Dayton. Rather, they are a function concept established to accomplish the District’s missions in a geographic or task area. The financial statements in the District’s 2003 annual report do not illustrate the accounting records of individual subdistricts or subdivisions.

Funding

General funding of the District comes from assessments paid by property owners who receive benefits from services provided by Miami Conservancy District in the following three areas:

- Flood Protection
- Groundwater Preservation Program
- Recreational Amenities

The fee schedule for maintaining the District's flood protection system comes from two sources, unit and individual assessments. Unit assessments are charged to both cities and counties which have property and infrastructure protected by the District's flood protection system. Infrastructure includes public water and sewer systems, roadways and bridges.

Individual assessments are charged against parcels that flooded in the 1913 flood and receive protection from the District's flood protection system. A parcel's assessment is based on two factors including 1913 flood depth and current taxable value. The assessment is computed as a percent of the individual benefits within city or county boundaries. Individual benefits are in turn calculated as a percent of the tax value of a particular property. The percentage ranges from 3% to 30% depending on the depth the 1913 flood reached at the property. Cities pay 40% of the individual assessments within their boundaries. Counties pay a combination of 40% of the individual benefits within the townships, plus 15% of all benefits in the county.

For example: A \$60,000 home is valued for tax purposes at 35%, or \$21,000. If exposed to 3 feet of the 1913 floodwater, benefit received is 15% of \$21,000 or \$3,150. The assessment rate is currently 1.65% of the benefit or \$51.98/year.

The Ohio Conservancy Act enables a Conservancy District to levy assessments against property receiving the benefit of groundwater preservation. A unit assessment, levied against each of the nine counties within the program boundaries, funds the District's activities. Each county has the option to pay the assessment out of its general fund or to spread the assessment over all properties within the program area.

Levies were also assessed against property receiving the benefit provided by recreational amenities. The political entities where these amenities are located pay an annual assessment to the District to provide maintenance for bikeways, low head dams and recreational trail bridges in Montgomery and Butler counties. The River Corridor Improvement Subdistrict's Board of Appraisers set benefits for each type of structure based on its replacement value. An assessment rate is established by the Subdistrict's Board, which is applied to these benefits to establish the annual assessment. The concept is similar to how assessments are established for street lights or curb and sidewalk improvements found on a common property tax bill.

In addition to assessments, the District also pursues outside funds from various funding sources. For example, in 2003, a \$700,000 grant was received through EPA's Watershed Initiative (or Targeted Watersheds) Grant Program to implement a suite of watershed improvement projects with local partners throughout the Great Miami River Watershed.

In its 2003 Annual Report, MCD listed five fund categories of its accounting records. Table 1 shows total cash receipts and disbursements for each of the 5 fund categories are as follows:

A. General Fund

Limited to operation, maintenance, and other current expenses of the District.

B. Special Revenue Funds

To account for the proceeds of specific revenue sources that are legally restricted to disbursements for specified purposes.

1. The Aquifer Preservation Subdistrict (APS)
2. The River Corridor Improvement Subdistrict
3. Miscellaneous
 - o Watershed Initiatives
 - o RiverSmart

C. Debt Service Funds

To account for the accumulation of resources for and the payment of debt principal, interest, and related costs: Dam Safety and Rehabilitation Debt Service

D. Capital Project Funds

To account for financial resources to be used for the acquisition or construction of major capital facilities: Dam Safety and Rehabilitation

E. Internal Service Funds

To account for the financing of goods or services provided by one department or agency to other departments or agencies of MCD.

1. Internal Service Support
2. Internal Service Operations

Table 1. Abbreviated MCD 2003 Financial Statements.

Fund Categories	General	Special Revenue	Debt Service	Capital Projects	Total
Receipts	\$ 4,338,252	\$ 1,361,881	\$ 1,183,936	\$ 110,136	\$ 6,994,205
Disbursements	4,386,463	1,461,300	1,026,128	6,161,765	13,035,656
Other Receipts/(Disbursements)	(358,165)	(469,000)	0	4,000,000	4,110,835
Balance*	8,236,706	5,875,520	507,232	5,841,087	20,460,545

*Including carry-on's from 2002.

It is clear that the majority (62%) of the case receipts was from the general fund which presumably came from flood protection assessments on private and public properties.

The Great Miami River Watershed Water Quality Trading Program

Water quality credit trading utilizes a watershed framework to improve water quality. For example, a downstream wastewater treatment plant is facing expensive upgrade requirements which will require them to reduce the amount of pollutants they discharge as allowed in their National Pollutant Discharge Elimination System permit. They could invest money upstream that will fund less expensive agricultural management practices and achieve better water quality. Because the improvements are made upstream the quality of the water that flows past the downstream treatment plant will improve and so does all of the water in between. The customers of the wastewater treatment plant benefit from lower costs because expensive upgrades are avoided and everybody benefits from cleaner water.

The Water Conservation Subdistrict of MCD is currently leading a water quality trading program in the Great Miami River Watershed. Water quality trading uses market-based mechanisms to achieve loading reduction of water pollutants. It belongs to a group of environmental policies that assign a dollar value to the “right” of a source discharging/emitting pollutants into the environment and allow the trading of this right (so called emissions trading). The most widely known of these policies is the SO₂ emissions trading scheme that has been in place in the U.S. since early 1990’s. In essence, trading of the “right” to discharge uses the market to explicitly value and place dollar values on an important ecosystem function, receiving and assimilating wastes from human activities. By leading the effort in developing, implementing and managing such a market for water pollutants, MCD is in effect managing an important function of the ecosystem in the Great Miami River Watershed.

Development of the Great Miami River Watershed Water Quality Credit Trading Program

The main driver behind the Great Miami River (GMR) Watershed Water Quality Credit Trading (WQCT) program is the more stringent effluent requirements for municipal, industrial and other permitted point sources under the pending nutrient standards proposed by the Ohio Environmental Protection Agency. Estimated millions of dollars would be required (Kieser & Associates, 2004) if the permitted point sources in the watershed (mostly municipal wastewater treatment plants) are to invest in new technology and equipment to achieve the new effluent requirements. In addition, with nonpoint sources make up the majority of the nutrient loadings (Reutter, 2003) in the watershed, it is doubtful that meeting the effluent requirements by point sources alone can achieve the nutrient standards for receiving waters. Nonpoint sources, mostly agricultural operations in the GMR Watershed, will also need to make significant load reductions. Besides nutrient load reductions, agricultural management practices that reduce agricultural nutrient loadings, such as conservation tillage, have many ancillary benefits that can improve water quality and habitat conditions in receiving waters. Examples are sediment load reduction, peak runoff flow attenuation, groundwater recharge enhancement, and riparian ecosystem improvement. However, funding for agricultural management practices is inadequate

in the watershed with the main source being the USDA-NRCS administrated Farm Bill conservation programs.

The Conservancy District, under the leadership of “Dusty” Douglas Hall, Manager of Program Development, saw the opportunity to establish a water quality trading program in the watershed under these circumstances. Such a trading program has the potential to offer a cost-effective approach to achieve the point source nutrient load reductions required by the pending new standards while providing the agricultural sector in the watershed a new source of non-governmental funding for environmentally friendly management practices. The District is well suited to lead such a program because:

- The District has worked with both rural and urban communities in the watershed in flood protection, urban stormwater management planning, groundwater monitoring and protection, water quality improvement outreach activities in cooperation with local watershed organizations, and recreational amenities development.
- The District is not a regulatory agency. As a service district, it is trusted by the agricultural community.
- The District and its staff members have acted as a liaison between state regulatory agencies, particularly OEPA, and local regulated communities (municipalities) in areas such as stormwater management planning and wellhead protection programs. Such an intermediary role enables the District to effectively communicate with both OEPA and main credit buyers in a point-nonpoint source water quality trading program, a key to the active participation of buyers in and support of OEPA for a trading program.

The idea of developing a water quality trading (WQT) program was followed by two years of meeting and negotiating with all potential players in such a program. In meetings with county Soil and Water Conservation Districts (SWCDs), it was clearly heard that farmers, particularly smaller ones would never want to be regulated. Environmental groups don’t like trading because of the uncertainties involved . This is where the monitoring aspect of the trading program came about (a percentage of projects and subwatershed monitoring, the latter has been done technically by MCD with its flow monitoring program).

The program design uses place-specific management and a 3rd party (MCD) to bring together the agricultural sector and municipalities (representing municipal wastewater treatment plants, the main point sources in the watershed). This would not have happened if it were a regulatory program. The wastewater treatment plants (WWTPs) were attracted to the program because

1. the State of Ohio is moving toward establishing water quality standards and TMDLs in the watershed that will require substantial nutrient load reductions from WWTP discharges;
2. A market analysis conducted by K&A indicated that water quality trading can save point sources in the watershed up to \$370 million dollars compared to treatment facility upgrades in achieving the required nutrient load reductions;

3. MCD help the WWTPs negotiated with the OEPA terms of the trading program that provided lower trading ratios to reward early participation in the program and more importantly long term stability, i.e., modification of their permit language to a 10-year pilot program that allows the permittees to use nonpoint source credits to meet load reduction requirements.

Within the District, the trading program is supported by the Conservancy Court, the Board of Directors, and the District General Manager. It is important to create an idea that is sellable and the trading program leaders made it clear that a win-win environment existed with trading. The Water Conservation Subdistrict used main district funds (~\$150K to 200K) to develop the trading program and these funds will be repaid with program funds contributed by WWTPs and/or funds generated from credit transactions.

Main Features of the GMR WQCT Program (MCD, 2005)

In this program, water quality credits are generated from pounds of phosphorus (TP) and pounds of nitrogen (TN) that are prevented from discharging into the Great Miami River Watershed's rivers and streams. Water quality credits only originate from an activity undertaken voluntarily i.e. not otherwise required by local, state, or federal law. Water quality credits may be purchased by permitted dischargers, who become eligible buyers, for the purpose of complying with regulations related to the particular nutrient for which the credit is generated.

Eligible buyers are public and private entities that (1) hold a state-issued National Pollutant Discharge Elimination System (NPDES) permit, (2) have their NPDES permit modified to reflect their participation in the Trading Program and (3) participate in funding the District's administrative and analytical costs for the trading program.

A trade occurs when water quality credits are transferred to an eligible buyer for their use to comply with an NPDES permit. The cost of a water quality credit is determined by the market. In general, the cost of a water quality credit is likely to be the sum of expenditures for the project (including applicable capital, operating, administrative and ongoing maintenance costs) divided by the number of credits.

Water quality credits will mainly be generated by implementing management practices that reduce the discharge of nutrients from agricultural land uses. Other opportunities to generate credits may include urban storm water management or home sewage treatment system upgrades - that go beyond what is required by law. The specific agricultural management practices that generate credits will be proposed by local soil and water conservation professionals. They will work directly with agricultural producers to identify and propose management practices that work best to accomplish the desired nutrient reduction. Reductions will be verified through inspections and by conducting water quality monitoring at a portion of the project sites. Water quality will also be measured with a continuous monitoring program on a subwatershed scale.

An advisory group, with broad-based stakeholder representation, will develop project criteria and then use it to review proposals and make recommendations for funding specific projects. The criteria will include consideration of the existence of an approved watershed action plan and/or an approved TMDL for the area of the proposed project. The Miami Conservancy District and its Water Conservation Subdistrict are responsible for the program management, including general program administration, water quality monitoring, and credit aggregation and distribution. Figure 3 below (adapted from MCD, 2005) shows the flow of trades. Note that in the diagram, there is not direct interaction between farmers and the regulatory agency, the Ohio EPA. This insulates that farmers from having to work with the Ohio EPA, removing a significant barrier to the participation of farmers in the trading program.

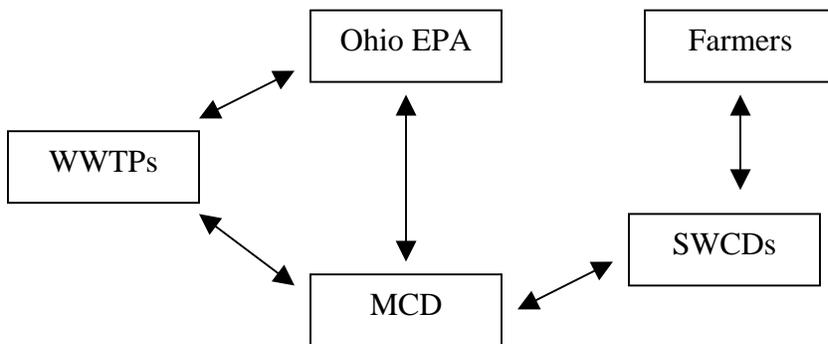


Figure 3. Flow of Trades in the Great Miami River Water Quality Trading Program

Specific features of the program

Several specific features of the trading program are worth noticing here. First, to be eligible to become a credit buyer in the program, a WWTP must first participate in funding the District’s administrative and analytical costs for the trading program. Eligible buyers that participate in the program before NPDES compliance requirements for nutrients are called “Investors.” Eligible buyers that choose to participate in the program but not in advance of their regulatory requirements are called “Contributors” (MCD, 2005). “Investors” are rewarded with a lower trading ratio (hence lower price for credits) for their early participation in financially supporting the program and contributing to early nonpoint source load reductions. Eligible buyers are currently funding the program at a rate that is proportional to their permitted discharge flow rate.

Second, the District also manages an Insurance Pool of credits to be used as a “guarantee” for credits being generated for eligible buyers. The Insurance Pool is one of two strategies used to insure that an eligible buyer is not at enforcement risk due to a possible failure of a management practice (the other one being the Management Practice Contingency Plan). Credits may be

withdrawn from the pool, if necessary, to replace credits that are lost due to a failed management practice. The SWCD staff responsible for oversight of the management practice will make the determination that a management practice has failed. Credits deposited to the Insurance Pool will have a life of five years from their date of deposit. If a pooled credit is not used within five years from its date of deposit, that credit will be retired.

A portion of the pooled credits will originate from projects that are funded by “Contributor” status eligible buyers. For Contributors with discharges to attaining water, one of every two required credits is directed to the Insurance Pool. For Contributors discharging to non-attaining water, one of every three required credits is directed to the Insurance Pool. In addition, water quality improvement projects subsidized by other sources of funds such as the Section 319 Nonpoint Source grant program may generate credits for deposit in the Insurance Pool. The District is actively pursuing credits to insure the Insurance Pool maintains adequate credits.

Third, a field and subwatershed scale monitoring plan is in place to analytically analyze the performance of the trading program. The program targets to collect project-specific data on a minimum of 5% of the total number of credit-generating projects. Nutrient data are also being collected at a larger scale to assess the overall effectiveness of the program within the Great Miami River Watershed. The District implemented a subwatershed water quality monitoring program that collects samples on a continuous basis at four different locations throughout the Watershed. In addition to providing an indication of the effectiveness of the trading program these data will fill a large gap in information necessary to more fully understand the role of nutrients within the Great Miami River Watershed and its contribution to downstream nutrient loading.

Finally, the program established an adaptive implementation approach to estimating nutrient load reductions. Currently, a spreadsheet model developed by the US EPA Region V office and based on the Michigan load quantification methods for CWA Section 319 projects is being used to quantify load reductions resulting from agricultural BMPs. As field monitoring of credit-generating projects gets implemented, the Ohio EPA and Ohio DNR will establish a Load Reduction Workgroup. The Workgroup will be responsible for the periodic evaluation and enhancement of the Load Reduction Spreadsheet. The Workgroup will receive project specific information on management practices, load reduction estimates, and associated analytical data. Based on these data, the Workgroup will direct and oversee the biannual evaluation of the accuracy of estimates made for the trading program. This adaptive approach will ensure the trading program will produce optimized return-on-investment for nutrient management practices and maximized attainment of state water quality standards.

Trading Program Progress

For the first year of program operation (2006), five municipal WWTPs joined the program with contributions to the program fund totaling more than \$352K. In addition, the District successfully applied for a three-year grant (\$938K) from USDA’s Conservation Innovation Grant program to support the program’s administrative and monitoring costs. The first round of

credit-generating project application and selection was conducted in March 2006. There were 71 bids submitted to the District, representing farmers and landowners from seven counties in the District and three of the four major subwatersheds of the Great Miami. The Project Advisory Group selected 13 projects to be funded based on a BMP load reduction efficiency criteria of \$2/lb of total nutrient (phosphorus and nitrogen) loads reduced. Fifty bids were deemed ineligible because the BMPs used did not have a standard load reduction quantification method available in the spreadsheet model used in the program. Other bids were ineligible because they intended to use the trading program as matching funds for other federal/state conservation programs. These bids, however, can be reconsidered for the next round of project funding when the ineligible elements of the projects are removed.

MCD in comparison with ESD

Ecosystem services districts (ESDs) are conceptual government authorities dedicated to management of ecosystem services. The Growing Water RFP defines ESD as “a specialized government entity to direct public investment into activities that enhance those ecological services that improve the condition of the district’s water and water dependent natural resources.” By taking the value of ecosystem services into account in making economic and social decisions, ESDs have the potential to promote sustainable development and fundamentally change the way our economic activities interact with the ecosystem.

The paper pioneering the ESD concept (Heal et al., 1997) considered the powers an ESD should have to manage ecosystem services, which include, from least to most controversial,

- coordination across existing different service districts (Coordination)
- generation of information on ecosystem services (Information Generation)
- zoning authority or other land use powers (Land Use), and
- taxation authority (Taxation).

This section measures MCD’s functions against these four categories. The impact of the new water quality credit trading program on MCD’s potential evolution to becoming an ecosystem service agency is also discussed. The process of building and operating a water quality trading market has involved MCD in all the four functions that the ESC concept envisions for such a district.

Coordination

Although the organization of MCD is county based, the flood control origin of the district has its main activities naturally fall into the Great Miami River watershed boundary. MCD work regularly with local organizations such as SWCD to obtain external funds and work together on watershed improvement projects. However, it seems that MCD does not have a defined role of coordinating officially established service districts. On the other hand, interestingly, some of

MCD's subdistricts clearly have different service focuses than the main district's flood protection (e.g., the Water Conservation Subdistrict and the Aquifer Preservation Subdistrict).

In addition, the recently re-activated Water Conservation Subdistrict covers a broad range of watershed activities, including assisting community-based watershed organizations, Phase II Stormwater permitting assistance, public education, and land conservation. The water quality trading program is also operated by this subdistrict. Other envisioned activities by the Subdistrict include expanded water quality monitoring, restoration of natural floodplains and wetlands, streamside recreational development, and public education.

For the Great Miami River Watershed Water Quality Credit Trading program, substantial efforts were made to obtain support from state and federal regulatory agencies (i.e., the Ohio Environmental Protection Agency and the U.S. Environmental Protection Agency) and local public and private organizations. During 2003, numerous meetings and discussions were held with various potential partners including staff of various public and private wastewater dischargers, county Soil and Water Conservation Districts, the Ohio Farm Bureau Federation, Ohio EPA, Ohio DNR, and the U.S. EPA. Cooperation and regulatory flexibility offered by Ohio EPA and U.S. EPA leadership staff, throughout the discussions, bodes well for the potential to implement an innovative and cost-effective program. For example, Ohio EPA has agreed to coordinate data collection with MCD, to participate in efforts to strengthen community-based watershed groups, and to cooperatively pursue a water-quality trading effort in the Great Miami River Watershed. Ohio DNR also has agreed to provide technical support and oversight for the trading program.

Staff prepared a draft amendment to the Official Plan of The Water Conservation Subdistrict of MCD, which would reactivate the dormant Subdistrict to carry out the proposed program. In June 2004, the Board of Directors approved the final Official Plan amendment. By the end of 2004, a draft Operations Manual had been completed for the program. Currently, additional funding for initiating and partially implementing the program is being pursued.

The WQT program in the Great Miami River watershed led by MCD is a project involving a variety of stakeholders including regulatory agencies, local governments, conservation districts, citizens' groups, and private landowners (farmers). MCD's role as the program administrator and credit broker makes a coordinating function necessary. The quantification of load reduction credits, an essential step of the trading process, provides the district information regarding the benefits of ecosystem restoration efforts, which can in turn be translated into economic value. Although only a small part of a comprehensive ecosystem analysis, such evaluation certainly moves MCD a step closer to the information generating function of an ESD.

In summary, the development and implementation of the Water Quality Credit Trading program required a tremendous amount of coordination among various local, state, and federal agencies. The program is a shining example of the ability of MCD and its staff in working with all levels and all branches governmental organizations.

Information Generation

MCD maintains an extensive and continually expanding monitoring network throughout the Great Miami River watershed. These stations monitor groundwater levels, groundwater quality and surface water quality at wells and streams. Miami Conservancy District's monitoring network currently consists of 189 groundwater level wells, 77 water quality wells. In addition to data collection, MCD staff interprets and analyzes the data to provide important information to decision-makers to help guide their use of the region's water resources. These results are published in user-friendly, non-technical reports that are widely distributed to MCD's constituents. MCD maintains 37 rain gauge stations and a subsequent database of rain records. MCD maintains or partners with other interests in the operation and maintenance of several 45 stream gauges and 2 lake gauges mostly provided by USGS.

For the Great Miami River Watershed Water Quality Credit Trading program, four automatic monitoring stations have been setup at major subwatershed outlets to provide baseline information on watershed nutrient loading conditions. In addition, 5% of the credit-generating projects will be monitored at the field or local small watershed scale to physically measure the improvement of water quality by these projects. Furthermore, monitoring for biological indices, the direct measure of the health of the river ecosystem, will be conducted to assess the overall effectiveness of the trading program.

Although these data collection activities have well equipped MCD to quantify water related ecosystem services, MCD has not taken conscious steps towards such quantification. Apparently, these data collection activities can be well justified with flood control/protection and groundwater quality protection. However, to take the MCD closer to an ESD, these data need to be analyzed in a way that goes beyond hydrology, chemistry, or biology. Economic and social factors and goals will also have to be considered.

Interestingly, MCD has actually started to move in this direction. Personal communications with MCD staff members indicated that MCD has initiated a study with the Ohio State University to study the economic impacts of watershed improvement projects such as trails, buffer strips, and river access points. In the water quality credit trading program, water quality monitoring data and the analysis results will have a direct impact on an important economic activity in the watershed, the operation of wastewater treatment facilities. This is because these results will eventually determine how many credits a point source can purchase from nonpoint sources, how much in-plant treatment needs to be done, and whether it should increase its sewage treatment fees to purchase more credits or upgrade its facilities. Such considerations in effect connect water quality quantification with economic goals of municipalities through the water quality trading market.

Land Use

It appears that outside of flood control and possibly groundwater protection, MCD has very limited land use power. Except the initial land and property acquisitions for the construction of

the flood control dam system, we have not been able to find cases where MCD exercised its dominant right of eminent domain. Although this is far from what an ESD is envisioned to be able to do in terms of managing land use for optimum ecosystem services, flood control, being a key service provided by any ecosystem, is an excellent starting point for land use management by any service district aspiring to become an ESD.

The District also acquires land, apparently using its general fund and grant or other extra funding sources, for preventing development on the floodplain and other watershed improvement projects. In addition, it appears that the District tries to influence local authorities' zoning decisions with technical advice and education. With its reputation and ability to work with all sides of a given issue and the consensus building approach (evident in the water quality trading program), MCD does influence local decisions directly or indirectly.

Through the water quality trading program, the District is actually influencing the land use decisions of individual landowners through the water quality credit market. Between continuing the traditional farming practices that can cause soil, nutrient, and water storage capacity loss from the land, and switching to new farmland management practices such as conservation tillage or even retiring the land from crop production that can improve soil and water quality and quantity of the land and provide other ecosystem services (e.g., flood reduction and wildlife habitat), farmers make the choice by considering the economic incentives offered through the water quality credit market created by the District's trading program. Using the market to change land use patterns voluntarily towards those that can produce more ecosystem services, although not a direct land use authority envisioned by the ESD concept, is in fact preferable in most cases and fits better with the concept's central theme of using market forces to manage ecosystems.

Taxation

Similar to its land use power, taxation by MCD is also largely based on flood control and groundwater protection, two pillar functions of the District. Funding analysis (see Table 1) shows that basic service assessments (taxation) provides the majority of MCD's operation expenses, likely reaching beyond these two key functions. The way that the assessments are levied is similar to a service value based scheme, although it is far from the evaluation process proposed by Heal et al. (2001) that is based on the production possibility frontier of the natural resources in an ecosystem and the maximum possible value for society from these natural resources.

Again, using existing regulations to create markets, such as the Great Miami River Watershed water quality credit market, to make ecosystem service users to pay for these services will work better than directly taxation. Equally important is the political resistance to taxation that has to be considered. Among the four functions of an ESD as envisioned by the concept, taxation is potentially most controversial. Unless absolutely necessary, finding a market mechanism or other innovative way to achieve similar results without taxation may well be the key to the success of any future experiment of implementing the ESD concept.

From Conservancy Districts to ESD

It can be concluded from this analysis that the Miami Conservancy District has the following characteristics that enabled it to be successful in developing the water quality trading program. It is a governmental organization with 1) the mandate to preserve and manage natural lands or resources (water quantity and quality in MCD's case), 2) the capability of conducting research to quantify the ecosystem services generated from the lands or resources, 3) the resources and authority to obtain additional public or private funding to implement conservation measures (e.g., assessments and grants), 4) the ability to manage the funds (i.e., repay the loan if required, and reinvest in further conservation measures if profit is generated), and 5) the leadership to create new conservation programs based on local conditions using regulatory or market forces to finance the programs.

Heal et al. (2001) suggested for steps to foster the implementation of ESDs. First, assess the ecological, economic and social conditions to justify the needs for safeguarding comparatively well-known ecosystem services (e.g., flood protection and water quality). Second, monitor the outcome of similar efforts elsewhere. Third, experiment and innovate. And fourth, promote model of success. From the analysis above, it can be shown that the Miami Conservancy District has in effect gone through the first three steps, particularly with the development and implementation of the water quality trading program.

MCD has always played an important and active role in managing the ecosystem in the Great Miami River watershed through its flood management, groundwater protection, and services for recreational amenities in the watershed. Although the District is not consciously moving towards a more ESD look-like organization, with the inauguration of the water quality trading program, the district is involved in ecosystem service management in a more apparent and direct way than ever before. More significantly, the use of the market to manage water quality has put the District more closely aligned with one of the central themes of the ESD concept, i.e., using the market to evaluate and manage ecosystem services. In addition, the successful development and implementation of the water quality trading program exemplifies an important aspect of the nature of the District—the conservancy district model works precisely because the districts are not regulatory agencies but service districts.

The biggest differences between MCD and a proposed ESD lie in the taxation and land use authorities that an ESD is envisioned to possess. Increasing or adding new taxes (assessments) is always difficult and it will take tremendous amount of public education and scientific research to justify the increases or new taxes on the ground of ecosystem protection beyond flood control and water quality improvement. Taking land use decision control from local governments and putting them under MCD is more difficult. Some fundamental changes in the political and administrative powers of all levels of local government in Ohio (or even in the United States as the entire nation) will have to happen for such a power shift to be realized. Based on these difficulties, it seems unlikely that MCD will ever become an ESD in the way that Heal et al. (2001) envisioned.

However, exactly how closely MCD resembles an ESD is not what makes the comparison between the two institutions valuable. The more important question is how MCD can, building on its experiences and successes, particularly the water quality trading program, manage the ecosystem services provided by the natural resources in the Great Miami River watershed using the principles outlined in the ESD concept. Towards that end, some strategic considerations may be contemplated.

First, more programs like the water quality trading program need to be developed to manage ecosystem services beyond the reduction of pounds of nutrients lost to runoff from farmland. Within its statutory limitations, the District may play a role in areas such as aquatic habitat restoration, urban stormwater treatment and reduction, and even the more systematic program of urban sprawl. In addition, the leadership of the District need to consider a strategic shift of the District's future directions if ecosystem service management is to become a major part or even the focus of the District's mission. The District is limited by its statutory authorization and geographic size to deal with only water related issues in the Great Miami River watershed and surrounding counties. It can not directly making land use decisions, the key issue of ecosystem management. How to get involved more directly into this area in cooperation with local government is a challenge to the District. In addition, ecosystem issues such as nutrient loadings from the entire Mississippi River basin and carbon sequestration needs to be addressed in the regional, national or even global level. Cooperation with service districts and government agencies from other states will be necessary. Finally, as Heal et al. (2001) pointed out as the last one of their four-step approach to implement ESDs, the success of the MCD model can be promoted to other conservancy districts in Ohio and beyond. The authors of this white paper are in fact working on the establishment of a conservancy district in northeast Ohio where rapid development needs to be balanced with natural resources preservation.

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ATTACHMENT H

Great Lakes Protection Fund Financial Report Form

Great Lakes Protection Fund Financial Report Form

Please report against the original budget as detailed below. Any changes to salaries and benefits require prior written permission from the Fund. Changes to any other line item in an amount that exceeds 1% of the total grant award require prior written permission of the Fund. You may use your own form as long as you include the information requested.

Environmental Trading Network

755

22-Jun-07

Grantee

Grant Number

Date of Report

	A	B	C	D	E
Total Amount of Grant: \$250,000	Original Funded Budget Amount	Line Item Transfers	Budget (adjusted)	Cumulative Expenditures	Balance (Column A or C minus Column D)
Grant Revenue To Date:	\$250,000.00			\$225,000.00	\$25,000.00
Expenses (by line item):					
ETN					
Salaries and Benefits	\$14,850.00	\$14,850.00	\$0.00	\$0.00	\$14,850.00
Communications	\$4,450.00	\$3,598.86	\$851.14	\$851.14	\$3,598.86
Bookkeeper	\$1,200.00	\$455.00	\$745.00	\$745.00	\$455.00
Travel - Project Team	\$10,000.00	\$0.00	\$12,691.75	\$12,691.75	-\$2,691.75
Travel - Advisory Team	\$3,000.00	\$3,000.00	\$0.00	\$0.00	\$3,000.00
PROJECT TEAM					
K&A	\$75,500.00	\$26,575.77	\$102,075.77	\$102,075.77	-\$26,575.77
AES	\$58,000.00	\$2,836.36	\$60,836.36	\$60,836.36	-\$2,836.36
Policy Solutions	\$32,000.00	\$3,087.50	\$28,912.50	\$28,912.50	\$3,087.50
EBX	\$13,500.00	\$0.00	\$13,500.00	\$13,500.00	\$0.00
King & Associates	\$10,000.00	\$6,400.00	\$3,600.00	\$3,600.00	\$6,400.00
Shaw Group	\$22,500.00	\$712.52	\$21,787.48	\$21,787.48	\$712.52
16th St. Community Ctr.	\$5,000.00	\$0.00	\$5,000.00	\$5,000.00	\$0.00
Total Expenses:	\$250,000.00		\$250,000.00	\$250,000.00	\$0.00