source of sediment impacting streams despite the large amount of new urban development anticipated to occur in the future. Eroding uplands are important sources of sediment in several other areas of the watershed in Waukesha and Milwaukee Counties, and contribute to downstream sedimentation problems.

Sediment delivery from eroding uplands can be controlled by reducing soil loss. Generally, the tolerable soil loss rate (T) for most agricultural land in the watershed is three tons per acre per year (T/A/Y). The T value is viewed as the amount of soil erosion which can occur for purposes of maintaining long-range soil productivity. Historically, soil erosion control programs have been successful in using a combination of best management practices to achieve rates approaching T.

As discussed in Chapter III, "Watershed Planning Methods," an evaluation of soil erosion rates and the associated amount of sediment delivered to surface waters was conducted. This results of this analysis, water quality information, and aquatic habitat investigations were used to establish a goal for reducing the amount of sediment impacting streams.

The sediment reduction goal for the streams in this watershed is 50 percent. Sediment delivery criteria were selected which combine the estimated amount of sediment delivered to streams with calculated erosion rates. Generally, the sediment reduction goals can be achieved if erosion rates of two tons per acre per year are attained in most areas of the watershed.

Table 22 shows the management categories and eligibility criteria used to target eroding uplands for management.

Lands where sediment reductions are achieved by reducing soil loss to two T/A/Y and sediment delivery to a rate corresponding to a 50 percent decrease are designated as Management Category I. Areas where sediment delivery above the sediment delivery cut-off but the soil loss rate is less than two T/A/Y are designated as Management Category II. Lands with sediment delivery rates below the specified cut-off were placed in Management Category III.

Table 23 shows the amount of control that will be achieved by implementing this strategy for uplands. On a watershed basis, sediment delivered to streams will be reduced 47 percent. This will require better management on 5,258 acres, or about one-third of the agricultural land in the watershed.

As shown of Map 12, control of sediment originating from eroding agricultural lands is needed in 12 of the 20 subwatersheds. The Germantown, Lilly Creek, Upper Menomonee, and Victory Center Subwatersheds together account for about 50 percent of the land needing improved management to reduce erosion and sediment delivery.

Uplands Delivering Sediment to Wetlands: The management category criteria in Table 22 are based on sediment delivery to rivers and streams. These criteria do not address eroding uplands draining to either wetlands adjacent to streams and rivers or isolated wetlands. Wetlands serve to trap most of the sediment contained in runoff during certain periods of the year and in the process provide a valuable water quality function. It is recognized, however, that in the process the wetland may itself suffer environmental

Table 22. Criteria and Management Categories for Eroding Agricultural Uplands in the Menomonee River Watershed.

Subwatershed[1]	Management Category	Criteria[2] Sediment Delivery		Criteria[2] Soil Loss
Dretzka Park	I	over 0.20 T/A/Y	&	over 2 T/A/Y
	II	over 0.20 T/A/Y	&	under 2 T/A/Y
	III	under 0.20 T/A/Y		
Goldenthal	I	over 0.09 T/A/Y	&	over 2 T/A/Y
	II	over 0.09 T/A/Y	&	under 2 T/A/Y
	III	under 0.09 T/A/Y		
Germantown	I	over 0.18 T/A/Y	&	over 2 T/A/Y
	II	over 0.18 T/A/Y	&	under 2 T/A/Y
	III	under 0.18 T/A/Y		
Granville	I	over 0.10 T/A/Y	&	over 2 T/A/Y
	II	over 0.10 T/A/Y	&	under 2 T/A/Y
	III	under 0.10 T/A/Y		
Lilly Creek	I	over 0.23 T/A/Y	&	over 2 T/A/Y
	II	over 0.23 T/A/Y	&	under 2 T/A/Y
	III	under 0.23 T/A/Y		
Little Menomonee	I	over 0.08 T/A/Y	&	over 2 T/A/Y
	II	over 0.08 T/A/Y	&	under 2 T/A/Y
	III	under 0.08 T/A/Y		
Middle Menomonee	I	over 0.28 T/A/Y	&	over 2 T/A/Y
	II	over 0.28 T/A/Y	&	under 2 T/A/Y
	III	under 0.28 T/A/Y		
Mequon	I	over 0.09 T/A/Y	&	over 2 T/A/Y
	II	over 0.09 T/A/Y	&	under 2 T/A/Y
	III	under 0.09 T/A/Y		

Table 22. (continued)

Subwatershed[1]	Management Category	Criteria[2] Sediment Delivery	Criteria[2] Soil Loss
Rockfield	I	over 0.08 T/A/Y &	over 2 T/A/Y
	II	over 0.08 T/A/Y &	under 2 T/A/Y
	III	under 0.08 T/A/Y	
Upper Menomonee	I	over 0.13 T/A/Y &	over 2 T/A/Y
	II	over 0.13 T/A/Y &	under 2 T/A/Y
	III	under 0.13 T/A/Y	
Victory Center	I	over 0.19 T/A/Y &	over 2 T/A/Y
	II	over 0.19 T/A/Y &	under 2 T/A/Y
	III	under 0.19 T/A/Y	
Willow Creek	I	over 0.11 T/A/Y	over 2 T/A/Y
	II	over 0.11 T/A/Y	under 2 T/A/Y
	III	under 0.11 T/A/Y	

1. Does not include watersheds where urban land use predominate and upland erosion is not a significant source of sediment.

2. T/A/Y - tons of sediment per acre per year.

Source: Wisconsin Department of Natural Resources and Wisconsin Department of Agriculture, Trade, and Consumer Protection.

damage. If it is severe enough, the wetland may lose its ability to continue to trap the eroding sediment and/or become degraded in terms of its ecological diversity and value as wildlife habitat.

If wetland degradation associated with sediment deposited from eroding uplands is suspected, site specific evaluations will be conducted during project implementation by the DNR Southeast District water resources management personnel and the county land conservation office staff. The DNR determines the eligibility for cost-sharing or technical assistance.

Table 23. Eroding Agricultural Uplands Targeted for Control in the Menomonee River Watershed.

	Management Category I			Management Category II			
Subwatershed	Acres	Tons	Control	Acres	Tons	Control	Total Control*
Dretzka Park	104	45	50%	--	--	--	50%
Goldenthal	503	58	35%	94	19	12%	47%
Germantown	630	215	48%	--	--	--	48%
Granville	362	54	38%	72	11	8%	46%
Lilly Creek	486	132	48%	--	--	--	48%
Little Menomonee	303	48	36%	97	16	6%	42%
Middle Menomonee	131	50	50%	--	--	--	50%
Mequon	252	45	41%	64	9	8%	49%
Rockfield	277	81	42%	156	26	6%	48%
Upper Menomonee	785	147	46%	--	--	--	46%
Victory Center	613	161	49%	--	--	--	49%
Willow Creek	246	48	41%	83	7	6%	47%
WATERSHED TOTAL	4,692	1,084	44%	566	88	3%	47%

*Control is the percent reduction in tons of sediment delivered to surface waters.

Source: Wisconsin Department of Natural Resources and Wisconsin Department of Agriculture, Trade, and Consumer Protection.

Cropland Eligible for Assistance to Comply With Other State or Federal Programs: Cropland eligible for assistance through the priority watershed project may also need practices beyond those required to achieve the sediment delivery reduction goals. In such cases, practices needed to reduce erosion to levels necessary to comply with requirements of the State Farmland Preservation or Federal Food and Security Act Programs may be eligible for funding under the priority watershed project. Generally, funding for these situations will be available for cropland needing low to moderate cost erosion control practices. Examples of such practices include contour strip cropping or reduced tillage. High cost measures to control erosion on these areas will not be eligible for funding under the priority watershed project. Examples include field diversions and terraces.

MANAGEMENT CATEGORY CRITERIA FOR STREAMBANK DEGRADATION

Management category criteria developed for eroding streambanks reflect the more localized nature of their impact. The criteria are based primarily on the rate at which streams are cutting into the streambanks and secondarily on the mass load of sediment being produced at the site.

Table 24 presents management category criteria for eroding streambanks. All sites having moderate to severe rates of lateral recession are targeted for control. Within this

group of sites, those producing five tons or more of sediment per year are the highest priority for control and are placed in Management Category I. Stream segments with many sites constituting nearly continuous erosion are also considered a priority and are included in Management Category I. Sites having trampled or eroded streambanks associated with cattle access are placed in Management Category I.

Table 24. Criteria and Management Categories for Eroding Streambanks on the Menomonee River and Tributary Streams in the Menomonee River Watershed.

SITE CRITERIA[1]		
Lateral Recession Rate at Site	Sediment Produced at Site (tons/yr)	Management Category[2]
Moderate to severe (At least .3 ft/yr)	At least 5	I
	Less than 5	II
Low to moderate (Between .1 and .3 ft/yr)	At least 5	II
	Less than 5	III
Slight (Less than .1 ft/yr)	n/a	III

1. Any site with cattle access is placed in Management Category I.

2. Where adjacent land use is residential, woodland, or wetland, management alternatives may be restricted. See text for discussion.

Source: Wisconsin Department of Natural Resources and Wisconsin Department of Agriculture, Trade, and Consumer Protection.

Sites producing less than five tons of sediment per year have a lower priority for control and are placed in Management Category II. Sites having low to moderate rates of lateral recession are targeted for only if the site produces at least five tons of sediment per year and as such are placed in Management Category II.

Application of these criteria in the rural portions of the watershed resulted in the identification of four sites in the Little Menomonee and Goldenthal Subwatersheds as Management Category I. Uncontrolled cattle access causes streambank erosion at these sites.

Removal of dams and similar in-stream structures in the Milwaukee River Basin is being evaluated under the previously described Milwaukee River Basin integrated resource

management planning effort. If removal of these types of structures occurs, it can be anticipated that newly exposed streambanks and lakebeds will become significant sediment sources unless adequately managed. Before these sources occur, the DNR and the appropriate unit of government will jointly evaluate the potential sources' anticipated severity and will assign a management category. Eligibility of these sources for technical and financial assistance will be in accordance with the assigned management category.

RURAL POLLUTION CONTROL PRACTICES

This section describes the general types of rural nonpoint source control practices needed to achieve the desired level of pollution control. It also contains guidance on the use of terraces, shoreline buffers, agriculture sediment basins, and easements. A full list of best management practices available for use in the watershed project, along with estimates of the practice quantities needed, is presented in Chapter VI, "Nonpoint Source Project Implementation."

Upland Erosion Control Practices: Target sediment delivery rates on both rotated and continuous cropland can generally be achieved using a combination of rotation changes, reduced tillage, contour plowing, and contour strip cropping. About 10 percent of the eroding uplands will require additional protection, such as critical area seeding, to achieve sediment delivery targets. To control existing gullies and prevent new ones from developing, grassed waterways, field diversions, and grade stabilization structures will be needed.

Cropland terracing will not be promoted as it is generally not needed to meet sediment reduction goals and is expensive to construct. Terraces are eligible for cost-sharing on a case-by-case basis, provided that the eroding field is in Management Category I and that achieving the sediment delivery target is not feasible using other practices. The county land conservation departments and the DATCP should jointly determine the need for terraces.

Shoreline buffers are vegetated filter areas adjacent to waterways. They should be used where ever possible to reduce sediment delivery from targeted lands adjacent to streams. In addition, they should be used along intermittent channels where stream flows overtop channel banks and scour adjacent fields.

Shoreline buffers and agriculture sediment basins may be needed to augment other best management practices where sediment delivery goals cannot be achieved. However, these practices may only be used as off-site "sediment filters" provided that companion soil erosion control practices are in place on fields draining to buffer or basin.

Wetland Restoration: Wetland restoration is an eligible best management practice for the purpose of controlling nonpoint sources of pollution. Secondary benefits of wetland restoration may be enhancement or recreation of wildlife or fish habitat. However the primary justification for restoration under this nonpoint source pollution control project must be water quality improvement.

Wetland restoration includes: the plugging or breaking up of existing tile drainage systems, the plugging of open channel drainage systems, other methods of restoring the pre-development water levels of an altered wetland, or fencing livestock out of wetlands.

Wetland restoration is an eligible practice when applied to any of the following:

1. Cultivated organic soils with tile or open channel drainage systems discharging to a lake, stream, or tributary.

   Wetland restoration will reduce the amount of nutrients and pesticides draining from the altered wetland to a water resource. Establishing permanent vegetation and disabling the drainage system will control this pollutant source.

2. Pastured wetlands riparian to lakes, streams, or tributaries.

   Eliminating livestock grazing within wetlands will reduce the organic and sediment loading to the wetland and adjacent water resource, and reduce the direct damage to the wetland from the livestock. Livestock exclusion by fencing will control the pollutants and restore the wetland.

3. Prior converted wetlands downslope or upslope from fields identified as critical upland sediment sources through the WIN model.

   Restoration of wetlands in these situations will do one of two things: create a wetland filter which reduces the pollutants from an upslope field(s) to a water resource; or reduce the volume and/or velocity of water flowing from an upslope wetland to a downslope critical field. Two eligibility conditions must be met to use wetland restoration in this situation:

   a. All upland fields draining to the wetland must be controlled to a soil loss rate that is less than or equal to two tons per acre per year.

   b. One or more of these same fields must still have a sediment loss rate (after the application any erosion control measures) greater than the "sediment delivery rate" listed in Table 22 for the appropriate subwatershed.

Pesticide and Fertilizer Management Practices: Improved pesticide and fertilizer management will be needed in the watershed. Rules for the Nonpoint Source Program (Chapter NR 120 of the Wisconsin Administrative Code) identify pesticide and fertilizer best management practices as eligible for funding and/or technical assistance.

The DATCP currently is developing standards and specifications for these practices. As the applications become available, they will be evaluated jointly by the DNR, DATCP, the county land conservation department staff, and staff from the newly created University of Wisconsin Center for Nutrient and Pesticide Management. Until that time,

pesticide and fertilizer management will be demonstrated as part of the information and education program.

Streambank Stabilization Practices: The principal practices include cattle exclusion, shoreline buffers, livestock and machinery crossings, shaping and seeding, and riprapping. Shoreline buffers may be used where streambank erosion results from uncontrolled livestock access or cropping too close to streams.

Animal Waste Management Practices: Barnyard runoff control systems and manure spreading management plans will be the principal control practices used to reduce pollution from barnyard runoff and landspreading animal wastes. Manure storage facilities will be used, if necessary, to restrict winter- spreading manure in accordance with plan recommendations.

USING EASEMENTS TO SUPPORT RURAL POLLUTION CONTROL PRACTICES

The nonpoint source program funds may be used to purchase land easements in order to support specified best management practices. These practices, all of which involve the establishment of permanent vegetative cover, include:

* Shoreline buffers.
* Critical area stabilization.
* Wetland restoration.

Easements shall be for a period of no less than 20 years, although perpetual easements are preferred. The easement will be developed as an agreement separate from the cost-share agreement for the best management practice.

Easements may be contracts between the landowner and the Department of Natural Resources, or between the landowner and the local unit of government. The local unit of government will retain responsibility for identifying how the easement will be used in controlling targeted pollution sources. Final approval of the easement rests with the DNR's Bureau of Water Resources Management.

To initiate the process, the local unit of government shall forward the easement proposal to the DNR District nonpoint source coordinator. The nonpoint source coordinator will be responsible for obtaining review comments from the local DNR staff including those from Wildlife Management, Fish Management, and Water Regulation and Zoning. The nonpoint source coordinator will then forward the proposal to the DNR bureau offices of Water Resources Management, Property Management, and other disciplines as appropriate.

EASEMENTS TO SUPPORT CRITICAL AREA STABILIZATION AND SHORELINE BUFFERS

The following guidelines and criteria are for the purchase of easements used to support critical area stabilization, and shoreline buffers exclusive of wetland restoration.

Guidelines for using easements to support wetland restoration are presented later on in this plan.

Riparian Lands Along "High Priority" Water Resources: These are the highest priority areas for obtaining easements to support critical area stabilization and shoreline buffer practices. These water resources are those streams that are most sensitive to nonpoint pollution. Also, these water resources will experience added benefits from the permanent vegetative cover. These added benefits include enhancements to aquatic habitat and, if agreed to by the landowner, improved public access to surface waters.

In this watershed "high priority" waters include those perennial and intermittent streams in the following subwatersheds:

* Little Menomonee.
* Lilly Creek.
* Mequon.
* Richfield.
* Willow Creek.
* Goldenthal.

Easements to allow the establishment of permanent vegetative cover in these areas will be considered even though other lower-cost practices, such as changes in crop rotation, reduced tillage, contour plowing, or contour strips may provide an adequate level of control. Easements in these areas will also be considered as a cost-effective alternative to more expensive practices such as cropland terraces or agricultural sedimentation basins.

Other Portions of the Watershed: Easements may also be used to support critical area stabilization and shoreline buffers in other portions of the watershed, although additional restrictions apply.

In these areas, the easement must offer pollution control at a cost that is competitive with that of other controls, as required by NR 120. For example, the easement should be lower or similar in cost to expensive practices (such as terraces or agricultural sediment basins) for continuous row crops where the only other alternative is retiring the land.

Easements may not be purchased with program funds to establish shoreline protection or critical area stabilization practices outside high priority areas if significantly lower-cost practices, such as changes in crop rotation, reduced tillage, contour plowing, or contour strips provide an adequate level of control.

EASEMENTS TO SUPPORT WETLAND RESTORATION

Easements may be used to support eligible wetland restoration projects. The cost-effectiveness criterion for using wetland restoration is relaxed everywhere in the watershed, being similar to the criterion for easements for shoreline buffers and critical area stabilization in areas adjacent to "high priority waters."

If wetland restoration does not involve the purchase of an easement, then the LCD may sign a cost-share agreement for the required costs and proceed to implement the practice.

Easements to Support Shoreline Buffers: Easements may be used to support shoreline buffers designed to control the delivery of sediment to streams. The estimated acres of easements that are needed to support shoreline buffers are shown in Table 25. The following conditions must be met to use easements for this purpose:

* The shoreline buffer must be located immediately adjacent to a perennial or intermittent stream.

  High priority will be given to easements located along streams in the Little Menomonee Creek and Lilly Creek Subwatersheds. Medium priority will be given to easements located along streams in the Mequon, Rockfield, Willow Creek, and Goldenthal Subwatersheds.

* If the purpose of the shoreline buffer is to reduce the delivery of sediment from a field targeted for control, the buffer must be located directly on the targeted field. Targeted fields are those identified using the management category criteria in Table 22. Easements may not be used to support shoreline buffers created principally as off-site filtering devices for upgradient fields.

  Only that portion of the targeted field that is converted into the vegetated buffer strip is eligible for the easement. Guidelines on the required widths of shoreline buffers used to control sediment delivery are contained in Appendix D.

* Shoreline buffers designed to control targeted areas of streambank degradation may also be supported by easements. Targeted areas are those that meet the criteria in Table 24.

  Easements may be used to support restored wetlands in the shoreland area provided that the wetlands directly control an eligible pollution source. Easements may not be used to restore wetlands designed to filter pollutants originating on other lands.

Table 25. Estimated Acres Eligible for Easements in the Menomonee River Watershed.

	STREAMBANK PROTECTION[1]		UPLAND EROSION CONTROL[2]		TOTAL	
Subwatershed	Feet of Streambank	Acres of Easements	Feet of Streambank	Acres of Easements	Feet of Streambank	Acres of Easements
Goldenthal	1,000	2	4,700	7	5,700	9
Germantown	--	--	19,800	30	19,800	30
Granville	--	--	11,900	18	11,900	18
Lilly Creek	--	--	38,300	58	38,300	58
Little Menomonee	200	1	21,100	32	21,300	33
Middle Menomonee	--	--	6,600	10	6,600	10
Mequon	--	--	700	1	700	1
Rockfield	--	--	9,300	14	9,300	14
Upper Menomonee	--	--	17,500	26	17,500	26
Victory Center	--	--	10,000	15	10,000	15
Willow Creek	--	--	16,300	25	16,300	25
Watershed Total	1,200	3	156,200	236	157,400	239

1. Reflects cattle access sites only.
2. Reflects lands that are adjacent to intermittent or perennial streams, or are delivering sediment at rates that exceed the management target

Source: Wisconsin Department of Natural Resources and Wisconsin Department of Agriculture, Trade, and Consumer Protection.

Easements to Support Critical Area Stabilization: Easements may also be made available to support critical area stabilization outside the shoreland zone if applied to reduce the delivery of sediment to surface waters. This application is limited by the following conditions:

* The land must be in Management Category I.
* The total sediment load from the parcel must be significant.
* Other feasible alternatives must provide significantly less sediment control.

INTEGRATING FISH AND WILDLIFE MANAGEMENT CONCERNS

Fish and wildlife concerns will be identified and addressed during project implementation. The county land conservation department staff will contact the DNR Southeast District wildlife management and fish management staffs for the Milwaukee River Basin as conservation plans and cost-share agreements are developed.

The purpose of this coordination is to maximize the fish and wildlife benefits of nonpoint source control practices, to identify wildlife habitat mitigation measures needed to offset habitat loss occurring from installation of best management practices, and to prevent the use of practices that may have an adverse impact on water resources.

The conditions under which land conservation department staff are to contact DNR staff for consultation and assistance, and the role of the DNR are discussed in Chapter VI.

URBAN NONPOINT SOURCE CONTROL NEEDS

URBAN NONPOINT SOURCES

As discussed in Chapter IV, "Water Resource Conditions, Nonpoint Sources, and Water Resources Objectives" the principal water quality problems for urban streams result from many factors. These include:

* Stream channel modifications, including straightening and lining with concrete.

* High loadings of pollutants including sediment, nutrients, bacteria, heavy metals and other toxic materials.

* Hydrologic disturbances, including flashy high flows and loss of base flow.

* Streambank erosion.

Channel modifications, hydrologic disturbances, and streambank erosion are all related to the drastic changes that occur in the hydrology of streams draining urban areas.

Pollutant loading is related directly to the increase in pollutants generated within the urban landscape and the use of storm sewers to transport runoff to surface waters.

Three principal urban pollution sources must be addressed to reduce the water quality impacts of urban runoff. These sources are established urban areas, developing urban areas, and eroding streambanks.

Established Urban Areas: Established urban area runoff is that which occurs after development has been completed. The established urban area is dynamic and will increase as more development occurs. That portion of the urban area established as of 1985 is called the "existing urban area." That portion that will be added through the year 2000 is called the "planned urban area." The urbanized area in the year 2000 is the sum of the existing and planned areas, and is called the "future urban area."

Runoff from established urban lands is an important cause of irregular and "flashy" stream flows. In turn, these flows cause streambank erosion and flooding problems. Such problems have been traditionally dealt with through extensive modifications to stream channels. The modifications often destroy fish habitat and increase hydraulic scour.

Runoff from established urban lands is also an important source of pollutants, particularly organic and inorganic toxic materials and sediment. Existing urban lands must be retrofitted with storm water practices to reduce the delivery of these pollutants to streams. This requires purchasing land, modifying in-place storm sewers and utilities, and construction of a best management practice, such as a detention pond.

In contrast, newly urbanizing areas can have storm water practices included as an integral part of the development. Practices installed as part of the initial development can be five to 10 times less expensive than those retrofitted to existing urban areas.

Developing Urban Areas: Developing urban areas are those in any phase of construction that involves disturbing the soil through grading or excavation. Developing areas include those where land use is being converted for the first time, as occurs during creation of a new residential subdivision or industrial park in an area previously used for farming.

This type of development may also include renovation or redevelopment within the established urban landscape. These activities include utility replacement, street replacement, bridge reconstruction, or rehabilitation of commercial, industrial, or residential areas. Developing urban lands are important sources of construction site sediment and attached pollutants, primarily phosphorus.

Streambank Erosion: Streambank erosion sites include those identified as part of the urban streambank survey. These sites are important as sources of sediment and reduce the available shoreline habitat required for healthy fish populations.

MANAGEMENT ALTERNATIVES FOR ESTABLISHED URBAN AREAS

Alternatives for Existing Urban Lands: Existing urban land uses differ in their production of storm water pollutants and flow. Those urban land uses considered most critical to control nonpoint source pollution were identified for each subwatershed. To identify critical urban land uses, staff and budget resources are focused upon in the most cost-effective manner.

Two factors were used to identify critical urban land uses; the unit area rate (pounds/acre) at which each land use produces pollutants, and the portion of the total urban pollutant load (pounds/year) produced by each land use.

Six management alternatives were applied to the existing critical urban land uses. These management alternatives span a range of management practices and control effectiveness which include:

1. Do nothing.

2. Increase street sweeping to once per week on critical land uses.

3. Redirect roof down spouts on critical land uses to pervious areas.

4. Detain runoff from 50 percent of the critical land uses using wet detention ponds and increase street sweeping on the other 50 percent of the critical land uses to once per week.

5. Infiltrate runoff from 50 percent of the critical land uses and increase street sweeping on the other 50 percent of the critical land uses to once per week.

6. Detain runoff from 100 percent of the critical land uses using wet detention ponds.

The analysis of management alternatives assumes that wet ponds will trap all sediment particles of five microns or larger. This is a high level of control that will result in controlling 90 percent of the suspended sediment and about 70 percent of the heavy metals in urban runoff. The analysis assumes an infiltration rate of 0.25 inches per hour for infiltration basins and grassed swales. This is a moderate rate of infiltration that will provide less control of pollutants than wet detention ponds. Higher infiltration rates of about 2.5 inches per hour would provide excellent control of pollutants. Existing levels of street sweeping and grassed swale drainage are accounted for in evaluating these alternatives.

The alternatives evaluated how different management activities will affect two important factors; storm water pollutant concentrations and storm water pollutant loads. Information concerning the concentration of pollutants in storm water under the alternative scenarios provide the basis for selecting a management program which achieves acute toxicity standards for storm water.

The alternatives analysis also determines the management program for reducing mass loading of sediment and lead to achieve chronic toxicity standards for the Menomonee River and its tributaries.

Alternatives for Planned Urban Lands: Alternatives for planned urban areas identifying changes in pollutant loading anticipated to occur under different control programs. Pollutant loads will ultimately affect overall river quality and can compromise gains made through controls on existing urban lands.

Three management alternatives were applied to planned urban areas. These include:

* Redirect roof downspouts on all lands to pervious areas.

* Detain runoff from 100 percent of all lands with wet ponds.

* Infiltrate runoff from all residential areas using grassed swales and detain runoff from all commercial and industrial lands using wet detention ponds.

Alternatives for Future Urban Areas: The impacts of alternative management programs for existing urban areas were combined with those for planned urban areas to determine the net impacts on water quality under future conditions. The six management alternatives for existing areas were combined with each of the three management alternatives for planned urban areas. The result provides a comparison of pollutant loading under future conditions for 18 alternative urban management programs.

The plan recommendations were based on the alternative that provides for the reduction in pollutant loading which is necessary to achieve the previously described water resource objectives.

MANAGEMENT ALTERNATIVES FOR DEVELOPING URBAN LANDS

Two levels of management were identified for construction:

* Manage construction sites, assuming control practices which are 75 percent effective in controlling off-site sedimentation.

* Manage construction sites, assuming control practices which are 90 percent effective in controlling off-site sedimentation

IDENTIFICATION OF URBAN STREAMBANK EROSION CONTROL ALTERNATIVES

It was assumed that urban streambanks would be controlled using the same criteria specified for rural areas. Alternatives for achieving this level of control have not been evaluated, but will be required as part of any feasibility study for streambank erosion control prepared prior to installing practices. Flow reduction through application of upland practices, and practices applied to the eroding sites themselves will need to be investigated as alternatives.

ANALYSIS OF URBAN MANAGEMENT ALTERNATIVES

The long-term goal of urban nonpoint source controls in this watershed is to contribute towards the eventual elimination of toxicity in urban stormwater runoff and in receiving waters. The current wording in the plan reflects the fact that urban runoff is a significant, although not the sole, contributor of toxicity problems.

The Integrated Resource Management Plan for this watershed identifies toxic in-place pollutants (sediments) and industrial spills as other factors contributing to toxicity problems. Urban nonpoint source controls will consequently reduce toxicity, but true elimination will require other management actions. Also, reducing the average concentrations of metals in stormwater effluent and receiving waters to acceptable levels will reduce the magnitude and frequency of concentrations that exceed state standards, but will not eliminate them entirely.

Management alternatives for established and developing urban areas were evaluated based on their capabilities to meet pollution reduction goals. Three reduction goals identified in Chapter IV, were used as the principal criteria for evaluating the effectiveness of urban nonpoint source control alternatives. These reduction goals are:

* Decrease the 1985 suspended sediment loading to principal tributary streams and the Menomonee River by 50 percent to reduce substrate embeddedness.

* Reduce the heavy metals loading from existing urban areas in all subwatersheds as needed to reduce the acute toxicity of storm water effluents (varies by subwatershed).

* Reduce the heavy metals loading from the future urban area (existing and planned areas) to 50 percent of the 1985 level to reduce the chronic toxicity of the Menomonee River.

Results for Sediment: Construction erosion, runoff from established urban areas (existing and planned), and streambank erosion are the principal urban sediment sources. The relative importance of these sources to the existing and projected mass loading of sediment to the Menomonee River and its tributaries is presented in Chapter IV.

Management needs for construction site and streambank erosion controls are presented below. The recommended levels of control, in association with those called for in the rural areas, form the backdrop for evaluating alternatives for established (existing and planned) urban area runoff.

Sediment Control for Developing Areas: Construction site erosion control throughout most of the watershed is a cornerstone to achieving sediment reduction goals. Throughout much of the watershed annual construction activity will increase over past rates. Without adequate control, construction site erosion will remain as the most significant source of sediment in the watershed. As discussed below, the alternatives analysis assumes a 75 percent reduction in the amount of sediment loading to streams attributable to construction erosion.

Sediment Control For Eroding Streambanks: Streambank erosion occurs along a significant portion of Lilly Creek and the Menomonee River in the Middle Menomonee and Lower Menomonee Subwatersheds. This erosion is caused primarily by the changing stream hydrology, which is characterized as "flashy" and having increasing volumes and peak flows. This acts to constantly widen the stream channel, destroying the natural conditions needed for healthy communities of fish and other aquatic life. Also, the channel is scoured during runoff events, displacing in-stream cover such as rocks and logs and flushing away the organisms as well.

Streambank erosion in urban areas will be targeted for control using the same criteria developed for other portions of the watershed. These criteria were shown in Table 24 under the rural nonpoint source control strategy. Table 26 shows the results of applying these management category criteria to 250 sites encompassing approximately 28,500 feet of streambank erosion along the Menomonee River and its principal tributaries. Approximately 6,000 feet of streambank erosion at 48 sites in urban areas are targeted for control. These sites encompass 36 percent of the length and 59 percent of the mass load coming from this source.

Sites located in residential areas, wetlands, and woodlands may be impractical to control for several reasons. Access may be a limiting factor in any of these areas. Structural controls may not be suited to wetland areas because of unstable substrate material. In woodland areas, site preparation for structural controls may require disturbing extensive areas. As a result, sites located in these areas may need further evaluation. Options include structural controls such as riprapping, shaping and seeding. Less intrusive measures such as brushing to increase light penetration to encourage vegetation establishment may also be effective. Foregoing control all together may be necessary if the degree of site disturbance needed to install practices offsets the benefits to the stream.

Sediment Controls For Established Urban Areas: The effectiveness of using nonpoint source controls in established urban areas was evaluated to determine if this additional step in managing sediment loading is cost-effective. Table 27 shows how nonpoint source controls in established urban areas can be expected to affect total sediment loads from subwatersheds in Ozaukee and Washington Counties. Table 28 displays similar information for Milwaukee and Waukesha County Subwatersheds.

This analysis assumes that the recommendations presented in this plan for the control of eroding uplands, rural and urban streambank erosion, and construction sites will be implemented. Some adjustments downward have been made to reflect management category implications for upland erosion and some potential technical difficulties in controlling streambank erosion. As noted above, the analysis assumes that future construction erosion control efforts reduce sediment loading from this source by about 75 percent.

The alternatives analysis revealed that intensive management of existing and planned urban areas for purposes of reducing sediment loading to streams is needed throughout most of the watershed. Controlling streambank erosion, construction erosion, and

Table 26. Eroding Streambanks Targeted for Control in the Menomonee River Watershed.

Subwatershed	Management Category I[1]				Management Category II[1]				Total Control	
	Sites	Feet	Tons No.	Tons %	Sites	Feet	Tons No.	Tons %	Portion of Eroding Feet	Portion of Eroding Tons
OZAUKEE COUNTY										
Little Menomonee	1	240	5	33	--	--	--	--	15%	33%
WASHINGTON COUNTY										
Goldenthal	3	1,000	5	100	--	--	--	--	100%	100%
WAUKESHA COUNTY										
Butler Ditch	--	--	--	--	1	50	2	100	100%	100%
Underwood Creek	1	55	8	16	3	100	10	20	20%	37%
Middle Menomonee	9	2,400	560	90	--	--	--	--	75%	70%
Germantown	1	400	5	90	--	--	--	--	40%	90%
Lilly Creek	10	470	116	55	5	280	18	9	15%	12%
MILWAUKEE COUNTY										
Honey Creek	1	460	12	38	--	--	--	--	17%	38%
Lower Menomonee	13	835	109	53	3	160	10	5	45%	72%
Dretzka Park	1	800	60	90	--	--	--	--	50%	90%
WATERSHED TOTAL	40	6,660	880	70	12	600	40	35	29%	78%

1. Where adjacent land use is residential, woodland, or wetland, management alternatives may be restricted. See text for discussion.

Source: Wisconsin Department of Natural Resources and Wisconsin Department of Agriculture, Trade, and Consumer Protection

Table 27. Projected Change, Year 1985-2000, in Sediment Loads for Subwatersheds in the Ozaukee and Washington County Portions of the Menomonee River Watershed, Under Alternative Management Programs.

	CHANGE IN SEDIMENT, BY MAJOR SOURCE							CHANGE IN TOTAL SEDIMENT			
			Urban Areas[1]				Construction	All Sources[3]			
	Uplands	Streambanks	1,1	2,2	2,4	2,6	Sites[2]	Alt 1	Alt 2	Alt 3	Alt 4
OZAUKEE COUNTY											
Mequon	-49%	--	52%	61%	27%	-6%	225%	33%	25%	25%	25%
Little Menomonee	-42%	-50%	n/a	n/a	n/a	n/a	n/a	-73%	-73%	-73%	-74%
WASHINGTON COUNTY											
Germantown	-48%	-90%	125%	-6%	-23%	-37%	13%	-13%	-31%	-34%	-35%
Goldenthal	-47%	-75%	333%	3%	-24%	-51%	311%	39%	-2%	-5%	-9%
Rockfield	-55%	--	n/a	n/a	n/a	n/a	n/a	-65%	-65%	-65%	-66%
Upper Menomonee	-49%	--	30%	-11%	-43%	-74%	-90%	-61%	-62%	-62%	-71%
Victory Center	-49%	--	89%	-17%	-47%	-77%	51%	-1%	-28%	-36%	-49%
Willow Creek	-47%	--	147%	-10%	-36%	-61%	-75%	-55%	-65%	-66%	-68%

1. Includes existing and planned urban land uses. Alternative urban programs are:
   - 1,1 Redirect downspouts on all new development, no management of existing urban areas.
   - 2,1 Wet detention basins on all new development, no management of existing urban areas.
   - 2,2 Wet detention basins on all new development, increased street sweeping on existing critical land uses.
   - 2,4 Wet detention on all new development, increased street sweeping on 50% of existing critical land uses and wet detention for the other 50% of the existing critical land uses.
   - 2,6 Wet detention on all new development, wet detention on all existing critical land uses.
2. Reductions in construction site sediment assume that practices are 75% effective.
3. All alternatives include the reductions for upland erosion, streambank erosion, and construction site erosion included in the left half of this table. In addition:
   - Alternative 1 includes urban program 1,1.
   - Alternative 2 includes urban program 2,2.
   - Alternative 3 includes urban program 2,4.
   - Alternative 4 includes urban program 2,6.

Source: Department of Natural Resources.

Table 28. Projected Change, Year 1985-2000, in Sediment Loads for Subwatersheds in the Milwaukee and Waukesha County Portions of the Menomonee River Watershed, Under Alternative Management Programs.

	CHANGE IN SEDIMENT, BY MAJOR SOURCE							CHANGE IN TOTAL SEDIMENT			
			Urban Areas[1]				Construction	All Sources[3]			
	Uplands	Streambanks	1,1	2,2	2,4	2,6	Sites[2]	Alt 1	Alt 2	Alt 3	Alt 4
WAUKESHA COUNTY											
Butler Ditch	-25%	-75%	79%	-27%	-44%	-62%	38%	37%	18%	3%	-2%
Dousman Ditch	-25%	--	63%	-29%	-46%	-68%	-67%	-41%	-59%	-63%	-67%
Lilly Creek	-48%	-65%	117%	-23%	-44%	-65%	-24%	-22%	-43%	-45%	-47%
Middle Menomonee	-50%	-90%	35%	-11%	-36%	-59%	-82%	-54%	-61%	-65%	-69%
So. Br. Underwood	--	--	13%	-1%	-35%	-70%	-91%	-59%	-63%	-73%	-83%
Underwood Creek	--	-35%	31%	-19%	-44%	-70%	-73%	-44%	-58%	-64%	-71%
MILWAUKEE COUNTY											
Dretzka Park	-50%	-90%	209%	-16%	-22%	-48%	130%	48%	-3%	-5%	-10%
Granville	--	--	103%	-20%	-26%	-58%	1143%	188%	103%	99%	78%
Honey Creek	--	-35%	7%	-3%	-36%	-72%	-83%	-33%	-38%	-56%	-75%
Lower Menomonee	--	--	6%	-15%	-40%	-69%	-98%	-76%	-80%	-85%	-90%
Menomonee Valley	--	--	4%	-2%	-43%	-77%	-38%	-1%	-4%	-43%	-74%
Noyes Park	--	--	41%	4%	-21%	-45%	-88%	-64%	-70%	-75%	-80%

1. Includes existing and planned urban land uses. Alternative urban programs are:
   - 1,1 Redirect downspouts on all new development, no management of existing urban areas.
   - 2,1 Wet detention basins on all new development, no management of existing urban areas.
   - 2,2 Wet detention basins on all new development, increased street sweeping on existing critical land uses.
   - 2,4 Wet detention on all new development, increased street sweeping on 50% of existing critical land uses and wet detention for the other 50% of the existing critical land uses.
   - 2,6 Wet detention on all new development, wet detention on all existing critical land uses.
2. Reductions in construction site sediment assume that practices are 75% effective.
3. All alternatives include the reductions for upland erosion, streambank erosion, and construction site erosion included in the left half of this table. In addition:
   Alternative 1 includes urban program 1,1.
   Alternative 2 includes urban program 2,2.
   Alternative 3 includes urban program 2,4.
   Alternative 4 includes urban program 2,6.

Source: Wisconsin Department of Natural Resources.

sediment originating from rural areas is not sufficient to meet the sediment reduction goals in 10 subwatersheds encompassing about 60 percent of the Menomonee River Watershed.

Each of the alternative sediment control programs is very sensitive to the efficiency of construction site erosion controls. Improving efficiency of construction erosion control programs from 75 percent to 90 percent would dramatically improve the total sediment control throughout most of the watershed. This supports the conclusion that it is most cost-effective to optimize construction erosion controls instead of retrofitting existing urban areas with detention basins.

Achieving greater than a 75 percent efficiency in controlling construction erosion control practices is probably unrealistic. However, failure to attain at least a 75 percent efficiency in these control programs will result in failure to meet sediment reduction goals in most surface waters. This shortfall in the sediment reduction goal would compromise gains made from controlling other sediment sources including upland erosion, streambank erosion, and sediment originating from future urban development.

The analysis indicates that nonpoint source controls on existing and planned areas are not needed in some areas of the watershed to achieve the previously described sediment reduction goals. In Ozaukee and Washington Counties, four subwatersheds—Little Menomonee, Rockfield, Upper Menomonee, Willow Creek—fall into this category. Four additional subwatersheds—Middle Menomonee, South Branch Underwood Creek, Lower Menomonee, and Noyes Park—in the Milwaukee and Waukesha County portions of the watershed also do not require nonpoint source control to achieve sediment reduction goals.

Although installing urban stormwater controls in existing urban areas is not a cost-effective method of reducing sediment loads, it will be required to reduce the loading of urban toxic materials to acceptable levels. Since management actions needed to reduce toxicity are more stringent than those required to reduce sediment, the strategy to control toxic materials in runoff will dictate the recommended program for established urban areas. This is explained in more detail below.

Results for Total Lead: Chapter IV discussed reduction goals related to reducing the acute toxicity of storm water runoff and the chronic toxicity of the receiving waters into which it flows. Investigating management actions that satisfy these reduction goals required two distinct approaches. Each is described below. One approach considers reducing the acute toxicity of stormwater effluents and the other considers reducing the chronic toxicity of receiving waters. Both of these approaches will also reduce the transport of lead and other urban toxic materials to the contaminated bottom sediments of receiving waters.

Reducing the Acute Toxicity of Storm Water Discharged to Streams. The approach used to identify management actions that reduce the toxicity of storm water runoff was based on evaluating individual subwatersheds. This is necessary because individual storm water pipes are the primary concern and existing and planned urban area runoff should be looked at separately in evaluating how best to reduce toxicity.

The need for reducing the potential for acute toxicity problems was presented in Chapter IV, where it was shown that heavy metals concentrations in urban stormwater are a concern (Tables 16 and 17). One way of achieving this is to reduce the mass load of pollutants entering the storm sewer system. If it is assumed that the volume of storm water remains the same, the concentrations will be reduced in direct proportion to reductions in the load of pollutants entering the storm sewer system.

Table 29 shows the effect of different management alternatives on estimated pollutant concentrations in storm water. When compared to the monitored and calculated concentrations of heavy metals in stormwater presented in Tables 16 and 17, this information gives an indication of the intensity of management needed in the existing urban areas to reduce the potential for acute toxicity. Nearly all subwatersheds will require an ambitious retrofitting program to achieve this goal. Most will require detention on between 50 percent and 100 percent of the existing critical land uses, with increased street sweeping, where needed, to bring frequencies up to once per week.

Reducing Chronic Surface Water Toxicity. The second evaluation addressed the chronic toxicity of streams receiving the urban pollutant loads. These investigations assumed that storm water and river water are well mixed. Large scale mass loading of pollutants are involved, and the surface waters will reflect changes in loading that occur over time from a multitude of storm sewer pipes.

The analysis considered principal tributary subwatersheds and major points along the Menomonee River. Also, it is appropriate to integrate the effects of managing both the existing and planned urban area runoff since both act together to influence pollutant concentrations in the surface waters.

Five of the 18 nonpoint source control alternatives were selected to show the level of management needed to meet the reduction goals presented in Chapter IV. The effectiveness of these alternatives on reducing total lead loads in the Ozaukee and Washington County portions of the watershed is presented in Table 30. Table 31 presents similar information for the Milwaukee and Waukesha County portions of the watershed.

To reduce chronic toxicity, an ambitious program of controls on both existing and planned urban areas is required. Alternative 4, representing extensive detention on both existing and planned urban areas, is required to sufficiently reduce mass loading in both upstream urbanizing portions of the watershed and in the most intensively developed downstream areas. Consequently, all subwatersheds need a high level of control on established urban areas.

In addition to reducing chronic toxicity in the Menomonee River, Alternative 4 will result in a significant reduction in loadings of heavy metals and other urban pollutants to tributary streams and the Milwaukee Harbor Estuary.

Even though the effectiveness of Alternative 4 is reduced in these areas, this stringent level of management is still recommended. Less control of urban stormwater pollution, such as that which would take place under Alternative 2 or 3, would result in future river

Table 29. Estimated Change in Average Subwatershed Storm Water Effluent Concentrations of Total Lead Under Selected Storm Water Management Alternatives.[1]

	Urban Stormwater Management Alternatives[2]			
Subwatershed	A	B	C	D
RIVER POINT 1				
Germantown	0%	-24%	-46%	-63%
Goldenthal	0%	-42%	-59%	-76%
Rockfield	0%	-34%	-54%	-73%
Willow Creek	0%	-37%	-55%	-73%
Upper Menomonee	0%	-21%	-46%	-77%
RIVER POINT 2				
Butler Ditch	0%	-45%	-57%	-69%
Dretzka Park	0%	-18%	-43%	-70%
Lilly Creek	0%	-48%	-60%	-73%
Middle Menomonee	0%	-17%	-42%	-67%
Victory Center	0%	-29%	-53%	-77%
RIVER POINT 3				
Granville	0%	-33%	-35%	-69%
Little Menomonee	0%	-26%	-43%	-67%
Mequon	0%	-6%	-28%	-57%
Noyes Park	0%	-1%	-26%	-56%
RIVER POINT 4				
Dousman Ditch	0%	-46%	-56%	-72%
Honey Creek	0%	-5%	-33%	-71%
Lower Menomonee	0%	-23%	-38%	-68%
Menomonee Valley	0%	-2%	-38%	-72%
So. Br. Underwood	0%	-4%	-35%	-72%
Underwood Creek	0%	-26%	-47%	-69%

1. Represents the change in the 1985 average annual flow weighted concentration for lead. Estimated concentration are calculated from estimates of mass loading and flow for the Subwatershed. Data is for existing urban area runoff only.

2. Alternatives are as follows:
   A. Do nothing with runoff from existing urban areas.
   B. Increase street sweeping on existing critical urban areas to once/week.
   C. Increase street sweeping on 50% of existing critical urban areas; provide 50% of existing critical urban areas with wet detention.
   D. Provide 100% of existing critical urban areas with wet detention.

Source: Wisconsin Department of Natural Resources

Table 30. Projected Change, Year 1985-2000, in Urban Nonpoint Source Loads of Total Lead for the Ozaukee and Washington County Portions of the Menomonee River Watershed.

	Urban Stormwater Management Alternatives[1]				
Subwatershed[2]	1	1a	2	3	4
OZAUKEE COUNTY					
Mequon	406%	54%	54%	37%	20%
WASHINGTON COUNTY					
Germantown	99%	21%	-3%	-25%	-42%
Goldenthal	347%	75%	33%	16%	-2%
Upper Menomonee	24%	4%	-16%	-44%	-68%
Victory Center	74%	16%	-13%	-37%	-61%
Willow Creek	150%	32%	-5%	-22%	-41%

1. Includes existing and planned urban land uses. Alternative urban programs are:
   - 1 Redirect downspouts on all new development, no management of existing urban areas.
   - 1a Wet detention basins on all new development, no management of existing urban areas.
   - 2 Wet detention basins on all new development, increased street sweeping on existing critical land uses.
   - 3 Wet detention on all new development, increased street sweeping on 50% of existing critical land uses and wet detention for the other 50% of the existing critical land uses.
   - 4 Wet detention on all new development, wet detention on all existing critical land uses.

2. Does not include the Little Menomonee and Rockfield Subwatersheds. The pollutant load is assumed to remain the same because no additional growth is projected.

Source: Wisconsin Department of Natural Resources.

Table 31. Projected Change, Year 1985-2000, in Urban Nonpoint Source Loads of Total Lead for the Milwaukee and Waukesha County Portions of the Menomonee River Watershed.

	Urban Stormwater Management Alternatives[1]				
Subwatershed	1	1a	2	3	4
MILWAUKEE COUNTY					
Dretzka Park	184%	40%	12%	-4%	-30%
Granville	119%	26%	-7%	-9%	-43%
Honey Creek	7%	1%	-4%	-32%	-69%
Lower Menomonee	8%	2%	-21%	-36%	-66%
Menomonee Valley	4%	1%	-1%	-37%	-71%
Noyes Park	55%	12%	12%	-14%	-44%
WAUKESHA COUNTY					
Butler Ditch	85%	18%	-27%	-37%	-51%
Dousman Ditch	73%	16%	-31%	-41%	-56%
Lilly Creek	123%	26%	-21%	-34%	-47%
Middle Menomonee	31%	7%	-10%	-36%	-61%
So. Br. Underwood	13%	3%	-1%	-32%	-69%
Underwood Creek	32%	7%	-19%	-40%	-62%

1. Includes existing and planned urban land uses. Alternative urban programs are:
   - 1 Redirect downspouts on all new development, no management of existing urban areas.
   - 1a Wet detention basins on all new development, no management of existing urban areas.
   - 2 Wet detention basins on all new development, increased street sweeping on existing critical land uses.
   - 3 Wet detention on all new development, increased street sweeping on 50% of existing critical land uses and wet detention for the other 50% of the existing critical land uses.
   - 4 Wet detention on all new development, wet detention on all existing critical land uses.

Source: Wisconsin Department of Natural Resources.

conditions that are, at best, unchanged and, at worst, more degraded than those presently occurring at these points along the Menomonee River.

Results for Flow: Hydrologic analyses have not been conducted to investigate the effect of management alternatives on reducing and preventing streambank erosion and bed scour, or on maintaining stream base flows. These studies will need to be conducted as part of future feasibility studies for the existing and planned urban areas.

RECOMMENDED URBAN NONPOINT SOURCE CONTROL PROGRAM

The recommended urban nonpoint source control program for this watershed consists of five elements. Each element contains general recommendations and specifies the local units of government to which they apply. Where necessary, additional recommendations follow for specific units of government.

This plan acknowledges that although county parkland represents a reserve of open space upon which urban structural practices could potentially be located, the Milwaukee County Parks Department manages this land for many other purposes, including recreation. The Parks Department will review each nonpoint source control proposal that involves county parkland on a case-by-case basis to determine whether the county supports use of the land for such a purpose, and to determine the county's role as a provider of the local share for capital construction costs.

In addition, the Parks Department will not assume long-term maintenance liability for practices placed on its property when those practices are installed to control pollutants and stormwater flows that are generated from urban lands located in other governmental jurisdictions. This is anticipated to be the case in all or nearly all situations.

Urban best management practice recommendations are shown on Map 13 for communities in Ozaukee and Washington Counties, and on Map 14 for communities in Milwaukee and Waukesha Counties

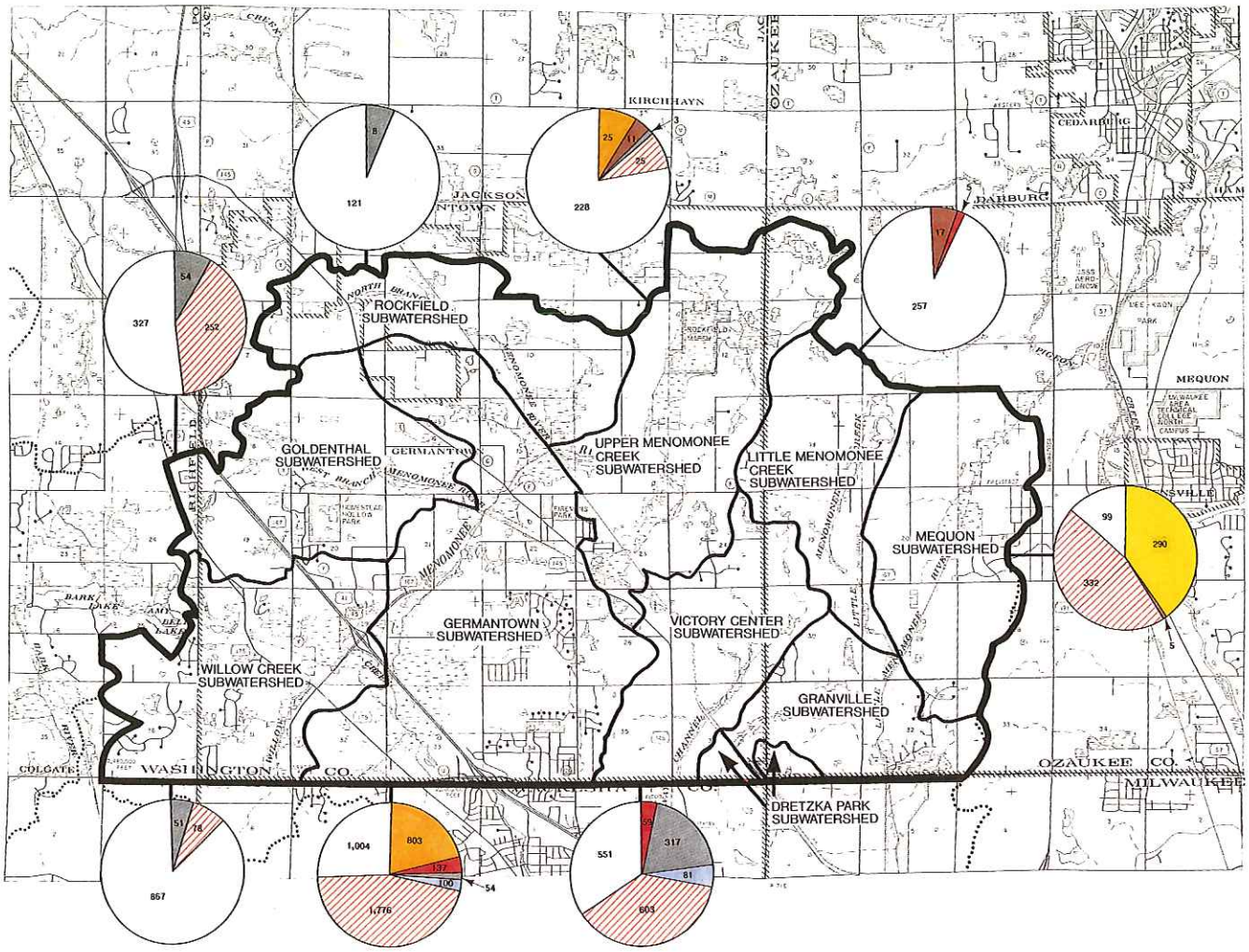
Construction Site Erosion Control Element: This plan identifies the need for effective construction erosion control programs throughout the watershed. It is needed to control erosion from newly developing areas, urban renewal projects in established urban areas, and from installation and/or maintenance of roadways and buried utilities.

Construction erosion control is accomplished most effectively through a comprehensive ordinance, practice standards and application guidelines, an effective administrative program and effective enforcement. Training programs are needed for staff administering ordinances and developers who usually are responsible for installing and maintaining the erosion control practices.

General Requirements. Ordinances must meet the applicability and content requirements of NR 120.16 dealing with erosion control. The "Model Construction Site Erosion Control Ordinance" (developed cooperatively by the DNR and the League of Wisconsin Municipalities (DNR, 1987)) and suggested changes to the model ordinance (set forth by Mr. James H. Schneider, League Legal Counsel, in the March 1989 issue of "The Municipality") will be used as guides to determine adequacy of ordinances. Erosion

Map 13

RECOMMENDED URBAN NONPOINT SOURCE CONTROLS FOR THE OZAUKEE AND WASHINGTON COUNTY PORTIONS OF THE WATERSHED



INCLUDES LANDS IN THE MILWAUKEE AND WAUKESHA COUNTY PORTIONS OF THE WATERSHED

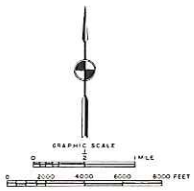
LEGEND

EXISTING URBAN LANDS TARGETED FOR MANAGEMENT

803 ACRES

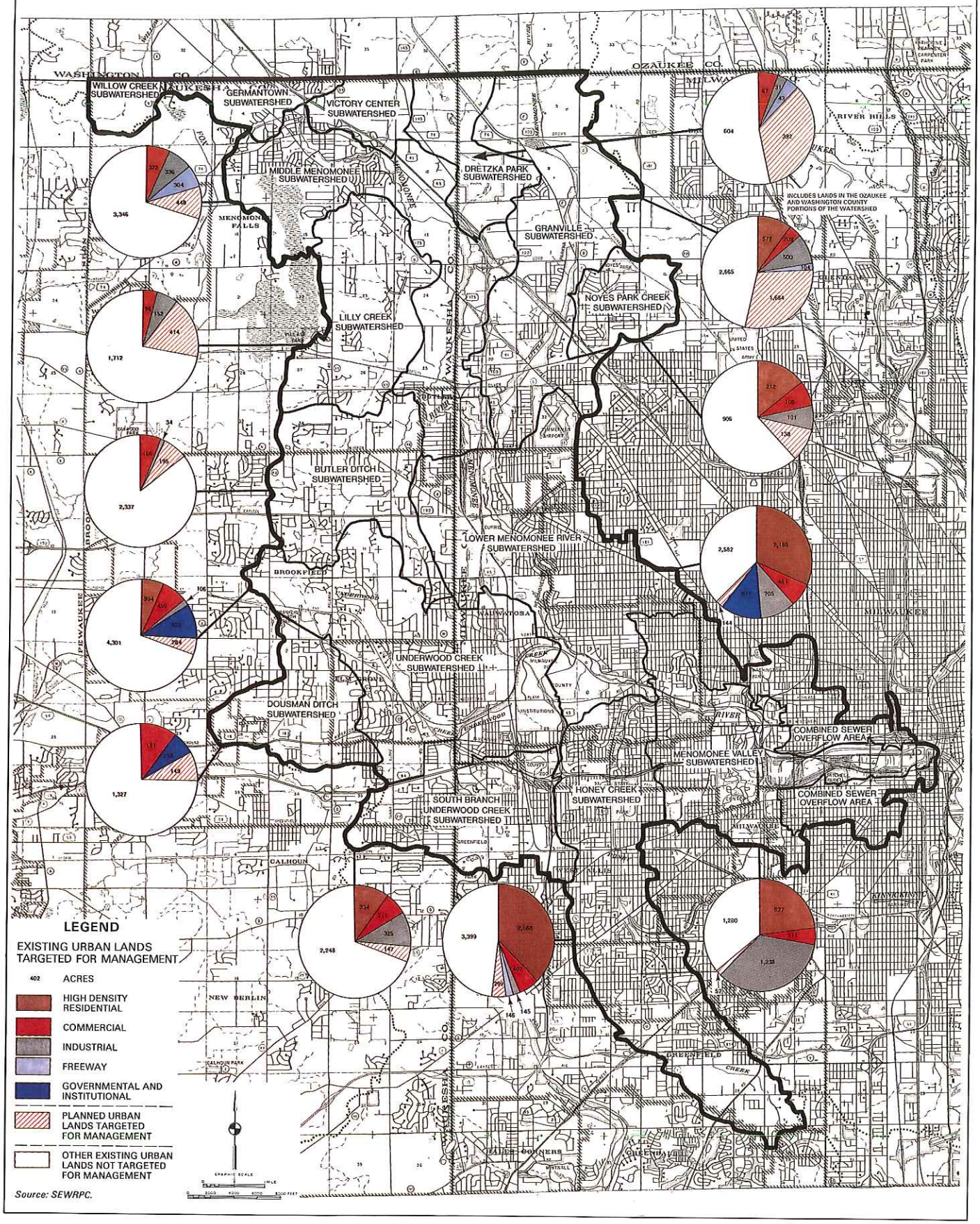
- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- FREEWAY
- PLANNED URBAN LANDS TARGETED FOR MANAGEMENT
- OTHER EXISTING URBAN LANDS NOT TARGETED FOR MANAGEMENT

Source: SEWRPC.



Map 14

RECOMMENDED URBAN NONPOINT SOURCE CONTROLS FOR THE MILWAUKEE AND WAUKESHA COUNTY PORTIONS OF THE WATERSHED



Source: SEWRPC.

control practice standards and applicability criteria should be consistent with those set forth in the Wisconsin Construction Site Best Management Practice Handbook (DNR, 1989).

Education and training activities needed to control construction site erosion are set forth in the information and education portion of Chapter VI. The nonpoint source program will provide assistance to support ordinance development, ordinance modification, and ordinance administration and enforcement. This is also discussed in Chapter VI.

SPECIFIC NEEDS OF LOCAL GOVERNMENTS.

* ***Milwaukee, Ozaukee, Washington, and Waukesha County*** governments need to develop ordinances that cover unincorporated areas and/or construction activities on county property, identify and fulfill staffing and training needs for ordinance administration and enforcement, and effectively administer and enforce ordinance provisions.

  Alternatively, construction erosion control programs could be established by the towns of Germantown and Richfield in Washington County and the towns of Brookfield and Lisbon in Waukesha County. The ordinances could be administered either locally or in cooperation with the county governments.

* ***The cities of Brookfield, Greenfield, Mequon, New Berlin, and Wauwatosa and the villages of Butler, and Menomonee Falls*** need to develop ordinance provisions, identify and fulfill staffing and training needs for ordinance administration and enforcement, and effectively administer and enforce ordinance provisions.

* ***The villages of Germantown and Elm Grove*** need to review the existing ordinance with the DNR to determine if there is a need for revisions, identify and fulfill staffing and training needs for ordinance administration and enforcement, and effectively administer and enforce ordinance provisions.

* ***The cities of Milwaukee and West Allis and the villages of Elm Grove, Germantown and West Milwaukee*** need to identify and fulfill staffing and training needs for administration and enforcement of their existing ordinances, and effectively administer and enforce ordinance provisions.

Established Urban Area Element-Existing Areas: The control program for existing urban areas is based on the pollution reduction goals for urban toxic materials, as indicated by lead and other heavy metals. Sediment control will occur primarily through adoption and enforcement of construction erosion control ordinances.

General Requirements. The long-term management goal for all subwatersheds is to achieve a high level of control for existing critical land uses. This requires the equivalent of providing wet detention for 100 percent of the existing critical land uses for established urban areas.

Infiltration should be considered as an alternative to wet detention where conditions are suitable for providing an equivalent level of control and where groundwater quality

would not be threatened. Infiltration basins or trenches may be used in combination with wet detention ponds to provide groundwater recharge and base flow enhancement.

A combination of increased street sweeping and detention may be used as a stepping stone toward achieving the significant level of nonpoint source control. As the areas served by wet detention increase and the two practices begin to overlap, the accelerated sweeping program can be reduced to eliminate the overlap.

Feasibility studies will be needed to select the site specific practices consistent with this watershed plan. The cost and complexity of studies will vary, depending on the availability of land for locating practices and the compatibility of the existing storm sewer networks with locating structures.

Assistance available to communities under the priority watershed project to develop nonpoint source controls in existing urban areas is presented in Chapter VI.

Community Specific Requirements. Table 32 shows the amount of management required for each community in its existing urban area. A range is provided for the wet detention requirements of each community. The low end represents detention for 50 percent of the critical land uses; the high end represents detention for 100 percent of the critical land uses. The total land requirements to support these levels of detention are roughly two times the surface area requirements for the wet ponds. The curb-miles for street sweeping represent the maximum increase that would occur as part of a stepped approach to providing the full amount of wet detention.

The acres of urban land that may need to be addressed through more site specific feasibility studies are also listed in Table 32. The low end of the range reflects the number of acres in critical land uses; the high end considers all urban land uses. The acres that need to be addressed in feasibility studies will vary depending upon land use configuration and the locations of suitable sites to install practices.

Established Urban Area Element-Planned Areas: The pollution reduction goals for urban toxic materials also drives the control program for planned urban areas. Sediment reductions achieved from newly established urban surfaces are of moderate importance in most of the watershed.

General Requirements. The long-term management goal for all subwatersheds is to achieve a high level of control for planned urban development. These controls are needed as part of a comprehensive program to reduce nonpoint sources in established urban areas. A level of control equivalent to providing wet detention for 100 percent of the planned urban growth is required.

Infiltration should be considered as an alternative to wet detention where conditions are suitable for providing an equivalent level of control. In particular, grassed swale drainage systems in planned residential areas should be investigated to both control pollutants and decrease the size of wet detention facilities needed for additional pollution control. Infiltration basins or trenches may be used in conjunction with wet detention to provide groundwater recharge and base flow enhancement.

Table 32. Recommended Urban Best Management Practices for Existing Urban Areas in the Menomonee River Watershed.[1]

Community	Management Plans(acres)[2]		Wet Detention[3] Pond Area (acres)		Wet Detention[3] Total Area (acres)		Street Sweeping (curb mi/yr)[4]
MILWAUKEE COUNTY							
City of Greenfield	800 to	1,700	2.7 to	5.3	5.4 to	10.6	28
City of Milwaukee	13,300 to	20,500	44.5 to	89.0	89.0 to	177.8	450
City of Wauwatosa	5,970 to	6,760	19.9 to	39.8	39.8 to	79.6	203
City of West Allis	4,075 to	4,235	16.2 to	32.5	32.5 to	65.0	185
Village of West Milwaukee	380 to	400	2.5 to	5.0	5.0 to	10.0	18
OZAUKEE COUNTY							
City of Mequon	180 to	850	0.6 to	1.2	1.2 to	2.4	6
WASHINGTON COUNTY							
Village of Germantown	860 to	3,400	3.6 to	7.2	7.2 to	14.4	15
WAUKESHA COUNTY							
City of Brookfield	2,580 to	6,650	8.6 to	17.2	17.2 to	34.4	60
City of New Berlin	45 to	430	0.1 to	0.3	0.2 to	0.6	2
Village of Butler	310 to	475	1.8 to	3.7	3.6 to	7.4	10
Village of Elm Grove	470 to	2,025	1.9 to	3.9	3.8 to	7.8	17
Village of Menomonee Falls	2,600 to	6,580	10.8 to	21.7	21.6 to	43.2	56
Town of Brookfield	40 to	110	0.2 to	0.4	0.4 to	0.8	2
WATERSHED TOTAL	31,610 to	54,115	113.4 to	226.8	226.8 to	453.6	1,052

1. Infiltration may be feasible in some areas as an alternative or addition to detention.

2. Low end of range includes only critical acres, high end represents all urban land uses.

3. Low end of range is sufficient to detain runoff from 50% of critical urban land use. High end of range is sufficient to detain runoff from 100% of critical urban land use. Total area is surface area of wet pond needed to trap 5 micron particle size. Total area includes pond surface and surrounding land required to contain the pond.

4. These estimates will be revised.

Source: Wisconsin Department of Natural Resources

Storm water ordinances with provisions for controlling both pollutants and flows from new development are needed. Storm water plans for areas where development is expected to occur are needed to assure that land is set aside for practices that are needed to meet the flow and pollutant load reductions specified in the ordinances. Ordinance requirements and storm water plans for new development must be closely coordinated among communities that affect common drainage areas.

Assistance available through the nonpoint source program to control urban storm water quality and quantity in planned urban areas is presented in Chapter VI.

Community Specific Requirements. Table 33 shows the number of acres projected for new development that will need storm water planning, and the estimated acres of detention needed as part of the established urban area control program. The total land requirements are also listed. These requirements are two times the surface area needed for the ponds themselves. The use of grassed swale drainage in residential areas can reduce the acres needed for detention.

Streambank Erosion Control Element: Urban streambank erosion targeted for control is concentrated primarily in the Lilly Creek, Middle Menomonee, and Lower Menomonee Subwatersheds. Hydraulic overloading associated with urbanization primarily causes streambank erosion in these streams. Consequently, control will probably require a combination of streambank protection practices, such as those applied directly to the eroding sites and those applied to reduce peak flows and flow velocities of runoff coming from urban areas that are tributary to the stream system.

A number of governmental units must coordinate planning and implementation activities associated with control of the eroding sites and the storm water flows which cause them. The assistance provided to governmental units through the nonpoint source program to control streambank erosion is set forth in Chapter VI.

URBAN BEST MANAGEMENT PRACTICES

Three general classes of management practices are used to reduce the adverse impacts of runoff from urban areas. These classes include: source reduction practices, infiltration practices, wet detention practices, and streambank erosion control practices.

Source Reduction Practices: These practices are meant to reduce the generation of urban pollutants as close to the source as possible. At a minimum, pollutants are controlled prior to being washed from urban surfaces by rainfall and snowmelt.

Source area controls are generally non-structural, relying instead on changes in lifestyle by urban residents. Reducing the amount of automobile traffic is an example of a source control, as automobiles are the source of many urban pollutants. Current policies requiring removal of lead from gasoline and asbestos from automobile brake linings are also examples of source area controls. Other source area controls that should be used as part of the Menomonee River Priority Watershed Project include, but are not limited to:

Table 33. Recommended Urban Best Management Practices for Planned Urban Areas in the Menomonee River Watershed.[1]

Subwatershed[2]	Where Urbanization is Anticipated	Management Plan (acres)[3]	Pond Area (acres)	Total Area (acres)
MILWAUKEE COUNTY				
Dretzka Park	C. of Milwaukee V. of Menomonee Falls	392	9.3	18.6
Granville	C. of Milwaukee	1,684	37.3	74.6
Honey Creek	C. of Milwaukee C. of Wauwatosa C. of West Allis C. of Greenfield	299	2.9	5.8
Lower Menomonee	C. of Brookfield C. of Milwaukee C. of Wauwatosa	144	3.1	6.2
Menomonee Valley	C. of Milwaukee C. of West Allis V. of West Milwaukee	52	1.0	2.0
Noyes Park	C. of Milwaukee	138	3.0	6.0
WASHINGTON COUNTY				
Germantown	V. of Germantown V. of Menomonee Falls	1,776	19.8	39.6
Goldenthal	V. of Germantown	252	5.5	11.0
Upper Menomonee	C. of Mequon	25	0.4	0.8
Victory Center	V. of Germantown V. of Menomonee Falls	603	16.0	32.0
Willow Creek	V. of Germantown	78	2.2	4.4

Table 33 (continued)

Recommended Urban Bet Management Practices for Planned Urban Areas in the Menomonee River Watershed[1]

Subwatershed[2]	Where Urbanization is Anticipated	Management Plan (acres)[3]	Pond Area (acres)	Total Area (acres)
WAUKESHA COUNTY				
Butler Ditch	C. of Brookfield V. of Menomonee Falls	195	9.0	18.0
Dousman Ditch	C. of Brookfield V. of Elm Grove	149	3.6	7.2
Lilly Creek	V. of Menomonee Falls	414	17.5	35.0
Middle Menomonee	C. of Milwaukee V. of Menomonee Falls	448	13.2	26.4
So. Br. Underwood	C. of West Allis C. of Milwaukee C. of Brookfield	147	2.6	5.2
Underwood Creek	C. of Brookfield C. of Wauwatosa V. of Elm Grove	284	8.3	16.6
WATERSHED TOTAL		7,412	159.2	318.4

1. Infiltration may be feasible in some areas as an alternative or addition to detention.
2. Counties where most of the subwatershed is located.
3. Sufficient to detain runoff from 100% of the planned urban land use.
4. Pond area is surface area of wet pond needed to trap 5 micron particle size. Total area includes pond surface and surrounding land required to contain the pond.

Source: Wisconsin Department of Natural Resources

* Reduce the use of galvanized roof materials and gutters—a primary source of zinc in urban runoff.

* Remove pet wastes immediately from lawns, sidewalks, and streets to reduce bacterial contamination of urban runoff.

* Manage the timing, amount and type of fertilizer and pesticide applications in urban areas.

* Disposal of automobile waste fluids such as radiator water and engine oil appropriately, keeping them out of the storm sewer system.

* Removal of leaves and street dirt from street and parking lot surfaces through municipal sweeping and leaf collection.

* Control land use through zoning, which, in part, considers on- site suitability for storm water management practices to meet water quality, habitat, and flood prevention objectives.

* Control construction site erosion.

* Minimize use of street de-icing compounds.

* Reduce the amount of vehicle traffic.

* Reduce the areal extent of parking lots.

* Encourage that urban developments take place on lands within urban service area boundaries.

Source area controls that prevent the generation of pollutants, such as the removal of lead from gasoline are the most effective. However, these controls often cannot be initiated at the local level but rather are regional or national initiatives. Citizen action that leads to this type of control is an important component of any long-range urban strategy to reduce nonpoint pollution.

Source area controls that rely on better housekeeping practices, such as pet waste control programs and wise use of lawn and garden products can be initiated locally. These types of controls are an inexpensive and vital component of any program to reduce urban nonpoint pollution. Information and education efforts presented in Chapter VI, "Nonpoint Source Project Implementation," are critical in supporting these "grass roots" approaches to solving urban water quality problems.

Infiltration Practices: Reducing pollutant transport to surface waters involves reducing the amount of urban storm water reaching streams, primarily from impervious surfaces. This is accomplished by increasing the infiltration of storm water into the ground. Storm water infiltration on a suitable site can effectively reduce nonpoint pollution. In addition, infiltration can help stabilize the hydrology of small urban streams by replenishing groundwater, much of which is ultimately discharged to surface water.

Infiltration practices can be used with wet detention facilities to augment pollutant removal effectiveness or reduce pond size.

Practices that promote on-site infiltration include porous pavements, redirecting roof downspouts to grassy areas, and directing runoff waters to infiltration trenches. These practices are generally most applicable to small source areas such as rooftops and parking lots. Grassed swale drainage systems can also be used to reduce infiltrate runoff. Finally, infiltration basins can be located at the end of drainage outlets serving larger drainage areas.

Not all sites are appropriate for the use of infiltration practices. A minimum separation distance of three feet between the bottom of the infiltration devise and the groundwater or bedrock is generally required. Heavy or poorly drained soils limit the effectiveness or practical use of infiltration devices. Slopes may limit the use of grassed swales in residential areas. Most importantly, precautions must be taken when infiltrating urban storm water to prevent groundwater contamination. Runoff from residential rooftops and driveways, rooftops in institutional, commercial, and non-manufacturing industrial areas can generally be infiltrated with little risk of groundwater contamination.

Runoff from parking lots in institutional and commercial areas, and separate employee or visitor parking lots in non-manufacturing industrial areas can be infiltrated, but requires that some form of pre-treatment is provided. Infiltration devices in these areas should be monitored to assure that groundwater contamination is not occurring. Highly contaminated runoff, such as that from commercial and industrial storage and loading areas should not be infiltrated.

Appendix E contains more details concerning suggested restrictions on the use of infiltration devices designed to control urban storm water runoff.

Wet Detention Practices: Wet detention ponds effectively control particulate pollutants and can be designed to control peak flow discharges. Consequently, the wet ponds can be employed to serve many needs, including removal of pollutants, control of peak flooding and/or storm water flows that may be causing streambank erosion and streambed scour. These ponds have limited effectiveness in controlling pollutants dissolved in storm water, and cannot effectively reduce the total storm water volume or enhance stream base flows. The wet pond can be situated near a small source area such as a parking lot, but are more commonly used to control runoff from larger areas.

Streambank Erosion Control Practices: Streambank erosion control practices used along urban streams are similar to those used to control unstable banks in rural areas. Generally, these practices include seeding and shaping for areas with conditions under which these less intensive types of practices can be effective. Rapidly eroding sites, extensive areas of erosion, or areas with steep or high streambanks may require more stable materials. These include rock riprap, gabions, or other structural practices with a greater ability to with stand higher stream flows.

Using Easements to Support Urban Pollution Control Practices: Easements may be used to support wetland restoration, critical area stabilization, and shoreline buffers in urban areas in order to reduce the water quality impacts of stormwater runoff. Use of these

practices as stormwater runoff control measures, and the use of easements to support these practices, must be reviewed on a case-by-case basis by the Department of Natural Resources. The same general rules set forth for the use of easements in rural areas also apply to urban stream reaches.

PERFORMANCE STANDARDS AND DESIGN CRITERIA FOR URBAN STRUCTURAL PRACTICES IN ESTABLISHED URBAN AREAS

The guidelines in this section are presented to facilitate the urban practice design, review, and approval phases required before controls can be installed and cost-shared through the nonpoint source program. The design standards contained in this section are preliminary, and will need to be augmented by existing engineering references and design manuals. Also, the DNR Nonpoint Source and Land Management staff should be contacted prior to the start of practice design activities, in accordance with NR 120.

To meet water resources objectives, goals for the Menomonee River and its principal tributary streams, the combined effect of all practices must achieve about a 50 percent reduction of lead loads from existing areas and reduce to the maximum extent possible pollutant loads from new development. In addition, existing urban storm water flows must be reduced sufficiently in Lilly Creek and portions of the main stem of the Menomonee River to help rehabilitate areas of active streambank erosion and habitat scour.

In planned urban areas throughout the watershed, impacts on stream hydrology must be minimized. Conformance of individual practices to the following guidelines will assure that the total level of control is adequate, provided the recommended plan is fully implemented.

Standards: The following preliminary standards should be used to guide the design of individual practices. They will be superseded by standards developed as part of the model ordinance for storm water management, which is being prepared by the DNR.

1. Wet detention ponds in existing and planned urban areas should be designed to control 90 percent of the incoming suspended sediment load. This will be achieved by trapping the five micron particle size. This will provide approximately 70 percent control of the annual lead load from lands tributary to the pond. Where retrofitted, ponds should be located to control runoff coming primarily from the critical land uses. Where planned as part of new development, ponds should be located to control runoff from all land uses.

2. Wet detention ponds in existing urban areas should contribute to reducing stream velocities and minimize erosion and streambed scour.

3. Wet detention ponds in planned urban areas should maintain peak flows for the 2-year, 24-hour storm at pre-development levels.

4. Infiltration devices in existing and planned urban areas should infiltrate all runoff from the one-inch storm. Infiltration basins and grassed swales are most effective,

since they control runoff from all impervious surfaces (roofs, streets, parking lots) in the contributing area. If infiltration trenches are used that control selected impervious surfaces, such as parking lots and rooftops only, control efficiency drops significantly since street runoff remains uncontrolled. Where retrofitted, these devices should be located to control runoff coming primarily from the critical land uses. Where planned as part of new development, ponds should be located to control runoff from all land uses. In locating practices, infiltration rates should be carefully considered as they are a prime determinant of the pollution control efficiency for infiltration practices, particularly in non-residential areas.

5. Infiltration devices in existing urban areas should contribute to reducing stream velocities to speeds that do not erode banks or scour habitat.

6. Infiltration devices in planned urban areas should maintain peak flows for the 2-year, 24-hour storm at pre-development levels.

Design Criteria: NR 120.14(22) requires that the Department of Natural Resources participates in the practice design process, and approve detailed practice designs. Selected preliminary design criteria for wet detention ponds and infiltration devices are presented in Table 34.

Importantly, pretreatment and groundwater monitoring in the practice design for infiltration devices is desireable. Providing pretreatment for these devices will greatly reduce required maintenance to reduce clogging and restore infiltration. Pretreatment could be a sediment trap, a wet detention pond, a grass filter strip, or street sweeping. Selected practices should be equipped with groundwater monitoring wells to assure that groundwater contamination remains within acceptable bounds.

Finally, all detention and infiltration urban structural practices should be equipped with signs that clearly identify that the site contains urban storm water pollutants. Such signs should also carry warnings, where appropriate, against using storm water treatment facilities in ways which could endanger public health.

Wet detention ponds should not be used for consumptive fishing, swimming, or wading. Infiltration basins might pose a hazard if used during dry periods as open recreational space, due to possible suspension of contaminated dust. These risks should be investigated further.

INFORMATION AND EDUCATION ELEMENT

The urban information and education element is presented in Chapter VI.

ENVIRONMENTAL AND PUBLIC HEALTH CONCERNS

Public concern has been expressed about the potential economic, environmental and public health impacts of storm water detention ponds. Concern has been expressed about the toxicity of sediments and water in wet detention ponds and the danger posed

Table 34. Selected Preliminary Design Criteria for Infiltration Devices and Wet Detention Basins.

Practice	Design Criteria
Wet Detention	1. Percent of drainage required as pond surface for 90% control of solids. Freeways 2.8% Industrial 2.0% Commercial 1.7% Institutional 1.7% Residential 0.8% Open Space 0.6% 2. Permanent pond minimum 5 feet deep when constructed. 3. Minimum 10 feet shelf around pond perimeter. 4. Minimum 5:1 sideslope to edge of pond. 5. Pond shape must be minimum 3:1 length to width ratio. 6. Maintain minimum pond depth of 3 feet. 7. Minimum 25-foot vegetated buffer strip. 8. Protect outlet channel from erosion. 9. Minimum depth to groundwater 3 feet.*
Infiltration Devices	
Grass Swales	1. Minimum grade of 0.5% and maximum of 5%. 2. Maximum sideslopes of 3:1. 3. Minimum depth to groundwater 3 feet.* 4. Maximum flow velocity 6 feet per second. 5. Check infiltration rates annually. 6. Prevent compaction during construction. 7. Sweep streets to prevent clogging.
Infiltration Trenches	1. Minimum depth to groundwater 3 feet.* 2. Pretreatment necessary (e.g., grass filter strip, wet detention basin, trap, etc.). 3. Trench must be wider than it is deep. 4. Observation well must be installed. 5. Check infiltration rates annually. 6. Do not put near water supply wells.
Infiltration Basins	1. Minimum depth to groundwater 3 feet.* 2. Test soil infiltration rates at least 5 feet below the surface. 3. Do not put near water supply wells. 4. Pretreatment necessary (e.g., wet detention basin). 5. Prevent compaction of soil.

* As measured from bottom of practice to seasonally high groundwater.

to humans and wildlife. Concern was also expressed about the disposal of contaminated sediments and the costs which may be incurred in finding and utilizing suitable disposal technology.

Information was collected in 1990 about the water and sediment quality in a wet detention pond serving a mixed residential and commercial area in Madison, Wisconsin. This information is discussed below as it relates to these public concerns. It is important to recognize that sediment and water quality may vary between detention ponds serving the same general land uses, due to differences in the specific mix of tributary land uses and spills or illegal connections to the storm sewer system. Caution should also be made against applying these data to ponds serving more intensive land uses, such as industrial areas.

Pond Water Quality: Samples were collected on each of nine different days between early May and late June. The study evaluated three heavy metals (lead, zinc, copper), bacteria, polyaromatic hydrocarbons, pesticides, and phthalate esters. Metals concentrations measured in the pond were compared to the chronic toxicity standards for warm water fish and aquatic life; bacteria concentrations were compared to the standard for full body contact recreation; insecticide concentrations were compared to acute toxicity criteria for water fleas; polyaromatic hydrocarbon concentrations were compared to the human cancer criterion, and phthalate ester concentrations were compared to the human threshold criterion.

The study concluded that polyaromatic hydrocarbons, pesticides, and phthalate ester concentrations in the pond water did not exceed the applicable criteria on any of the dates sampled. Bacteria concentrations were found to significantly exceed the recreational standard on several sampling dates, with exceedences greatest soon after rainfall events. All heavy metals, however, were found to occasionally exceed the applicable criteria. Lead concentrations exceeded the chronic toxicity standard for all samples. Copper and zinc concentrations exceeded the chronic toxicity standard about 25 percent of the time. All exceedences were between one and one and one-half times the chronic toxicity standard, but well below any acute toxicity standards.

In addition to these tests, acute toxicity was evaluated through a 24-hour exposure bioassay test using water fleas as the test organisms. All samples tested completely negative, showing 0 percent mortality.

In summary, the water in ponds receiving runoff from commercial and residential areas should not be a concern except for the human health hazard associated with bacterial contamination. Ponds should not be used for any type of contact recreation. Although aquatic life will develop in these ponds, fish should not be stocked and consumptive fishing should be discouraged as an added precaution.

Pond Sediment Quality: Assuming a sediment accumulation rate of one to two inches per year and a pond storage depth of two feet, most wet detention ponds will require periodic dredging about once every 15-20 years. The quality of pond sediments is a concern in part because it will determine available options for disposing of contaminated sediments.

The concentrations of eight heavy metals (lead, cadmium, zinc, copper, nickel, arsenic, chromium, and cyanide) were measured in sediment taken from a detention pond serving a mixed residential and commercial area in Madison, Wisconsin. Results are presented in Table 35. The concentrations were evaluated to determine whether the sediments could be land-spread or placed in a conventional land fill, as opposed to requiring disposal in a special hazardous waste landfill at a significantly greater cost.

Table 35. Average concentrations of heavy metals in bottom sediments of a wet detention pond located in Madison, Wisconsin.[1]

	Concentration (mg/kg)	
Metal	Inlet	Rest of Pond
Lead	85	173
Cadmium	1	3
Zinc	225	457
Copper	30	60
Nickel	15	33
Arsenic	4	3
Chromium	20	40
Cyanide	1	1

1. Sampling was conducted in 1990. The pond was constructed in 1980, has a surface area of 200 acres, and receives runoff from a mixture of commercial and medium density residential land uses.

Source: Wisconsin Department of Natural Resources

None of the eight metals tested from the commercial/residential area would require disposal at a hazardous waste landfill under Wisconsin state law. Only one metal—lead—showed any potential of posing a hazardous waste problem. Upon further testing, using the EP Toxicity Test and the TCLP Test, this metal was found to pose no hazard at the concentrations found.

In addition to heavy metals, organic pollutants were also measured in detention pond sediments. These included: the pesticides diazanon, chlordane and DDT; PCB; PAHs;

and phthalate esters. The chlordane concentrations are highest, and need to be evaluated to determine if they would require special disposal.

Based on heavy metal concentrations, two potential options for disposal would appear to be either landspreading or burying in a conventional landfill. In order to evaluate the suitability of sediments for landspreading, metals criteria set forth in NR 204 Wis. Adm. Code (Municipal Sludge Management) were used.

Table 35 shows that the concentrations of lead and cadmium in sediments would not restrict landspreading. Concentrations of lead in sediments throughout the detention pond are well below the limit of 250 mg/kg (milligrams per kilogram) specified in NR 204. Concentrations of cadmium throughout the pond are also well below the 10 mg/kg threshold specified in NR 204.

Table 36 shows the maximum amount of various metals that can be applied through landspreading, as set forth in NR 204, and the mass load of these metals that would be applied with one acre-inch of sediments taken from the Madison detention pond. As shown, zinc would pose the greatest restriction for general applications. For application to crops directly consumed by humans, annual restrictions on cadmium applications would be most restrictive.

These data show that landspreading may be an option, but several cautions are needed. First, variability in cadmium and zinc concentrations, even within ponds draining residential and commercial land uses, may make some sediments marginally acceptable or unacceptable for landspreading. Secondly, some organic contaminants in sediments may restrict landspreading. Placement of dredge spoils in a land fill or adjacent to the wet detention pond in areas not used for the growing of food crops may be the best options.

Pollutant Bioaccumulation: There is also public concern over the potential for bioaccumulation of toxicants in wet detention ponds and their subsequent export back into the surrounding ecosystem. This is an area needing further investigation.

Table 36. Comparison of Landspreading Criteria For Metals and the Mass of Metals Contained in Sediments Taken From a Wet Detention Pond Located in Madison, Wisconsin.[1]

	Mass of Metal (lbs/acre-inch)		Spreading Criteria[3]	
Metal	Inlet[2]	Rest of Pond[2]	Annual	Total
Lead	15	11	--	445.0
Cadmium	0.2	0.2	.45	4.4
Zinc	39	30	--	225.0
Copper	5	4	--	110.0
Nickel	3	2	--	45.0

1. Sampling was conducted in 1990. The pond was constructed in 1980, has a surface area of 200 acres, and receives runoff from a mixture of commercial and medium density residential land uses.

2. Based on average concentrations.

3. Criteria from NR 204 Wis. Adm. Code (Municipal Sludge Spreading). Assumes a soil cation exchange capacity of 5 meq/100 mg.

Source: Wisconsin Department of Natural Resources

PART TWO
DETAILED PROGRAM FOR IMPLEMENTATION

Chapter VI: Detailed Program for Implementation

CHAPTER VI
DETAILED PROGRAM FOR IMPLEMENTATION

INTRODUCTION

This chapter identifies the means for implementing the rural and urban nonpoint source control program described in Chapter V, "Nonpoint Source Control Needs." It is divided into three sections. The first describes the rural nonpoint source implementation strategy. The second section contains the elements of the urban nonpoint source control implementation strategy. Finally, this chapter describes the rural and urban information and education strategy. The success of this priority watershed project depends on the aggressive implementation of these three nonpoint source control strategies.

More specifically this chapter identifies:

* The agencies and units of government responsible for carrying out the identified tasks.
* The best management practices (BMPs) necessary to control pollutants on the critical sites identified in Chapter V.
* The funding sources and the administrative procedures for carrying out the project.
* The schedule for completion of the implementation tasks.
* The type and amount of staff needed by local units of government to carry out the project.
* The cost of installing BMPs, including cost-sharing, technical assistance and administration.
* The information and education activities that will be carried out in the project area.

RURAL PROGRAM FOR IMPLEMENTATION

PROJECT PARTICIPANTS: ROLES AND RESPONSIBILITIES

Landowners and Land Operators: Owners and operators of public and private lands are important participants in the priority watershed program. They will adopt BMPs which reduce nonpoint sources of water pollution and protect and enhance fish, wildlife and other resources. Landowners and land operators in the Menomonee River Watershed who are eligible for cost-share assistance through the priority watershed program include:

individuals, Ozaukee County, Milwaukee County, Washington County, and Waukesha County; other governmental units described in NR 120.02(19); corporations; and the State of Wisconsin.

Ozaukee, Washington, and Waukesha Counties: As required by statutes and administrative rules; Ozaukee County, Washington County, and Waukesha County are responsible for implementing this plan in the unincorporated areas of the watershed in the respective county.

Ozaukee, Washington, and Waukesha Counties are the primary units of government responsible for implementing this plan in rural areas.

The Ozaukee, Washington, and Waukesha County Land Conservation Committees (LCC) will act for the respective County Boards and be responsible contractually and financially to the State of Wisconsin for management of the project in areas with rural land uses. The Ozaukee, Washington, and Waukesha County LCCs will coordinate the activities of all other local agencies involved with the rural portion of the project.

The villages of Germantown and Menomonee Falls, the city of Mequon, Ozaukee County, Washington County, and Waukesha County should enact a manure storage ordinance meeting the provisions outlined by DATCP in Ag 166.98. The intent of this type of ordinance is to prevent pollution of groundwater by poorly designed and constructed animal waste storage facilities.

The specific responsibilities for these counties are defined in the Wisconsin Administrative Rules, s. NR 120.04, and are summarized below:

* Identify in writing a person to represent the county during implementation of the project.

* Contact all owners or operators of lands identified as significant nonpoint sources within one year of signing the nonpoint source grant agreement. The counties' strategies for contacting landowners are included in this chapter.

* Develop farm conservation plans consistent with the needs of the project.

* Enter into nonpoint source cost-share agreements with eligible landowners and enforce the terms and conditions of cost-share agreements as defined in s. NR 120.13, Wisconsin Administrative Code.

* For county-owned and operated lands, enter into cost-share agreements with the DNR to correct identified nonpoint sources and fulfill their obligations as a cost-share recipient.

* Design best management practices and verify proper practice installation.

* Reimburse cost-share recipients for the eligible costs of installing BMPs at the rates consistent with administrative rules and established in this plan.

* Prepare and submit annual work plans for activities necessary to implement the project. The Ozaukee, Washington, and Waukesha County Land Conservation Departments (LCDs) shall submit a workload analysis and grant application to the Department of Agriculture, Trade and Consumer Protection (DATCP) as required in s. Ag. 166.50.

* Prepare and submit to the Department of Natural Resources (DNR) and the Department of Agriculture, Trade and Consumer Protection (DATCP) the annual resource management report required under s. NR 120.21(7) to monitor project implementation by tracking changes in the nonpoint source inventory, and quantifying pollutant load reductions which result from installing BMPs.

* Participate in the annual watershed project review meeting.

* Conduct the information and education activities identified in this plan for which they are responsible.

Milwaukee County: There are no significant rural nonpoint pollution sources located in the Milwaukee County portion of this watershed.

Department of Natural Resources: The role of the Department of Natural Resources (DNR) is identified in s. 144.24, Stats. and s. NR 120, Wis. Adm. Code. (NR 120) The DNR has been statutorily assigned the overall administrative responsibility for the Wisconsin Nonpoint Source Pollution Abatement Program. The DNR's role is summarized below.

Project Administration. Project administration includes working with the counties to ensure that work commitments required during the eight-year project implementation phase can be met. The DNR will participate in the annual work planning process with the county.

The DNR reviews cost-share agreements, which are signed by the county and the participating landowners, for installing BMPs. The DNR provides guidance when questions arise concerning the conformance of proposed activities with the statutes, administrative rules, and the watershed plan.

Financial Support. Financial support for implementation of the priority watershed project is provided to each county in two ways: a local assistance grant agreement, and a nonpoint source grant agreement. These agreements are described later in this chapter.

The DNR may also enter into cost-share agreements directly with local or state units of government for the control of pollution sources on land the governments own or operate.

Project Evaluation. The DNR has responsibility for priority watershed project monitoring and evaluation activities. These efforts determine if changes in water quality occur as best management practices and other pollution controls are installed or implemented. The water quality evaluation and monitoring strategy for the Menomonee River Watershed are included in Chapter VIII, "Water Quality Evaluation Monitoring."

The DNR documents the results of monitoring and evaluation activities in interim and final priority watershed project reports.

Technical Assistance. The DNR provides technical assistance to the county on the design and application of best management practices.

Other Responsibilities. These include:

* Assisting county staff with site reviews to determine the impacts of nonpoint sources on wetlands and/or groundwater quality.

* Assisting county staff to integrate wildlife and fish management concerns into selection and design of BMPs.

Department of Agriculture, Trade and Consumer Protection: The role of the Department of Agriculture, Trade and Consumer Protection (DATCP) is identified in s. 144.25, stats., ch. 92 stats., and NR 120. In summary, the DATCP will:

* Manage a training program for the staff involved with project implementation.

* Cooperate with the University of Wisconsin - Extension to act as a clearinghouse for information related to agricultural best management practices, sustainable agriculture, and nutrient and pest management.

* Assist the counties to carry out the information and education activities or tasks described in this plan.

* Assist county staff to identify watershed participants subject to federal or state conservation compliance programs.

* Assist counties, if requested, to develop a manure storage ordinance.

* Assist county staff to complete annual workload analyses and grant applications for work conducted under the priority watershed project.

* Participate in the annual project review meetings.

* If the need arises, assist in developing technical standards for agricultural BMPs, and provide technical assistance to county staff concerning application of these practices.

* Assist county staff to evaluate the site specific practicality of implementing rural best management practices.

Other Agencies: The Menomonee River Watershed Project will receive assistance from the agencies listed below.

Soil Conservation Service (SCS). This agency works through the local LCC to provide technical assistance for planning and installing conservation practices. The local SCS personnel will work with the county staff to provide assistance with technical work. Personnel from the Area SCS office will provide staff training and engineering assistance for best management practices, especially where there is a lack of engineering job approval for particular practices. The DATCP will make efforts to assist the SCS to coordinate the Menomonee River Priority Watershed Project with the conservation compliance and other conservation provisions of the 1985 and subsequent Federal Farm Bills.

University of Wisconsin Extension (UWEX). County and area Extension agents will provide support in developing and conducting a public information and education program aimed at increasing voluntary participation in the project. This will include assistance to carry out the information and education activities identified in this plan.

Agricultural Stabilization and Conservation Service (ASCS). The ASCS administers most of the federal programs aimed at the stabilization of the prices paid producers for agricultural products and administers federal funds for rural soil and water and other resource conservation activities. The Agricultural Conservation Program (ACP), which the ASCS administers, will be coordinated with the Menomonee River Priority Watershed Project to the best extent possible. In addition other conservation incentives such as the Conservation Reserve Program (CRP) will be used whenever possible to control critical nonpoint sources of pollution.

BEST MANAGEMENT PRACTICES (BMPs)

BMPs Eligible for Cost-Sharing and Their Rates: Best management practices are those practices identified in NR 120 which are determined in this watershed plan to be the most effective controls of the nonpoint sources of pollution. The practices eligible for cost-sharing under the Menomonee River Priority Watershed Project and cost-share rates for each BMP are listed in Table 37.

Design and installation of all BMPs must meet the conditions listed in NR 120. Generally these practices use specific standard specifications included in the SCS Field Office Technical Guide. In some cases additional specifications may apply. The applicable specifications for each BMP can be found in NR 120.14.

Following is a brief description of some of the most commonly used cost-shared BMPs included in Table 37. A more detailed description of these practices can be found in NR 120.14.

* ***Contour Farming***: The farming of sloped land so that all operations from seed bed preparation to harvest are done on the contour.

Table 37. State Cost-Share Rates for Best Management Practices.

BEST MANAGEMENT PRACTICE	STATE COST-SHARE RATE
Contour Farming	50% *
Contour Strip Cropping	50% *
Field Strip Cropping	50% *
Field Diversions and Terraces	70%
Grassed Waterways	70%
Reduced Tillage	50%
Critical Area Stabilization	70% (1.)
Grade Stabilization Structures	70%
Agricultural Sediment Basins	70%
Shoreline and Streambank Stabilization	70%
Shoreline Buffers	70% (1.)
Barnyard Runoff Management	70%
Animal Lot Relocation	70%
Manure Storage Facilities	70% **
Livestock Exclusion from Woodlots	50%
Wetland Restoration	70% (1.)
Roofs for Barnyard Runoff Management and Manure Storage Facilities	70%
Nutrient and Pesticide Management	50% (2.)

1. Easements may be entered into with landowners identified in the watershed plan in conjunction with these BMPs. See Chapter V for where easements may apply.

2. Spill control basins have a state cost-share rate of 70 percent.

* Wildlife habitat restoration components of this practice are cost-shared at 70 percent.

** Maximum cost share amount is $10,000 including no more than $5,000 for manure transfer equipment.

* ***Contour and Field Stripcropping***: Growing crops in a systematic arrangement, usually on the contour, in alternate strips of close grown crops, such as grasses or legumes, and tilled row crops.

* ***Reduced Tillage***: A system which leaves a roughened surface or substantial amounts of crop residue in or on the soil surface after crops are planted. The system consists of no more than one primary tillage pass in the fall or spring and no more than two passes with light or secondary tillage equipment prior to planting. It is utilized in two situations; one for continuous row crops or long corn rotations, the other for short crop rotations or for the establishment of forages and small grains.

* ***Critical Area Stabilization***: The planting of suitable vegetation on critical nonpoint source sites.

* ***Grassed Waterways***: A natural or constructed channel shaped, graded and established with suitable cover as needed to prevent erosion by runoff waters.

* ***Grade Stabilization Structure***: A structure used to reduce the grade in a channel to protect the channel from erosion or to prevent the formation or advance of gullies.

* ***Livestock Exclusion from Woodlots***: The exclusion of livestock from woodlots to protect the woodlots from grazing by fencing or other means.

* ***Shoreline and Streambank Stabilization***: The stabilization and protection of stream and lake banks against erosion and the protection of fish habitat and water quality from livestock access. This practice includes streambank fencing.

* ***Terraces***: A system of ridges and channels with suitable spacing and constructed on the contour with a suitable grade to prevent erosion in the channel.

* ***Field Diversions***: This purpose of this practice is primarily to divert water from areas it is in excess or is doing damage to where it can be transported safely.

* ***Barnyard Runoff Management***: Structural measures such as gutters, downspouts, or diversions to redirect surface runoff around the barnyard, and collect, convey and temporarily store runoff from the barnyard.

* ***Manure Storage Facility***: A structure for the storage of manure for a period of time that is needed to reduce the impact of manure as a nonpoint source of pollution. Livestock operations where this practice applies are those where manure is winterspread on fields that have a high potential for runoff to lakes, streams and groundwater. The facility is needed to store and properly spread manure according to a management plan.

* ***Agricultural Sediment Basins***: A structure designed to reduce the transport of pollutants to surface waters and wetlands of sediment eroded from critical agricultural fields.

* ***Shoreline Buffers***: A permanently vegetated area immediately adjacent to lakes, streams, and wetlands designed and constructed to manage critical nonpoint sources or to filter pollutants from nonpoint sources.

* ***Animal Lot Relocation***: Relocation of an animal lot from a critical site, such as a floodway, to a suitable site to minimize the amount of pollutants from the lot to surface or groundwater.

* ***Wetland Restoration***: The construction of berms or destruction of the function of tile lines or drainage ditches to create conditions suitable for wetland vegetation.

* ***Roofs for Barnyard Runoff Management and Manure Storage Facilities***: Construction of roofs to prevent rain and snow from contacting manure.

* ***Nutrient Management***: The management of the application of manure, legumes, and commercial fertilizers including the rate, method, and timing of application to minimize the amount of nutrients entering surface or groundwater.

* ***Pesticide Management***: The management of the handling, disposal, and application of pesticides including the rate, method and timing of application to minimize the amount of pesticides entering surface and groundwater.

BMPs Not Cost-Shared: BMPs not cost-shared, but which shall be included on the cost-share agreement if necessary to control the nonpoint sources, are listed in NR 120.17. Several examples are listed below.

* Practices to be funded through other programs.

* Practices previously installed and necessary to support cost-shared practices.

* Changes in crop rotations and other activities normally and routinely used in growing crops or which have installation costs that can be passed on to potential consumers.

* Changes in location of unconfined manure stacks involving not capital cost.

* Manure spreading management.

* Other activities the DNR determines are necessary to achieve the objectives of the watershed project.

Activities and Sources Of Pollution Not Eligible For Cost-share Assistance: Priority watershed cost-share funds cannot be used to control sources of pollution and land management activities specifically listed in NR 120.10(2). The following is a partial list of ineligible activities most often inquired about for cost-sharing in rural areas.

* Operation and maintenance of cost-shared BMPs.
* Actions which have drainage of land or clearing of land as the primary objective.
* Practices already installed.
* Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of Wis. Stats. (including livestock operations with more than 1,000 animal units, or livestock operations issued a notice of discharge under ch. NR 243).
* Septic system controls or maintenance.
* Dredging activities.
* Silvicultural activities.
* Bulk storage of fertilizers and pesticides.
* Activities and structures intended primarily for flood control.
* Practices required to control sources which were adequately controlled at the time the cost-share agreement was signed.
* Other practices or activities which the DNR determines not to meet the objectives of the program.

NONPOINT SOURCE GRANT AGREEMENT AND ADMINISTRATION

General Information: The Nonpoint Source (NPS) Grant Agreement is the means for transmitting funds from the DNR (through the nonpoint source program) to Ozaukee, Washington, and Waukesha Counties for use in funding the state's share of cost-share agreements. Cost-share agreements are the means to transmit funds from the counties to the landowners.

A portion of the nonpoint source grant is forwarded to Ozaukee, Washington, and Waukesha Counties to allow each county to set up an "up front" account. The county uses funds from this account to pay landowners after practices are installed under the project. As this account is drawn down, the county will request reimbursements from DNR to replenish the account. The counties will submit reimbursement requests on a quarterly basis. This reimbursement schedule will insure that the "up front" account balance is maintained at an adequate level. The NPS Grant Agreement will be amended annually to provide funding needed for cost sharing for the year. The funds obligated

under cost-share agreements must never exceed the total funds in the NPS Grant Agreement.

Fiscal Management Procedures, Reporting Requirements: Counties are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Menomonee River Watershed Project. The records of all watershed transactions must be retained for three years after the date of final project settlement. A more detailed description of the fiscal management procedures can be found in NR 120.25 and NR 120.26.

COST-SHARE AGREEMENT AND ADMINISTRATION

Purpose and Responsibilities: Consistent with s. 144.25, Stats. and NR 120, Wis. Adm. Code, cost-share funding is available to landowners for a percentage of the BMP installation costs to meet the project objectives. Landowners have three years after formal approval of the watershed plan to enter into cost-share agreements. Practices included on cost-share agreements must be installed within the schedule agreed to on the cost-share agreement. Unless otherwise approved, the schedule of installing BMPs will be within five years of signing of the cost-share agreement. Practices must be maintained for a minimum of ten years from the date of installing the final practice included in the cost-share agreement.

The cost-share agreement is a legal contract between the landowner and the county. The agreement includes the name and other information about the landowner and grant recipient, conditions of the agreement, the practices involved and their location, the quantities and units of measurement involved, the estimated total cost, the cost-share rate and amount, the timetable for installation, and number of years the practice must be maintained. The agreements also identify and provide information on practices not cost-shared through the nonpoint program but that are essential to controlling pollution sources (such as crop rotations). Once both parties sign the agreement, they are legally bound to carry out the provisions in the agreement.

If land ownership changes, the cost-share agreement remains with the property and the new owner is legally bound to carry out the provisions. NR 120.13(9) and (10) has more information on changes of land ownership and the recording of cost-share agreements.

Local, state, or federal permits may be needed prior to installation of some BMPs. The areas most likely to need permits are zoned wetlands and the shoreline areas of lakes and streams. These permits are needed whether the activity is a part of the watershed project or not. Landowners should consult with the county planning and zoning department or the Land Conservation Department offices to determine if any permits are required. The landowner is responsible for acquiring the needed permits prior to installation of practices.

The cost-share agreement binds the county to provide the technical assistance needed for the planning, design, and verification of the practices on the agreement, and to provide the cost-share portion of the practice costs.

Counties are responsible for enforcing compliance of cost-share agreements to which they are a party. Where DNR serves as a party to an agreement with a unit of government, the DNR will take responsibility for monitoring compliance. The responsible party will insure that BMPs installed through the program are maintained in accordance with the operation and maintenance plan for the practice for the appropriate length of time. Ozaukee, Washington, and Waukesha Counties will check for compliance with practice maintenance provisions once every three years after the last practice has been installed. The county must check maintenance at its own expense after the NPS Grant Agreement has lapsed.

Landowner Contact Strategy: The following procedure will be used to make landowner contacts.

1. During the first three months of the implementation period, the county will send a mailing to all landowners or operators with eligible nonpoint sources. The mailing explains the project and how the landowners and operators can become involved.

2. After the initial landowner mailings, county staff will make personal contacts with all landowners that have been identified as having critical nonpoint sources of pollution (Management Category I). These contacts will occur within a year of receiving the NPS Grant Agreement.

3. The county will continue to make contacts with eligible (Management Category I and II) landowners and operators until they have made a definite decision regarding participation in the program.

4. Six months prior to the end of the cost-share sign-up period, the county will contact, through personal letter, all eligible landowners (as defined in Step 3 listed above) who have not signed cost-share agreements.

Procedure for Developing a Cost-share Agreement: Eligibility for cost-sharing is verified following a site visit, using the criteria described in Chapter V.

The development of farm conservation plans will be the primary method used to develop cost-share agreements. These plans are specific to a particular landowner and are a comprehensive approach to the abatement of the nonpoint sources of pollution, and the conservation of soil and other resources. The farm plan takes into consideration the sustainability of the agricultural resources and the management decisions of the owner or operator. When a landowner has livestock, a manure-spreading plan will be developed. Participants in the watershed project will be required to limit winterspreading of livestock manure in accordance with the criteria listed in Chapter V.

The cost-share agreement specifies the items listed in the farm conservation plan that are necessary to reduce the nonpoint sources of pollution. The conservation plan and cost-share agreement will document existing management which must be maintained to protect water quality.

The county will use the following procedure for developing and administering agreements. Below are the steps to be used from the initial landowner contact through the completion of the BMP maintenance.

1. Landowner and county staff meet to discus the watershed project, nonpoint source control practice needs, and coordination with conservation compliance provisions if applicable.

2. Landowner agrees to participate with the watershed project.

3. The county prepares a farm conservation plan.

4. The landowner agrees with the plan, a cost-share agreement is prepared, and the landowner and county sign both documents. the county. Two copies of the cost-share agreement (CSA) are sent to the DNR Southeast District nonpoint source program coordinator and a copy given to the landowner. The county will record the CSA with their County Register of Deeds.

5. The county, or its designee will design practices, and a copy of the design is provided to the landowner.

6. The landowner obtains the necessary bids or other information required in the cost containment policy.

7. Amendments to the CSA are made if necessary.

8. The county staff oversees practice installation.

9. The county verifies the installation.

10. The landowner submits paid bills and proof of payment (cancelled checks or receipts marked paid) to the county.

11. The Land Conservation Committees, and if required, county boards, approve cost-share payments to landowners.

12. The county issues checks to the respective landowners and updates the project ledgers.

13. The county records the check amount, number, and date.

14. DNR reimburses the county for expended cost-share funds.

Identifying Wildlife and Fishery Needs: The Ozaukee, Washington, and Waukesha County staffs will consult with the DNR's Southeast District wildlife management and fisheries management staff to optimize the wildlife and fish management benefits of nonpoint source control BMPs. Specifically, the county staff will contact DNR staff if:

* Streambank protection practices, agricultural sediment basins, or critical area stabilization practices are being considered.

* The installation of agricultural BMPs adversely affects fence rows, rock piles, wetlands, or other wildlife habitat components.

The DNR staff will assist county staff by:

* Identifying streambank protection practices that benefit fish and wildlife.

* Identifying wildlife habitat components that could be incorporated into vegetative filter strips along streams or in upland areas.

* Reviewing placement of agricultural sediment basins to assure that negative impacts on stream fish and aquatic life do not occur and recommending wildlife habitat components.

* Providing technical assistance by proposing measures to minimize the impact on wildlife habitat when the installation of BMPs require the removal of obstructions or other wildlife habitat.

* Assisting to resolve questions concerning effects of agricultural nonpoint source BMPs on wetlands.

Submittal to the Department of Natural Resources: Cost-share agreements do not need prior approval from the DNR, except in the following instances:

* Where cost-share funds are to be used for practices on county-owned or controlled land.

* For agreements or amendments where the cost-share amount for all practices for a landowner exceeds $50,000 in state funds.

* For grade stabilization structures and agricultural sediment basins with embankment heights between 15 and 25 feet and impoundment capacities of 15 to 50 acre feet.

* For streambanks to be controlled using riprap or other materials with banks over six feet high.

* For animal lot relocation.

* For roofs over barnyards or manure storage facilities.

Rural Cost Containment Procedures. Chapter NR 120 requires that cost containment procedures be identified in this plan. The cost containment procedures to be used by Ozaukee, Washington, and Waukesha Counties are described below.

Cost-share payments will be based on actual installation costs. If actual installation costs exceed the amount of cost-sharing determined by the bidding and average cost methods the amount paid the grantee may be increased with the approval of the appropriate land conservation committee. Appropriate documentation regarding the need for changes will be submitted to the DNR.

Bids. Competitive bids will be required for all structural BMPs with estimated total costs, as determined by the project technicians, exceeding $5,000. The bidding process requires the cost-share recipient to receive a minimum of two bids from qualified contractors in lump sum bid. The cost-share recipient must provide copies of the bids to the county prior to initiating construction. In cases where the cost-share recipient provides proof that bids were requested from a minimum of three qualified contractors but only one bid was received, the county will determine if the bid constitutes an appropriate cost for the project. If no bids are received or if the lone bid is not deemed appropriate, the county will limit cost sharing based on average costs.

Average Costs. Average costs will be used for all structural BMPs with an estimated cost equal to or less than $5,000, unless the cost-share recipient decides to bid the installation of the BMPs. The average costs to be used will be sent to the DNR and the DATCP for approval prior to the counties signing cost-share agreements. This average cost list will be reviewed periodically and appropriate changes made. If changes are made the list will be forwarded to the DNR and the DATCP for final approval before the changes are used for calculating cost-share agreements and payments.

Flat Rates. Several of the BMPs listed in Table 37 will use flat rates for determining the state's cost-share funding amount. Practices using flat rates are shown in Table 38. The rates shown are the state's share of the practice installation costs.

LOCAL ASSISTANCE GRANT AGREEMENT ADMINISTRATION

General Information: The Local Assistance Grant Agreement (LAGA) is a grant from the DNR to Ozaukee, Washington, and Waukesha Counties for supporting their staffing and support costs of carrying out this watershed plan. Each county will have its own agreement. Consistent with NR 120, the counties will use funds from the LAGA for additional staff to implement the project and conduct information and education activities. The LAGA also supports other items such as travel, training, and certain office supplies. Further clarification of eligible costs supported by this grant is given in NR 120.14(4) and (6).

Grant Agreement Application Procedures: An annual review of the LAGA is conducted through the county's development of an annual workload. This workload estimates the work needed to be accomplished each year. The workload is provided to DATCP and DNR for review and clarification. Along with the workload analysis, a grant application form is sent. Funds needed to complete the agreed upon annual workload are amended to the LAGA.

Table 38. Practices Using a Flat Rate for State Cost-Share Funding.

BEST MANAGEMENT PRACTICE	FLAT RATE
Contour Farming	$6.00/ac.
Strip Cropping	$12.00/ac.
Field Strip Cropping	$10.00/ac.
Reduced Tillage	$15.00/ac. (1.)
Reduced Tillage	$45.00/ac. (2.)

(1.) Reduced tillage systems for short crop rotations, and establishment of forages and small grains (includes no-till).

(2.) Reduced tillage systems for continuous row cropping or long rotations (does not include no-till).

Fiscal Management Procedures, Reporting Requirements: Ozaukee, Washington, and Waukesha Counties are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Menomonee River Watershed Project. The records of all watershed transactions must be retained for three years after the date of final project settlement. A more detailed description of the fiscal management procedures can be found in NR 120.25 and NR 120.26.

NR 120 requires quarterly reports to DATCP from each county in accordance with s. Ag. 166.40(4) accounting for staff time, expenditures, and accomplishments regarding activities funded through the watershed project. Reimbursement requests may be included with the submittal of the quarterly project reports.

BUDGET AND STAFFING NEEDS

This section estimates the funding and staffing required to conduct the rural portion of this project. These estimates are based on needs identified for Ozaukee, Washington, and Waukesha Counties where nearly all of the rural practices will be located.

Costs of Installing Rural BMPs: The quantity and type of management practices that are required to meet this projects water quality objectives are listed in Tables 39, 40, 41, and 42. The capital cost of installing the BMPs are listed in this table assuming landowner participation rates of 100 percent and 75 percent. Also included are the units of measurement and cost-share amount per unit for the various BMPs.

The capital cost of installing the BMPs in Ozaukee, Washington, and Waukesha Counties is approximately $419,000, $252,000, and $101,000 dollars, respectively, assuming 100 percent participation.

* State funds necessary to cost-share this level of control would be about $274,000, $184,000, and $66,000 for Ozaukee, Washington, and Waukesha Counties, respectively.

* The local share provided by landowners and other cost-share recipients would be about $121,000, $59,000, and $27,000, respectively. At a 75 percent level of participation, the state funds needed to cover capital installation would be about $206,000, $138,000, and $50,000 for Ozaukee, Washington, and Waukesha Counties, respectively.

Easement Costs: Chapter V identifies where nonpoint source program funds can be used to purchase easements. The estimated cost purchasing easements on eligible lands in Ozaukee, Washington, and Waukesha Counties is shown in Table 39. At 100 percent participation, the estimated purchase price of easements on eligible lands would be $60,000, $150,000, and $30,000 in Ozaukee, Washington, and Ozaukee Counties, respectively. At 75 percent participation, the cost would be $45,000, $112,500, and $22,500; respectively. The easement costs would be paid for entirely by the state.

Staff Needs: Table 43 lists the total estimated staff needed to implement the project in Ozaukee, Washington, and Waukesha Counties; respectively. Figures are provided for both the 50 percent and 75 percent levels of participation. A total of about 7,000 staff hours is required (1,820 hours per staff year)in Ozaukee County, 8,400 staff hours in Washington County, and 3,300 staff hours to implement this plan at a 75 percent landowner participation rate. The estimated cost for staff at this landowner participation rate is approximately $107,000, $129,000, and $51,000; respectively, in Ozaukee, Washington, and Waukesha Counties. All of these costs, with the exception of some direct cost items, would be paid for by the state.

Total Rural Project Cost: The total state funding required to meet the rural nonpoint source pollution control needs at a 75 percent level of landowner participation is presented Table 44. This figure includes the capital cost of practices, staff support, and easement costs presented above. The estimated cost to the state would be $372,562, $394,473, and $131,550 in Ozaukee, Washington, and Waukesha Counties, respectively.

GRANT DISBURSEMENT AND PROJECT MANAGEMENT SCHEDULE

Implementation may begin upon approval of this watershed plan by the Ozaukee County Board; Wisconsin Department of Agriculture, Trade and Consumer Protection; and the Department of Natural Resources. The priority watershed project implementation period lasts eight years. It includes an initial three year period for contacting eligible landowners and signing cost-share agreements. Practices on any cost-share agreement must be installed within a five-year period.

Under extenuating circumstances, the initial period for entering into cost-share agreements can be extended by DNR for a limited period of time if it will result in a significant increase in nonpoint source control. Limited extensions for the installation period for practices on individual cost-share agreements must also be approved by the DNR and the DATCP.

Table 39
Cost-Share Budget Needs for Rural Management Practices in the Menomonee River Watershed

Management Needs	Number	Cost/Unit	Total Cost[1]	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*BEST MANAGEMENT PRACTICES							
UPLAND SEDIMENT CONTROL							
Change in Crop Rotation	2,610 ac	NA[3]	0	0	0	0	0
Contour Cropping	1,950 ac	$6	11,700	11,700	[2]	8,775	[2]
Contour Strip Cropping	510 ac	$12	6,120	6,120	[2]	4,590	[2]
Reduced Tilage[4]	1,020 ac	$45	45,900	45,900	[2]	34,425	[2]
Reduced Tilage[5]	1,550 ac	$15	23,250	23,250	[2]	17,438	[2]
Critical Area Stabilization	400 ac	$100	40,000	28,000	12,000	21,000	9,000
Grass Waterways	47 ac	$2,500	117,500	82,250	35,250	61,688	26,438
Field Diversions & Terraces	10,000 ft	$3	30,000	21,000	9,000	15,750	6,750
Grade Stabilization	33 ea	$3,000	99,000	69,300	29,700	51,975	22,275
Agricultural Sediment Basin	9 ea	$3,000	27,000	18,900	8,100	14,175	6,075
Livestock Fencing from Woodlots	8,000 ft	$1	8,000	4,000	4,000	3,000	3,000
Pasture Management	50 ac	NA	0	0	0	0	0
Shoreline Buffers	240 ac	$150	36,000	25,200	10,800	18,900	8,100
Wetland Restoration	13 ea	$2,000	26,000	18,200	7,800	13,650	5,850
ANIMAL WASTE MANAGEMENT							
Barnyard Runoff Control	6 ea	$15,000	$90,000	63,000	27,000	47,250	20,250
Manure Storage Facility[6]	10 ea	$20,000	200,000	100,000	60,000	75,000	45,000
Manure Spreading Management	106 ac	NA	0	0	0	0	0
STREAMBANK EROSION CONTROL							
Shape and Seeding	1,000 ft	$4	4,000	2,800	1,200	2,100	900
Fencing	1,240 ft	$1	1,240	868	372	651	279
Rip-Rap	0 ft	*$20	0	0	0	0	0
Livestock/Machinery Crossing	4 ea	$1,500	6,000	4,200	1,800	3,150	1,350
Totals:			$771,710	$524,688	$207,022	$393,516	$155,267
EASEMENTS	240 ac	$1,000	240,000	240,000	0	180,000	0
Totals:		$1,011,710	$764,688	$207,022	$573,516	$155,267	

(1) Total cost to control identified critical pollution sources.
(2) Local share of labor and any additional equipment costs.
(3) NA means that cost share funds are not available for this practice.
(4) This practice is reduced tillage continuous row, or long rotational croplands.
(5) This practice is reduced tillage, including no-till, on short rotation croplands or for establishing forage crops.
(6) Maximum cost-share is $10,000 of which a maximum of $5,000 can be for waste transfer.
* Streambank Cost/Unit was $25 for Waukesha County.

Table 40
Cost-Share Budget Needs for Rural Management Practices in Ozaukee County

Management Needs	Number	Cost/Unit	Total Cost[1]	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*BEST MANAGEMENT PRACTICES							
UPLAND SEDIMENT CONTROL							
Change in Crop Rotation	670 ac	NA[3]	0	0	0	0	0
Contour Cropping	430 ac	$6	2,580	2,580	[2]	1,935	[2]
Contour Strip Cropping	110 ac	$12	1,320	1,320	[2]	990	[2]
Reduced Tilage[4]	220 ac	$45	9,900	9,900	[2]	7,425	[2]
Reduced Tilage[5]	340 ac	$15	5,100	5,100	[2]	3,825	[2]
Critical Area Stabilization	85 ac	$100	8,500	5,950	2,550	4,463	1,913
Grass Waterways	25 ac	$2,500	62,500	43,750	18,750	32,813	14,063
Field Diversions & Terraces	2,000 ft	$3	6,000	4,200	1,800	3,150	1,350
Grade Stabilization	28 ea	$3,000	84,000	58,800	25,200	44,100	18,900
Agricultural Sediment Basin	3 ea	$3,000	9,000	6,300	2,700	4,725	2,025
Livestock Fencing from Woodlots	3,000 ft	$1	3,000	1,500	1,500	1,125	1,125
Pasture Management	15 ac	NA	0	0	0	0	0
Shoreline Buffers	60 ac	$150	9,000	6,300	2,700	4,725	2,025
Wetland Restoration	3 ea	$2,000	6,000	4,200	1,800	3,150	1,350
ANIMAL WASTE MANAGEMENT							
Barnyard Runoff Control	6 ea	$15,000	90,000	63,000	27,000	47,250	20,250
Manure Storage Facility[6]	6 ea	$20,000	120,000	60,000	36,000	45,000	27,000
Manure Spreading Management	70 ac	NA	0	0	0	0	0
STREAMBANK EROSION CONTROL							
Shape and Seeding	0 ft	$4	0	0	0	0	0
Fencing	240 ft	$1	240	168	72	126	54
Rip-Rap	0 ft	$20	0	0	0	0	0
Livestock/Machinery Crossing	1 ea	$1,500	1,500	1,050	450	788	338
Subtotals:			$418,640	$274,118	$120,522	$205,589	$90,392
EASEMENTS	60 ac	$1,000	60,000	60,000	0	45,000	0
Totals:			$478,640	$334,118	$120,522	$250,589	$90,392

(1) Total cost to control identified critical pollution sources.
(2) Local share of labor and any additional equipment costs.
(3) NA means that cost share funds are not available for this practice.
(4) This practice is reduced tillage continuous row, or long rotational croplands.
(5) This practice is reduced tillage, including no-till, on short rotation croplands or for establishing forage crops.
(6) Maximum cost-share is $10,000 of which a maximum of $5,000 can be for waste transfer.
* Streambank Cost/Unit was $25 for Waukesha County.

Table 41
Cost-Share Budget Needs for Rural Management Practices in Washington County

Management Needs	Number	Cost/Unit	Total Cost[1]	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*BEST MANAGEMENT PRACTICES							
UPLAND SEDIMENT CONTROL							
Change in Crop Rotation	1,520 ac	NA[3]	0	0	0	0	0
Contour Cropping	1,250 ac	$6	7,500	7,500	[2]	5,625	[2]
Contour Strip Cropping	330 ac	$12	3,960	3,960	[2]	2,970	[2]
Reduced Tilage[4]	660 ac	$45	29,700	29,700	[2]	22,275	[2]
Reduced Tilage[5]	1,000 ac	$15	15,000	15,000	[2]	11,250	[2]
Critical Area Stabilization	250 ac	$100	25,000	17,500	7,500	13,125	5,625
Grass Waterways	16 ac	$2,500	40,000	28,000	12,000	21,000	9,000
Field Diversions & Terraces	6,000 ft	$3	18,000	12,600	5,400	9,450	4,050
Grade Stabilization	3 ea	$3,000	9,000	6,300	2,700	4,725	2,025
Agricultural Sediment Basin	4 ea	$3,000	12,000	8,400	3,600	6,300	2,700
Livestock Fencing from Woodlots	3,500 ft	$1	3,500	1,750	1,750	1,313	1,313
Pasture Management	25 ac	NA	0	0	0	0	0
Shoreline Buffers	150 ac	$150	22,500	15,750	6,750	11,813	5,063
Wetland Restoration	8 ea	$2,000	16,000	11,200	4,800	8,400	3,600
ANIMAL WASTE MANAGEMENT							
Barnyard Runoff Control	0 ea	$15,000	0	0	0	0	0
Manure Storage Facility[6]	2 ea	$20,000	40,000	20,000	12,000	15,000	9,000
Manure Spreading Management	20 ac	NA	0	0	0	0	0
STREAMBANK EROSION CONTROL							
Shape and Seeding	1,000 ft	$4	4,000	2,800	1,200	2,100	900
Fencing	1,000 ft	$1	1,000	700	300	525	225
Rip-Rap	0 ft	*$20	0	0	0	0	0
Livestock/Machinery Crossing	3 ea	$1,500	4,500	3,150	1,350	2,363	1,013
Subtotals:			$251,660	$184,310	$59,350	$138,233	$44,513
EASEMENTS	150 ac	$1,000	150,000	150,000	0	112,500	0
Totals:			$401,660	$334,310	$59,350	$250,733	$44,513

(1) Total cost to control identified critical pollution sources.
(2) Local share of labor and any additional equipment costs.
(3) NA means that cost share funds are not available for this practice.
(4) This practice is reduced tillage continuous row, or long rotational croplands.
(5) This practice is reduced tillage, including no-till, on short rotation croplands or for establishing forage crops.
(6) Maximum cost-share is $10,000 of which a maximum of $5,000 can be for waste transfer.
* Streambank Cost/Unit was $25 for Waukesha County.

Table 42
Cost-Share Budget Needs for Rural Management Practices in Waukesha County

Management Needs	Number	Cost/Unit	Total Cost[1]	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*BEST MANAGEMENT PRACTICES							
UPLAND SEDIMENT CONTROL							
Change in Crop Rotation	420 ac	NA[3]	0	0	0	0	0
Contour Cropping	270 ac	$6	1,620	1,620	[2]	1,215	[2]
Contour Strip Cropping	70 ac	$12	840	840	[2]	630	[2]
Reduced Tilage[4]	140 ac	$45	6,300	6,300	[2]	4,725	[2]
Reduced Tilage[5]	210 ac	$15	3,150	3,150	[2]	2,363	[2]
Critical Area Stabilization	65 ac	$100	6,500	4,550	1,950	3,413	1,463
Grass Waterways	6 ac	$2,500	15,000	10,500	4,500	7,875	3,375
Field Diversions & Terraces	2,000 ft	$3	6,000	4,200	1,800	3,150	1,350
Grade Stabilization	2 ea	$3,000	6,000	4,200	1,800	3,150	1,350
Agricultural Sediment Basin	2 ea	$3,000	6,000	4,200	1,800	3,150	1,350
Livestock Fencing from Woodlots	1,500 ft	$1	1,500	750	750	563	563
Pasture Management	10 ac	NA	0	0	0	0	0
Shoreline Buffers	30 ac	$150	4,500	3,150	1,350	2,363	1,013
Wetland Restoration	2 ea	$2,000	4,000	2,800	1,200	2,100	900
ANIMAL WASTE MANAGEMENT							
Barnyard Runoff Control	0 ea	$15,000	0	0	0	0	0
Manure Storage Facility[6]	2 ea	$20,000	40,000	20,000	12,000	15,000	9,000
Manure Spreading Management	16 ac	NA	0	0	0	0	0
STREAMBANK EROSION CONTROL							
Shape and Seeding	0 ft	$4	0	0	0	0	0
Fencing	0 ft	$1	0	0	0	0	0
Rip-Rap	0 ft	*$25	0	0	0	0	0
Livestock/Machinery Crossing	0 ea	$1,500	0	0	0	0	0
Subtotals:			$101,410	$66,260	$27,150	$49,695	$20,363
EASEMENTS	30 ac	$1,000	30,000	30,000	0	22,500	0
Totals:			$131,410	$96,260	$27,150	$72,195	$20,363

(1) Total cost to control identified critical pollution sources.
(2) Local share of labor and any additional equipment costs.
(3) NA means that cost share funds are not available for this practice.
(4) This practice is reduced tillage continuous row, or long rotational croplands.
(5) This practice is reduced tillage, including no-till, on short rotation croplands or for establishing forage crops.
(6) Maximum cost-share is $10,000 of which a maximum of $5,000 can be for waste transfer.
* Streambank Cost/Unit was $25 for Waukesha County.

Table 43
Estimated County LCD Needs for Project Implementation

Activity	Project Years When Work Will Be Done	Ozaukee County 75% Landowner Participation (Staff Hours)	Ozaukee County 50% Landowner Participation (Staff Hours)	Washington County 75% Landowner Participation (Staff Hours)	Washington County 50% Landowner Participation (Staff Hours)	Waukesha County 75% Landowner Participation (Staff Hours)	Waukesha County 50% Landowner Participation (Staff Hours)
Project & Financial Management	1-8	1444.0	1444.0	1444.0	1440.0	1440.0	1440.0
Information & Education Program	1-8						
Pre-Contact Office Inventory; Landowner Contacts, & Progress Tracking	1-3	148.5	99.0	432.0	288.0	94.5	63.0
Conservation Planning; Cost Share Agreement Development	1-3	445.5	297.0	1296.0	864.0	283.5	189.0
Practice Design & Installation	1-8						
Upland Sediment Control		3681.7	2454.5	4515.4	3010.3	1200.5	800.3
Barnyard Runoff Control		450.0	300.0	0.0	0.0	0.0	0.0
Manure Spreading Management & Storage		362.6	241.8	120.8	80.5	120.6	80.4
Streambank Erosion Control		27.0	18.0	166.5	111.0	0.0	0.0
Training	1-8	400.0	400.0	400.0	400.0	200.0	200.0
Total LCD Workload		6955.3	5250.2	8370.6	6193.8	3339.1	2772.7
Estimated Staff Required for Years 1-3:		490.9 per year	362.1 per year	880.7 per year	622.0 per year	263.4 per year	203.0 per year
Estimated Staff Required for Years 4-8:		1096.5 per year	832.8 per year	1145.7 per year	865.6 per year	509.8 per year	432.7 per year

Table 44
Total Project Costs at 75% Landowner Participation Rate

Item	OZAUKEE COUNTY Costs (State Share)	WASHINGTON COUNTY Costs (State Share)	WAUKESHA COUNTY Costs (State Share)	WATERSHED TOTAL Costs (State Share)
Cost Share Funds: Practices	$205,589	$138,233	$49,695	$393,517
Cost Share Funds: Easements	$45,000	$112,500	$22,500	$180,000
Local Assistance Staff Support	$106,973	$128,740	$51,355	$287,067
Information/Education Direct				$0
Other Direct (travel, Supplies, etc.)	$15,000	$15,000	$8,000	$38,000
TOTAL	$372,562	$394,473	$131,550	$898,584

* Salary + Indirect = $32,000/year

The disbursement of the grants (Local Assistance and Nonpoint Source) to Washington, Waukesha and Ozaukee Counties will be based on an annual workload analysis and grant application process. The estimated grant disbursement schedule based on 75 percent participation by eligible landowners can be found in Tables 45 through 48; for the entire watershed, Ozaukee County, Washington County, and Waukesha County, respectively.

COORDINATION WITH STATE AND FEDERAL CONSERVATION COMPLIANCE PROGRAMS

The Menomonee River Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP, and the Federal Food Security Act (FSA) administered by the Soil Conservation Service. DATCP will assist Ozaukee, Washington, and Waukesha Counties and the SCS offices to identify landowners within the watershed that are subject to the compliance provisions of FPP and FSA. Conservation Farm Plans were completed for all landowners in FPP and FSA on December 31, 1989.

There will be a need to implement the conservation plans, and in the future amend these plans during the implementation phase of the watershed project. The staff, which is supported by the watershed project, will revise the conservation plans that are developed for FPP and FSA to include management decisions and the installation of needed BMPs for nonpoint source pollution abatement while addressing other resource conservation problems. This comprehensive approach to farm planning will facilitate consideration of the various goals and objectives for all the programs in which the landowner participates.

In order to meet soil erosion program goals established through other state and federal programs, some eroding uplands in Management Categories I and II may need control in addition to that required for meeting sediment delivery targets. Where this occurs, technical and financial assistance from the nonpoint source program can be used to support practice design and installation on these critical lands. This assistance applies only where the additional control needed to meet soil erosion goals can be achieved using low cost practices.

URBAN PROGRAM FOR IMPLEMENTATION

TIMING AND SEQUENCING OF URBAN MANAGEMENT PROGRAM

The following discussion provides guidance on the implementation of the urban nonpoint source control program. It considers first the relationship of the recommendations for existing and planned urban areas to the federal storm water permit program. Second, the elements of a "core" program for controlling urban nonpoint source are discussed. Finally, the contents and means for implementing the more complex elements of the urban management program—detention, infiltration, street sweeping—are presented.

Relationship of the Urban Management Program to the Federal Stormwater Permit Program: As discussed in Chapter I, "Plan Purpose and Legal Status," a federal stormwater permit program will begin early in the implementation phase of this priority watershed project. The requirements of the federal stormwater program will result in

Table 45
Grant Disbursement Schedule at 75% Landowner Participation Rate for the Menomonee River Watershed

Item	Project Year 1	2	3	3-8
Cost Share Funds: Practices	$78,712	$157,403	$157,402	$0
Cost Share Funds: Easements	60,000	60,000	60,000	0
Local Assistance Staff Support	35,890	35,890	35,890	179,398
Information/Education: Direct	0	0	0	0
Other Direct (travel, supplies, etc.)	5,000	5,000	5,000	23,000
TOTAL	$179,602	$258,293	$258,292	$202,398

Table 46
Grant Disbursement Schedule at 75% Landowner Participation Rate for Ozaukee County

Item	Project Year 1	2	3	3-8
Cost Share Funds: Practices	$41,117	$82,236	$82,236	$0
Cost Share Funds: Easements	15,000	15,000	15,000	0
Local Assistance Staff Support	13,370	13,370	13,370	66,863
Information/Education: Direct	0	0	0	0
Other Direct (travel, supplies, etc.)	2,000	2,000	2,000	9,000
TOTAL	$71,487	$112,606	$112,606	$75,863

Table 47
Grant Disbursement Schedule at 75% Landowner Participation Rate for Washington County

Item	Project Year 1	2	3	3-8
Cost Share Funds: Practices	$27,645	$55,294	$55,294	$0
Cost Share Funds: Easements	37,500	37,500	37,500	0
Local Assistance Staff Support	16,100	16,100	16,100	80,440
Information/Education: Direct	0	0	0	0
Other Direct (travel, supplies, etc.)	2,000	2,000	2,000	9,000
TOTAL	$83,245	$110,894	$110,894	$89,440

Table 48
Grant Disbursement Schedule at 75% Landowner Participation Rate for Waukesha County

Item	Project Year 1	2	3	3-8
Cost Share Funds: Practices	$9,950	$19,873	$19,872	$0
Cost Share Funds: Easements	7,500	7,500	7,500	0
Local Assistance Staff Support	6,420	6,420	6,420	32,095
Information/Education: Direct	0	0	0	0
Other Direct (travel, supplies, etc.)	1,000	1,000	1,000	5,000
TOTAL	$24,870	$34,793	$34,792	$37,095

the issuance of permits under the Wisconsin Pollution Discharge Elimination System (WPDES) for discharging stormwater to surface water. Initially, only the city of Milwaukee and some industries will fall under the requirements of the federal program. However, it is likely that many communities and industries in the Menomonee River Watershed will ultimately be required to reduce pollution attributable to urban nonpoint sources.

Regulations guiding the conduct of the federal stormwater permit program were released in October 1990. Implementation of the urban nonpoint source control recommendations in this plan will meet some of the requirements of the federal program. However, it is uncertain if financial assistance will be available for requirements specified in a stormwater permit. Consequently, communities and industries are encouraged to begin implementing this plan's recommendations to take advantage of grant funds currently available under the nonpoint source program.

Core Elements of the Urban Management Program: The "core" elements of the urban nonpoint source control program applicable to local units of government include basic measures that can be implemented without further study. Adopting a community specific core program is the first step in the implementation process. As such, communities will need to commit within the first three years of the project to implement the core program. This is a requirement to receive technical and financial assistance through the priority watershed project. This requirement applies only to the receipt of funds used directly by the municipality as a grantee, such as where the municipality installs, owns, and operates a management practice. It does not apply to those instances where the municipality acts as a grantor, passing cost-share funds on to private landowners. This means that individual landowners could receive cost-share funds from the DNR for the installation of management practices prior to a municipality's agreement to conduct core elements of the urban program.

The basic elements of the "core" program are:

* Develop, adopt and enforce a construction erosion control ordinance consistent with the "model" developed jointly by the Wisconsin League of Municipalities and the Department of Natural Resources. Construction erosion control practices should be consistent with the standards and specifications in the "Wisconsin Construction Site Best Management Practice Handbook."

* Develop and implement a community specific program of urban "housekeeping" practices which reduce urban nonpoint source pollution. This may include a combination of information and education efforts, adoption of ordinances regulating pet wastes or changes in the timing and scheduling of leaf collection.

* Implement an information and education program containing the elements and achieving the goals of the urban information and education strategy presented at the end of this chapter.

"Segmented" Elements of the Urban Management Program: The "segmented" elements of the urban nonpoint source program include those requiring site specific investigations prior to implementation. It is anticipated that many of these segmented elements will be

implemented individually as discrete nonpoint source control practices. An example would be construction of one or more detention ponds in a given subwatershed following completion of an engineering feasibility study.

Importantly, the higher costs of implementing this portion of the urban management program will require communities to budget expenditures over the course of several years. Best management practices implemented under this portion of the program most likely will include detention ponds, infiltration devices, streambank erosion controls and other structural means for reducing urban nonpoint source pollution. These elements also include changes in schedules and equipment used for street sweeping.

The detailed studies will include engineering feasibility and other site specific investigations for existing and new development. The results will determine the best means for reducing urban nonpoint sources in a specific community through more site specific application of the plan's recommendations.

Communities can implement the segmented elements of the urban management strategy any time following development and initial implementation of the "core" program. However, cost sharing will be limited to those elements of the segmented program completed within the eight-year implementation period.

The basic elements of the segmented program are:

* Conduct detailed engineering studies to determine the best means to implement community-specific nonpoint source control measures for existing urban areas. This element will also consider accelerated street sweeping as a component of the control strategy for existing urban areas. The detailed engineering feasibility studies should set forth the allocation of local costs between municipalities where more than one municipality contributes runoff to an urban structural practice. The allocation should result in an equitable distribution of costs based on the contribution of each municipality to the total pollutant loading or stormwater runoff volume being controlled.

  The effect of source reduction activities on the extent of urban structural practices needed to meet pollution reduction goals should be considered in conducting these studies. Some examples of source reduction activities that might be considered are presented in Chapter V, "Urban Best Management Practices."

* Design and install structural urban best management practices for existing urban areas with completed detailed engineering studies. (Practices for locations outside of areas having detailed engineering studies will be considered only on a case-by-case basis.)

* Develop, as needed, management plans for planned urban development. These plans will identify the type and locations of structural urban best management practices.

* Adopt and enforce a comprehensive stormwater management ordinance consistent with the state "model" stormwater ordinance under preparation. Following adoption of a stormwater management guidebook, development of a stormwater management ordinance will be incorporated into the "core" program.

* Conduct detailed alternative financing/implementation studies which determine the means to pay for administering an urban nonpoint source pollution control program in each municipality. These studies will be conducted on a parallel schedule with the other initial high priority elements undertaken within the segmented program.

PROGRAM PARTICIPANTS—ROLES AND RESPONSIBILITIES

The specific roles and responsibilities for program participants are summarized below. The primary participants include local units of government (cities, villages, towns, counties); the DNR; other agencies; landowners and land operators. Where applicable, the roles and responsibilities are discussed according to the previously described "core" and "segmented" approaches to project implementation. As noted in Chapter I, "Plan Purpose and Legal Status," implementation begins following approval of this priority watershed plan by the counties, the DATCP, and the DNR.

Local Units of Government "Core" Program Roles and Responsibilities: The following is a schedule for implementing the "core" elements of the urban nonpoint source control strategy for this priority watershed project. Each community wishing to participate should:

1. Identify in writing an authorized representative for the local unit of government within 30 days of the start of implementation.

2. Adopt an adequate ordinance, develop administrative procedures, and determine staff needs to enforce a construction erosion control ordinance in cities and villages within 12 months of the start of implementation.

3. Identify the roles and responsibilities of towns and counties for controlling construction erosion in unincorporated areas within six months of implementation. Adopt adequate ordinances, develop administrative procedures, and determine staff needs to enforce a construction erosion control ordinance in unincorporated areas within 12 months of implementation. The nonpoint source program funding to Ozaukee, Waukesha and Washington Counties for carrying out agricultural management recommendations is not contingent upon construction site erosion control coverage for the county.

4. Develop and implement a community specific program of urban "housekeeping" practices that reduce urban nonpoint source pollution. This may include but is not limited to a combination of information and education efforts, adoption of ordinances regulating pet wastes, and changes to the timing and scheduling of leaf collection. The local unit of government and the DNR will negotiate the

content of the community specific program and a schedule for implementation within 12 months of implementation.

5. Implement the information and education strategy according to the manner and schedule described in this chapter.

6. Prepare and submit annual work plans for staff and activities which are necessary to implement the project.

7. Prepare and submit to the DNR an annual report for the purposes of monitoring the project's implementation.

8. Participate in the annual watershed project review meeting.

Local Units of Government "Segmented" Program Roles and Responsibilities: The following is a schedule for the "segmented" elements of the urban nonpoint source control strategy for this priority watershed project. Each community wishing to participate should:

1. Identify within six months of implementation, the high-priority segments the community wishes to pursue in existing and planned urban areas through the priority watershed project. This should include an evaluation of source reduction and financing. This list can be amended throughout the eight-year project period.

2. Conduct engineering feasibility and site location studies for urban nonpoint source control practices in high-priority areas for existing urban development. These studies should include an evaluation of nonstructural alternatives and financing mechanisms. The above referenced detailed engineering studies will guide the type and manner of practice installation. A commitment to implementing the recommendations will be required as a condition for subsequent financial assistance for these studies.

3. Adopt, administer, and enforce a comprehensive stormwater management ordinance for planned urban development within 12 months of completion of an approved state "model" ordinance.

4. Enter into cost-share agreements for eligible best management practices.

    a. For practices installed and maintained by private individuals, the cost-share agreement is between the landowner and the local unit of government. The local units of government will be required to:

        * Design or contract for the design of best management practices and verify proper practice installation.

* Request reimbursement from the DNR for practices installed by private landowners, and, in turn, reimburse those landowners for the eligible amount of cost-sharing.

* Monitor landowner compliance with provisions of the cost-share agreement.

* For practices installed and maintained by the local unit of government, the cost-share agreement is between the unit of government and the DNR.

b. For practices installed and maintained by the local unit of government, the cost-share agreement is between the unit of government and the DNR. Where more than one municipality contributes runoff to a control practice, the DNR will enter into cost-share agreements. These agreements will be consistent with an equitable allocation based on municipal contributions to the pollutant loads and stormwater volumes being controlled.

c. Practice maintenance is the responsibility of the grant recipient. In some cases, urban stormwater pollutants are generated wholly or in part by a community different than that in which the stormwater control practice is located. An example is the potential use of wet detention in Dretzka Park (Milwaukee County) to control urban pollutants generated from the city of Milwaukee.

   In these instances, there are several alternatives to properly distribute the financial burden of practice maintenance. Two examples are presented below. In each example, the "upstream community" generates all or part of the urban pollutant load to the best management practice, which is located in the "downstream" community.

   * The "downstream" community can act as grant recipient, which includes ultimate accountability for practice maintenance. The responsibility could then be delegated, all or in part, to the "upstream" community through an inter-governmental agreement.

   * The "upstream" community can act as the grant recipient, which includes ultimate accountability for practice maintenance. The "downstream" community could provide, through an inter-governmental agreement, all or part of the local share of the practice installation cost.

     The Milwaukee County Parks Department has determined that it will not assume long-term maintenance liability for practices placed on its property when those practices are installed to control pollutants and stormwater flows generated from urban lands located in other governmental jurisdictions. This is anticipated to be the case in all or nearly all situations.

5. Conduct detailed alternative financing/implementation studies which determine the means to pay for administering an urban nonpoint source control program in each municipality. These studies will be conducted on a parallel schedule with the other initial high priority elements undertaken under the segmented program.

6. Submit information to the DNR for project evaluation.

Department of Natural Resources: The DNR has been statutorily assigned the overall administrative responsibility for the Wisconsin Nonpoint Source Water Pollution Abatement Program. This includes providing financial support for local staff and installation of management practices, assisting local units of government to integrate wildlife and fish management concerns into selection and design of BMPs, and conducting project evaluation activities.

The DNR's role in assisting local units of government in carrying out the "core" and "segmented" activities are as follows:

Core Program Roles and Responsibilities—

* Assist local units of government to develop and adopt construction erosion control ordinances.

* Review community specific programs of urban "housekeeping" practices for nonpoint source control.

* Review and approve annual work plans for staff and activities necessary to implement the project.

* Review and approve annual project implementation reports.

* Participate in the annual watershed project review meeting.

* Track changes in urban pollutant loads using information supplied by local units of government.

Segmented Program Roles and Responsibilities—

* Develop a comprehensive stormwater management ordinance for planned urban development. Assist communities with adoption and enforcement of stormwater management ordinances.

* Assist communities to develop priorities, schedules and requirements for segmented activities.

* Participate in the selection of BMPs and approve practice designs. Review nonpoint source cost-share agreements signed by local units of government with eligible landowners.

* Enter into nonpoint source cost-share agreements with the local units of government that have eligible owned or operated lands.

* Review designs of urban nonpoint source control practices for which cost-share agreements are signed.

* Reimburse cost-share recipients for the eligible costs of installing BMPs at the rates consistent with administrative rules and those established in this plan.

* Approval of stormwater management plans will be based upon the ability of the plan to meet the pollution reduction goal in the nonpoint source plan. The results of recently completed and anticipated future water quality monitoring will be used to "fine-tune" the direct application of reduction goals in specific areas of the watershed.

Landowners and Land Operators: In some situations, private landowners will install BMPs on their property. As such, they can be important participants in the urban implementation strategy. Eligible landowners will participate in the project by signing cost-share agreements with local units of government. Maintenance responsibility can be allocated using agreements similar to those discussed above.

Other Agencies with Urban Implementation Responsibilities:

Soil Conservation Service (SCS). This agency works through the local land conservation committee to provide technical assistance for planning and installing conservation practices. The local SCS personnel may work with the local units of government in selected circumstances to provide assistance with technical work.

University of Wisconsin Extension (UWEX). Area Extension agents will provide support in developing and conducting a public information and education program aimed at increasing voluntary participation in the project. These activities are described later in this chapter in the information and education strategy.

Milwaukee Metropolitan Sewerage District. Sewerage districts have all of the privileges and responsibilities of cities, counties, and villages when participating in the nonpoint source program. However, the district may only enter into grants with the DNR for carrying out core and segmented program elements consistent with this watershed plan if those elements are closely related to the district's wastewater and stormwater management responsibilities.

BEST MANAGEMENT PRACTICES (BMPs)

BMPs Eligible For Cost-Sharing And Their Rates: Best management practices are those practices identified in NR 120 determined in this watershed plan to be the most effective in reducing nonpoint sources of pollution. Design and installation of the best management practices previously described under the rural implementation strategy must meet the conditions listed NR 120. Generally these practices use specific standard specifications in the "U. S. Soil Conservation Service Field Office Technical Guide."

Specifications for the structural urban practices were described in Chapter V, "Nonpoint Source Control Needs." The DNR will provide technical assistance in the application of these practices. Eligible practices and state cost-share rates are listed in Table 49.

Table 49. State Cost-Share Rates for Urban Management Practices.

BEST MANAGEMENT PRACTICE	STATE COST-SHARE RATE
Critical Area Stabilization	70% (1)
Grade Stabilization Structures	70%
Shoreline and Streambank Stabilization	70%
Shoreline Buffers	70% (1)
Wetland Restoration	70% (1)
Structural Urban Practices	70% (2)
Street Sweeping	50% (3)

1. Easements may be used in conjunction with these practices.
2. Applies only to structures for established urban areas. Established urban surfaces are considered to be those in existence prior to the date the DNR approves this watershed plan.
3. This is an alternative best management practice not listed in NR 120 of the Wisconsin Administrative Code. See Appendix D for more information.

Source: Wisconsin Department of Natural Resources.

Activities and Sources of Pollution Not Eligible for Cost-share Assistance: Priority watershed cost-share funds cannot be used to control sources of pollution and land management activities specifically excluded in NR 120.10 and NR 120.17. The following is a partial list of ineligible activities most often inquired about for cost-sharing in urban areas.

* Operation and maintenance of cost-shared best management practices (BMPs).

* Construction erosion control practices.

* Structural BMPs for new urban development. New urban development is defined as that for which construction activity commences after the DNR approves this watershed plan.

* BMPs installed prior to signing cost-share agreement.

* Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program.

* On-site septic system controls or maintenance.

* Dredging activities.

* Activities and structures intended primarily for flood control.

* Purchase of land.

* Stormwater conveyance systems.

* Minimum levels of street sweeping & leaf collection.

* Minimum levels of street sweeping are defined in Appendix D.

This plan recognizes that some items not eligible for funding under the nonpoint source program will be required to implement the plan recommendations. Examples include land purchase and the renovation or construction of storm sewer systems. Such activities will be needed to install structural urban practices, such as wet detention ponds, in many existing urban areas. These items are not currently eligible for funding under the nonpoint source program because of budgetary constraints.

These limits on funding eligibility, as set forth in this plan, are meant to apply only to the Nonpoint Source Water Pollution Abatement Program as administered under existing NR 120 Wis. Adm. Code. These limits are not meant to preclude separate budgetary or contractual financial assistance agreements that may be developed outside the existing scope of the nonpoint source program. Such agreements might be developed under new state or federal programs, or with other units of government. This plan endorses the use of funds procured through such agreements to implement the recommendations set forth in this plan.

NONPOINT SOURCE GRANT AGREEMENT AND ADMINISTRATION

The Nonpoint Source Grant Agreement is the means for transmitting funds from DNR to local units of government to provide cost sharing for installation of urban best management practices. In some cases the municipality will act only as a grantee. In this case, the municipality will use funds obtained under the grant agreement directly for practices it will install, own, and operate.

In other cases, the municipality will play an additional role as a grantor. In these situations, the municipality will pass the cost-share funds, which it has received from the DNR, along to private landowners who have responsibility for installing, operating, and maintaining the management practices. When this occurs, the municipality will enter into a separate cost-sharing agreement with the private landowner who receives the state funds.

The procedures for administering Nonpoint Source Grant Agreements and cost-share agreements parallel those contained in this plan's rural implementation strategy and in NR 120, Wis. Adm. Code.

COST-SHARE AGREEMENT AND ADMINISTRATION

Purpose and Responsibilities: Consistent with s. 144.25, Stats. and NR 120, cost-share funding is available to landowners and local units of government for a percent of the costs of installing BMPs to meet the project objectives. Cost-share agreements must be initiated within three years after formal approval of the watershed plan and are filed as part of the property deed. The agreements may be amended throughout the eight-year project period.

Practices included on cost-share agreements must be installed within the schedule agreed to in the cost-share agreement. Unless otherwise approved, the schedule of installing BMPs will be within five years of signing the cost-share agreement. Practices must be maintained for a minimum of ten years from the date of installing the final practice included in the cost-share agreement.

Local, state, or federal permits may be needed prior to installation of some BMPs. The areas most likely to need permits are zoned wetlands and the shoreline areas of lakes and streams. These permits are needed whether the activity is a part of the watershed project or not. The cost-share recipient is responsible for acquiring the needed permits prior to installation of the practices.

Local units of government are responsible for enforcing compliance of cost-share agreements to which they are a party. Where DNR serves as a party to an agreement with a unit of government, the DNR will take responsibility for monitoring compliance. The responsible party will insure that BMPs installed through the program are maintained in accordance with the operation and maintenance plan for the practice and for the appropriate length of time.

Identifying Wildlife and Fishery Needs: The local units of government will consult with the DNR's Southeast District wildlife management and fisheries management staff to optimize the wildlife and fish management benefits of nonpoint source control BMPs. Specifically, the DNR will be contacted if:

* Streambank protection practices or critical area stabilization practices are being considered.

* Installation of BMPs adversely affect wetlands or other wildlife habitat components.

The DNR staff will assist by:

* Identifying streambank protection practices that benefit fish and wildlife.

* Identifying wildlife habitat components that could be incorporated into vegetative filter strips along streams or in upland areas.

* Providing technical assistance when the installation of BMPs will require the removal of obstructions or other wildlife habitat by proposing measures to minimize impact on wildlife habitat.

* Assisting to resolve questions concerning effects of nonpoint source BMPs on wetlands.

Cost Containment Procedures: Cost containment procedures for local units of government are governed by state statute.

LOCAL ASSISTANCE GRANT AGREEMENT ADMINISTRATION

General Information: The Local Assistance Grant Agreement (LAGA) is a grant from the DNR to local units of government for supporting their staffing and support costs of carrying out the urban implementation strategy. Each local unit of government will have its own agreement. Consistent with NR 120 these grant funds will be used for installation of best management practices on land owned by the local unit of government, additional staff to implement the project and conduct information and education activities. The LAGA also supports other items such as travel, training, and certain office supplies. Further clarification of eligible costs supported by this grant is given in NR 120.14(4) and (6).

Activities described in the "core" and "segmented" elements of the urban implementation strategy are eligible for financial assistance. The type of eligible activities and the amount of state funds available are described in Table 50.

Grant Agreement Application Procedures: An annual review of the LAGA is conducted through development of an annual work plan by the local unit of government. This plan estimates the work needed to be accomplished each year. The work plan is provided to the DNR for review and clarification. Along with the work plan, a grant application form is sent. Funds needed to complete the agreed upon annual workload are amended to the local assistance grant agreement.

Fiscal Management Procedures, Reporting Requirements: The local units of government are required by NR 120 to maintain a financial management system that accurately tracks the disbursement of all funds used for the Menomonee River Watershed Project. The records of all watershed transactions must be retained for three years after the date of final project settlement. A more detailed description of the fiscal management procedures can be found in NR 120.25 and NR 120.26. NR 120 requires quarterly reports from each local unit of government accounting for staff time, expenditures, and accomplishments regarding activities funded through the watershed project. Reimbursement requests may be included with the submittal of the quarterly project reports.

Table 50. Urban Implementation Strategy Measures Eligible for State Funding.

ACTIVITY	SUPPORT RATE
Development of Construction Erosion Control Ordinances	100%
Development of Stormwater Management Ordinances	100%
Engineering Studies for Existing Urban Areas; Studies for Planned Urban Areas	100%[1]
Design and Engineering for Structural Best Management Practices	100%
Staff for Enforcing Construction Erosion and Stormwater Management Ordinances	100%[2]
Additional Staff Needed for Accelerated Street Sweeping	100%[2]
Development of alternative financing and administration strategies	100%

1. Funding not available for components dealing exclusively with drainage and flooding.
2. Funding limited to five years. Level of staffing based on a work plan submitted by local units of government and approved by the DNR.

Source: Wisconsin Department of Natural Resources.

URBAN BUDGET AND STAFFING NEEDS

The urban program budget and staffing requirements include several key components. These are presented below, along with estimates of budget and staffing needs if available at this time. Estimated budget and staffing needs to conduct the urban program are presented in Table 51, Table 52, Table 53, and Table 54.

Tables 51 and 52 present the estimated costs of implementing the recommendations for existing urban areas. All of these costs are associated with the "segmented" urban

program. Table 51 shows the cost of preparing detailed engineering feasibility studies that will be needed before practices are designed and installed to control runoff from existing urban areas. These estimates are made for each municipality. Table 52 presents estimated costs of implementing the wet detention and street sweeping recommendations. These costs are also presented by municipality. The cost of implementing the streambank erosion control element is presented in the text only, as it has yet to be determined how the costs may be divided.

Table 53 presents the cost of implementing the recommendations for planned urban areas. Table 53 presents cost estimates for implementing "segmented" urban program activities, including stormwater planning and practice installation for urbanizing areas. These costs are presented by subwatershed only, since projections of urban growth were not made by municipality. Cost estimates for implementing the construction site erosion control element of this plan, a "core" urban program activity, are not included in Table 53, but are estimated in the text.

Table 54, a summary of estimated costs for the rural and urban portions of the watershed project, summarize the costs of conducting all urban "segmented" and "core" level activities.

Engineering Feasibility/Siting Studies: Table 31 estimates that detailed engineering feasibility studies will be needed for 31,600 to 54,100 acres of existing urban development in order to choose and site practices. The private sector will probably carry out most of these studies with the DNR covering most of the cost. The estimated costs of preparing these feasibility studies for each community are presented in Table 51. In making these estimates, a planning cost of $100/acre was assumed.

Table 33 estimates that studies to choose and site stormwater practices in areas of new development will be needed for about 7,400 acres. Most of these studies will probably be carried out by the private sector, with the cost borne by the DNR. The estimated costs of preparing these feasibility studies for each community are presented in Table 53. In making these estimates, a planning cost of $60/acre was assumed.

Alternative Funding Sources: A substantial portion of the estimated costs of implementing this plan's urban management recommendations is for the construction of stormwater management practices in existing urban areas to control pollutants generated by a wide variety of activities. Where urban structural practices are used to control stormwater pollutants, the state cost share is limited and the burden falls on local funding sources as a result of current constraints set forth in state statutes and administrative rules.

Some municipalities have endorsed a concept of internalizing the cost of pollution control by developing a mechanism to charge the cost of pollution control to those responsible for generating the pollutants. In addition, municipalities have indicated a desire to pursue additional state or federal funding sources.

One way to internalize costs is to assess the source of each stormwater pollutant. This requires the identification of sources responsible for pollutant generation. This plan endorses investigations that identify sources of urban pollutants so that pollutant

Table 51. Estimated Cost of Preparing Detailed Engineering Feasibility Studies For Existing Urban Areas in the Menomonee River Watershed.

Community	Planning Needs (acs)(1.)		Estimated Cost	
OZAUKEE COUNTY				
C. of Mequon	180	850	$18,000	$85,000
MILWAUKEE COUNTY				
C. of Greenfield	800	1,700	$80,000	$170,000
C. of Milwaukee	13,300	20,500	$1,330,000	$2,050,000
C. of Wauwatosa	5,970	6,760	$597,000	$676,000
C. of West Allis	4,075	4,235	$407,500	$423,500
V. of West Milwaukee	380	400	$38,000	$40,000
WASHINGTON COUNTY				
V. of Germantown	860	3400	$86,000	$340,000
WASHINGTON COUNTY				
C. of Brookfield	2,580	6,650	$258,000	$665,000
C. of New Berlin	45	430	$4,500	$43,000
V. of Butler	310	475	$31,000	$47,500
V. of Elm Grove	470	2,025	$47,000	$202,500
V. of Menomonee Falls	2,600	6,580	$260,000	$658,000
T. of Brookfield	40	110	$4,000	$11,000
WATERSHED TOTAL	31,610	54,115	$3,161,000	$5,411,500

1. Low end of range includes only critical acres, high end represents all urban land uses.
2. Estimated cost of feasibility studies is $100/acre.

Source: Wisconsin Department of Natural Resources

Table 52. Cost of Implementing Recommended Urban Program in Existing Urban Areas in the Menomonee River Watershed.[1]

Municipality	Wet Detention Component			Street Sweeping Component		
	Cost(2.)	State Share(3.)	Local Share(4.)	Cost/ Year(5.)	State Share(6.)	Local Share(7.)
MILWAUKEE COUNTY						
City of Greenfield	$2,120,000 to $4,240,000	$275,600 to $551,200	$1,844,400 to $3,688,800	$700	$490	$210
City of Milwaukee	$35,600,000 to $71,200,000	$4,628,000 to $9,256,000	$30,972,000 to $61,944,000	$11,250	$7,875	$3,375
City of Wauwatosa	$15,920,000 to $31,840,000	$2,069,600 to $4,139,000	$13,850,400 to $27,700,000	$5,075	$3,553	$1,523
City of West Allis	$13,000,000 to $26,000,000	$1,690,000 to $3,380,000	$11,310,000 to $22,620,000	$1,500	$1,050	$450
V. of West Milwaukee	$2,000,000 to $4,000,000	$260,000 to $520,000	$1,740,000 to $3,480,000	$4,625	$3,238	$1,388
OZAUKEE COUNTY						
City of Mequon	$480,000 to $960,000	$62,400 to $124,000	$417,600 to $875,200	$150	$105	$45
WASHINGTON COUNTY						
V. of Germantown	$2,880,000 to $5,760,000	$374,000 to $748,800	$2,505,600 to $5,011,200	$375	$263	$113
WAUKESHA COUNTY						
City of Brookfield	$6,880,000 to $13,760,000	$894,000 to $1,788,800	$5,985,600 to $11,971,200	$1,500	$1,050	$450
City of New Berlin	$120,000 to $240,000	$15,600 to $31,200	$104,400 to $208,800	$50	$35	$15
V. of Butler	$1,480,000 to $2,960,000	$192,400 to $384,000	$1,287,600 to $2,575,200	$250	$175	$75
V. of Elm Grove	$1,560,000 to $3,120,000	$202,800 to $405,000	$1,357,200 to $2,714,400	$425	$298	$128
V. of Menomonee Falls	$8,860,000 to $17,360,000	$1,128,400 to $2,256,800	$7,551,600 to $15,103,200	$1,400	$980	$420
Town of Brookfield	$160,000 to $320,000	$20,800 to $41,600	$139,200 to $278,400	$50	$35	$15
TOTAL	$90,880,000 $181,760,000	$11,814,000 $23,628,800	$79,065,600 $158,131,200	$27,350	$19,147	$8,207

1. Practice quantities are listed in Table 31.
2. Detention pond costs include: (a) capital expenses of pond excavation and development, (b) cost of storm sewer rerouting, (c) cost of land purchase, and cost of relocating businesses or homes, and (d) engineering. Low end of cost range in $400,000/acre and assumes extensive storm sewer rerouting but no relocation of existing structures. High end of cost range is $800,000/acre and assumes an additional cost for relocating existing structures such as businesses or homes.
3. Includes 70% of capital costs for pond excavation and pond development, and 100% design work.
4. Add operation and maintenance, estimated at $2,000 per surface acre per year.
5. Assumes cost of $25/curb mile including: equipment, labor, O&M, depreciation, fuel, disposal.
6. Cost share rate is 50% for equipment related expenses, and 100% for additional staff.
7. Applies to first five years only. See Appendix D for information on municipal obligation to continue practice.

Source: Wisconsin Department of Natural Resources

Table 53. Cost of Implementing Urban Practices in Planned Urban Areas, Menomonee River Watershed.[1]

Subwatershed[2]	Where Urbanization is Anticipated	Estimated Cost of Stormwater Planning	Estimated Capital Cost of Detention
OZAUKEE COUNTY			
Mequon	C. of Mequon	19,520	319,500
MILWAUKEE COUNTY			
Dretzka	C. of Milwaukee		
	V. of Menomonee Falls	23,520	660,300
Granville	C. of Milwaukee	101,040	634,100
Honey Creek	C. of Milwaukee		
	C. of Wauwatosa		
	C. of West Allis		
	C. of Greenfield	17,940	49,300
Lower Menomonee	C. of Brookfield		
	C. of Milwaukee		
	C. of Wauwatosa	8,640	52,700
Menomonee Valley	C. of Milwaukee		
	C. of West Allis		
	V. of West Milwaukee	3,120	17,000
Noyes Park	C. of Milwaukee	8,280	51,000
WASHINGTON COUNTY			
Germantown	V. of Germantown		
	V. of Menomonee Falls	15,120	336,600
Goldenthal	V. of Germantown	106,560	93,500
Upper Menomonee	C. of Mequon	1,500	6,800
Victory Center	V. of Germantown		
	V. of Menomonee Falls	36,180	272,000
Willow Creek	V. of Germantown	4,680	37,400
WAUKESHA COUNTY			
Butler Ditch	C. of Brookfield		
	V. of Menomonee Falls	11,700	153,000
Dousman Ditch	C. of Brookfield		
	V. of Elm Creek	8,940	61,200
Lilly Creek	V. of Menomonee Falls	24,840	297,500
Middle Menomonee	C. of Milwaukee		
	V. of Menomonee Falls	26,880	224,400
So. Br. Underwood	C. of West Allis		
	C. of Milwaukee		
	C. of Brookfield	8,820	44,200
Underwood Creek	C. of Brookfield		
	C. of Wauwatosa		
	V. of Elm Creek	17,040	141,100
WATERSHED TOTAL		444,720	3,451,600

1. Infiltration may be feasible in some areas as an alternative or addition to detention.
2. Counties where most of the subwatershed is located.
3. Sufficient to detain runoff from 100% of the planned urban land use.
4. Pond area is surface area of wet pond needed to trap 5 micron particle size.
   Total area includes pond surface and surrounding land required to contain the pond.

Source: Wisconsin Department of Natural Resources

Table 54. Summary Costs, in Millions of Dollars, of Implementing Plan Recommendations in Urban and Rural Areas of the Menomonee River Watershed.

	TOTAL COST	STATE SHARE	LOCAL GOV'T[1]	LANDOWNER SHARE
RURAL RECOMMENDATIONS				
Management Practices	2.4	1.7 (70%)	0	0.7 (32%)
Easements	0.2	0.2 (100%)	0	0
Local Staffing	0.8	0.8 (100%)	0	0
URBAN RECOMMENDATIONS				
Existing Areas[2]				
Feasibility Studies	2.5	2.5 (100%)	0	0
Detention Ponds	70 to 140	9.3 (7-13%)	60.7 to 130.7 (87-93%)	
Street Sweeping	4.3	1.9 (44%)	2.4 (56%)	0
Streambank Protection	0.4	0.3 (75%)	0.1 (25%)	0
PLANNED AREAS				
Erosion Controls[3]				
-Practices	1.7	0	0	1.7 (100%)
-Administration	1.6	1.0 (63%)	0.6 (37%)	0
Stormwater Controls[2]				
-Stormwater Plans	0.4	0.4 (100%)	0	0
-Detention Ponds	5.1	0	0	5.1 (100%)
WATERSHED TOTAL	89.4 to 159.4	18.1	71.3 to 141.3	

1. Some local governments have indicated that there may be an inability to fund some components of the identified costs. Therefore, the financing plan recognizes that additional funding through new initiatives must be provided to improve full program implementation.
2. These costs are associated with "segmented" urban program activities.
3. These costs are associated with "core" urban program activities. I&E costs for urban areas, which are also associated with "core" level activities, are not listed in this table. I&E cost data are presented in Table 55.

Source: Wisconsin Department of Natural Resources

generation can be reduced. If pollutant generation cannot be reduced, this identification would provide an alternative means of assigning pollution control costs.

State or federal programs could be developed to help internalize the cost of pollution control. This could be done by collecting pollution generation fees and redistributing these funds to local units of government. Such fees could be associated with the production or use of polluting materials. Current examples include the state's tire tax which is collected on every tire sale to finance long-term tire disposal. Alternatively, costs could be internalized by assessing local charges within the urban area based on the amount of polluted runoff generated. Current examples include utility districts and basin authorities being used throughout the country to finance stormwater management practices.

This plan endorses continuing investigation into source control alternatives as well as development of alternatives for internalizing local pollution control costs. Some of these alternatives, such as the collection and redistribution of fees at the state level and increased state funding for urban nonpoint source control practices should be investigated through the ongoing Legislative Council Study on Nonpoint Source Pollution Control. Other alternatives, such as the creation of local utility districts should be investigated by respective municipalities.

Detailed Engineering Designs: Once practices are sited, detailed designs must be prepared. These designs will probably be prepared partly by the private sector and staffs of local governments. The cost of site designs for structural practices located in existing and planned urban areas is included in cost estimates presented in the following section. It has been assumed that designs are prepared by the private sector and supported 100 percent by the DNR.

Cost of Installing Structural Practices in Existing Urban Areas: There are many factors that can affect the cost of constructing practices to control existing urban runoff. Key factors include:

* Labor rates.
* Land costs.
* Cost of relocating residences.
* Excavation costs.
* Cost of re-routing storm sewers.

The relative importance of these costs will vary tremendously on a case-by-case basis. Land costs will vary by community and will include acquisition costs for land procured from the private sector and the opportunity cost of using land currently held in the public domain. Residences in densely urbanized areas may need to be relocated to make space for structural practices; where open land exists, this would not be necessary. Excavation costs for structures that must be put underground, such as detention chambers, are several times greater than if the excavation is for a surface structure.

Finally, re-routing storm sewers to get urban stormwater to the site of control practices can be costly.

Table 52 presents cost information for installing wet detention ponds in existing urban areas. The cost information assumes 100 percent detention of existing critical land uses. The total cost for installing these ponds in densely urbanized areas, such as the Lincoln Creek Subwatershed in the city of Milwaukee, ranges from $400,000 to $800,000 per surface acre of pond depending on the need to condemn and relocate existing structures such as homes or businesses. The lower cost assumes that open land is available for purchase, but that extensive rerouting of the storm sewer system is required. The upper end of the cost range assumes that land is completely developed and condemnation of existing businesses or homes would be required. Both figures assume that the cost of pond excavation and development, such as the construction of pond inlet and outlet structures and pond landscaping, costs about $70,000 per acre.

Under all scenarios, the state share of the cost is limited to 70 percent of the cost for pond excavation and development, and 100 percent of the design costs. This equals about $52,500 of state assistance per surface acre of detention pond. The remaining costs, including land purchase, storm sewer rerouting, and annual operation and maintenance are not eligible for cost sharing under the existing rules governing the state nonpoint source program. However, some of these costs may become eligible for cost sharing in the future.

Some local governments have indicated that there may be an inability to fund some components of these costs. Therefore, this financing plan recognizes that additional funding through new initiatives must be provided to improve full program implementation.

Cost of Installing Structural Practices in Planned Urban Areas: Table 53 presents an estimate of the cost for wet detention in planned urban areas. The factors that make retro-fitting so expensive should not be of concern in developing areas, as good planning can assure that land is set aside and stormwater practices located in harmony with the conveyance systems.

Table 53 shows that an estimated $11 million will be required to install wet detention in the planned urban areas. Land costs would be additional. The entire cost would be borne locally, as nonpoint source program funds are not used for practices in areas of new development.

Operation and Maintenance for Structural Practices: Operation and maintenance costs for detention are about five percent of the capital construction cost per year. This cost is not included in Tables 52 or 53. It must be borne locally.

Cost of Street Sweeping in Existing Urban Areas: Table 52 shows the estimated cost of sweeping 50 percent of the critical urban land uses as part of a program that phases in the required level of wet detention. The costs presented in the table assume a total cost of $25 per curb mile. Principal component costs include wages and salaries (34 percent), indirect labor benefits and overhead (nine percent), maintenance and fuel (25 percent), equipment depreciation (16 percent), and litter disposal (16 percent). The total annual

cost of improving local street sweeping programs to the accelerated level recommended in this plan is about $30,000. The annual state share would be approximately $20,000 and the annual local share about $10,000.

After five years, local units of government would need to maintain the accelerated levels of sweeping at their own expense as the nonpoint source program funding is limited to a five-year period. As wet detention or other practices providing equivalent control are installed, the accelerated sweeping could be discontinued.

Cost of Preparing Construction Site Erosion Control Plans: This cost has not been estimated. It will be borne primarily by the private sector to meet requirements of local ordinances.

Cost of Installing Construction Erosion Control Practices: It is assumed that construction site practices will average $250/acre. Using this unit cost, it will require an estimated $1,700,000 to install construction site erosion control practices in the watershed. All of this cost will be borne locally by the private sector to meet requirements of local ordinances.

Cost of Administering Construction and Stormwater Control Ordinances: It is estimated that five staff years of effort will be needed in the watershed. Assuming a unit cost of $40,000 per staff per year, the administrative cost is estimated to be $200,000 per year. Over the eight year life of the project, the estimated cost is $1,600,000. The nonpoint source program will support 100 percent of the required staff for a period of five years, or $1,000,000. The remaining three years would be funded locally, probably in part through permit fees. Each local unit of government is expected to continue supporting these administrative costs as needed in the years following the end of this watershed project.

MENOMONEE RIVER WATERSHED PROJECT COST SUMMARY

Table 54 presents a summary of estimated costs for implementing the rural and urban portions of this watershed project. The estimated total project cost is $89.4 to $159.4 million. Rural recommendations will require two to four percent of this total to implement. The remainder of the cost is associated with controls in the existing and planned urban areas.

The most expensive aspects of the recommended plan include engineering feasibility studies and construction of structural practices to control stormwater pollution from existing urban areas. This plan element is anticipated to cost about $72.5 to $142.5 million, or 80 percent of the total plan cost. This cost can be partly defrayed by state cost-share assistance through the nonpoint source program, but most of the cost ($60.7 to $130.7 million) would be borne by local governments and individual landowners under existing state cost-share guidelines.

Control of construction site erosion is estimated to cost about $3.3 million, or two to four percent of the total project costs, while controlling stormwater runoff from areas of new development is estimated to cost $5.5 million or three to six percent of total project

costs. These elements represent pro-active management actions that are very cost-effective.

In addition to these costs, an estimated $50,000 will be needed for non-staff related information and education expenses over the initial three years of the watershed project. These costs, in addition to those needed to support two regional education specialists (one rural and one urban), are supported entirely by the DNR. A detailed discussion of the rural and urban information and education strategy, including activities, budget needs, and staffing needs, is presented in the next section.

INFORMATION AND EDUCATION STRATEGY

The Milwaukee River South Watershed educational strategy has been prepared as part of a basinwide information and education strategy. The strategy is based upon survey data from rural and urban residents, public meetings, committee review, staff suggestions, and other participatory processes. The strategy also draws on elements of the "Urban Water Quality Information and Education Strategy for the Milwaukee River Program" (Johnson, 1989) and other basinwide information and education materials. These basinwide materials contain support information and policy positions not included here.

PURPOSE AND PERSPECTIVES

The primary purpose of the information and education strategy for the Milwaukee River South Watershed is to enhance implementation of watershed plan objectives.

To achieve the most impact with available funds, educational program planning was viewed from several perspectives:

* Key audiences capable of having the greatest impact on the resource because they own, manage, or help govern critical lands.

* Key messages of the watershed project that need to be relayed.

* Potential uses of activities such as providing information, promoting participation, and instructing of specific practices.

* Opportunities for combining efforts of public and private agencies.

* Critical timeliness associated with phases in the watershed project.

* Educational approaches that are most effective for the purpose.

The resulting educational plan for the Milwaukee River South Watershed includes recommendations for both general and specifically targeted activities. It recognizes that certain targeted audiences hold the key to actions that can produce immediate and substantial improvements in water resources. At the same time, the plan acknowledges that educational activities designed for general audiences are important. These activities can influence both short and long-term management decisions. In part, this recognizes

that numerous encounters with information are often required to motivate positive action. The general activities also address the public's "right-to-know" and "momentum-building" objectives. Even though these are general activities, the targeting of audiences and the refining of messages will be achieved to the extent that cost efficiency and program impacts are maximized.

KEY AUDIENCES AND OUTCOMES

Ideally, the watershed project would be able to reach all key audiences throughout the project implementation. However, the realities of limited staff and resources require prioritizing activities for each stage of the project. Key audience groups include:

1. ***Those who must act***:
   Business and industry
   Local elected and appointed officials
   Rural landowners and operators (farmers)
   Urban homeowners/residents

2. ***Those who can support change***:
   Agricultural organizations
   Civic and service groups
   Concerned citizens
   Conservation and environmental groups
   Fishing, boating and other water resource user groups
   Local government associations

3. ***Future actors and supporters***:
   Youth
   Teachers and youth leaders
   General public

For the sign-up period, audiences will be addressed according to the following desired outcomes (in order of priority):

1. Watershed project participation, primarily through:

   a. Cost-sharing agreements with local governments or rural landowners.

   b. Community action through regulation of nonpoint source pollution (ordinances) or proper management (public works programs).

2. Widespread individual action on a voluntary basis without a cost-sharing agreement—including urban residents using good "housekeeping" practices and rural landowners using nutrient and pesticide best management practices.

3. Other state and federal conservation programs utilized to achieve water quality objectives in ways complementary to the nonpoint source program.

4. Support of the watershed project through the understanding, acceptance, and advocacy of project goals.

5. Increased awareness that the project exists and of what is being accomplished.

These outcomes complement the broad educational goals established for the Milwaukee River program (See Appendix F). More than one of these outcomes may apply to an activity and audiences may overlap. Furthermore, priorities will change as the project moves beyond sign-up through implementation to evaluation.

EFFECTIVE METHODS TO REACH KEY AUDIENCES

Key audiences have been grouped into five categories for this educational strategy:

* Rural landowners and operators
* Local governments
* Urban residents
* Business and industry
* Youth

Important characteristics of each group and information about the best ways to reach them are summarized below.

Rural Landowners and Operators: The educational methods selected to reach farmers in this watershed are methods used, to varying degrees, in other watersheds in the state:

* One-to-one contacts—with a folder of materials tailored to each contact.
* Watershed newsletters.
* Demonstration projects and tours.
* Town meetings.
* Fact sheets and workshops on recommended practices.
* Local radio talk shows and news programs.
* News articles in local newspapers.
* Articles in agricultural publications.
* Exhibits at county fairs.

Analysis of information on rural landowners and operators, collected through surveys and face-to-face meetings, can improve the effectiveness of these methods. According to a 1986 rural survey, most farmers in the Milwaukee River Basin (88 percent) believe that protecting water quality is important. However, more than 90 percent also believe that their farm does not cause water quality problems. Only 17 percent of those surveyed recognize soil erosion as a medium to large problem. Young farmers (18 to 35 years old) are more likely to recognize soil erosion problems (60 percent do so), but half of the farmers in this basin are over 55 years old.

Compared to urban residents, farmers are less likely to use water for recreation. About 5 percent of farmers swim or boat compared to about 60 percent of urban residents who swim and 25 percent who boat. The most popular water sport for farmers is fishing. About 20 percent of them fish compared to about 45 percent of urban residents.

Other characteristics of rural audiences in this watershed according to the survey and other observations include:

* More specialty crop and hobby farming.

* Short planning horizon for many farms due to landowner age and urbanization.

* High rate of absentee landlords.

* Economic pressure of escalating land values and taxes.

Fact sheets, newsletter articles and other materials should be adapted to speak directly to the concerns of local farmers. When surveyed, farmers express concerns about costs and benefits, tax exemptions, public access requirements for stream buffers, and maintenance requirements.

Local Governments: Other important audiences are the elected and appointed officials of local governments. There are 21 local governments (five towns, ten villages, four cities and two counties) in this watershed. All were invited to send representatives to the citizens and technical committees that reviewed the plan, but many elected and appointed officials remain relatively uninformed. Characteristics of local government audiences which became apparent during the planning process include:

* Reluctance to regulate or tax more than neighboring communities and resistance to raising local taxes.

* Pressing social problems in the urban environment which compete with water quality problems for funding.

* Historical belief that cleaning up point source pollution was all that urban areas would need to do to solve water quality problems.

* Concern about economic issues such as job attraction and retention, maintaining property values, and expanding tax base.

The educational approach selected for this audience includes:

* Meetings (one-to-one or group)—with graphic summary materials.

* Watershed newsletters.

* Demonstration projects and tours.

* Workshops for staff on new practices—with handbooks and fact sheets.

* Regional water quality conferences.

* Speakers for local government associations—with high quality audio-visual and printed materials.

Considerable time and effort must be devoted to this audience due to the numbers of local governments and the importance of their action to control construction erosion, manage stormwater runoff, and stabilize eroding streambanks.

Urban Residents: The Milwaukee River Basin is the largest urbanized area encountered by the Wisconsin Nonpoint Source Priority Watershed Program. To determine the educational methods that will be most effective with urban residents, a survey was conducted during the summer of 1989. According to the survey, Milwaukee area residents find the following to be the most interesting methods in which to receive information about water quality:

* Community water quality newsletters.

* Television news reports.

* Educational materials received in the mail.

* Newspaper stories.

About 50 percent to 70 percent of the survey respondents report that they are "very likely" to learn about water quality through these means. On the other hand, less than 15 percent report that they are very likely to attend meetings or workshops, check out videotaped programs from local libraries, or visit demonstration sites. Workshops, videotaped programs and demonstration projects are more appropriately used for highly-motivated, interested citizens and groups rather than the general public.

Other characteristics of this audience to keep in mind when developing educational activities and materials include:

* Value placed on "quality of life" and clean neighborhoods.

* Perception that industry is the leading cause of water quality problems.

* Pessimism about the degree of water quality improvement possible in the lower river and harbor.

* Reluctance to accept any degree of risk from toxic materials.

* Preference for funding sources other than property tax.

Educational methods selected for use with this audience include:

* Promotional media campaign—with assistance from professional public relations experts.

* Newspaper coverage including news, feature articles and limited advertising.

* Television coverage including news stories and interview shows.

* Radio coverage including news stories, talk shows and public service announcements.

* Watershed newsletters sent to interested citizens and groups.

* Speakers for local groups—with high quality audio-visual and printed materials.

* Workshops, volunteer leader training, demonstrations, audio-visual and printed materials about new practices for interested citizens.

* Exhibits at local events, especially water-related events.

The educational approach for the urban public relies primarily on the mass media. Workshops, speakers, demonstrations, and leader training are reserved for interested citizens and organizations.

Business and Industry: Another component of the urban audience, is the effect of nonpoint source plan recommendations on businesses and industries. Those development-related businesses which will encounter new construction erosion control and stormwater management requirements are most affected. Others that may be affected include owners of eroding streambanks or "critical areas" for retrofitting stormwater devices.

Characteristics of this audience that should be considered when selecting educational methods and developing materials include:

* Concern about economic costs and benefits.

* Sense of civic responsibility.

* Concern about Wisconsin's competitiveness as a place to do business compared to other states.

* Value placed on "quality of life" (including clean water for recreation) in decisions regarding corporate relocation.

* Seasonal variations in time availability for those in the construction industry.

Educational methods selected for use with this audience include:

* Articles in industrial newspapers and magazines.

* Speakers for business and industry associations.

* Workshops on new practices for those affected by new regulations—with handbooks, audio-visual and printed materials.

* Demonstration projects and tours.

* Exhibits at appropriate industrial shows and meetings.

Youth: Youth are addressed within this plan because they are those who must act and support action to reduce nonpoint source pollution in the future. The current statewide movement to infuse environmental education into school curricula makes the timing for water quality education initiatives especially appropriate. Characteristics of the youth audience in this watershed include:

* Interest of youth in water-based recreation.

* Limited access to high quality water resources.

* Limited water resource education due to scarcity of teachers with appropriate training and inadequate funding for field trips.

* Need to inform older youth about career opportunities related to water resources.

The educational approach developed for this audience includes:

* Teacher and youth leader workshops.

* Curriculum development.

* School programs including a water quality testing project for high school students.

* Youth group projects.

Due to limited resources available to the Milwaukee River Program, staff from private and public nature/environmental education centers that currently work with schools in

the watershed will play a leading role in these activities. Private as well as public funds will be sought for expensive projects.

Coordination With Other Programs

Information and education for the nonpoint source control program in this watershed will be carefully coordinated with information and education for the Milwaukee Estuary Remedial Action Plan and other related resource programs. Wherever possible, individual program identities will be subsumed under one consistent clean water theme. Slide and videotape programs, fact sheets, exhibits, and media events will refer to the Milwaukee River Program. Printed and audio-visual materials will be developed in a way that allows their use by other aspects of the program.

Staff from UW-Extension, DNR, DATCP, and county LCDs will meet regularly to coordinate information and education efforts. Some overlap of citizen members and staff assignments for information and education committees will also enhance coordination.

Educational Strategy

The initial years of educational activity within the Milwaukee River South Watershed will be the most ambitious because the groundwork for a successful and extensive program needs to be established. Therefore, activities for the first three years—the sign-up period for cost sharing—are laid out in greater detail in Tables 55 and 56 and in Appendix G. The tables indicate the need for approximately 600 hours and $15,000 per year to support information and education activities for the watershed project during the sign-up period.

General information for the remaining years of the watershed project is included in Appendix G but details will be filled in during the updating process. The educational strategy will be updated regularly—probably on an annual basis. The first update will rank among the most important due to insights gained during the first year of project sign-up and implementation.

Table 55. Educational Materials and Events—Menomonee River Watershed

Educational Material/Event	Responsible Party (hours)[a] Milwaukee County UWEX Year 1	Year 2	Year 3	Ozaukee County UWEX Year 1	Year 2	Year 3	Ozaukee County LCD Year 1	Year 2	Year 3	Comments:
Printed Materials										
Watershed newsletter[b] articles	--	--	--	20	20	20	20	20	20	2/year
Watershed folder	--	--	--	--	--	--	20	10	5	Adaptation for individual landowners
Demonstration project fact sheets	--	--	--	--	--	--	20	--	--	See also: demonstrations
Rural management practice fact sheets	--	--	--	--	--	--	20	--	--	Water quality/wildlife habitat improvements
Yard care fact sheets	15	10	5	--	--	--	--	--	--	
Existing printed materials (reprinting)[d]	--	--	--	10	5	--	10	--	--	
Articles for "Ozaukee Dirt" newsletter	--	--	--	--	--	--	20	20	20	4/year
Audio-visual Materials										
Watershed slide program[e]	--	--	--	5	--	--	5	--	--	Taking slides for inclusion
Yard care slide program[c]	--	15	5	--	--	--	--	--	--	
Infosource tapes—homeowner practices[e,f]	10	10	10	--	--	--	--	--	--	
Exhibits										
County fairs-Milwaukee Co. 4-H Fair and Ozaukee County Fair	5	5	5	--	--	--	10	10	10	
Other Milwaukee County events[c] (Home Show, Lawn & Garden Show, State Fair, Conservation Days at Zoo)	--	25	25	--	--	--	--	--	--	
Other Ozaukee County locations (Libraries, other public buildings, and feed mills)	--	--	--	10	10	10	30	30	30	
Breakfast on the Farm	--	--	--	--	--	--	10	--	--	
Purchase of needed exhibit components	--	--	--	--	--	--	10	--	--	
Media										
Newspaper columns[g]	25	25	25	5	5	5	--	--	--	Ozaukee Co.-adaptation of basinwide columns
Radio talk shows[g]	5	5	5	--	--	--	--	--	--	
Radio PSAs[c]	--	--	--	--	--	--	--	--	--	
Articles submitted to local newspapers	--	--	--	15	15	15	15	15	15	6/year
Tours										
Local officials/leaders	--	--	--	40	--	--	60	--	--	
Annual LCC tour	--	--	--	--	--	--	20	20	20	
Animal waste management auto tour	--	--	--	--	25	--	--	25	--	
Cropland management tour	--	--	--	--	--	25	--	--	25	
Subtotal Hourly Commitments	60	95	80	105	80	75	280	150	145	

Table 55. (continued)

Educational Material/Event	Responsible Party (hours)[a] Milwaukee County UWEX Year 1	Year 2	Year 3	Ozaukee County UWEX Year 1	Year 2	Year 3	Ozaukee County LCD Year 1	Year 2	Year 3	Comments:
Demonstrations[h]										
Mervis riverfront management	15	10	10	--	--	--	--	--	--	
Brown Deer golf course[i]	NA	NA	NA	--	--	--	--	--	--	
South Branch Creek stormwater ponds	NA	NA	NA	--	--	--	--	--	--	
Roden Barnyard	--	--	--	10	--	--	10	--	--	
Greenhouse[h]	NA	NA	NA	--	--	--	--	--	--	
All-farm demonstration of combined practices	--	--	--	--	60	--	--	--	--	
Conservation tillage[j]	--	--	--	--	20	--	--	20	--	
Nutrient and pesticide management[j]	--	--	--	20	--	--	60	--	--	
Model yards[i]	NA	NA	NA	--	--	--	--	--	--	
Signs										
Demonstration projects	--	--	--	--	--	--	--	--	--	See: demonstrations
Rural cooperator signs and visor hats[k]	--	--	--	--	--	--	10	10	10	Ongoing
At key watershed locations[l]	--	--	--	10	--	--	--	--	--	Ongoing with emphasis in first year(s)
Workshops										
Yard care leader training[c]	--	15	30	--	--	--	--	--	--	
Meetings										
Local governments	30	15	15	15	10	10	15	10	10	
Community groups	5	5	5	10	10	10	--	--	--	2/year
Agricultural groups	--	--	--	10	10	10	10	10	10	4/year
Youth Education										
Testing the waters[c]	35	35	35	--	--	--	--	--	--	
Storm sewer stenciling[c]	NA	NA	NA	--	--	--	--	--	--	
River Resource Center	10	10	10	--	--	--	--	--	--	
School classroom presentations	--	--	--	--	--	--	10	10	10	3/year
Annual Educational Strategy Update	10	10	10	10	10	10	10	10	10	
Subtotal Hourly Commitments	105	100	115	85	120	40	125	70	50	
Total[m]	165	195	205	190	200	115	405	220	195	

NA = not available.

Table 55. (continued)

Footnotes

[a] Many activities will utilize Area UWEX staff leadership or assistance, as reflected in separate annual work plans. This priority watershed educational plan reflects only county time commitments and budgetary needs. Ozaukee County will be the lead responsible party for rural activities and Milwaukee County will be the lead responsible party for urban activities pertaining to their respective jurisdictions.

[b] Watershed newsletters may be combined into an Upper Milwaukee River Basin newsletter which emphasizes rural issues and a Lower Milwaukee River Basin newsletter, which emphasizes urban issues.

[c] Activity with basinwide applicability that is especially important for the successful implementation of this watershed project.

[d] The identification and purchase of existing bulletin materials (including fact sheets, brochures, newsletters, etc.) will prevent unnecessary duplication and make use of already published expertise. Conservation tillage, "sustainable agriculture," and crop rotations are several subjects for which this approach is anticipated.

[e] Part of a high quality basinwide slide program to be developed by contract with audio-visual experts.

[f] Taped information available by telephone.

[g] Radio talk shows and newspaper columns originating from Milwaukee will also benefit other watersheds and thus are a "basinwide" education activity.

[h] Hourly estimates for new demonstrations pertain to their investigation, formal proposal, and documentation with slides and fact sheets—not to the more time-consuming establishment, maintenance, and use.

[i] Hours have not been estimated because project plans are still being developed.

[j] Proposals are being advanced for new demonstration project(s) and/or assistance to informally demonstrate good management practices. This may be in conjunction with complementary resource management programs having water quality objectives.

[k] Visor hats for cooperating landowners is another type of "sign" undergoing approval for the watershed project. By providing these to individuals who understand the project and have made commitments, one-on-one education through local testimonials is anticipated.

[l] Signs placed at key watershed locations such as bridge crossings and public access points would be part of a basinwide plan to raise awareness of the Milwaukee River Program.

[m] At the time of plan adoption, a more clear and complete picture of activities, hourly commitments, and budgetary needs existed for year-one than for subsequent years. The annual updating process will address this matter by providing supplementary details. In addition, hourly and cost estimates may deviate somewhat from those finally required. Therefore, the entry of specific items in this table is more important than estimates of resources utilized.

Table 56. Educational Budget—Menomonee River Watershed

Educational Material/Event	Responsible Party [a]: Milwaukee County Year 1	Milwaukee County Year 2	Milwaukee County Year 3	Ozaukee County Year 1	Ozaukee County Year 2	Ozaukee County Year 3	Area UWEX Year 1	Area UWEX Year 2	Area UWEX Year 3	Comments:
Printed Materials										
Watershed newsletter articles	--	--	--	--	--	--	--	--	--	
Watershed folder	--	--	--	$500	--	--	$1500[b]	--	--	
Demonstration Project fact sheets	--	--	--	--	--	--	--	--	--	See demonstrations.
Rural management practice fact sheets	--	--	--	$500	$500	$500	--	--	--	
Yard care fact sheets[c]	--	--	--	--	--	--	$2500	$1000	$500	
Existing printed materials (reprinting)[d]	$100	$100	$100	$200	$200	$200	--	--	--	Estimated yearly need.
Articles for "Ozaukee Dirt" newsletter	--	--	--	--	--	--	--	--	--	
Audio-visual Materials										
Watershed slide program[c,e]	--	--	--	$100	--	--	--	--	--	County photos for inclusion in slide programs and exhibits.
Yard care slide program[c]	$50	--	--	--	--	--	--	--	--	County photos for inclusion in slide programs and exhibits.
InfoSource tapes—homeowner practices[f]	$200	$100	$100	--	--	--	--	--	--	
Construction erosion control programs	--	--	--	$70	--	--	--	--	--	Purchase of D.Last programs.
Exhibits										
County fairs	--	--	--	--	--	--	--	--	--	
Other Milwaukee County events[c]	--	--	--	--	--	--	--	--	--	
Other Ozaukee County events	--	--	--	--	--	--	--	--	--	
Purchase of exhibit components[g]	$500	--	--	$1000	--	--	$500	$500	$500	
Media										
Newspaper columns	--	--	--	--	--	--	--	--	--	
Radio talk shows	--	--	--	--	--	--	--	--	--	
Radio PSAs[c,h]	--	--	--	--	--	--	$5000	$5000	$5000	
Articles submitted to local newspapers	--	--	--	--	--	--	--	--	--	
Tours										
Local officials/leaders	--	--	--	$600	--	--	--	--	--	
Annual LCC tour	--	--	--	--	--	--	--	--	--	Ongoing activity partly water quality.
Animal waste management auto tour	--	--	--	--	$100	--	--	--	--	
Cropland management tour[i]	--	--	--	--	--	--	--	--	NA	

Table 56. (continued)

Educational Material/Event	Responsible Party [a] Milwaukee County Year 1	Milwaukee County Year 2	Milwaukee County Year 3	Ozaukee County Year 1	Ozaukee County Year 2	Ozaukee County Year 3	Area UWEX Year 1	Area UWEX Year 2	Area UWEX Year 3	Comments:
Demonstrations[j]										
Mervis riverfront management	--	--	--	--	--	--	$1200	--	--	
Brown Deer golf course	--	--	--	--	--	--	$1200	--	--	
South Branch Creek stormwater ponds	--	--	--	--	--	--	$1200	--	--	
Roden barnyard	--	--	--	$650	--	--	--	--	--	
Greenhouse[k]	NA	--	--	--	--	--	--	--	--	
All-farm demonstration of combined practices[l]	--	--	--	$1200	--	--	--	--	--	
Conservation tillage[j]	--	--	--	NA	--	--	--	--	--	
Nutrient and pesticide management[j]	--	--	--	NA	--	--	--	--	--	
Model yards[j]	NA	--	--	--	--	--	--	--	--	
Subtotal	$850	$200	$200	$4820	$800	$700	$13,100	$6500	$6000	
Signs										
Demonstration projects	--	--	--	--	--	--	--	--	--	See: demonstrations.
Rural cooperators signs and visor hats	--	--	--	--	--	--	$2000	--	--	
At key watershed locations[l,j]	--	--	--	--	--	--	NA	--	--	
Workshops										
Yard care leader training	--	--	--	--	--	--	$100	$100	--	
Meetings										
Local governments	--	--	--	--	--	--	--	--	--	
Community groups	$50	$50	$50	$50	$50	$50	--	--	--	
Agricultural groups	--	--	--	$100	$100	$100	--	--	--	
Youth Education										
Testing the waters[l]	--	--	--	--	--	--	$5000	$5000	--	
Storm sewer stenciling	--	--	--	--	--	--	--	--	--	
River Resource Center	--	--	--	--	--	--	--	--	--	
School classroom presentations	--	--	--	--	--	--	--	--	--	
Subtotal	$50	$50	$50	$150	$150	$150	$7100	$5100	--	
Total[m]	$900	$250	$250	$4970	$950	$850	$20,200	$11,600	$6000	

NA = not available.

Table 56. (continued)

Footnotes

[a] Many activities will utilize Area UWEX staff leadership or assistance. This priority watershed educational plan reflects only county budgetary needs except for special items listed under the Area UWEX column. These items are activities with basinwide applicability that are especially important for this watershed project.

[b] Folder for local government officials throughout the basin. Cost split with Menomonee River Watershed.

[c] Activity with basinwide applicability that is especially important for the successful implementation of this watershed project.

[d] The identification and purchase of existing bulletin materials (including fact sheets), brochures, newsletters, etc.) will prevent unnecessary duplication and make use of already published expertise. Conservation tillage, "sustainable agriculture," and crop rotations are several subjects for which this approach is anticipated.

[e] Part of a high quality basinwide slide program to be developed by contract with audio-visual experts.

[f] Taped information available by telephone.

[g] Purchase of exhibit board and lights for counties. Update of display materials and replacement of boards for Area UWEX.

[h] Coordinated program for one week of prime time radio PSA coverage on 18 Milwaukee area radio stations including creation of PSA. Administrative fee only.

[i] Costs have not been estimated because project plans are still being developed.

[j] Cost estimates for new demonstrations pertain to signs and documentation with slides and fact sheets-not to the more costly establishment, maintenance, and use.

[k] Signs placed at key watershed locations such as bridge crossings and public access points would be part of a basinwide plan to raise awareness of the Milwaukee River Program.

[l] $5000/year/watershed (2 years, 5 watersheds) for a total of $50,000 in public funds to match $50,000 in private funds.

[m] At the time of plan adoption, a more clear and complete picture of activities and budgetary needs existed for year-one than for subsequent years. The annual updating process will address this matter by providing supplementary details. In addition, cost estimates may deviate somewhat from those finally required. Therefore, the entry of items in this table is more important than specific cost estimates.

PART THREE
PROJECT EVALUATION

Chapter VII: Project Tracking

Chapter VIII: Water Quality Evaluation Monitoring

CHAPTER VII
PROJECT TRACKING

INTRODUCTION

Project evaluation has three components: evaluation of project administration, evaluation of pollutant load reduction, and evaluation of changes in surface waters. This chapter briefly summarizes how progress will be measured in carrying out the required administrative activities and in reducing nonpoint source pollutant loads to surface waters. The surface water evaluation monitoring activities planned for the project area are set forth in Chapter VIII, "Water Quality Evaluation Monitoring."

This chapter is divided into four sections:

1. Rural administrative review.
2. Rural pollutant load reduction review.
3. Urban administrative review.
4. Urban pollutant load reduction review.

RURAL ADMINISTRATIVE REVIEW

Primarily, the Ozaukee County Land Conservation Department (LCD) will evaluate the progress of project administration and the progress in reducing pollutant loads. The Ozaukee County LCD will report this progress on a regular basis to the DNR and the DATCP.

The administrative review will focus on indicators of accomplishment, financial expenditures made through the project, and staff time spent on project activities.

ACCOMPLISHMENT REPORTING

CAMPS, the Computer Assisted Management and Planning System, is a computer data management system that has been developed by the U.S. Soil Conservation Service (SCS), and is used by the SCS, the DNR and the DATCP to meet accomplishment-reporting requirements of all three agencies. The county will collect data on administrative accomplishments using CAMPS, and will provide this information to the DNR and the DATCP for program evaluation.

The county will provide the following data quarterly to the DNR and the DATCP:

* Status of landowner contacts.
* Completed information and education activities.
* The number of farm conservation plans prepared for the project.
* The number of signed cost-share agreements.
* The number of completed status reviews for farm conservation plans and cost-share agreements.
* The number of farms and acres of cropland checked for proper maintenance of best management practices.

In addition, county representatives will meet annually with the DNR and the DATCP staff to review progress and identify workplan objectives for the subsequent year.

FINANCIAL EXPENDITURES

The county will provide the following data quarterly to the DNR and the DATCP:

* Money encumbered in cost-share agreements.
* The number of landowner reimbursement payments made for installation of best management practices (BMPs) and amount of money paid.
* Staff travel expenditures.
* Information and education expenditures.
* Expenditures for equipment, materials, and supplies.
* Expenditures for professional services and staff support costs.
* Total project expenditures for LCD staff.

The County will provide the following information annually:

* Staff training expenditures.
* Interest money earned and expended.
* Total county LCD budget and expenditures on the project.

TIME SPENT ON PROJECT ACTIVITIES

The county will provide time summaries quarterly to the DNR and the DATCP for the following activities:

* Project and fiscal management.
* Clerical assistance.
* Pre-design and conservation planning activities.
* Technical assistance: practice design, installation, cost-share agreement status review, and compliance monitoring.
* Educational activities.
* Training activities.
* Leave time.

RURAL POLLUTION LOAD REDUCTION

The purpose of the second evaluation component—pollution load reduction—is to calculate reductions in the amount of key pollutants as a result of installing best management practices. Four sources have been identified for estimating changes in pollution loads reaching surface waters: streambank erosion, upland sediment, runoff from barnyards, and fields spread with manure.

STREAMBANKS

Ozaukee, Washington, and Waukesha Counties will calculate changes in streambank sediment, specifically of tons of sediment and length of eroding sites. A tally will be kept of landowners contacted, the amount of streambank sediment generated at the time of contact, and changes in erosion levels estimated after installing best management practices. This information will be summarized and submitted annually to the DNR.

UPLAND SEDIMENT SOURCES

The counties will estimate reductions in sediment delivery due to changes in cropping practices, and submit a summary annually to the DNR. Periodically, the DNR will calculate changes using the WIN model. The counties will provide data for the WIN model through the CAMPS system.

BARNYARD RUNOFF

The counties will use the BARNY model to estimate phosphorus reductions due to installation of barnyard control practices. This information will be summarized annually to the DNR through the CAMPS system.

MANURE SPREADING

The counties will update the inventory to identify the actual number of critical acres spread annually by each livestock operator. The counties will identify the number of critical acres where winterspreading will no longer occur as a result of implementing management practices. This information will be submitted annually to the DNR.

URBAN ADMINISTRATIVE REVIEW

ACCOMPLISHMENT REPORTING

The DNR and local units of government will jointly evaluate the urban program components. Local units of government will report annually to the DNR on the progress of "core" program activities. Reports will cover:

* Scheduled information and education activities.
* Completion of construction site erosion control ordinance modification or adoption.
* Acres of construction activity with adequate erosion control plans.
* Acres of construction activity monitored for compliance with provisions of ordinance and erosion control plans.
* Identification of needed changes in housekeeping.
* Implementation of housekeeping program changes.

Local units of government will report annually on the progress of "segmented" program activities. Reports will cover:

* By land use, existing 1985 urban acres covered by engineering feasibility studies.
* By land use, acres of new post-1985 urban development covered by plans for controlling urban pollutant loads and stormwater flows.
* By land use, acres of new post-1985 urban development not covered by plans for controlling urban pollutant loads and storm water flows.
* Stormwater ordinance adoption or modification.

* The number of feet and tons of eroding streambanks addressed in detailed engineering feasibility studies.

In addition, representatives of governments addressing urban pollution issues will meet with the DNR staff annually to review progress and identify workplan objectives for the subsequent year.

FINANCIAL EXPENDITURES, TIME SPENT ON PROJECT ACTIVITIES

Reporting on these items will parallel reporting specified in this plan for the rural areas.

URBAN POLLUTANT LOAD CHANGES

Source reduction activities that a community takes to reduce urban pollutant loadings should also be acknowledged. Although the effect on urban pollutant loadings may not be quantifiable, accomplishments should be recognized and publicized as having a positive impact on efforts to reduce pollutant loads.
Local units of government will provide the following information annually to the DNR so that the DNR can evaluate changes in urban pollutant loading:

* Existing urban acres, by land use, served by urban stormwater practices, and information requested by the DNR concerning practice characteristics.

* Acres of new 1985 urban development, by land use, served by stormwater practices, and information requested by the DNR concerning practice characteristics.

* Acres of new 1985 urban development, by land use, not served by stormwater practices.

* Acres of construction site activity served by adequate erosion control practices.

* Acres of construction site activity not served by adequate erosion control practices.

* Changes in streambank erosion, in number of tons and feet of erosion, due to installation of erosion control and flow reduction practices.

* Identification of streambank erosion control accomplishments.

CHAPTER VIII
WATER QUALITY EVALUATION MONITORING

INTRODUCTION

This chapter identifies general guidelines by which the DNR will evaluate changes in water quality resulting from implementation of this project. The monitoring details for this watershed will be developed as part of a comprehensive monitoring strategy aimed at meeting the evaluation needs of the remedial action and integrated resource management programs. The DNR will establish monitoring locations, procedures, staff needs, and costs within one month of its approval of the plan. Implementation of the detailed evaluation monitoring plan will begin in summer 1990.

The evaluation monitoring will be conducted in at least two phases. First, pre-implementation monitoring to develop intensive baseline data suitable for project evaluation purposes and, second, final monitoring to assess changes in water quality and aquatic habitat following full implementation of the recommended nonpoint source control strategies.

An interim monitoring program may be conducted approximately mid-way through the implementation period following installation of some nonpoint source control practices.

PROCEDURES, CRITERIA AND SCHEDULES FOR THE MONITORING PROGRAM

The following guidelines will be used in developing the detailed evaluation monitoring program.

PHYSICAL, CHEMICAL AND OTHER RELATED EVALUATION PROCEDURES CONSIDERED IN DEVELOPING A MONITORING PROGRAM

* Chemical water quality and bottom sediment characteristics including conventional and toxic pollutants.

* Physical characteristics including stream and stormwater runoff rates and volumes, and sediment quantities.

* Characteristics of stream, wetland and riparian habitats.

* Levels of bacteria and/or other pathogens in streams.

* Concentrations of toxic compounds in wildlife, fish and other aquatic life tissue.

* Characteristics of biological indicators used to determine the condition of streams including macro-invertebrate, fish, and aquatic plant communities.

* Bioassays of sediment, surface water, interstitial water, and stormwater.

* Changes in recreational uses and aesthetic characteristics.

CONSIDERATIONS IN SELECTING MONITORING LOCATIONS

The following considerations will be used to determine the locations for carrying out the field investigations necessary to evaluate the success of the priority watershed project:

* The potential for measuring changes in water quality and aquatic habitat resulting from implementation of nonpoint source controls.

* Suitability of the site for representing baseline conditions ("low" or "no" impact by nonpoint sources) for water quality and aquatic communities.

* Drainage area size and complexity of impacts and sources.

* Similarity of the site to other sites, so that data can be extrapolated to sites where investigations cannot be made.

* Need for additional information to develop or confirm water resource management objectives.

* Existing or planned monitoring being conducted through other programs.

APPENDICES

APPENDIX A.	SUMMARY OF FEDERAL STORMWATER REGULATIONS
APPENDIX B.	STATE OF WISCONSIN WATER QUALITY STANDARDS FOR STREAMS AND LAKES IN THE WATERSHED
APPENDIX C.	LAND DEVELOPMENT CATEGORIES AND DESCRIPTIONS FOR THE URBAN AREAS OF THE MENOMONEE RIVER WATERSHED
APPENDIX D.	GUIDELINES FOR CALCULATING SHORELINE BUFFER WIDTHS
	ALTERNATIVE PRACTICE SPECIFICATIONS AND COST SHARE POLICIES FOR STREET SWEEPING
APPENDIX E.	NONPOINT SOURCE POLLUTION CONTROL GUIDELINES FOR INFILTRATION DEVICES IN URBAN AREAS
APPENDIX F.	MILWAUKEE RIVER PROGRAM BASINWIDE EDUCATIONAL GOALS
APPENDIX G.	DESCRIPTION OF WATERSHED-SPECIFIC INFORMATION AND EDUCATION MATERIALS AND EVENTS
APPENDIX H.	GLOSSARY

APPENDIX A
SUMMARY OF FEDERAL STORMWATER REGULATIONS

Federal regulations requiring permits for certain categories of stormwater discharges became effective November 16, 1990. The regulations address point sources of stormwater discharges and emphasize the use of best management practices to prevent contaminants from getting into stormwater. The Department of Natural Resources (DNR) will be the permitting authority in Wisconsin.

WHO IS REQUIRED TO APPLY FOR A PERMIT

Incorporated areas over 100,000 in population are required to apply for permits. In Wisconsin that includes the cities of Madison and Milwaukee. The DNR can also designate other communities surrounding these cities as permittees if the DNR feels they also are contributing significant amounts of pollutants to surface waters, are interconnected via drainage ways and are in the same watershed.

Other entities which are required to apply for permits include:

- Facilities currently subject to effluent limitations or performance standards.
- Manufacturing industries within Standard Industrial Classifications 20 - 39.
- Mining operations within Standard Industrial Classifications 10 - 14.
- Hazardous waste treatment, storage or disposal facilities.
- Landfills, land application sites and open dumps that receive or have received industrial waste.
- Recycling facilities (eg., scrapyards, battery reclaimers).
- Steam electric generating plants.
- Transportation facilities within Standard Industrial Classification 40, 41, 42 (except 4221-4225) 43, 44, 45 and 5171 which have vehicle maintenance shops, equipment cleaning operations and airport deicing operations.

- Treatment works over one million gallons per day in design flow treating domestic sewage or any other sewage sludge or wastewater treatment device or system over one million gallons per day in design flow.

- Construction activity resulting in the disturbance of five or more acres of land.

PERMIT APPLICATION REQUIREMENTS

MILWAUKEE AND MADISON (INCORPORATED AREAS)

There are two parts to the permit applications for municipalities. Part One includes:

- Description of the municipality's legal authority to control discharges to the storm sewer system.

- A description of the storm sewer system including legal controls over discharges to the system, the locations of outfalls and land uses associated with each outfall, locations of any permitted discharges to the system, location of major structural controls for storm water discharges, location of landfills and location of recreation areas.

- Discharge characterization including monthly rainfall estimates, data describing the volume and quality of discharges from the system, list and description of the receiving water bodies and monitoring data from all major outfalls for pH, total chlorine, total copper, total phenol and detergents. A major outfall is one measuring 36 inches or greater in diameter or one measuring 12 inches or greater in diameter serving an industrial area or any outfall serving more then two acres of industrial area.

- A description of existing management programs to control pollutants from the municipal storm sewer system.

- A description of the fiscal resources available to proceed with Part Two of the application.

Part Two of the application includes:

- Quantitative data for five to 10 outfalls designated by the permitting authority. This includes an analysis for organic pollutants, toxic metals, cyanide, total phenols among other common constituents such as suspended solids and biochemical oxygen demand.

- An estimate of the annual pollutant load to receiving waters.

- A proposed management plan to reduce pollutant loading to the maximum extent practicable. This could include ordinances to control pesticide and fertilizer applications, pet waste control ordinances, increased street sweeping, educational efforts, construction erosion control measures and installation of detention basins.

INDUSTRIES AND OTHER PERMITTEES

Nonmunicipal permit applications include only one part. These applicants will need to provide the following information:

- A site map showing the topography of the facility and surrounding land owned by the permit applicant, locations of stormwater outfalls, paved areas and buildings, material storage areas, hazardous waste treatment, storage or disposal areas and surface water bodies receiving stormwater runoff.

- An estimate of the area of impervious surfaces, total area drained by each outfall, a historical description of any materials stored or used on site including spills, descriptions of stormwater controls and a description of treatment of stormwater runoff including controls for illicit discharges to the system.

- Monitoring data for any pollutants suspected to be in the stormwater based on the activities performed on site. This includes flow rates, and data and duration of the storm events during which sampling occurred.

CONSTRUCTION SITES

Applications for construction site permits should include a description of the location and area of disturbed land, proposed erosion control measures, a runoff coefficient of the area and the name of the receiving water.

GROUP APPLICATIONS

Groups of potential permittees may apply using a single application if they are industries within the same SIC code. Application information is similar to that for individual permit applications but there are two parts to these applications to allow more time for the applicants to collect and organize the required data.

APPLICATION DEADLINES

Municipalities:

Milwaukee

Part 1	November 18, 1991
Part 2	November 18, 1991

Madison

Part 1	May 16, 1992
Part 2	May 16, 1993

Industries and other applicants:

November 18, 1991 (EPA is proposing to change this to October 1, 1992)

Group Applicants:

(*Send these applications directly to EPA.)

Part 1	September 30, 1991
Part 2	May 16, 1992 (EPA is proposing to change this to October 1, 1992.)

PERMIT REQUIREMENTS

Permit requirements will require management plans to prevent pollutants from contaminating stormwater. Permits may also include numeric limits. Permittees will need to become familiar with best management practices to prevent pollutants from entering stormwater. These could range from performing as many manufacturing activities indoors or under cover as possible, using good spill prevention programs, installing detention basins, education efforts, increased street sweeping, fertilizer and pesticide control ordinances, pet waste control ordinances and reducing air pollutant emissions.

Permit applications may be obtained from the Department of Natural Resources. Write to Anne Mauel, Bureau of Wastewater Management, Wisconsin Department of Natural Resources, 101 S. Webster St., Madison, WI 53707. You may also call Anne at (608) 267-7634.

A copy of the regulations may be obtained from your local library. They were published in the November 16, 1990 Federal Register and were entitled 40 CFR Part 122.

APPENDIX B
STATE OF WISCONSIN WATER QUALITY STANDARDS FOR STREAMS AND LAKES IN THE WATERSHED

APPENDIX B
STATE OF WISCONSIN WATER QUALITY STANDARDS FOR STREAMS AND LAKES IN THE WATERSHED

Stream Classification		Water Quality Parameter: Maximum Temperature (°F)	pH Range (s.u.)	Minimum Dissolved Oxygen (mg/l)	Maximum Fecal Coliform (counts/100 ml)	Maximum Umonized Ammonia (mg N/l)	Maximum Total Ammonia (mg N/l)	Other
Full fish and Aquatic Life	Trout	1,2	6.0-9.0[3]	6.0[4]	-	0.02	-	5,6,9
	Balanced Warm Water Aquatic Community	89[1]	6.0-9.0[3]	5.0	-	0.04	-	9
Intermediate	Unbalanced Aquatic Community	-	6.0-9.0	3.0	-	-	3-6[7]	5,9
Marginal	Effluent Channel, Wetland, Diffuse Surface Water	-	6.0-9.0	1.0	-	-	-	5,9
Recreational	Full Body	-	-	-	200-400[8]	-	-	9

[1]There shall be no temperature changes that may adversely affect aquatic life. Natural daily and seasonal temperature fluctuations shall be maintained.

[2]There shall be no significant artificial increases in temperature where natural trout or stocked salmon reproduction is to be protected.

[3]The pH shall be within the range of 6.0 to 9.0 standard units, with no change greater than 0.5 unit outside the estimated natural seasonal maximum and minimum.

[4]Dissolved oxygen shall not be lowered less than 7.0 mg/l during the trout spawning.

APPENDIX C
LAND DEVELOPMENT CATEGORIES AND DESCRIPTIONS FOR URBAN AREAS

Land use	Code	Description
RESIDENTIAL:		
High Density with Alleys	HRWA	Urban single and two-family housing at a density of greater than 6 units per acre, including the house, driveway, yard, alley, and streets.
High Density with No Alleys	HRNA	Urban single and two-family housing at a density of greater than 6 units per acre, including the house, driveway, yard, and streets.
Medium Density with Alleys	MRWA	Urban single and two-family housing at a density between two and six units per acres, including the house, driveway, yard, alley, and streets.
Medium Density with No Alleys	MRNA	Urban single and two-family housing at a density between two and 6.5 units per acres, including the house, driveway, yard, and streets.
Low Density	LR	Urban single and two-family housing at a density of between 0.7 and two units per acre, including the house, driveway, yard alley and streets.
Multiple Family	MF	Housing for three or more family units from one to three stories in height. Units may be adjoined up and down, side by side, or front and rear. Includes building, yard, parking lot, and driveway.
High Rise Apartments	HIR	Housing four or more stories in height. Units may be adjoined up and down, side by side, or front and rear. Includes building, yard, parking lot, and driveways.

Trailer Parks	MOBR	For a mobile home or trailer park, includes all vehicle homes, the yard, driveway, and office area.
Suburban	SUBR	Urban single family housing at a density of between 0.2 and 0.6 units per acre, including the house driveway, yard, alley and streets.
COMMERCIAL:		
Strip Commercial	CST	Commercial areas for which the primary function involves the sale of goods and/or services. This land includes the buildings, parking lots, and streets. This category does not include buildings used for the manufacture of goods or warehouses; nor does it include nurseries, tree farms, or lumber yards.
Shopping Centers	SC	Commercial areas the related parking lot is at least 2.5 times the size of the building's roof area. The buildings in this land use are usually surrounded by the parking lot, and the streets.
Office Park	OP	Land use where non-retail business takes place. The buildings are usually multi-storied surrounded by larger areas of lawn and landscaping. This land use includes the buildings, lawn, and road areas.
Downtown Commercial	CDT	Highly impervious downtown areas of commercial land uses.
INDUSTRIAL:		
Manufacturing	MI	Those buildings and premises which are devoted to the manufacture of products. This category also includes utility power plants.

Non-Manufacturing	LI	Those buildings which are used for the storage and/or distribution of goods awaiting further processing or sale to retailers. This category includes warehouses and wholesalers. This category also includes businesses such as lumber yards, auto salvage yards, junk yards, oil tank farms, coal and salt storage areas, grain elevators, agricultural coops, and areas for bulk storage of fertilizers and pesticides.
INSTITUTIONAL:		
Hospitals	HOSP	Medical facilities that provide inpatient overnight care. Includes nursing homes, state, county, or private facilities. Includes the buildings, grounds, parking lots, and drives.
Education	SCH	Includes any public or private primary, secondary, or college educational institutional grounds. Includes buildings, playgrounds, athletic fields, roads, parking lots, and lawn care.
Miscellaneous/Institutional	MISC	Churches and large areas of institutional property. This includes government buildings, parking lots, lawns, and road areas.
OPEN SPACES:		
Cemeteries	CEM	Includes cemetery grounds, roads, and buildings located on the grounds.
Parks	PARK	Outdoor recreational areas including municipal playgrounds, botanical gardens, arboretums, golf courses, and natural areas.
Undeveloped	OSUD	Lands that are private and publicly owned with no structures and have a complete vegetative cover. This includes vacant lots.

Land under development	CNST	Lands not yet fully developed at the time of the survey and bare soil is present.
FREEWAY:		
Freeways	FREE	Limited access highways and the interchange areas.

APPENDIX D
PART 1: GUIDELINES FOR CALCULATING SHORELINE BUFFER WIDTHS

The following tables identify the filtering of overland flow by vegetated buffers. These tables are derived from a procedure contained in a Soil Conservation Service (SCS) recommended article, "Predicting Runoff Pollutant Reduction in Buffer Zones Adjacent to Land Treatment Sites" by Overcash, Bingman and Westerman (Transactions of the ASAE - 1981). Minimum filter strip widths shall not fall below minimums specified in SCS Standard 393.

Table D-1. Ratios of buffer length to source field length associated with various pollutant load reductions.

Soil Type	% Reduction	Ratio
loam, silt	100%	0.7
loam or sandy	75%	0.2
clay loam	50%	0.1
silty clay loam	20%	>1.0
	10%	0.4

Table D-2. Buffer widths associated with various ratios of buffer length to source field length presented in Table C-1.*

Ratio	Original Field	Reduced Field	Buffer	
0.1	400 feet	365 feet	35 feet	(2 rods)
	300	275	25	
	200	180	20	
	100	90	10	
0.2	400 feet	335 feet	65 feet	(4 rods)
	300	250	50	(3 rods)
	200	165	35	(2 rods)
	100	85	15	(1 rod)
0.4	400 feet	290 feet	110 feet	
	300	215	85	
	200	145	55	
	100	70	30	(2 rods)
0.7	400 feet	240 feet	160 feet	
	300	180	120	
	200	120	80	
	100	60	40	

*Assumptions: rainfall intensity of 0.5 inches/hour; very good vegetated cover.

PART 2:
ALTERNATIVE PRACTICE SPECIFICATIONS AND COST-SHARING POLICIES FOR ACCELERATED STREET SWEEPING

PRACTICE DESCRIPTION

Use of brush or vacuum style sweepers to remove leaf litter and accumulated dirt from street surfaces on an accelerated schedule designed for improving quality of surface waters.

PURPOSE

In the Menomonee River Watershed, extensive use of wet detention and infiltration practices is needed to meet the pollutant load reductions called for in this plan. However, accelerated sweeping can be useful on an interim basis to provide some level of reduction as wet detention and infiltration practices are being phased in. Once established, urban structural practices will provide the level of pollutant load reduction required. As the structural practices are installed, accelerated sweeping can be discontinued as a water quality measure in the areas served by these practices.

The purpose of accelerated sweeping in this watershed is to provide interim protection in areas that will ultimately be served by urban structural practices.

CONDITIONS

Cost sharing is authorized for the support of a portion of an accelerated street sweeping nprogram for existing critical land uses.

> Accelerated sweeping is defined as that meeting the schedule set forth in Tables C-3 and C-4. It consists of two parts: 1) the "base level" and 2) the "additional level". The "base level" portion of the accelerated program is not eligible for support. The "additional level" portion of the accelerated program is eligible for support.
>
> Existing urban areas are those in existance as of the date the Department of Natural Resources approves this watershed plan.

Cost sharing will be effective for a 5-year period for each municipality, beginning when the community first accepts cost share funds for sweeping. Eligible cost components include:

* direct and indirect staff costs to operate the sweeper including wages, salaries, benefits, and overhead (Only cost of "additional staff", as defined in NR 120.02, is eligible).
* fuel, equipment maintenance, and equipment depreciation.
* litter disposal.

Eligible staff related costs will be supported 100% through the Local Assistance Grant Agreement. Other costs will be supported at a cost-share rate of 50 percent. The community may negotiate with the Department of Natural Resources for a flat fee cost-share amount per curb mile. Cost sharing will be on a reimbursement basis.

Following the five-year period of cost-share eligibility, the community at its own expense must maintain an accelerated street sweeping schedule in those areas for which it received cost sharing. This ten-year period will be when the area is retro-fitted with urban structural practices consistent with the intent of this watershed plan.

Table D-3. Components of accelerated street sweeping schedules for critical urban land uses, curb & gutter drainage.

Season[1]	Program Description	Freeway	Commercial Industrial	High Density Residential
Spring	Accelerated Program[2]	Once/week: vacuum	Once/week: alternate	Once/week:alternate brush & vacuum
	Base component[3]	Once/week: brush	Once/week: brush	Twice/month: brush
	Additional component[4]	Convert to vacuum	Convert to vacuum on alternate passes	Two added passes with vacuum
Summer	Accelerated Program	Once/week: vacuum	Once/week: alternate brush & vacuum	Twice/month: alternate brush & vacuum
	Base component[3]	Once/week: brush	Once/week: brush	Twice/month: brush
	Additional component[4]	Convert to vacuum	Convert to vacuum on alternate passes	Convert to vacuum on alternate passes
Fall	Accelerated Program	Once/week: vacuum	Once/week: alternate brush & vacuum	Twice/month: brush & vacuum
	Base component[3]	Once/week: brush	Once/week: brush	Twice/month: brush
	Additional component[4]	Convert to vacuum	Convert to vacuum on alternate passes	Convert to vacuum on alternate passes

(1) Spring is considered to be one month (March).
Summer is considered to be 6 months (April-September).
Fall is considered to be 2 months (October-November).
(2) The accelerated program is made up of the base component and the additional component.
(3) This component is not eligible for cost-share assistance.
(4) This component is eligible for cost-share assistance.

Table D-4. Components of accelerated street sweeping schedules for critical urban land uses, grassed swale drainage.

Season[1]	Program Description	Commercial, Industrial	High Density Residential
Spring	Accelerated Program[2]	Once/week: alternate brush & vacuum	Once/month: vacuum
	Base component[3]	Twice/month: brush	Once/month: brush
	Additional component[4]	Two added passes with vacuum	Convert to vacuum
Summer	Accelerated Program	Once/week: alternate brush & vacuum	Once/month: vacuum
	Base component[3]	Twice/month: brush	Once/month: brush
	Additional component[4]	Two added passes with vacuum	Convert to vacuum
Fall	Accelerated Program	Once/week: alternate brush & vacuum	Once/month: vacuum
	Base component[3]	Twice/month: brush	Once/month: brush
	Additional component[4]	Two added passes with vacuum	Convert to vacuum

(1) Spring is considered to be one month (March).
Summer is considered to be 6 months (April-September).
Fall is considered to be 2 months (October-November).
(2) The accelerated program is made up of the base component and the additional component.
(3) This component is not eligible for cost-share assistance.
(4) This component is eligible for cost-share assistance.

APPENDIX E
NON-POINT SOURCE POLLUTION CONTROL GUIDELINES FOR INFILTRATION DEVICES IN URBAN AREAS

APPENDIX E
NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES IN URBAN AREAS

	Residential[4]	Institutional[5]		
Infiltration Device Type		Rooftop	Parking Lot	
			0 - 5,000 sq. ft.	5,000 - 500,000 sq. ft.
Infiltration Basin[1]	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	No Pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Infiltration Trench[1]	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	No Pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Grassed Swale[2]	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	No Pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Infiltration Practices	Redirect downspouts and slope driveways to lawn, for infiltration. No pretreatment.	Redirect downspouts to lawn for infiltration. No pretreatment.	Slope lots to grass buffer strip.	

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]Multi- and single-family dwellings.
[5]Churches, schools, and hospitals.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES FOR INFILTRATION DEVICES

	Commercial[4]					
	Rooftop Runoff		Parking Lot Runoff			Storage and Loading
Infiltration Device Type[3]	0-10,000 sq. ft.	> 10,000 sq. ft.	0-5,000 sq. ft.	5,000-500,000 sq. ft.	>500,000 sq. ft.	Acres Runoff[5]
Infiltration Basin[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Infiltration Trench[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Grassed Swale[2]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices	Redirect downspouts to lawn for infiltration. No pretreatment.		Slope lots to grass buffer strip.			

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. Grit chambers remove particles down to 100 u and wet sedimentation removes particles down to 40-100 u. All pretreatment devices should be equipped with oil and grease traps.
[4]Retail and service operations.
[5]The use of infiltration practices in storage areas must be reviewed on a case-by-case basis.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES FOR INFILTRATION DEVICES

	Industrial (Non-Manufacturing)[4]				
Infiltration Device Type	Rooftop Runoff 0-10,000 sq. ft.	Rooftop Runoff > 10,000 sq. ft.	Separate Employee & Visitor Parking Lot Runoff 5,000-500,000 sq. ft.	Separate Employee & Visitor Parking Lot Runoff > 500,000 sq. ft.	Storage and Loading Area Runoff[5]
Infiltration Basin[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Infiltration prohibited.
Infiltration Trench[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Infiltration prohibited.
Grassed Swale[2]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment required.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices	Redirect downspouts and driveways to lawn for infiltration. No pretreatment.				

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]Good materials management practices should be practiced to prevent the risk of generating contaminated runoff in the first place.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

	Industrial (Manufacturing)[4]			
Infiltration Device Type[3]	Rooftop Runoff 0-10,000 sq. ft.	Rooftop Runoff > 10,000 sq. ft.	Separate Employee & Visitor Parking Lot Runoff	Storage and Loading Area Runoff[5]
Infiltration Basin[1]	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.
Infiltration Basin[1]	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.
Grassed Swale[2]	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices				

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]For the purpose of this table, industrial (manufacturing) consists of production industries. An example would be an industry with smokestacks that have the potential for emitting particulates that will settle on building rooftops and parking lots.
[5]Good materials management practices should be practiced to prevent the risk of generating contaminated runoff in the first place.

APPENDIX F
MILWAUKEE RIVER PROGRAM BASINWIDE EDUCATIONAL GOALS

BASINWIDE GOAL PERTAINING TO EDUCATION

Educate key audiences regarding nonpoint source pollution and related resource management problems and solutions, thereby facilitating public involvement, informed decisionmaking, and plan implementation.

INFORMATION AND EDUCATION SUBCOMMITTEE-ADOPTED GOALS

The best available techniques, including research and survey results, will be utilized in educational strategy development, implementation, and evaluation. The Milwaukee River Priority Watersheds Information and Education Program will strive to:

* Improve the awareness/understanding of the watershed as a system, water quality problems, and the benefits available through integrated resources management, particularly nonpoint source pollution control.

* Inform people about the potentials of and instill a sense of responsibility or ethic for the natural resources within the Milwaukee River Basin.

* Achieve widespread participation in and support for the priority watershed and integrated resource management programs through the involvement of broadly-based and diverse groups.

* Develop and maintain a clear understanding of the steps the program will be taking among rural and urban landowners and users, watershed communities, community leaders, and other groups.

* Optimize both the use of rural and urban nonpoint source pollution control measures through voluntary cooperation, and the integrated use of complementary resource management techniques.

* Coordinate and cooperate with other federal, state, and local programs and promote all appropriate implementation strategies (including mandatory controls, where warranted) as mechanisms to achieve water quality improvements.

APPENDIX G
DESCRIPTION OF WATERSHED-SPECIFIC INFORMATION AND EDUCATION MATERIALS AND EVENTS

INTRODUCTION

This appendix to the educational strategy primarily addresses watershed-specific activities for the Menomonmee River Watershed. However, some basinwide and statewide activities are included due to their importance for project success. Descriptions of other basinwide and statewide activities are included in the Urban Water Quality Information and Education Strategy for the Milwaukee River Program (Johnson, 1989).

NEWSLETTERS

Newsletters will be used to convey information to targeted groups such as local government officials, rural landowners, civic and environmental groups, fishing and boating groups, business and industry associations, interested citizens and other likely participants in the Milwaukee River Program. The objectives of newsletters will be to:

* Supply basic information on the program.
* Provide updates on important elements of the program including dates of upcoming events.
* Improve understanding of nonpoint source pollution problems and causes.
* Increase appreciation of lakes, streams and related natural resources in the watershed.
* Introduce landowners to recommended management practices.
* Provide information on available assistance including cost-sharing.
* Build a sense of momentum by providing information on participation and implemented practices.

Newsletters will be distributed to key audiences within the watershed and used as handouts at public meetings, tours and exhibits.

Many issues in the Milwaukee River Program transcend watershed boundaries and interest groups often have regional membership. Therefore, newsletters may be most efficiently written and distributed at the basinwide, rather than watershed level.

The lead responsible party for watershed newsletters will be the area UW-Extension Water Quality staff with state specialist assistance. Other UW-Extension, DNR and LCD staff will also be involved in newsletter preparation and distribution.

WATERSHED FOLDERS AND FACT SHEETS

Watershed folders will be used to communicate basic information about the watershed project and serve as "cover pieces" for educational packets assembled to meet the needs of rural landowners/operators and local government officials. Folders will contain different sets of information and education materials, including fact sheets, depending upon the audience groups to which it will be given.

Folders will bear a Milwaukee River Program rather than a watershed-specific identity. Most of the fact sheets will have basinwide or statewide applicability and be produced at those levels. An exception may be demonstration project fact sheets and write-ups describing good management practices which are viewed as "informal demonstrations." These could be localized to this watershed project.

County LCD staff will assemble the rural watershed folder contents and, in conjunction with County UW-Extension staff, draft fact sheets on demonstrations. DNR staff, with county or area UW-Extension staff assistance, will assemble the local government folder contents. Area UW-Extension staff will have the lead responsibility for publishing demonstration project fact sheets and Milwaukee River Program fact sheets. State UW-Extension specialists and DNR and DATCP staff will develop or assist with the development of fact sheets on rural and urban best management practices with statewide applicability.

WATERSHED SLIDE PROGRAM(S)

An automated slide program will be developed for use at public meetings, community group programs and volunteer training sessions. The program will have some modules which can be used throughout the basin such as those explaining the Milwaukee River Program, nonpoint source pollution, and rural and urban practices for abating nonpoint source pollution. Other modules will be specific to the watershed such as those explaining local nonpoint source pollution problems and causes, local examples of nonpoint source pollution abatement practices, landowner survey(s), inventory data, and plan recommendations.

County LCD and UW-Extension staff will provide slides and information for the watershed-specific portions of the slide program, will locally adapt basinwide portions of the program, and use the program for public meetings, community group programs and volunteer training sessions. The DNR or state or area UW-Extension staff will prepare many of the slides, especially graphic summaries of landowner surveys, inventory data and plan recommendations. Area UW-Extension Water Quality staff will be responsible for coordinating the production of the slide program.

LOCAL EXHIBITS

Exhibits on the Milwaukee River Program, on urban and rural nonpoint source pollution, on specific watershed plans and on best management practices will be used at county fairs, festivals, shows and other special events in the watershed. The purpose or focus of

these exhibits will change as the program progresses. Thus interchangeable groups of exhibit components will be developed to cover a variety of themes.

Arrangements for use of exhibits in local areas will be the responsibility of county UW-Extension and Land Conservation Department (LCD) staff with assistance from area UW-Extension and district DNR staff. Most materials for the exhibits will be developed by area UW-Extension and district DNR staff. Watershed advisory committee members and other volunteers will staff exhibits whenever possible to augment staff resources.

MEDIA CONTACTS

An active program to involve the media in covering watershed events begins with conferences with the major newspapers and television stations in the watershed to further acquaint editors and reporters with the Milwaukee River Program. The lead responsible person for this activity is the public information officer for the DNR Southeast District. The Milwaukee River program coordinator and UW-Extension staff will also be involved.

News releases will be distributed to local newspapers, television and radio stations to announce watershed events such as tours, public information meetings, plan completion/amendment, demonstration project installations and grant awards. The lead responsible agency for the news releases will vary depending on which agency or private group is responsible for a particular event.

Newspaper feature articles and appearances on radio talk shows and television interview programs will be sought to provide more in-depth coverage of the program. Special feature articles or interview shows may involve direct participation by state or district DNR or UW-Extension staff.

County UW-Extension staff will be responsible for covering water quality issues in their regular radio talk shows and newspaper columns. Background material for radio programs and newspaper columns will often be prepared at the basinwide or state level, although county staff will prepare materials related to their field of expertise.

SERIES OF NEWSPAPER COLUMNS AND RADIO PUBLIC SERVICE ANNOUNCEMENTS

A coordinated series of newspaper columns and radio public service announcements will be used to inform people about nonpoint source pollution and best management practices. The focus of the series will be homeowner practices such as yard care, household hazardous waste, stream corridor and lakeshore management, automobile maintenance, and pet waste disposal. General information on the Milwaukee River Program, nonpoint source pollution and best management practices for municipalities will also be included.

Development of the series of newspaper columns and radio public service announcements will be coordinated at the basinwide level, but publication or distribution will be made part of the watershed implementation program. County UW-Extension

agents will adapt newspaper columns and radio public service announcements for local use and will arrange for distribution to local newspapers and radio stations. Newspaper columns will also be distributed for publication in local civic and environmental group newsletters. County Extension agents may be involved in the development of newspaper columns or public service announcements related to their areas of expertise. Supportive educational materials such as fact sheets will be available, upon request, through county Extension offices. Such fact sheets and other written materials will generally be prepared at the basinwide or statewide level.

DEMONSTRATION SITE AND KEY RURAL PRACTICES TOURS

A meeting and tour will be conducted for the existing barnyard runoff management and pesticide mixing demonstration sites--and for future demonstrations including those planned for nutrient and pesticide management and well water testing. Priority landowners needing specific information and first-hand exposure to the demonstrated practices will be invited to the event(s). Transportation to and from the sites and organization around a social event such as a meal will be utilized as advisable and approved.

In addition, tours related to best management practices will be pursued as appropriate for specific audiences, making use of both formal and informal "demonstrations."

County LCD and UW-Extension staff are identified as having the major responsibility for these tours with area and state UW-Extension staff providing organizational and/or subject matter specialty assistance.

IMPLEMENTATION MEETING/TOUR

During the implementation phase in the watershed, a meeting and/or tour will be scheduled. The purposes of the meeting/tour will be to update local officials on program progress, to encourage more participation, and to inform the media and the public about implemented practices and water quality improvements. Rural and urban demonstration projects and other implemented practices will be featured in the meeting/tour. The meeting/tour should be scheduled before the end of the sign-up period for state cost-sharing. Implementation meetings and tours may be combined for adjacent watersheds where sign-up periods overlap.

The lead responsible party for arranging implementation meetings/tours will be the Milwaukee River Program coordinator. Assistance will also be provided by other DNR staff, county and area UW-Extension, and LCD staff.

DEMONSTRATION PROJECTS

The need for demonstrations of nonpoint source pollution control practices is being evaluated in the watershed on an ongoing basis. Where appropriate, demonstrations will be designed to enhance related natural resources such as fish and wildlife habitat as well as to improve water quality. Watershed demonstrations are evaluated according to the following criteria:

* Does the practice address an identified, major source of water pollution in the Milwaukee River Basin?

* Is the practice needed in a variety of areas in the watershed (or other parts of the Milwaukee River Basin) to achieve water quality goals?

* Is the practice unfamiliar and/or untested in the vicinity or in southeastern Wisconsin?

* Does the practice require further research and refinement before widespread application? Would a demonstration aid this process?

* Is the site proposed for the demonstration highly visible, easily accessible, or located where there would be credibility ascribed to the practice?

Milwaukee River Program staff, with the advice of watershed advisory committees and local governments, will identify and actively pursue needed demonstrations. Implementation of specific demonstrations will be the responsibility of appropriate DNR, LCD, local government and UW-Extension staff. Part of the plan for each demonstration will be an information and education element including--at a minimum--signs, slides, fact sheets and tours.

Area UW-Extension Water Quality staff will be the primary responsible party for reviewing demonstration project plans for information and education elements and printing fact sheets. County LCD staff will be the lead responsible parties for documenting costs and project progress, drafting fact sheets, taking slides and conducting tours.

SIGNS

Signs with the Milwaukee River Program logo will be used at selected locations to increase public awareness of the program. Potential sites for signs will be selected and prioritized by the Information and Education (I&E) Subcommittee. Signs will be produced via separate outside contracts. Primary responsibility for coordinating this sign project will be assigned to a staff member at the DNR Southeast District.

Signs identifying demonstration projects and other Milwaukee River Program cooperators will also be used. Wherever possible, more detailed signs explaining the watershed project and associated practices will be put up in prominent public locations such as parks, waysides, boat and fishing access sites, and river walkways.

TOWN MEETINGS

Two meetings are planned for each of the towns in the watershed in Ozaukee County. The primary purpose of town meetings scheduled for the first year of the project will be to indicate that implementation is underway and encourage participation. These meetings will also be a "courtesy call" for local officials who may be contacted by their

constituents. Future meetings could be used to advise that sign-up for cost-sharing will end shortly and to offer suggestions for future involvement.

County UW-Extension and LCD staff will be responsible for these meetings. Area UW-Extension and DNR staff assistance will be available as needed for specific topics or the production of handout materials.

CITY AND VILLAGE MEETINGS

Meetings will also be scheduled with each city and village in the watershed. Purposes of the meetings scheduled during the first year of the project are to:

* Present inventory results, urban residents survey results, and plan recommendations for each community.

* Develop appropriate local assistance and cost-sharing agreements for implementation of the plan in each community.

In larger cities and villages, Milwaukee River Program staff may present the same information to municipal staff before meeting with the village board or city council. Separate meetings may also be scheduled with committees, commissions or boards of the village or city upon request.

The lead responsible party for scheduling meetings with municipal staff and elected officials will be the Milwaukee River Program coordinator. Other DNR and county or area Extension staff responsible for that watershed will provide assistance at these meetings as needed.

CONSTRUCTION EROSION CONTROL AND STORMWATER MANAGEMENT WORKSHOPS

One specific type of technical education and training assistance offered to local governments will be construction erosion control and stormwater management workshops. The workshops will be designed to provide technical information on these practices to local government staff, developers, builders, contractors and consultants. The most effective time to schedule them will be winter or early spring, before the busiest construction season.

The area UW-Extension urban water quality educator will be responsible for organizing these workshops. Materials for use in the workshops will be developed on a basinwide or state level. The "Wisconsin Construction Site Best Management Practice Handbook" will be the basic text for the workshop. DNR will provide copies of the handbook, but fees will cover remaining out-of-pocket expenses. DNR and LCD staff will assist with the workshops by speaking, developing handouts, evaluating results and providing publicity. County UW-Extension offices will assist with publicity and registration.

INDIVIDUAL CITY AND VILLAGE EDUCATIONAL PROGRAMS

Each city and village will have an information and education element included in any local assistance or cost-sharing agreement. At a minimum, these will include:

* Publicity for new leaf collection and street sweeping programs.

* Publicity for pet waste cleanup ordinances.

* Publicity for local waste oil recycling and hazardous waste collection programs.

* Information for the construction industry about new or changed local construction erosion control and stormwater management ordinances.

* Training of local government staff for construction erosion control, stormwater management, and streambank stabilization.

City and village staff will be responsible for implementing their community's information and education program. Appropriate county or area UW-Extension and DNR staff will assist local governments in the development and implementation of information and education programs for their residents, businesses and industries. DNR and Extension staff will also provide information on urban best management practices to city and village officials through telephone contacts, attending local government meetings, providing workshops, or other educational means.

Area and county UW-Extension staff will assist with the development of printed materials and with arranging workshops on urban best management practices. Specifically, the watershed project educational program for municipalities will require a series of fact sheets or brochures on urban "housekeeping" practices for water quality protection on the following general subjects:

* Reduction in pet waste runoff.

* Improved efficiency of leaf collection and street sweeping.

* Proper use and disposal of car care products and lawn-garden chemicals.

* Encouragement of precipitation infiltration and detention rather than runoff.

Many of these printed materials have been initiated through the "Yard Care and the Environment" fact sheet series under the leadership of area UW-Extension staff. These fact sheets will be formatted to allow easy adaptation and reprinting by city and village staff.

PROGRAMS FOR LOCAL GROUPS

To provide an organized approach for soliciting and meeting program requests from local groups, the Milwaukee River Program is developing a speakers bureau. Members of the speakers bureau will include state and local government staff and members of the advisory committees. State or area staff, or contracted private or public agencies will develop videotapes, slide programs and supportive educational materials on a statewide or basinwide level for use by the speakers bureau.

The primary responsibility for maintaining the speakers bureau database will belong to the DNR Southeast District. Area UW-Extension staff will play a role in developing or coordinating the development of needed materials. Area and county UW-Extension, LCD, DNR and DATCP staff will publicize and participate in the speakers bureau and the development of information and education materials according to their areas of interest and available time.

YARD CARE PROGRAMS

Yard care information and education activities will be provided for urban residents as well as lake property owners. These activities will include a training program for volunteer leaders, a slide program on alternative yard care practices, printed materials, InfoSource taped messages, model yard contests or demonstrations, and a state fair exhibit.
Master gardeners and other volunteer leaders will be trained by county UW-Extension agents to provide programs for community groups on alternative yard care practices that reduce or prevent nonpoint source pollution. These programs will include topics such as reduced fertilizer use, alternative pest management techniques, yard waste reduction and reuse, selecting plants appropriate to the site, vegetative buffers for lakeshores and streambanks, and infiltration of stormwater.

County UW-Extension agents will train volunteers and coordinate model yard contests/demonstrations. Materials for the yard care program, including the "Yard Care and the Environment" fact sheet series, will be developed by county and area UW-Extension staff with state specialist assistance.

SCHOOL CURRICULUM AND TEACHER WORKSHOPS

Given the lack of knowledge evidenced by surveys of residents in the Milwaukee River Basin, nonpoint source pollution--causes, impacts and corrective actions--is a subject which should be included in the curriculum development process. Part of the curriculum development for schools in the basin should be materials on the Milwaukee River including: geology, history of use, fish and aquatic organisms, pollution problems and clean-up programs.

The lead responsible parties for curriculum development and associated teachers workshops and in-services will be private and public nature and environmental centers, DNR, and UW-Extension staff who work with school groups. These organizations will submit special grant proposals to private foundations and public agencies for curriculum

development, teacher training and other youth activities related to nonpoint source pollution.

SCHOOL PROGRAMS

A consortium of nature/environmental education centers in the Milwaukee River Basin has met with DNR and UW-Extension staff to evaluate water quality education opportunities for teachers and students. The conclusion of the group is that a variety of environmental awareness programs that include water quality are available for elementary and middle school teachers and students. However, programs for high school teachers and students are lacking. Therefore, the group has formulated a grant proposal for a high school water quality monitoring program called "Testing the Waters." This proposal is modeled after the Rouge River Project in Michigan.

The lead responsible parties for this project are the private and public nature/environmental education centers, DNR and UW-Extension staff who work with school groups. These organizations will submit special grant proposals to private foundations and public agencies for "Testing the Waters" and implement the program. Additional school programs may be developed by this group or individual nature/environmental education centers in future years.

YOUTH GROUP PROGRAMS

School water quality programs will be supplemented by youth group programs including educational events and community service projects. One proposal submitted to youth groups will be the storm sewer stencilling project developed in Seattle. The objectives of this project are to teach youth and adults that storm sewers carry materials directly to local lakes and streams and to discourage dumping of pollutants such as waste oil, antifreeze and paint into them.

The lead responsible party for this project will be county UW-Extension staff who work with youth groups. Area UW-Extension and DNR staff will provide assistance in procuring materials and developing associated educational programs. Information on hazardous waste reduction, recycling and proper disposal will also be provided through this program.

ANNUAL EDUCATIONAL STRATEGY UPDATE

The Menomonee River Watershed educational strategy will be reviewed and updated annually. Annual updates will further define educational materials and events, costs, and timing, and include estimates for the fourth through eighth years of the project.

Area UW-Extension staff will provide the leadership role in this annual plan updating process, and will be assisted by county UW-Extension and LCD staff. DNR and DATCP staff will also play an important role in the needs identification process.

APPENDIX H
GLOSSARY

ACUTE TOXICITY:
Any poisonous effect produced by a single short-term exposure to a chemical that results in a rapid onset of severe symptoms.

ADVANCED WASTEWATER TREATMENT:
The highest level of wastewater treatment for municipal treatment systems. It requires removal of all but 10 parts per million of suspended solids and biological oxygen and/or 50 percent of the total nitrogen. Advanced wastewater treatment is also known as " tertiary treatment."

AGRICULTURAL CONSERVATION PROGRAM (ACP):
A federal cost-sharing program to help landowners install measures to conserve soil and water resources. ACP is administered by the USDA ASCS through county ACP committees.

ALGAE:
A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Thus algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:
A form of nitrogen (NH_3) found in human and animal wastes. Ammonia can be toxic to aquatic life.

ANAEROBIC:
Without oxygen.

AREA OF CONCERN:
Areas of the Great Lakes identified by the International Joint Commission (IJC) as having serious water pollution problems.

AREAWIDE WATER QUALITY MANAGEMENT PLANS (208 PLANS):
A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

ANTIDEGRADATION:

A policy which states that water quality will not be lowered below background levels unless justified by economic and social development considerations. Wisconsin's antidegradation policy is currently being revised to make it more specific and meet EPA guidelines.

AVAILABILITY:

The degree to which toxic substances or other pollutants that are present in sediments or elsewhere in the ecosystem are available to affect or be taken up by organisms. Some pollutants may be "bound up" or unavailable because they are attached to clay particles or are buried by sediment. The amount of oxygen, pH, temperature and other conditions in the water can affect availability.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, and some are important in the stabilization of organic wastes.

BASIN PLAN:

See "Areawide Water Quality Management Plan".

BENTHIC ORGANISMS (BENTHOS):

The organisms living in or on the bottom of a lake or stream.

BEST MANAGEMENT PRACTICE (BMP):

The most effective, practical measures to control nonpoint sources of pollutants that runoff from land surfaces.

BIOACCUMULATION:

The uptake and retention of substances by an organism from its surrounding medium and from its food. Chemicals move through the food chain and tent to end up at higher concentrations in organisms at the upper end of the food chain such as predator fish, or in people or birds that eat these fish.

BIOASSAY STUDY:

A test for pollutant toxicity. Tanks of fish or other organisms are exposed to varying doses of treatment plant effluent; lethal doses of pollutants in the effluent are thus determined.

BIOCHEMICAL OXYGEN DEMAND (BOD):

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. BOD_5 is the biochemical oxygen demand measured in a five day test. The greater the degree of pollution, the higher the BOD_5.

BIODEGRADABLE:

Waste which can be broken down by bacteria into basic elements. Most organic wastes such as food remains and paper are biodegradable.

BIOTA:
All living organisms that exist in an area.

BUFFER STRIPS:
Strips of grass or other erosion-resisting vegetation between disturbed areas and a stream or lake.

BULKHEAD LINES:
Legally established lines which indicate how far into a stream or lake an adjacent property owner has the right to fill. Many of these lines were established many years ago and allow substantial filling of the bed of the River and Bay. Other environmental laws may limit filling to some degree.

CARCINOGENIC:
A chemical capable of causing cancer.

CATEGORICAL LIMITS:
All point source discharges are required to provide a basic level of treatment. For municipal wastewater treatment plants this is secondary treatment (30 mg/1 effluent limits for SS and BOD). For industry the level is dependent on the type of industry and the level of production. More stringent effluent limits are required if necessary to meet water quality standards.

CHLORINATION:
The application of chlorine to wastewater to disinfect it and kill bacteria and other organisms.

CHLORORGANIC COMPOUNDS (CHLORORGANICS):
A class of chemicals which contain chlorine, carbon and hydrocarbon. Generally refers to pesticides and herbicides that can be toxic. Examples include PCB's and pesticides such as DDT and dieldrin.

CHRONIC TOXICITY:
The effects of long-term exposure of organisms to concentrations of a toxic chemical that are not lethal is injurious or debilitating to an organism in one or more ways. An example of the effect of chronic toxicity could be reduced reproductive success.

CLEAN WATER ACT:
See "Public Law 92-500."

COMBINED SEWERS:
A wastewater collection system that carries both sanitary sewage and stormwater runoff. During dry weather, combined sewers carry only wastewater to the treatment plant; during heavy rainfall, the sewer becomes swollen with stormwater. Because the treatment plant cannot process the excess flow, untreated sewage is discharged to the plant's receiving waters, i.e., combined sewer outflow.

CONFINED DISPOSAL FACILITY (CDF):
A structure built for the containment and disposal of dredged material.

CONGENERS:
Chemical compounds that have the same molecular composition, but have different molecular structures and formula. For example, the congeners of PCB have chlorine located at different spots on the molecule. These differences can cause differences in the properties and toxicity of the congeners.

CONSERVATION TILLAGE:
Planting row crops while disturbing the soil only slightly. In this way a protective layer of plant residue says in the surface; erosion is decreases.

CONSUMPTION ADVISORY:
A health warning issues by WDNR and WDHSS that recommends that people limit the fish they eat from some rivers and lakes based on the levels of toxic contaminants found in the fish.

CONTAMINANT:
Some material that has been added to water that is not normally present. This is different from a pollutant, as a pollutant suggests that there is too much of the material present.

CONVENTIONAL POLLUTANT:
Refers to suspended solids, fecal coliforms, biochemical oxygen demand, and pH, as opposed to toxic pollutants

COST-EFFECTIVE:
A level of treatment or management with the greatest incremental benefit for the money spent.

CRITERIA:
See water quality standard criteria.

DDT:
A chlorinated hydrocarbon insecticide that has been banned because of its persistence in the environment.

DIOXIN (2,3,7,8-tetrachlorodibenso-p-dioxin):
A chlorinated organic chemical which is highly toxic.

DISINFECTION:
A chemical or physical process that kills organism that cause disease. Chlorine is often used to disinfect wastewater.

DISSOLVED OXYGEN (DO):

Oxygen dissolved in water. Low levels of dissolved oxygen cause bad smelling water and threaten fish survival. Low levels of dissolved oxygen are often due to inadequate wastewater treatment. The Department of Natural Resources considers 5 ppm DO necessary for fish and aquatic life.

DREDGING:

Removal of sediment from the bottom of water bodies.

ECOSYSTEM:

The interacting system of biological community and its nonliving surrounding.

EFFLUENT:

Solid, liquid or gas wastes (byproducts) which are disposed on land, in water or in air. As used in the RAP generally means wastewater discharges.

EFFLUENT LIMITS:

The Department of Natural Resources issues WPDES permits that establish the maximum amount of pollutant that can be discharged to a receiving stream. Limits depend on the pollutant involved and the water quality standards that apply for the receiving waters.

EMISSION:

A direct (smokestack particles) or indirect (busy shopping center parking lot) release of any contaminant into the air.

ENVIRONMENTAL PROTECTION AGENCY (USEPA):

The federal agency responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air and solid waste pollution control to state agencies.

ENVIRONMENTAL REPAIR FUND:

A fund established by the Wisconsin Legislature to deal with abandoned landfills.

EPIDEMIOLOGY:

The study of diseases as they affect populations rather than individuals, including the distribution and incidence of a disease mortality and morbidity rated, and the relationship of climate, age, sex, race and other factors. EPA uses such data to establish national air quality standards.

EROSION:

The wearing away of the land surface by wind or water.

EUTROPHIC:

Refers to a nutrient-rich lake. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION:
The process of nutrient enrichment of a lake loading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FACILITY PLAN:
A preliminary planning and engineering document that identifies alternative solutions to a community's wastewater treatment problems.

FECAL COLIFORM:
A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FISHABLE AND SWIMMABLE:
Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

FLOURANTHENE:
A polyaromatic hydrocarbon (PHA) with toxic properties.

FLY ASH:
Particulates emitted from coal burning and other combustion, such as wood burning, and exited into the air from stacks, or more likely, collected by electrostatic precipitators.

FOOD CHAIN:
A sequence of organisms in which each uses the next as a food source.

FURANS (2,3,7,8-tetra-chloro-dibenzpfurans):
A chlorinated organic compound which is highly toxic.

GREEN STRIPS:
See buffer strip.

GROUNDWATER:
Underground water-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water which flows in response to gravity and pressure. Often used by the source of water for communities and industries.

HABITAT:
The place or type of site where a plant or animal naturally lives and grows.

HEAVY METALS:

Metals present in municipal and industrial wastes that pose long-tern environmental hazards if not properly disposed. Heavy metals can contaminate ground and surface waters, fish and other food stuffs. The metals of most concern are: Arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and zinc (see also separate listings of these metals for their health effects).

HERBICIDE:

A type of pesticide that is specifically designed to kill plants and can also be toxic to other organisms.

HYDROCARBONS:

Any of a large family of chemicals containing carbon and hydrogen in various combinations.

INCINERATOR:

A furnace designed to burn wastes.

INFLUENT:

Influent for an industry would be the river water that the plant intakes for use in its processing. Influent to a municipal treatment plant is untreated wastewater.

IN-PLACE POLLUTION:

As used in the RAP refers to pollution from contaminated sediments. These sediments are polluted from post discharges from municipal and industrial sources.

INTERNATIONAL JOINT COMMISSION (IJC):

An agency formed by the United States and Canada to guide management of the Great Lakes and resolve border issues.

ISOROPYLBIPHENYL:

A chemical compound used as a substitute for PCB.

LANDFILL:

A conventional sanitary landfill is "a land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading solid wastes in thin layers, materials at the end of each operating day". Hazardous wastes frequently require various types of pretreatment before they are disposed of, i.e., neutralization chemical fixation encapsulation. Neutralizing and disposing of wastes should be considered a last resort. Repurifying and reusing waste materials or recycling them for another use may be less costly.

LC-1:

The concentration that results in 1 percent mortality of the test animal populations exposed to the contaminant.

LC_{50}:
Lethal concentration for 50 percent of the test population exposed to a toxicant substance.

LD_{50}:
Lethal dose for 50 percent of the test population exposed to a toxicant substance.

LEACHATE:
The contaminated liquid which seeps from a pile or cell of solid materials and which contains water, dissolved and decomposing solids. Leachate may enter the groundwater and contaminate or inking water supplies.

LOAD:
The total amount of materials or pollutants reaching a given local.

MACROPHYTE:
A rooted aquatic plant.

MASS:
The amount of material a substance contains after measured by its weight (in a gravitational field).

MASS BALANCE:
A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutant present, its sources, and the processes by which the chemical moves through the ecosystem.

MESOTROPHIC:
Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrohpic.")

MILLIGRAMS PER LITER (mg/1):
A measure of the concentration of substance in water. For most pollution measurement this is the equivalent to "parts per million".

MITIGATION:
The effort to lessen the damages caused, by modifying a project, providing alternatives, compensating for losses. or replacing lost values.

MIXING ZONE:
The portion of a stream or lake in which effluent is allowed to mix with the receiving water. The size of the area depends on the volume and flow of the discharge and receiving water. For streams the mixing zone is one-third of the lowest flow that occurs once every 10 years for a seven day period.

NONPOINT SOURCE POLLUTION (NSP):

Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

NPS:

See nonpoint source pollution.

OLIGOTROPHIC:

Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

OUTFALL:

The mouth of a sewer, drain, or pipe where effluent from a wastewater treatment plant is discharged.

PATHOGEN:

Any infective agent capable of producing disease; may be a virus, bacterium, protozoan, etc.

PELAGIC:

Referring to open water portion of a lake.

PESTICIDE:

Any chemical agent used for control of specific organisms, such as insecticides, herbicides, fungicides, etc.

PH:

A measure of acidity or alkalinity, measured on a scale of 0 to 14 with 7 being neutral and 0 being most acid, and 14 being most alkaline.

PHENOLS:

Organic compounds that are byproducts of petroleum refining, textile, dye, and resin manufacture. High concentrations can cause taste and odor problems in fish. Higher concentration can be toxic to fish and aquatic life.

PHOSPHORUS:

A nutrient that when reaching lakes in excess amounts can lead to overfertile conditions and algae blooms.

PLANKTON:

Tiny plants and animals that live in water.

POINT SOURCES:
Sources of pollution that have discrete discharges, usually from a pipe or outfall.

POLLUTION:
The presence of materials or energy whose nature, location, or quantity produces undesired environmental effects.

POLYCHLORINATED BIPHENYLS(PCBs):
A group of 209 compounds, PCBs have been manufactured since 1929 for such common uses as electrical insulation and heating/cooling equipment, because they resist wear and chemical breakdown. Although banned in 1979 because of their toxicity, they have been detected on air, land and water, and recent surveys have found PCBs in every section for the country, even those remote from PCB manufacturers.

POLYCHLORINATED ORGANIC COMPOUNDS:
A group of toxic chemicals which contains several chlorine atoms.

PRETREATMENT:
A partial wastewater treatment required from some industries. Pretreatment removes some types of industrial pollutants before the wastewater is discharged to a municipal wastewater treatment plant.

PRIORITY POLLUTANT:
A list of toxic chemicals identified by the federal government because of their potential impact in the environment and human health. Major discharges are required to monitor for all or some of these chemicals when their WPDES permits are reissued.

PRIORITY WATERSHED:
A drainage area about 100,000 acres in size selected to receive Wisconsin Fund money to help pay the cost of controlling nonpoint source pollution. Because money is limited, only watersheds where problems are critical, control is practical, and cooperation is likely are selected for funding.

PRODUCTIVITY:
A measure of the amount of living matter which is supported by an environment over a specific period of time. Often described in terms of algae production for a lake.

PUBLIC LAW 92-500 (CLEAN WATER ACT):
The federal law that set national policy for improving and protecting the quality of the nation's waters. The law set a timetable for the cleanup of the nation's waters and stated that they are to be fishable and swimmable. This also required all discharges of pollutants to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities.

Amendments in the Clean Water Act were made in 1977 by passage of Public Law 95-217, and in 1987.

PUBLIC PARTICIPATION;
The active involvement of interested and affected citizens in governmental decision-making.

PUBLICLY OWNED TREATMENT WORKS (POTW):
A wastewater treatment plan owned by a city, village or other unit of government.

RAP:
See Remedial Action Plan.

RECYCLING:
The process by which waste materials are transformed into new products.

REMEDIAL ACTION PLAN:
A plan designed to restore beneficial uses to a Great Lakes Area of Concern.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RF/FS):
An investigation of problems and assessment of management options conducted as part of a superfund project.

RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA):
This federal law amends the Solid Waste Disposal Act of 1965 and expands on the Resource Recovery Act of 1970 to provide a program which regulates hazardous wastes, to eliminate open dumping and to promote solid waste management programs.

RETRO-FIT:
The placement of an urban structural practice in an existing urban area, which may involve rerouting existing storm sewers and/or relocating existing buildings or other structures.

RIPARIAN:
Belonging or relating to the bank of a lake, river or stream.

RIPRAP:
Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RULE:
Refers to Wisconsin administrative rules. See Wisconsin Administrative Code.

RUNOFF:
Water from rain, snow melt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SECONDARY IMPACTS:
The indirect effects that an action can have on the health of the ecosystem or the economy.

SECONDARY TREATMENT:
Two-stage wastewater treatment that allows the coarse particles to settle out, as in primary treatment, followed by biological breakdowns of the remaining impurities. Secondary treatment commonly removes 90 percent of the impurities. Sometimes "secondary treatment" refers simply to the biological part of the treatment process.

SEDIMENT:
Soil particles suspended in and carried by water as a result of erosion.

SEICHES:
Changes in water levels due to the tipping of water in an elongated lake basin whereby water is raised in one end of the basin and lowered in the other.

SEPTIC SYSTEM:
Sewage treatment and disposal for homes not connected to sewer lines. Usually the system includes a tank and drain field. Solids settle to the bottom of the tank; liquid percolates through the drain field.

SLUDGE:
A byproduct of wastewater treatment; waste solids suspended in water.

SOLID WASTE:
Unwanted or discharged material with insufficient liquid to be free flowing.

STANDARDS:
See water quality standards.

STORM SEWERS:
A system of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUPERFUND:
A federal program which provides for cleanup of major hazardous landfills and land disposal areas.

SUSPENDED SOLIDS (SS):
Small particles of solid pollutants suspended in water.

SYNERGISM:
The characteristic property of a mixture of toxicants that exhibits a greater-that-additive cumulative toxic effect.

TACs:

Technical advisory committees that assisted in the development of the Remedial Action Plan.

TERTIARY TREATMENT:

See advanced wastewater treatment.

TOP-DOWN MANAGEMENT:

A management theory that uses biomanipulation, specifically the stocking of predator species of fish to improve water quality.

TOTAL MAXIMUM DAILY LOADS:

The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TOXIC:

An adjective that describes a substance which is poisonous, or can kill or injure a person or plants and animals upon direct contact or long-term exposure. (Also, see toxic substance.)

TOXIC SUBSTANCE:

A chemical or mixture of chemicals which through sufficient exposure, or ingestion, inhalation of assimilation by an organism, either directly from the environment or indirectly by ingestion through the food chain, will, on the basis of available information cause death, disease, behavioral or immunologic abnormalities, cancer, genetic mutations, or development of physiological malfunctions, including malfunctions in reproduction or physical deformations, in organisms or their offspring.

TOXICANT:

See toxic substance.

TOXICITY:

The degree of danger posed by a toxic substance to animal or plant life. Also see acute toxicity, chronic toxicity and additivity.

TOXICITY REDUCTION EVALUATION:

A requirement for a discharger that the causes of toxicity in an effluent be determined and measures taken to eliminate the toxicity. The measures may be treatment, product substitution, chemical use reduction or other actions that will achieve the desired result.

TREATMENT PLANT:

See wastewater treatment plant.

TROPHIC STATUS:
The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.

TURBIDITY:
Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):
A special outreach, education branch of the state university system.

VARIANCE:
Government permission for a delay or exception in the application of a given law, ordinance or regulation. Also, see water quality standard variance.

VOLATILE:
Any substance that evaporates at a low temperature.

WASTELOAD ALLOCATION:
Division of the amount of waste a stream can assimilate among the various dischargers to the stream. Results in the limit on the amount (in pounds) of chemical or biological constituent discharged from a wastewater treatment plant to a water body.

WASTEWATER:
Water that has become contaminated as a byproduct of some human activity. Wastewater includes sewage, washwater and the water-borne wastes of industrial processes.

WASTE:
Unwanted materials left over from manufacturing processes, refuse from places of human habitation or animal habitation.

WASTEWATER TREATMENT PLANT:
A facility for purifying wastewater. Modern wastewater treatment plants are capable of removing 95 percent of organic pollutants.

WATER QUALITY AGREEMENT:
The Great Lakes Water Quality agreement was initially signed by Canada and the United States in 1972 and was subsequently revised in 1978 and 1987. It proves guidance for the management of water quality, specifically phosphorus and toxics, in the Great Lakes.

WATER QUALITY LIMITED SEGMENT:
A section of river where water quality standards will not be met if only categorical effluent standards are met.

WATER QUALITY CRITERIA:

A measure of the physical, chemical or biological characteristics of a water body necessary to protect and maintain different water uses (fish and aquatic life, swimming, etc.).

WATER QUALITY STANDARDS:

The legal basis and determination of the use of a water body and the water quality criteria, physical, chemical, or biological characteristics of a water body, that must be met to make it suitable for the specified use.

WATER QUALITY STANDARD VARIANCE:

When natural conditions of a water body preclude meeting all conditions necessary to maintain full fish and aquatic life and swimming a variance may be granted.

WATERSHED:

The land area that drains into a lake or river.

WETLANDS:

Those areas that are inundates or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas.

WISCONSIN ADMINISTRATIVE CODE:

The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN FUND:

A state program that helps pay the cost of reducing water pollution. Funding for the program comes from general revenues and bonds and is based on a percentage of the state;s taxable property value. The Wisconsin Fund includes these programs:

Point Source Water Pollution Abatement Grant Program - Provides grants for 60 percent of the cost of constructing wastewater treatment facilities. Most of this program's money goes for treatment plant construction, but three percent of this fund is available for repair or replacement of private , onsite sewer systems.

Nonpoint Source Water Pollution Abatement Grant Program - Funds to share the cost of reducing water pollution nonspecified sources are available in selected priority watersheds.

Solid Waste Grant Program - Communities planning for solid waste disposal sites are eligible for grant money. $500,000 will be available each year to help with planning costs.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

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