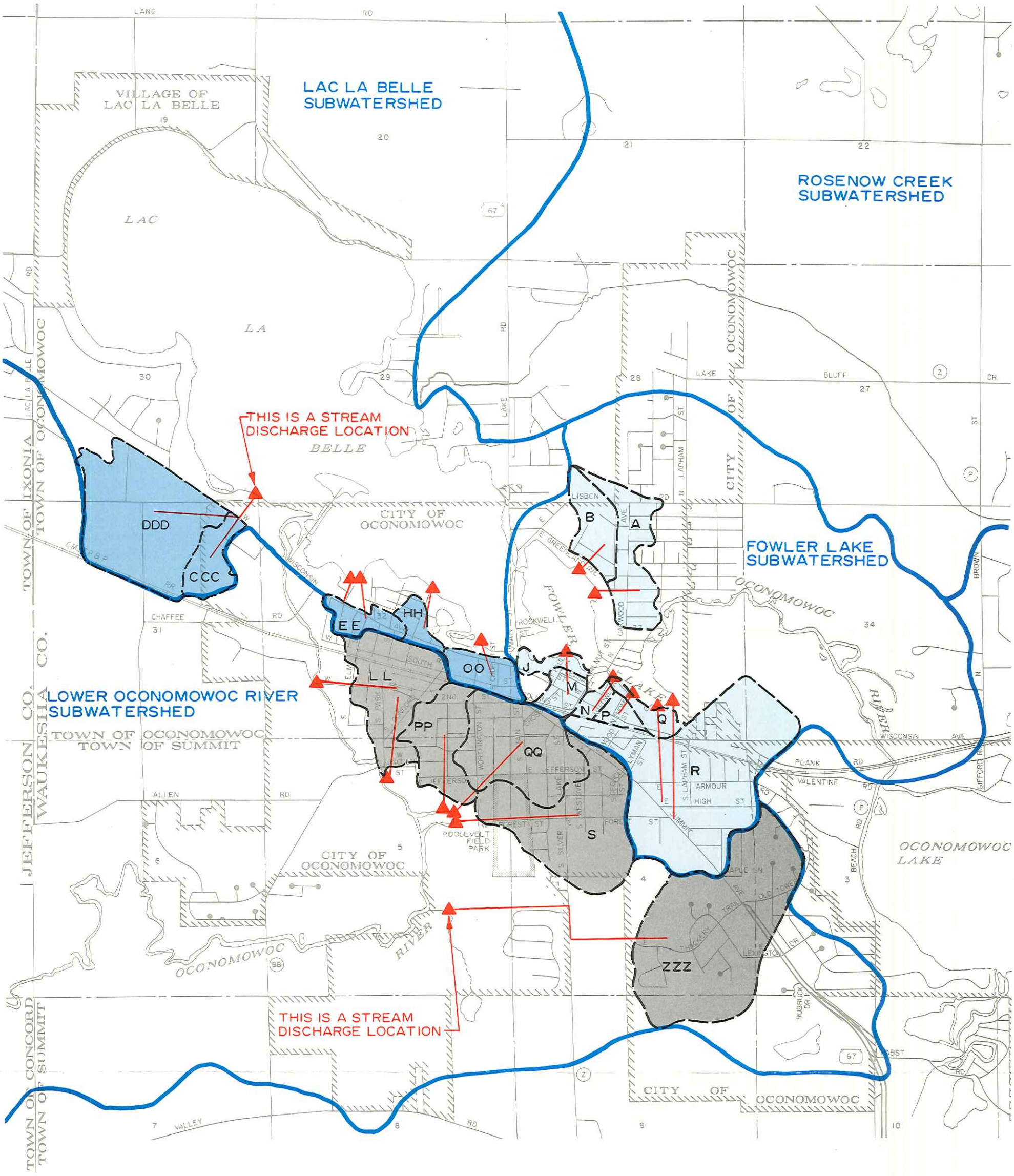
Map VIII-1

CRITICAL URBAN SUBBASINS DRAINING TO FOWLER LAKE, LAC LA BELLE, AND THE LOWER OCONOMOWOC RIVER



LEGEND

CRITICAL URBAN SUBBASINS

- SUBBASINS DRAINING TO FOWLER LAKE
- SUBBASINS DRAINING TO LAC LA BELLE
- SUBBASINS DRAINING TO LOWER OCONOMOWOC RIVER
- DDD SUBBASIN IDENTIFICATION
- SUBBASIN BOUNDARY
- STORM SEWER OUTFALL

GRAPHIC SCALE

0 1000 2000 3000 FEET

Table VIII-6 . Feasibility of Reducing The Phosphorus Loading To Fowler Lake

Pollutant Source Category	Portion of the Phosphorus Load Contributed By The Source Category	Portion of Phosphorus Load That Can Reasonably Be Removed From The Source Category	Feasible Phosphorus Load Reduction(1.)
Agricultural Runoff (sediment phosphorus)	5%	63%	3%
Agricultural Runoff (soluable phosphorus)	2%	5%	<1%
Urban Runoff	10%	50%	5%
Atmospheric Deposition(2.)	1%	0%	0%
Load From Oconomowoc Lake(2.)	82%	17%	14%
			Total: 22%

1. This figure = (column B)*(column C).
2. Existing loads based on information presented in
The Hydrology and Water Quality of Fowler Lake, Wisconsin(DRAFT)",
U.S.G.S., 1985.

addition, six acres of pasture management will be needed. Table III-7 also shows that application of conservation tillage and pasture management practices on upland areas will reduce the soil loss by 63 percent. This will still leave some lands eroding at a rate exceeding three t/a/y however. Additional practices will be needed on 16 acres, and will result in additional 90 tons per year of soil loss control. This would bring the total soil loss control to 68 percent.

The proposed strategy for controlling rural nonpoint pollution sources is presented below. Changes may be made in the inventory data as each site is visited by project staff during implementation. The strategy outlined below will be modified as necessary to reflect any changes in inventory information.

Pollutant Management Categories are as follows:

1. Upland Sheet and Rill Erosion Sources

   - Management Category I. These are the ranked farms which cumulatively contribute the top 50 percent of the portion of the soil loss that is occurring at a rate greater than three tons/acre/year, or those farms having at least 300 tons/year soil loss targeted for control. In addition, any single field in the inventory corridor eroding at a rate exceeding seven t/a/y will be placed in this management category.

   - Management Category II. The remaining lands in the area draining to Fowler Lake that have soil loss exceeding three t/a/y will be placed in this management category.

   - Management Category III. Fields that are currently losing less than three t/a/y are not eligible for cost sharing, and are placed in this management category.

Since the upland sheet and rill erosion survey did not assess waterway or gully erosion sites the need for controlling these sources will be assessed during implementation. Management categories will be assigned to any problem areas found by project staff.

URBAN POLLUTION CONTROL STRATEGY

The urban pollution control strategy addresses both developing and established urban areas in the Fowler Lake Subwatershed. Although the pollutant loads coming from the established urban areas must be considered important and in need of control, the fact is that the opportunities for retrofitting these areas with additional control measures discussed later on in this strategy are very limited. Although these opportunities will be evaluated and pursued as part of this project, the most fruitful rewards are most likely to come from protection efforts directed towards the developing areas.

Strategy For Developing Urban Areas

Development can be expected in both civil divisions, the City of Oconomowoc and the Town of Oconomowoc, in the subwatershed. The strategy for these areas includes taking steps to assure that construction site erosion, and future

stormwater runoff from these developing areas, do not cause water quality degradation of the Oconomowoc River or Fowler Lake. The City currently has an ordinance in place to limit erosion and sediment transport from larger scale construction activities, although single family home construction is generally excluded.

In order to prevent water quality degradation from construction site erosion, the following steps should be taken:

1. The City of Oconomowoc should review its existing construction erosion control ordinance, and make those changes necessary to meet the minimum requirements of the Department of Natural Resources for control of construction site erosion and stormwater runoff. This activity will be required in order for the city to be eligible for cost sharing on other management practices through the Nonpoint Source Control Program.

   Waukesha County and the Town of Oconomowoc should review mechanisms by which construction site erosion and stormwater runoff can be most effectively controlled in the unincorporated areas, and develop an ordinance or other form of control that meets the minimum requirements of the DNR.

   Assistance from the Department of Natural Resources will be made available to the city, town, and county for review and modification of existing ordinances. This is explained in greater detail in Chapter XIV.

2. The City of Oconomowoc should review its zoning and its projections of future development to identify those areas of future development where stormwater management control provisions contained in an ordinance may need to be supplemented by stormwater detention. The identification of such areas before they are developed would provide the opportunity for siting a detention facility before all of the land is developed and siting becomes impossible. This activity is required for the city to be eligible for cost sharing on other management practices through the Nonpoint Source Control Program.

   Where it is determined that such planning is desirable, the Department of Natural Resources will provide assistance to the City in developing a plan, as described in Chapter XIV.

3. The City of Oconomowoc, Waukesha County, the Department of Natural Resources, and the Wisconsin Department of Transportation should cooperate in assuring that adverse water quality impacts from the State Highway 16 and 67 reconstruction projects are minimized. Control of pollutants generated during construction, and from the established road surface, should be discussed and addressed. Monitoring the performance of contractors responsible for installing construction erosion control measures should be a high priority.

This cooperative effort can be an outgrowth of the agreement currently in effect between the Department of Natural Resources and the Department of Transportation, meant to provide increased levels of environmental protection during highway projects.

Strategy For Established Urban Areas

The City of Oconomowoc is currently performing many management practices which are important in reducing the urban pollutant loading to Fowler Lake. The City conducts a street sweeping program, which targets the downtown areas most heavily and includes outlying residential areas less frequently. The sweeping includes an intensive spring clean-up throughout the City. The City recently purchased a vacuum style sweeper, replacing an older, less efficient brush-style machine. The City also collects leaves during the fall. In addition to the street sweeping and leaf pick-up program, the City recently completed a grass filter strip between Fowler Lake and a portion of a large downtown parking lot located in urban sub-basin J.

There are several places in the City where urban runoff has a chance to infiltrate. For example, there are still some residential areas in the city served by grass swales. Where properly constructed and maintained, grass swales serve to increase the infiltration of runoff waters, thereby reducing the pollutant loading from adjacent land uses to the surface water system. However, where the design of a grassed swale is not adequate to serve as an infiltration device, it may become a maintenance and flooding problem. This condition does occur in some of the grassed swales in the City. In addition to the grassed swales, some of the rooftops in the downtown commercial area discharge to cisterns which provide infiltration and can be expected to filter pollutants from the percolating waters.

The urban pollution control practices that could either be initiated or enhanced in the urban area draining to Fowler Lake include street sweeping, cleaning of catch basins, infiltration of runoff from commercial and industrial rooftops and parking areas, infiltration of runoff from rooftops in residential areas served by storm sewers, renovation of grassed swales, and stormwater detention. Not all of these practices are equally cost-effective, however, since they remove pollutants to varying degrees and vary widely in cost.

In order to determine which practices to evaluate in detail for application in the Fowler Lake, Lac LaBelle, and Lower Oconomowoc River subwatersheds, a generalized cost-effectiveness analysis was made combining all urban lands in these three subwatersheds. The analysis evaluated fourteen alternatives that were formulated as different combinations of the practices applicable to this area.

Each alternative, or control program, was evaluated for cost and its effectiveness in reducing pollutant loading beyond that brought about by the city's current management practices. The only alternatives where current programs could not totally be accounted for were spring street sweeping and fall leaf pick-up. The cost-effectiveness analysis involving these programs therefore assumes that nothing is currently being done by the City. As a result, the pollutant load reductions for street sweeping calculated as part of this analysis are overestimated.

Costs used in the analysis are expressed as total annual cost. This cost includes capital costs amortized over a 20 year period at a 9 percent interest rate, and annual operation and maintenance costs. The pollutants evaluated

included heavy metals, such as lead, copper, and zinc; phosphorus; suspended solids; fecal coliform bacteria; dissolved solids, and flow. Figures VIII-1 and VIII-2 present the results of this analysis. In these figures, the desirable alternatives are to the lower right, since these programs represent high pollution control at a relatively low cost.

Figure VIII-1 shows the results of the analysis for lead. For this pollutant, the most cost-effective urban pollution control programs include detention, infiltration, or combinations of these practices. Figure VIII-2 shows the results of the cost effectiveness analysis for the control of phosphorus, and the conclusions are similar. Although street sweeping appears to be cost effective for phosphorus, the data represented in the graph do not account for the existing street cleaning program conducted by the city. Therefore, the graph actually depicts more pollution reduction than could actually be achieved above the current city program.

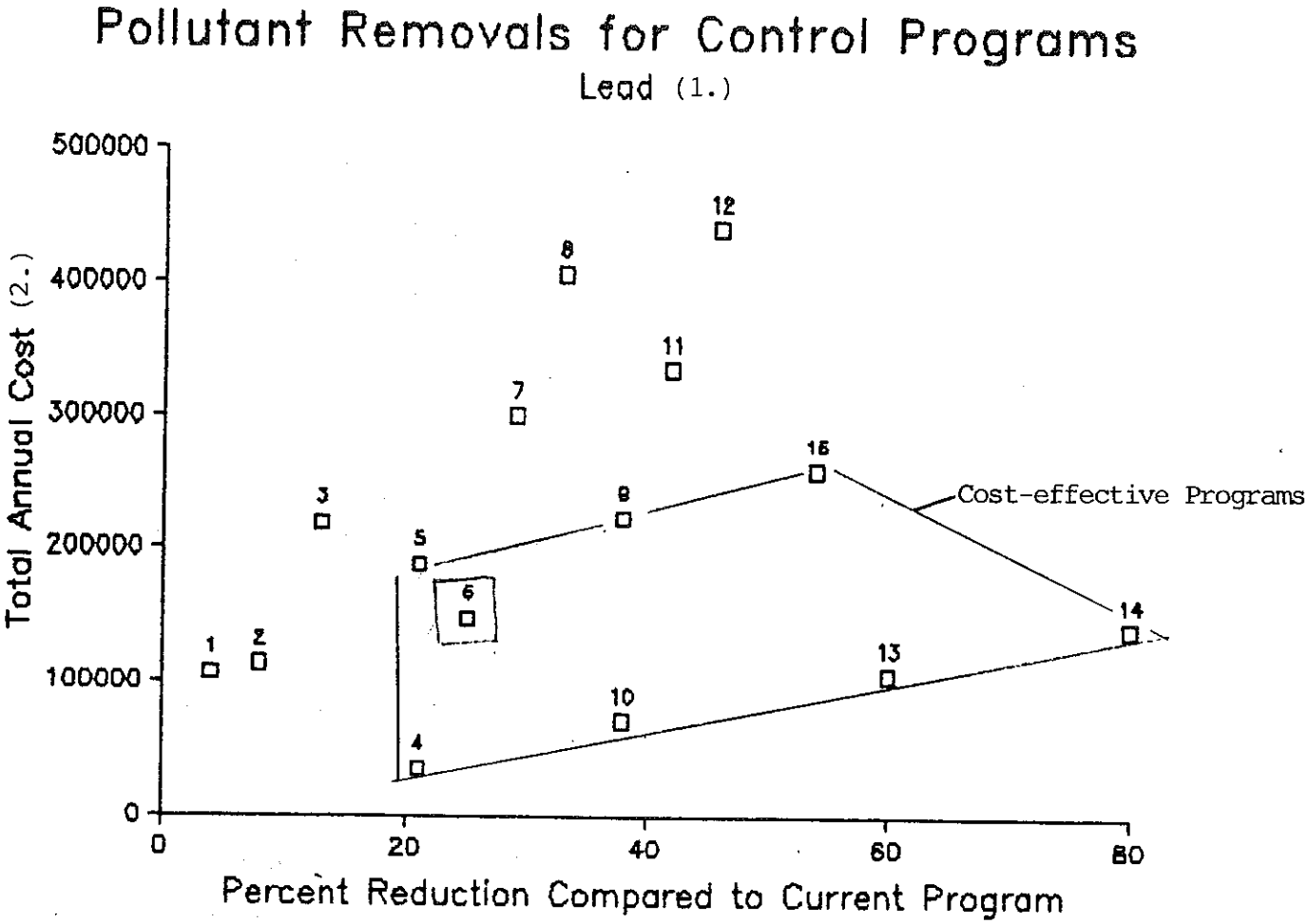
Although the existing city street sweeping program is very important, acceleration of the street cleaning program is probably not cost-effective. This is consistent with intensive research on street sweeping conducted in the Milwaukee area. This research showed that accelerated street cleaning does not provide cost-effective reduction in pollutant loading. For most urban areas, the effectiveness of street sweeping in reducing pollutant loads is relatively low from late spring until early fall. However, it must be stressed that spring and fall street cleaning and leaf pick-up, such as that currently practiced by the City, is very important. Early intensive street cleaning may reduce the street pollutant load for the first month of the season by as much as 50 percent (Bannerman et al., 1983).

For fecal coliform bacteria, flow, and dissolved materials, the only reasonable control measure is infiltration. All other practices have little or no affect on these pollutants. For fecal coliform bacteria, which come mainly from pet wastes, the most effective control is probably removing pet wastes from lawns, sidewalks, and street curbs before they are washed into the storm sewer system.

Based on this general analysis, detention, infiltration, and combinations of the two were evaluated in further detail as feasible control measures in the Fowler Lake Subwatershed.

Table VIII-7 presents additional cost-effectiveness information developed specifically for the application of infiltration and detention practices applied to urban lands in the Fowler Lake Subwatershed. The table shows the effectiveness of detention placed at the bottom of each sub-basin. The table assumes that any individual detention basin would be designed so that 80 percent of the influent lead load to the basin would be controlled. Similar removal efficiencies would be found for suspended solids (90 percent) and copper (80 percent). Basins capable of this removal efficiency for lead, copper, and suspended solids would remove 55 percent of the phosphorus, zinc, and COD load. As previously mentioned, detention basins are ineffective in reducing flow, total solids, or fecal coliforms. The size of the detention basins is approximate, and is based on the acreage and land use mix that is tributary to the detention basin. Although detention that would treat all of sub-basin R is not particularly cost-effective, smaller detention sites

FIGURE VIII-1.



FOOTNOTES

1. Copper and Suspended Solids behave similarly.
2. Includes capital cost amortized at 9% over 20 years, labor and maintenance. Does not include land costs.

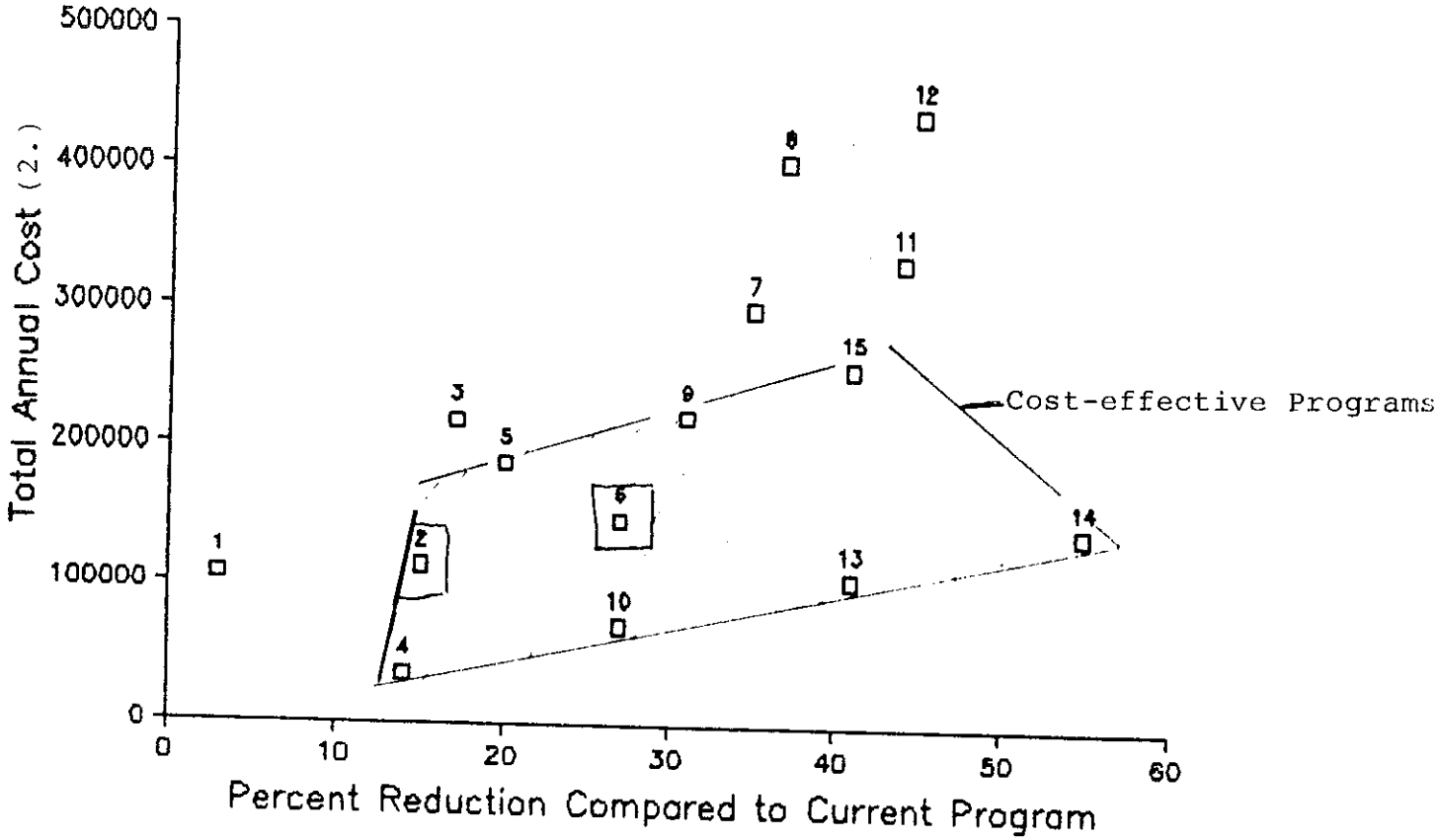
PROGRAM DESCRIPTIONS

1. Catchbasin cleaning
2. Street cleaning
3. Street cleaning and catchbasin cleaning
4. Wet detention basins for 25% of the land area
5. Infiltration of 50% of the commercial and industrial rooftops and parking lots
6. Street cleaning and 25% wet detention
7. Street cleaning and infiltration
8. Street cleaning, catchbasin cleaning, and infiltration
9. Infiltration and 25% wet detention
10. Wet detention basins for 50% of the land area
11. Street cleaning, infiltration, and 25% wet detention
12. Street cleaning, infiltration, catchbasin cleaning, and 25% wet detention
13. Wet detention basins for 75% of the land area
14. Wet detention basins for 100% of the land area
15. Infiltration and 50% wet detention

Figure VIII-2

Pollutant Removals for Control Programs

Phosphorus (1.)



FOOTNOTES

1. Zinc and COD behave similarly, except programs 2 and 6 are less cost-effective than for phosphorus.
2. Includes capital cost amortized at 9% over 20 years, labor and maintenance. Does not include land costs.

PROGRAM DESCRIPTIONS

1. Catchbasin cleaning
2. Street cleaning
3. Street cleaning and catchbasin cleaning
4. Wet detention basins for 25% of the land area
5. Infiltration of 50% of the commercial and industrial rooftops and parking lots
6. Street cleaning and 25% wet detention
7. Street cleaning and infiltration
8. Street cleaning, catchbasin cleaning, and infiltration
9. Infiltration and 25% wet detention
10. Wet detention basins for 50% of the land area
11. Street cleaning, infiltration, and 25% wet detention
12. Street cleaning, infiltration, catchbasin cleaning, and 25% wet detention
13. Wet detention basins for 75% of the land area
14. Wet detention basins for 100% of the land area
15. Infiltration and 50% wet detention

Table VIII-7. Cost-Effectiveness of Stormwater Detention Basins and General Infiltration For Reducing The Urban Pollutant Load To Fowler Lake.

	Sub-basin Location	Size of Detention (2.)	% Urban Pollutant Load Reduction		Capital Cost(1.)			Total Cost per % Lead Removed
			Lead	Phosphorus	State Share (3.)	Local Share (4.)	Total	
Detention								
	R(5.)	10 acres	21%	14%	$276,500	$118,500	$395,000	$18,800
	P	.8 acres	10%	4%	$22,400	$9,600	$32,000	$3,200
	M	.6 acres	8%	4%	$18,200	$7,800	$26,000	$3,200
	N	.5 acres	6%	3%	$14,350	$6,150	$20,500	$3,400
	A	1.5 acres	4%	4%	$42,000	$18,000	$60,000	$15,000
	Subtotal	13.4 acres	49%	29%	$373,450	$160,050	$533,500	
Infiltration								
	(6.)		26%	21%	$409,500	$175,500	$585,000	$22,500
TOTAL			75%	50%	$782,950	$335,500	$1,118,500	

1. Figures do not include land costs.
2. Sizing could be reduced. See text for explaination.
3. The state share will be 70% of the total capital cost.
4. The local share will be 30% of the total capital cost. In addition, there will be annual operation and maintenance costs, which are not reflected in the figures.
5. Location of several small detention basins within R to serve critical land uses would be more cost effective would be more cost effective and needs further investigation.
6. Assumes infiltration of 50% of rooftops and parking surfaces in the commercial and industrial areas, regardless of their location in the watershed.

serving concentrations of commercial land uses within the sub-basin should be investigated as an alternative. This approach would be a more cost-effective approach, since the detention basins would be smaller, cost less, and still capture most of the pollutant load. Sub-basins serving P, M, and N are also relatively good choices, providing land could be found. Where there is no place for a detention basin within a sub-basin, piping of stormwater to another area more suitable for detention may feasible. However, the increased costs due to pumping could change the overall cost-effectiveness of the practice and make it an unacceptable alternative.

It should be noted that smaller detention basins than those assumed in this analysis could be constructed, although there would be some reduction in pollutant removal efficiency. For example, a basin that is 55 to 60 percent smaller than the basin size assumed in Table VIII-7 would provide 75 percent of the pollutant removal at a 55 to 60 percent reduction in cost. Where land costs are high, or land sufficient to construct a larger basin is not available, smaller basins may be an alternative provided a reasonable overall reduction in the pollutant loading can still be achieved.

Table VIII-7 also shows the cost effectiveness of infiltration. These figures assume application of infiltration practices affecting 50 percent of the commercial and industrial rooftops and parking lots, and redirection of some downspouts in residential areas so that the roof runoff goes to lawns instead of to driveways.

The feasibility of increasing stormwater infiltration and achieving stormwater detention in the established urban area of Oconomowoc is uncertain at this time, and needs to be evaluated further. Potential groundwater impacts from stormwater infiltration need to be more carefully considered as part of the feasibility study.

Based on the information developed to date concerning pollutant loading from the established urban area, and the recognition that the feasibility of implementing control measures in the established areas needs to be further investigated, the following control strategy is proposed for the established urban areas draining to Fowler Lake:

1. The City of Oconomowoc should investigate the feasibility of increasing infiltration of runoff from critical land uses, including commercial and industrial rooftops and parking lots. The City should also investigate the feasibility of providing stormwater detention for runoff from the critical urban sub-basins identified in Table VIII-7.

2. If the feasibility report indicates increased infiltration of rooftops and parking areas is feasible, the City should work to encourage landowners to install infiltration practices through the priority watershed project. If the report indicates detention of stormwater coming from the critical urban sub-basins is feasible, the City should work through the priority watershed project to install detention basins where possible, given economic and political constraints.

3. The City should maintain existing infiltration, to the extent possible, in its established urban areas. Where the City is considering improving

drainage in inadequate grassed swales, it should explore alternatives to curb and gutter drainage served by conventional storm sewer. Alternatives such as reconstructing the grassed swales to serve as infiltration devices, or curb and gutter served by infiltration outlets, should be investigated.

4. The City should actively promote, through an information and education program, the redirection of roof drains in residential areas away from storm sewers and paved areas and onto pervious areas, such as lawns, where ever it is possible.

5. The City should review its cleaning schedule for streets and parking areas so that optimal spring cleaning in the downtown area and fall sweeping in the areas of heaviest leaf-fall is assured. The fall leaf collection program should also be reviewed to determine if changes could be made to more effectively protect water quality. The need for better public education as a means to improve the efficiency and effectiveness of the leaf collection and street sweeping programs should also be evaluated.

   In addition, the City should work with owners of large parking areas to assure that these areas are adequately cleaned during the spring and fall.

6. The City should review its existing program of catch basin cleaning, and make minor modifications as needed to increase water quality protection.

The Department of Natural Resources will provide technical or financial assistance to the City of Oconomowoc as needed to:

1. study the feasibility of increasing infiltration of runoff from commercial and industrial rooftops and parking areas,

2. study the feasibility of detaining stormwater from critical sub-basins identified in Table VIII-7,

3. study the need for modifications in the street cleaning and leaf collection programs, and

4. develop information and education programs to promote roof drain redirection, proper leaf management, and other basic urban housekeeping practices, and to inform the public how it can assist the city with its street cleaning effort.

Details of these assistance packages can be found in Chapter XVIV. The Department of Natural Resources will provide cost sharing assistance for practices designed to increase infiltration and provide stormwater detention in critical sub-basins. Details of the cost sharing are also presented in Chapter XIV.

CHAPTER IX

THE AREA DRAINING TO LAC LABELLE:
The Lac LaBelle Subwatershed
Rosenow Creek Subwatershed

EXISTING WATER RESOURCES CONDITIONS

The area draining to Lac LaBelle includes the Lac LaBelle Subwatershed and the Rosenow Creek Subwatershed. The Lac LaBelle Subwatershed, including the lake surface, covers 4,583 acres. The Rosenow Creek Subwatershed covers 3,249 acres. Lac LaBelle and Rosenow Creek are the only major surface water resources. Subwatersheds are shown on Map II-1.

Rosenow Creek

Rosenow Creek is a 3.6 mile long tributary to Lac LaBelle, originating in section 26 of Oconomowoc Township. The creek was surveyed by the Department of Natural Resources in the spring of 1981 to determine whether or not the stream contained a trout population (DNR Internal Office Memorandum, June 3, 1981).

During the survey, two substantial springs were found to contribute groundwater to the creek in the northwest quarter of section 27. These two springheads have been ditched, and one has been excavated into a .25 acre shallow farm pond. Another feeder stream originates in a farm pond located in section 22, and flows into Rosenow Creek along the border of sections 27 and 28.

The only spawning gravel located during the 1981 survey was on the border of sections 27 and 28 of Oconomowoc Township. Entering section 28 from the east, the creek flows through 40 acres of land owned by the Oconomowoc School District, and 40 acres of floodplain lands owned by the City of Oconomowoc. Some of the uplands in this area are within a developing subdivision, where eroding construction sites pose a potential hazard to water quality.

The survey discovered a large number of brown trout, along with a few brook trout. The upstream limit of the fishable trout population was found to be where the two springs enter Rosenow Creek, and the downstream limit was State Highway 67. The greatest abundance of trout was found within the School District property; fewer trout were found just upstream of State Highway 67. Carp dominated the fish population below State Highway 67. Trout were not found in this segment.

Water quality data for Rosenow Creek includes grab samples collected near the mouth of the creek between May 1976 and July 1977, and biotic index samples collected during the spring and fall of 1979 at the Nature Center Road bridge in section 28 of Oconomowoc Township (DNR Files). The grab samples indicate that phosphorus concentrations reached .71 mg/l and fecal coliform counts reached 70,000. The biotic index showed somewhat degraded water quality conditions in Rosenow Creek. The spring sample was 2.03, indicating good water quality, and the fall sample was 2.33, indicating fair water quality.

These samples were collected below the point where the tributary, originating in section 22, enters Rosenow Creek. Water quality in this tributary was noted during the 1981 survey to be poorer than that in the mainstem. Although somewhat degraded, the water quality is not expected to limit the trout population (DNR Fish Manager, personal communication). Although trout are present in Rosenow Creek, the habitat is degraded. Much of the stream has been ditched. Cropland erosion, cattle access, and developing residential construction site erosion in the Town of Oconomowoc have resulted in siltation and loss of bank cover, and in many places the stream channel is wide and shallow. Siltation problems are severe downstream from Highway 67. Some of the siltation below State Highway 67 may be from erosion of the streambank in areas where purple loosestrife has forced out the native streambank vegetation.

Despite these problems, the spawning gravel, combined with the flow from the two springs, provide limited trout habitat and a naturally reproducing trout population. Protection of the springheads is needed to increase natural reproduction, and to add more fishable stream area. Channel narrowing and addition of bank cover is needed to improve habitat along the main stem of the creek. Some of the improvements to the main channel have been started by the Department of Natural Resources. With these improvements, it is suspected that Rosenow Creek can support 200 to 250 pounds per acre of brown trout, compared to the 60 pounds per acre that currently exist.

Lac LaBelle

Lac LaBelle is the sixth and final lake in the chain connected by the Oconomowoc River. Water resources information for the lake and its major inlets was collected between May 1976 and April 1977, and presented as part of A Water Quality Management Plan For Lac LaBelle (SEWRPC, 1980). The lake was sampled again during April, June, July, and August 1984, and the results presented in a report to the Lac LaBelle Management District (USGS, 1984). Sampling similar to that conducted during 1984 has been completed for 1985 (Personal Communication, Steven Fields, USGS).

Lac LaBelle is a natural 1,117 acre glacial lake with water levels controlled by an outlet structure. During the 1976-1977 lake study, the Oconomowoc River provided 80 percent of the inflow to the Lake, Rosenow Creek provided 11 percent, and direct precipitation accounted for six percent.

The remaining three percent of the inflow was contributed by the direct drainage area. Three channels drain this direct drainage area. Golf Course, or LaBelle Creek, drains an agricultural area and enters the lake along the northeast shore. Saeger Creek, which drains a wetland, enters along the northwest shore. Finally, there is a creek which enters just north of Lakeview Lane, along the lake's southwest shore. This creek drains approximately 182 acres, which is comprised of about 70 percent row crops, 15 percent open land and woodlot, and 15 percent commercial and industrial land, including an industrial park (SEWRPC, 1984).

The lake gained groundwater during May and June, 1976, and lost groundwater from July through October 1976. This pattern can be expected to vary considerably.

The lake has four deep holes ranging from 30 to 45 feet deep. About 22 percent of the lake area is over 20 feet deep. Dissolved oxygen in these deeper parts of the lake becomes seriously reduced during the summer months. During winter, concentrations are adequate at all depths to support a wide variety of fish species.

The lake has an extensive shallow water area, with 38 percent of the lake area less than five feet deep and 56 percent less than 10 feet deep. The average depth of the lake is nine feet. Silt is the dominant bottom material, covering 66 percent of the lake bottom. In the shallow water areas, sand is the dominant material except along the east and northeast shore where silt and muck predominate. Purple loosestrife has become a problem in some of the shoreline areas, where it is forcing out the native wetland vegetation and resulting in some destabilization of the shoreline. Generally, weed growth in the lake is sparse to moderate. This is attributed in part to poor rooting substrate for the plants, and also to carp activity which is damaging aquatic weeds.

Table IX-1 summarizes the water quality data collected from three sites on Lac LaBelle from 1976-1985. These sites include one in the center of the lake, one in the southeast portion of the lake, and one in the northwest portion. Phosphorus concentrations were very different over the sampling period depending on the year and the location in the lake. Overall, phosphorus concentrations were high during 1976-77, ranging from .044 mg/l to .063 mg/l at the three sites during spring turn-over. The most phosphorus at this time of year was found in the northwestern part of the lake. During 1984-85, the phosphorus concentrations during spring turn-over were very low (less than .01 mg/l) at all sites with one exception. During 1984, the concentration was .10 mg/l at the northwest site, or about ten times the other measured concentrations.

This information indicates that the phosphorus concentration in Lac LaBelle is varies significantly, possibly in response to changes in pollutant loadings from Rosenow Creek and the direct drainage area to the lake. Monitoring stations in the Menominee River Watershed showed that during 1976 and 1977 major runoff events occurred that resulted in pollutant loadings greatly in excess of subsequent years.

The elevated phosphorus concentrations in the northwestern part of the lake could be due to many factors, including carp or wind activity stirring up phosphorus-rich sediment, or nonpoint pollutant sources draining to this area from the Golf Course Creek drainage. Important nonpoint pollutant sources occur in this drainage, as explained in the next section of this chapter. Although limited in scope, the water quality monitoring conducted on this creek between March and July of 1977 showed phosphorus concentrations as high as .53 mg/l and fecal coliform bacteria counts as high as 30,000. Monitoring during rainfall or runoff events would better characterize the loading coming from this drainage. Other potential sources of phosphorus include on-site septic systems. A recently completed feasibility study indicated problem areas include residences in the area of Blackhawk Drive, and residences in certain parts of the lake's western shoreline.

Table IX- 1. Existing Water Quality Conditions For Lac LaBelle(1.)

Parameter	Sampling Location	Year	Average	Range	Trophic Index	Wisconsin Lakes Water Quality Index(2.)
Chlorophyll-a (ug/l)(3.)	All Sites Combined	1976-77	2.7	.3 - 8.0	40	very good
		1984-85	3.0	<.1 - 8.0	41	very good
Secchi Depth (feet)(3.)	All Sites Combined	1976-77	5.2	4.5 - 6.5	53	fair
		1984-85	6.3	3.9 - 8.2	51	fair
Total Phosphorus (mg/l)(4.)	Center	1976-77	.044	.043-.045	59	fair
		1984	<.01	-		excellent
	Southeast	1976-77	.037	-	56	fair
		1984-85	.006	.003-.010	32	excellent
	Northwest	1976-77	.063	-	64	poor
		1984	.10	-	71	poor
		1985	.006	-	32	excellent

1. 1976-77 data from DNR monitoring. 1984-85 from USGS monitoring.
2. See Table III-2.
3. Average summer concentrations.
4. Average concentration during spring turn-over.

Unlike the phosphorus concentrations, the chlorophyll concentrations and secchi depths were fairly consistent from site to site and from year to year. Chlorophyll concentrations were relatively low during all sampling periods. This is consistent with observations that algae blooms occurred only occasionally during the 1976-77 study year, and nuisance shoreline accumulations did not develop. Since the measured concentrations were less than what would have been expected given the phosphorus concentrations during 1976-77, it is probable that some factor other than phosphorus concentration is limiting the algae growth in Lac LaBelle. The water clarity measurements may provide a clue. The water clarity throughout the sampling period was less than that expected from the algae growth. It is possible that general turbidity is limiting the water clarity which in turn may be affecting algae growth.

This turbidity may be caused in part by the extensive carp population which has been a nuisance in the lake for many years. Other sources of turbidity include pollutant loadings from Rosenow Creek, and from the direct drainage area to the lake. Large sediment plumes have been reported in the lake at the mouth of the creek which enters just north of Lakeview Lane. This sediment loading has been a concern of the City of Oconomowoc, and reduction in this sediment load has been one objective of a stormwater management plan developed by SEWRPC for the 180 acre area, including the industrial park, which drains to the lake via Rosenow Creek (SEWRPC, 1984).

Fish populations in Lac LaBelle have been heavily damaged by carp. Since 1960, when a mechanical carp barrier located at the Lac LaBelle outlet was removed, there has been an increase in the carp population and corresponding declines in the game and panfish catch. The carp are also suspected of overgrazing large zooplankton in the lake, leaving few to support the more desirable gamefish. A major fish rehabilitation project will be conducted on Lac LaBelle during the spring of 1986 in an attempt to reduce the carp and foster an increase in game and panfish species. In addition to treatment of the lake, the Oconomowoc River will be treated, and a barrier to fish migration established on the Oconomowoc River just upstream of its confluence with the Rock River.

The water quality studies conducted on Lac LaBelle did not include monitoring for toxic substances in urban runoff, or evaluations of the environmental impacts commonly associated with many urban pollutants. The runoff from urban areas in the subwatershed is of concern, however, because the presence of toxic materials in urban runoff has been well documented and the body of evidence linking this pollution source with water quality impacts is growing (Bannerman et al, 1983; Pitt, 1985). These toxic materials include heavy metals, such as lead, copper, and zinc, pathogens and fecal bacteria, pesticides, and a wide range of hazardous organic compounds. Environmental impacts caused by stormwater runoff of these materials have been documented in waterbodies near fairly large urban areas, including Milwaukee. Impacts include elevated concentrations of heavy metals in bottom sediments, dissolved oxygen depressions, severe flow fluctuations, and degraded fish and aquatic insect populations. In addition, extremely high bacteria counts have been measured in urban stormwater discharges and receiving waters.

Table IX-2. Feasibility of Reducing The Phosphorus Loading To Lac LaBelle.

Pollutant Source Category	Portion of the Phosphorus Load Contributed By The Source Category	Portion of Phosphorus Load That Can Reasonably Be Removed From The Source Category	Feasible Phosphorus Load Reduction(1.)
Agricultural Runoff (sediment phosphorus)	26%	69%	18%
Agricultural Runoff (soluable phosphorus)	13%	5%	1%
Barnyard Runoff	<1%	90%	<1%
Manure Stack Runoff	<1%	90%	<1%
Runoff of Winterspread Manure	1%	90%	1%
Urban Runoff	2%	30%	1%
Septic Systems(2.)	3%	90%	3%
Atmospheric Deposition(2.)	10%	0%	0%
Load From Fowler Lake(2.)	44%	22%	10%
			Total with Septic System Control: 34%
			Total Without Septic System Control: 31%

1. This figure = (column B)*(column C).
2. Existing loads based on information presented in The Water Quality Management Plan For Lac LaBelle(SEWRPC, 1980).

There are three public beaches on Lac LaBelle, all located within the City of Oconomowoc. City Beach is located at a city park, just west of the southern outlet from Fowler Lake. The other two beaches are located on the southeast and southwest shores of the lake, at the ends of Pine Street and North Park Street respectively.

In general, public boating access to Lac LaBelle is adequate.

LAND USE AND NONPOINT POLLUTION SOURCES

Table IX-2 shows the estimated loading of phosphorus to Lac LaBelle, and the relative importance of pollutant sources within the subwatershed. The main sources of phosphorus to Lac LaBelle are flow from Fowler Lake, which provides 44 percent of the loading, and agricultural croplands, which contributes 39 percent of the phosphorus load. Animal waste runoff, urban runoff, and septic systems are relatively insignificant phosphorus sources.

The urban areas in the subwatershed are the major source of pollutants such as lead, copper, and zinc, and some of the hazardous organic compounds. Rural areas are also sources of some organic compounds, such as those found in pesticides.

Rural Land Use and Pollutant Sources

Table III-4 shows the portions of the Rosenow Creek and Lac LaBelle subwatersheds that were inventoried for land use and nonpoint pollutant sources. Combined, rural land uses covered 3,468 acres, or 75 percent of the lands inventoried in these two subwatersheds.

Table III-5 shows the composition of rural lands inventoried in the Rosenow Creek and Lac LaBelle subwatersheds. In the Rosenow Creek Subwatershed, croplands cover 893 acres, or 64 percent of the inventory corridor. Most of this cropland is in crop rotation, with relatively little in continuous row crops. Little of this cropland has conservation practices applied at this time. A significant portion of the rural inventory corridor is covered by lands having a low potential to generate sediment and associated pollutants. These uses include wetland, grassland, and woodlot.

In the Lac LaBelle Subwatershed, croplands cover 1161 acres or 52 percent of the rural inventory corridor. Unlike the Rosenow Creek Subwatershed, however, most of this cropland is planted to row crops year after year and has a higher potential to generate pollutants. Like the lands in the Rosenow Creek Subwatershed, few conservation practices have been applied. Wetlands, grasslands, and woodlots cover almost half of the rural inventory corridor in the subwatershed.

Table III-6 summarizes sheet and rill erosion characteristics for lands in these subwatersheds. In the area draining to Lac LaBelle, about 16,000 tons/year of soil are eroded from lands in the rural inventory corridor. About 80 percent of this, or 13,000 tons/year, occurs on lands in the Lac LaBelle Subwatershed, principally those in the Golf Course Creek drainage area. Another important area of sediment is the 180 acre sub-basin

that drains into Lac LaBelle via a creek under Lakeview Lane. Of this 180 acres, 120 are in row crops and need conservation practices applied to control erosion.

Rates of erosion in the Lac LaBelle Subwatershed are very high, with 72 percent of the soil loss occurring on lands losing soil at a rate exceeding 10 tons/acre/year, and 90 percent occurring on lands eroding at rates exceeding five tons/acre/year.

Twenty percent, or about 3,000 tons/year of the erosion in the area draining to Lac LaBelle, occurs on lands in the Rosenow Creek Subwatershed. One-third of this erosion occurs at rates of five to 10 tons/acre/year, and 58 percent occurs on lands losing soil at rates exceeding three tons/acre/year. About 40 percent of the erosion in the Rosenow Creek Subwatershed occurs at rates less than three tons/acre/year, and is not targeted for control through the Oconomowoc River Priority Watershed Project.

Rosenow Creek was surveyed for streambank erosion, since an intensive effort is underway to increase the trout habitat in portions of the stream. In total, there were an estimated 27,000 feet of eroding banks identified along the creek. These areas of bank erosion are adjacent to, or upstream of the principal trout waters and spawning beds of Rosenow Creek. The cause of nearly two-thirds of these eroding stream banks (17,000 feet, located in sections 27 and 29 of Oconomowoc Township) is of unknown origins. However, along most of this distance the banks were shaded by trees so that little vegetation could grow and stabilize the banks. Along the other 10,000 feet of eroding banks, cropping too close to the stream and cattle trampling the streambanks were identified as the major causes of erosion. The major sites of erosion caused by these agricultural activities occur in sections 22 and 27 of Oconomowoc Township.

A determination was made during the initial phases of the inventory that roadside erosion was not widespread enough to warrant a detailed survey. A detailed assessment of gully erosion in rural portions of the inventory corridor was not made during this nonpoint source inventory, either. It is expected, however, that roadside and gully stabilization needs will be found in some areas by LCC staff during project implementation. This is indicated by a preliminary inventory of nonpoint sources in the area draining to Lac LaBelle made during preparation of A Water Quality Management Plan For Lac LaBelle (SEWRPC, 1980). In addition to areas of cropland erosion identified by the inventory, three sites of waterway erosion covering 2.4 acres, and three sites of roadside erosion covering .4 acres were identified. These six site numbers, as referenced in the SEWRPC Staff Memorandum (1983), are 1, 7, 9, 18, 22, and 23.

A detailed lakeshore erosion survey was conducted using a boat to scan the shoreline of Lac LaBelle. Although shoreline erosion is a common concern of many lakeshore property owners who may be losing property, only those areas judged to be having a significant impact on the public use of the lake were considered critical areas for purposes of the Wisconsin Nonpoint Source Water Pollution Abatement Program. Although no significant sites were found, there are two areas that will be investigated further. One is an uncontrolled

access point located at the end of a Town of Oconomowoc fire road off of Mary Lane Court. The other is erosion of fill materials placed behind the established bulkhead line in the Village of Lac LaBelle.

Tables III-8 and III-9 show the pollution potential from animal waste in Rosenow Creek and Lac LaBelle subwatersheds. Table III-8 shows that barnyard runoff is not a widespread concern in either subwatershed. Of the six livestock operations in this area, only three barnyards produce runoff that flows to surface waters. Only one of these actually contributes pollutants to a surface water (Rosenow Creek). This barnyard produces relatively little pollutant load to the creek and Lac LaBelle, but could be causing localized impacts in the creek.

Manure spreading poses more of a hazard. Table III-9 shows that about 18 acres of critical lands in the Lac LaBelle Subwatershed can be expected to be winterspread with manure each year, principally in the Golf Course Creek drainage tributary to the northern portion of Lac LaBelle. In the Rosenow Creek Subwatershed, 18.5 acres of critical lands can be expected to be winterspread each year. In both subwatersheds, the greatest hazard is expected to be spreading on frozen lands too close to a surface drainage channel. Although the hazard posed by improper disposal or storage of manure during other times of the year was not assessed, it may also pose a problem and will be evaluated by local staff during implementation of this project.

There are estimated to be 70 acres of cropped organic soils in the area draining to Lac LaBelle. Some of this area may have been ditched or tiled for drainage purposes, and as such would have a significant potential to contribute soluable phosphorus to surface waters if fertilizer applications are not properly managed.

Urban Land Use and Nonpoint Pollutant Sources

This discussion is divided into two parts. The first part concerns developing areas as pollution sources. Developing areas are considered to include a wide array of situations including urban renewal projects, individual site development within the existing urban area, or new subdivision development. The second part concerns existing urban areas as pollution sources. These areas include established residential, commercial, industrial, highway, and open space land uses.

Developing Areas

Development was occurring on three acres of land within the inventory corridor of the Rosenow Creek and Lac LaBelle subwatersheds at the time land use was surveyed for this project. However, land development patterns are dynamic and often unpredictable, and accurate predictions of the extent, timing, and location of lands that will be undergoing development are difficult to make. In 1975, an estimated 19 acres were under construction in this area. Most of these acres were within the present inventory corridor. The population growth in the area draining to Lac LaBelle is expected to grow at a higher rate than in either Waukesha County or the southeastern region of Wisconsin, with an additional 500 acres of urban development expected over the next 15 years (SEWRPC, 1980). Some of this increase will undoubtedly occur within critical distances of either Rosenow Creek or Lac LaBelle.

Table IX-3. Pollutant Loading From Urban Land Uses In The Area Draining to Lac LaBelle(1.)

Land Use	Area(acres)	Estimated Pollutant Loading(Lbs./Year)		
		Suspended Solids	Phosphorus	Lead
Low Density Residential	822	20250	34	9
Medium Density Residential	106	18303	45	20
High Density Residential	2	650	2	1
Commercial	17	9978	21	24
Industrial	10	5410	9	14
Construction	3	5156	9	
Recreation/ Open Land	241	5282	10	7
TOTAL	1201	65029	130	75

1.Based on data compiled by the Southeastern Wisconsin Regional Planning Commission. Includes the Lac LaBelle Subwatershed and the Rosenow Creek Subwatershed.

The magnitude of pollutant loading from construction sites was discussed in Chapter VIII, and indicates that even a small amount of construction can result in tremendous pollutant loadings to waterways. The water quality impacts from construction site runoff are well documented, and include loss of recreation areas and fish habitat through siltation, and nutrient enrichment of waterbodies (Pitt, 1985). It is suspected that Rosenow Creek has been affected by past erosion of construction sites. If water quality is to be protected or improved, there is a need to control pollutant generation and transport from areas undergoing development, even if they cover areas less than one acre.

Pollutant generation from these areas continues even after construction has been completed and the areas are considered established. This pollutant generation and transport can be a problem if post-development stormwater management is not taken into account during site design. Pollutant generation from established urban areas in the area draining to Lac LaBelle is described in the following section.

Existing Urban Areas

Urban lands comprised 1,201 acres, or 25 percent of the lands inventoried in the area draining to Lac LaBelle. These urban lands are distributed in three civil divisions: the City of Oconomowoc, along the southern lakeshore and the middle portion of Rosenow Creek; the Village of LaBelle, along the northern lakeshore; the Town of Oconomowoc, along the upper and lower reaches of Rosenow Creek and along the middle portion of the lakeshore.

Table III-11 shows the pollutant generation from lands within the urban inventory corridor of the area draining to Lac LaBelle. This table shows that about 33 tons of suspended solids, 130 pounds of phosphorus, and almost 75 pounds of lead are delivered to Lac LaBelle each year by all lands within the urban inventory corridor. About 15 percent of each pollutant is delivered to the lake via Rosenow Creek, which can be expected to experience some degradation in water quality from the urban areas in its subwatershed. Although lead is the only toxic material listed in Table III-11, it indicates the presence of the other toxic materials previously mentioned.

Both the importance of different land uses and the importance of different urban sub-basins within the area draining to Lac LaBelle were evaluated. These two approaches are discussed in more detail in Chapter VIII. Results for the area draining to Lac LaBelle are discussed below.

Table IX-3 shows the acreage and pollutant loading from the urban lands located in the area draining to Lac LaBelle. Land cover in the urban inventory corridor is dominated by low and medium residential areas, which account for 77 percent of the area, and recreation/open land, which accounts for an additional 20 percent of the total area. The most significant sources of lead and other urban toxic pollutants include commercial, industrial, and medium density residential land uses. Commercial and industrial land uses cover only two percent of the urban area, but contribute half of the lead load. The medium density residential areas cover about 10 percent of the urban area and contribute one-fourth of the lead load. These most critical

Table IX-4. Important Urban Sub-basins in the Area Draining To Lac LaBelle(1.)

Urban Sub-basin	Storm Sewers	Area (acres)	Portion of Subwatersheds' Urban Area Located In This Sub-basin	Sub-basin Contributes Significantly to the Subwatersheds' Lead Loading	Sub-basin Contains A Significant Portion of the Subwatersheds' Critical Land Uses(2.)
EE	Yes	25	2%	X	X
HH	Yes	14	1%	X	X
OO	Yes	30	3%	X	X
CCC/DDD	No	40 (3.)	3%	X	X
TOTAL		109	9%		

1. Includes the Rosenow Creek and Lac LaBelle Subwatersheds.
2. Includes sub-basins that contain at least 5% of the subwatershed's sewered commercial or industrial land uses.
3. This includes only the existing industrial land, and some of the open space between buildings. It does not include proposed commercial or industrial development, or other land uses such as agricultural land. Inclusion of these other land uses would bring the total size up to 180 acres. More details on the land uses within CCC and DDD can be found in the SEWRPC stormwater management feasibility study prepared for the 180 acre site.

urban land uses are concentrated in the Lac LaBelle Subwatershed, with most of the urban land use in the Rosenow Creek Subwatershed consisting of low density residential.

Fifteen urban sub-basins in the area draining to Lac LaBelle were delineated and analyzed for pollutant loadings. Table IX-4 identifies the most important sub-basins, based on the proportion of industrial and commercial land use and the sub-basin pollutant loading. The five critical sub-basins identified in this area are EE, HH, OO, CCC, and DDD. The locations of these sub-basins and their stormwater discharges are included in Map VIII-1. These five areas encompass 109 acres, or less than 10 percent of the inventoried urban lands. Table IX-5 provides more detailed information concerning these sub-basins. Although these basins cover less than 10 percent of the urban area, they include all of the industrial land uses, 87 percent of the commercial land uses, and 53 percent of the lead loading.

Sub-basin OO has additional significance in that it discharges adjacent to the City's main public swimming beach on Lac LaBelle. The other two swimming beaches on Lac LaBelle are also the sites of stormwater discharges, but from less critical urban areas. The Pine Street beach has a discharge pipe draining 37 acres made up mostly of medium density residential area and about two acres of commercial land use. Some of this area is served by grass swales, which provides some pollutant filtering. The Park Street beach has a discharge pipe draining six acres of medium density residential area. In addition, there is another discharge pipe entering Lac LaBelle about 600 feet to the west of the Park Street beach. This pipe drains 11 acres of medium density residential, one acre of high density residential, and one-half acre of commercial land. Although these two beaches do not receive a significant portion of the lead loading, the fecal coliform counts could be excessive.

Sub-basins CCC and DDD are part of the 180 acre area that drains to Lac LaBelle via the creek under Lakeview Lane. Sediment plumes from pollutants generated in this area have been noted in Lac LaBelle, as discussed in a previous section of this chapter.

WATER RESOURCES OBJECTIVES

Rosenow Creek

The water resources objectives for Rosenow Creek are to improve the capacity of the stream to support trout, and to decrease the pollutant load carried by Rosenow Creek into Lac LaBelle.

The improvement in trout habitat to be achieved through the watershed project will complement the habitat rehabilitation efforts already being conducted in portions of the Creek by the Department of Natural Resources' Fish Management Program. The Nonpoint Source Control Program will work to reduce the sediment and nutrient loads to the stream, to improve streambank conditions, and to protect the stream's springheads. This will be accomplished by reducing existing soil loss on croplands, by stabilizing streambanks and springheads against the effects of cropping and cattle access, by controlling runoff from barnyards and field-spread manure, and by assuring that future construction and post-construction runoff from developing areas does not cause further degradation to the trout habitat.

Table IX-5. Land Use and Pollutant Loading Characteristics of Important Urban Sub-basins in the Area Draining to Lac LaBelle(1.)

	% of Urban Pollutant Load From Sub-Basin			% Land Use In Sub-Basin	
Urban Sub-basin	Lead	Phosphorus	Sediment	Industrial	Commercial
EE	16%	11%	10%		
HH	7%	5%	4%		5%
OO	26%	20%	20%		82%
CCC/DDD	4%	8%	4%	100%	
TOTAL	53%	44%	38%		87%

1. Includes the Rosenow Creek and Lac LaBelle Subwatersheds.

All of these activities will reduce the pollutant load to Lac LaBelle, as well as improve the quality of Rosenow Creek.

Lac LaBelle

It is unclear what effect carp removal or phosphorus reduction will have on the water quality of Lac LaBelle, since there are probably many interrelated and opposing forces at work. For example, carp may be keeping weed growths low, which in turn leaves more phosphorus for algae growth. Poor water clarity, on the other hand, which may be due partly to carp activity, results in less light available for algae growth. The phosphorus concentration in the lake is also variable, and may only be excessive in years when there is a very high pollutant loading to the lake. Thus, the benefits of phosphorus reduction may not be evident in all years, and may be masked by changes in the carp population. The ability to maintain the existing low phosphorus concentration in the lake was evaluated in light of the elevated phosphorus concentrations measured in the lake in 1976-77. Table IX-6 shows the estimated 1976-77 phosphorus load to Lac LaBelle, and the reduction in the loading needed to prevent a recurrence of the high phosphorus concentrations. Table IX-2 shows the percent reduction of the phosphorus load to the lake that can be achieved under ideal circumstances. It appears that a significant reduction in the phosphorus load can be achieved, particularly through cropland erosion controls. This would result in less frequent occurrences of elevated phosphorus concentrations.

The objectives of the Nonpoint Source Control Program will be to contribute towards better water quality conditions for the support of aesthetic, recreational, and fish and aquatic life uses of the lake. This will be accomplished through maintaining a low phosphorus concentration, by decreasing the sedimentation along portions of the shoreline, by decreasing the loading of bacteria to the lake, particularly in sensitive areas such as swimming beaches, and by decreasing the discharge of toxic materials present in urban stormwater runoff.

RURAL NONPOINT SOURCE CONTROL STRATEGY

The proposed strategy for controlling rural nonpoint pollutant sources is presented below. Changes may be needed in the inventory data as each site in the rural areas is visited by project staff during implementation. When this occurs, changes in the rural pollution control strategy may be made to reflect the new information.

Pollutant Management Categories for each major type of source are as follows:

1. Upland Sheet and Rill Erosion Sources

   Table III-7 shows that 1,039 acres of control practices will be needed in the area draining to Lac LaBelle in order to bring the sheet and rill erosion rate on these lands down to a range acceptable for purposes of water quality protection. Conservation tillage will be the practice most widely recommended, with an estimated 1,007 acres needed. In addition, 32 acres of pasture management will be needed.

Table IX-6. Water Quality Impacts On Lac LaBelle From Different Phosphorus Loading Reduction Levels

Estimated 1976-77 Phosphorus Load (lbs.)	Reduction From 1976-77 Load	Predicted Total Phosphorus (mg/l)	Trophic Status Index(1.)	Wisconsin Lakes Water Quality Index(2.)
6500(3.)	0	.04	57	fair
4875	25%	0.03(4.)	53	fair to good
3250	50%	0.02(5.)	47	good

1. Based on phosphorus concentrations only.
2. See Table III-2.
3. This is the phosphorus load estimated by SEWRPC(SEWRPC, 1980) based on land use and an in-lake phosphorus concentration of .04 mg/l.
4. This is the secondary criterion proposed for Lac LaBelle.
5. This is the primary standard established for Lac LaBelle by the Regional Planning Commission.

Table III-7 also shows that application of conservation tillage and pasture management practices on upland areas will reduce the soil loss by 69 percent in the area draining to Lac LaBelle. This will still leave some lands eroding at a rate exceeding three t/a/y, however. Additional practices will be needed on 159 acres, and will result in an additional 787 tons per year of soil loss control. This would bring the total soil loss control in this area to 74 percent.

The strategy outlined above includes 249 acres of conservation tillage and 23 acres of pasture management in the Rosenow Creek Subwatershed, and would result in a 43 percent reduction in soil loss in that area.

- Management Category I. These are the ranked farms in the area draining to Lac LaBelle which cumulatively contribute the top 80 percent of the portion of the soil loss that is occurring at a rate greater than three tons/acre/year, or those farms having at least 250 tons/year of soil loss targeted for control. In addition, ranked farms in the Rosenow Creek Subwatershed which contribute the top 80 percent of the soil loss targeted for control, or at least 70 tons/year soil loss above three t/a/y, will be placed in this category.

Any single field in the inventory corridor eroding at a rate exceeding seven t/a/y will be placed in this management category as well.

- Management Category II. The remaining lands in the area draining to Lac LaBelle that have soil loss exceeding three t/a/y will be placed in this management category.

- Management Category III. Fields that are currently losing less than three t/a/y are not eligible for cost sharing, and are placed in this management category.

Since the rural upland sheet and rill erosion survey did not assess waterway or roadside erosion sites, the need for controlling these sources will be assessed by project staff during implementation. The three sites of waterway erosion, and three sites of roadside erosion identified by the preliminary inventory of rural nonpoint sources conducted during 1981-82 (SEWRPC, 1983) will be reviewed to determine their significance as sources of sediment. Management categories will be assigned to these sources by project staff at the time they are assessed. In addition, other such sites may be identified and assessed.

2. Barnyard Runoff Sources

- Management Category II. The only barnyard in the area draining to Lac LaBelle that is contributing phosphorus to surface waters is placed in this management category.

- Management Category III. Barnyards that are well buffered from the surface channel network, and that produce no loading of phosphorus to the surface waters according to the ARS Model, are placed in this management category.

3. Runoff of Winterspread Manure

- Management Category I. Livestock operations that spread five acres or more of critical lands with manure during the winter in the area draining to Lac LaBelle are placed in this management category. This is estimated to cover 80 percent of the critical lands winterspread with manure.

- Management Category II. Livestock operations that spread less than five acres of critical lands during the winter are placed in this management category.

- Management Category III. Farms that currently receive no winterspread manure on critical acres are placed in this management category.

Project staff will identify, during project implementation, those livestock operations that pose a threat to water quality due to improper disposal or storage of animal waste during other times of the year. Management categories assigned based solely on winterspreading may be modified to take these other problems into account.

4. Streambank Erosion

- Management Category I. Areas of streambank erosion along Rosenow Creek that are caused by agricultural activities, such as cropping too close to the bank or watering livestock in the stream, are placed in this management category.

- Management Category III. Areas of lakeshore erosion are placed in this category. The areas of eroding fill in the Village of Lac LaBelle, and the unrestricted access point off of Mary Lane, are placed in this category, but will be re-evaluated by local staff and the DNR during project implementation.

5. Other Agricultural Nonpoint Pollution Sources

- Tile drainage from cropped organic soils may be locally significant, and will be the covered as part of a special information and education program dealing with proper fertilizer application.

URBAN POLLUTION CONTROL STRATEGY

The urban pollution control strategy addresses both developing and established urban areas in the area draining to Lac LaBelle, including the Rosenow Creek and Lac LaBelle subwatersheds. This strategy builds upon that for Fowler Lake, presented in Chapter VIII.

Although the pollutant loads coming from the established urban areas must be considered important and in need of control, the fact is that the opportunities for retrofitting these areas with additional control measures (discussed later on in this strategy) are very limited. Although these

opportunities will be evaluated and pursued as part of this project, the most fruitful rewards are most likely to come from protection efforts directed towards the developing areas.

Strategy For Developing Urban Areas

Development can be expected in all the civil divisions included in the area draining to Lac LaBelle, including the City of Oconomowoc, the Town of Oconomowoc, and the Village of LaBelle. The strategy for these areas includes taking steps to assure that construction site erosion, and future stormwater runoff from these developing areas, do not cause water quality degradation of Rosenow Creek or Lac LaBelle. The City of Oconomowoc currently has an ordinance in place to limit erosion and sediment transport from larger scale construction activities, although single family home construction is generally excluded.

Chapter VIII of this plan contains recommendations for the City of Oconomowoc, the Town of Oconomowoc, and Waukesha County concerning the control of construction site erosion. The administration and enforcement of applicable ordinances or codes by these municipalities will also protect Rosenow Creek and Lac LaBelle.

The steps outlined for the control of construction site erosion should also be taken by the Village of LaBelle.

The review of zoning and development projections recommended for the City of Oconomowoc in Chapter VIII should include lands in the Rosenow Creek and Lac LaBelle subwatersheds.

Strategy For Established Urban Areas

Chapter VIII summarizes the stormwater management practices currently used by the City of Oconomowoc, and the process used to develop additional recommendations for the City. The same process was used to develop recommendations for city lands draining to Lac LaBelle.

Table IX-7 presents cost-effectiveness information developed specifically for the application of infiltration and detention practices applied to urban lands in the Lac LaBelle Subwatershed. The table shows the effectiveness of detention basins in reducing the urban phosphorus and lead load to Lac LaBelle. The effectiveness of infiltration is also presented. Assumptions made about the control practices referenced in this table are presented in the parallel discussion in Chapter VIII.

The lead load to Lac LaBelle would be decreased by about 50 percent if infiltration were increased in the commercial and industrial areas, and detention was provided for stormwater runoff coming from the five critical sub-basins. The phosphorus load would be decreased by about 30 percent. As the table shows, not all components of this strategy are equally cost-effective. Detention basins placed at OO, EE, and HH are most cost-effective. Control of pollutants from OO has added importance because the discharge pipe is located next to the public swimming area. Although the urban sub-basins discharging near the Pine and Park Street beaches are not

Table IX-7. Cost-Effectiveness of Stormwater Detention Basins and General Infiltration For Reducing The Urban Pollutant Load To Lac LaBelle.

	Sub-basin Location	Size of Detention (2.)	% Urban Pollutant Load Reduction: Lead	% Urban Pollutant Load Reduction: Phosphorus	Capital Cost(1.): State Share (3.)	Capital Cost(1.): Local Share (4.)	Capital Cost(1.): Total	Total Cost per % Lead Removed
Detention								
	OO	1.3 acres	21%	11%	$37,800	$16,200	$54,000	$2,600
	EE	.7 acres	13%	6%	$21,000	$9,000	$30,000	$2,300
	HH	.5 acres	6%	3%	$14,000	$6,000	$20,000	$3,300
	CCC/DDD	1.5 acres	3%	4%	$42,000	$18,000	$60,000	$20,000
	Subtotal	4.0 acres	43%	24%	$114,800	$49,200	$164,000	
Infiltration								
	(6.)		7%	5%	$100,380	$43,020	$143,400	$20,500
TOTAL			50%	29%	$215,180	$92,220	$307,400	

1. Figures do not include land costs.
2. Sizing could be reduced. See text for explaination.
3. The state share will be 70% of the total capital cost.
4. The local share will be 30% of the total capital cost. In addition, there will be annual operation and maintenance costs, which are not reflected in the figures.
5. See text for discussion of proposed land use changes in CCC/DDD.
6. Assumes infiltration of 50% of rooftops and parking surfaces in the commercial and industrial areas, regardless of their location in the watershed.

significant contributors of lead, they may be significant sources of bacteria. The Southeastern Wisconsin Regional Planning Commission has predicted future urban growth within sub-basin CCC/DDD (SEWRPC, 1984). The commercial and industrial acreage could increase significantly, with development of a medium density residential area also a possibility. This increased development would make control of the stormwater and its associated pollutants from CCC/DDD more cost effective than reflected in Table IX-7.

The control strategy for the established urban area in the City of Oconomowoc draining to Lac LaBelle is an extension of that recommended in Chapter VIII for the protection of Fowler Lake. The feasibility study on detention basins should include those critical sub-basins identified in Table IX-7. The stormwater management feasibility study prepared by SEWRPC will be a stepping stone for determining the role the Nonpoint Source Control Program can play in resolving the water quality problems created by current and projected land uses in CCC/DDD.

The established urban areas in the Town of Oconomowoc and the Village of LaBelle are mostly low density residential areas, and use of detention facilities and attempts to increase infiltration are not generally practical. However, an information and education program should be targeted in these areas to promote good housekeeping practices.

INTEGRATION OF PROGRAMS IN ACHIEVING WATER RESOURCES OBJECTIVES

A Water Quality Management Plan For Lac LaBelle, prepared by the Southeastern Wisconsin Regional Planning Commission (1980), includes recommendations in several program areas outside the scope of the Nonpoint Source Program. These include:

1. the modification of local zoning ordinances to more effectively implement the adopted regional land use plan,

2. the provision of sanitary sewer service to portions of the drainage area directly tributary to the lake,

3. the revision of the Waukesha County Sanitary Ordinance to address the operation, maintenance, and inspection of privately owned on-site sewage disposal systems that would not be eliminated by the proposed sanitary sewerage system, and

4. the continuation of existing lake management activities.

CHAPTER X

THE AREA DRAINING TO THE LOWER OCONOMOWOC RIVER:
The Battle Creek Subwatershed
The Lower Oconomowoc River Subwatershed

EXISTING WATER RESOURCES CONDITIONS

The area draining to the lower Oconomowoc River includes the Battle Creek Subwatershed, which covers 5,132 acres, and the Lower Oconomowoc River Subwatershed, which covers 10,072 acres. They are shown in Map II-1.

Battle Creek and the lower Oconomowoc River are the major water resources discussed in this chapter.

Battle Creek

Battle Creek is a small tributary to the Oconomowoc River. The stream is 5.7 miles long, averages less than .5 feet in depth, and has a very low gradient. The stream supports mainly panfish, forage fishes, bullhead, and carp (Poff and Threinen, 1963b; Poff et al., 1968; Fago, 1982).

Lower Oconomowoc River

This portion of the Oconomowoc River begins at the Lac LaBelle Dam and flows 14 miles to its confluence with the Rock River, at the end of the Oconomowoc River Watershed. The upper 4.7 miles of this river segment are in Waukesha County; the lower 9.3 miles are in Jefferson County.

The lower Oconomowoc River is classified for full fish and aquatic life. The one-mile long section of stream between the Lac LaBelle dam and county road BB has good habitat. The water velocity is high, and the substrate is sand and gravel (W. Wawrzyn, DNR Water Pollution Biologist, personal communication). However, the river has occasionally had a noticeable degree of turbidity as it passes beneath the Concord Road bridge (P. Lindquist, Washington County Conservationist, personal communication). During a fish survey conducted in June 1975, six species of forage fishes indicative of good water quality were found. These included the hornyhead chub, the stonecat, the fantail darter, the banded darter, the blackside darter, and the slender madtom (Fago,1982). The starhead top minnow may also be present in this stream segment (W. Wawrzyn, personal communication). The slender madtom and the starhead top minnow are both endangered species.

From county road BB to the county line, the river substrate is sand and gravel overlain by silt. For the last mile in Waukesha County, and through all of Jefferson County, the stream grade is low as the stream meanders through extensive wetlands. The stream bottom in Jefferson County is predominately muck (Poff, et al., 1968).

Throughout the lower Oconomowoc River, carp are abundant and pose a major water resource problem. They increase water turbidity by stirring up bottom sediments, and create unfavorable conditions for more desirable species of

Table X-1. Estimated Annual Loading of Phosphorus and Sediment to the Lower Oconomowoc River(1.)

Source	Phosphorus Pounds	Phosphorus % of Total	Sediment Pounds	Sediment % of Total
Lac LaBelle(2.)	2500	13.7%	308000	20.7%
Urban(3.)	150	0.8%	73000	4.9%
Cropland(3.)	2000	10.9%	1100000	74.1%
Barnyards/ Manure Stacks(3.)	50	0.3%		
Manure Spreading(3.)	100	0.5%		
Oconomowoc Sewage Treatment Plant(4.)	13500	73.8%	5000	0.3%
TOTAL	18300		1486000	

1. Includes pollutant loadings from the Battle Creek and Lower Oconomowoc River Subwatersheds.
2. From: Water Quality Management Plan For Lac LaBelle. SEWRPC, 1980.
3. Based on inventory data collected through the Nonpoint Source Program.
4. Based on information collected by DNR as part of the detergent phosphorus ban study.

fish. Carp and forage fishes tolerant of poor water quality conditions dominated the fish population surveyed from the Rock River to the county line during 1976 (Fago, 1982). Past efforts to eradicate carp from this portion of the river have been unsuccessful, since the carp population is easily replenished from the Rock River. An effort to rehabilitate the fish community in the lower Oconomowoc River will be made in 1986. The plan includes chemical treatment of the river, and installation of a barrier to stop the upstream migration of carp from the Rock River.

Water quality information was collected from the lower Oconomowoc River during the period 1970-1976. These sampling points were downstream of the old City of Oconomowoc sewage treatment plant, however, and reflected the impacts being caused by inadequate wastewater treatment (Department of Natural Resources, 1980). The treatment facility was upgraded in 1976, and the samples collected below the treatment plant prior to 1976 can no longer be considered indicative of river water quality.

The only recent water quality information includes phosphorus concentrations measured during September 1979 at a point .036 miles above the sewage treatment plant, and at points 1.4 and 3.7 miles below the treatment plant (Mace, 1980). Above the treatment plant, concentrations were low (.02 mg/l), dominated by the flow from Lac LaBelle. In this segment, most of the phosphorus was tied up in particulate form, and not immediately available for plant growth. The treatment plant, which is not required to remove phosphorus, was discharging 3.68 mg/l phosphorus, 97 percent of which was in a dissolved form immediately available for use by plants. Below the treatment plant, the total phosphorus concentration was very high (.31-.33 mg/l), with 68 percent of the phosphorus in a dissolved form. These concentrations reflect the impact of the treatment plant on the phosphorus concentrations of the stream within four miles of the treatment plant discharge. The impact of these elevated phosphorus concentrations on plant growth and dissolved oxygen has not been determined, however.

The lower Oconomowoc River, from the Lac LaBelle dam to the Rock River, is suitable as a canoe trail, although it does not receive heavy use by paddlers.

LAND USE AND NONPOINT POLLUTION SOURCES

Table X-1 shows the estimated loading of phosphorus and sediment to the lower Oconomowoc River from the Battle Creek and lower Oconomowoc River subwatersheds. The main source of phosphorus is the City of Oconomowoc wastewater treatment plant and Lac LaBelle and cropland runoff are estimated to be important, although secondary, sources. Urban areas and animal waste runoff are relatively insignificant overall as phosphorus sources, but could be locally important. For sediment, cropland runoff is estimated to be the dominant source. Construction erosion may also be significant, and is one potential source of the turbidity noticed as the Concord Road bridge. Runoff from the established urban areas is relatively insignificant as a sediment source.

The urban lands in the area draining to the lower Oconomowoc River are the major source of pollutants such as lead, copper, and zinc, and some of the hazardous organic compounds. Rural areas are also sources of some organic compounds, such as those found in pesticides.

Rural Land Use and Pollutant Sources

Table III-4 shows the portions of the Battle Creek and Lower Oconomowoc River subwatersheds that were inventoried for land use and nonpoint pollution sources. Combined, rural land uses covered 8,576 acres, or 93 percent of the lands inventoried in these two subwatersheds.

Table III-5 shows the composition of rural lands inventoried in the Battle Creek and Lower Oconomowoc River subwatersheds. In the Battle Creek Subwatershed, croplands cover 1,493 acres, or 48 percent of the inventory corridor. This cropland is almost evenly split between lands in crop rotation and lands continuously planted to row crops. Little of this cropland has conservation practices applied at this time. In the Lower Oconomowoc River Subwatershed, croplands cover 2,834 acres, or 52 percent of the inventory corridor. In both subwatersheds, about one-half of the land in the rural inventory corridor is made up of land uses such as wetland, grassland, and woodlots, which have a low potential for generating pollutants.

Table III-6 summarizes sheet and rill erosion characteristics for lands in these subwatersheds. In the area draining to the lower Oconomowoc River, about 13,500 tons/year of soil are eroded from lands in the rural inventory corridor. About 75 percent of this erosion occurs on lands in the Lower Oconomowoc River Subwatershed. Rates of erosion in this subwatershed are moderately high, with 35 percent of the soil loss occurring on lands losing soil at a rate exceeding 10 tons/acre/year, and 52 percent occurring on lands eroding at rates exceeding five tons/acre/year.

About 25 percent of the erosion in the area draining to the river occurs on lands in the Battle Creek Subwatershed. Rates of erosion are moderate. Almost one-half of the erosion occurs at rates of five to 10 tons/acre/year, with a small amount eroding between three and five tons/acre/year. About one-half of the erosion occurs on lands losing soil at rates less than three tons/acre/year. The erosion occurring at rates less than three tons/acre/year is not targeted for control practices through the Nonpoint Source Control Program.

A determination was made during the initial phases of the inventory that roadside and streambank erosion were not widespread enough to warrant a detailed survey. A detailed assessment of gully erosion in rural portions of the inventory corridor was not made during this nonpoint source inventory, either. It is expected, however, that roadside and gully stabilization needs will be found in some areas by LCC staff during project implementation. Eroding channel banks are known to be a problem between county road BB and the county line. These banks are overgrown with purple loosestrife. The loosestrife has a very shallow root system, and dies back each year leaving streambanks unprotected against erosive forces of the river and rainfall (W. Wawrzyn, personal communication).

Tables III-8 and III-9 show the pollution potential from animal waste runoff in the Battle Creek and Lower Oconomowoc River subwatersheds. Of the twenty livestock operations in this area, eleven produce runoff that flows to surface waters, while nine systems are internally drained. Of the eleven barnyards

that are hydrologically connected to surface waters, nine of them produce some pollutant loading. All of these are in the Lower Oconomowoc River Subwatershed.

Table III-9 shows that an estimated 13 livestock operations winterspread manure in the area draining to the lower Oconomowoc River. About 53 acres of critical lands in the area draining to the lower Oconomowoc River can be expected to be winterspread with manure each year. Most of the pollution potential from this activity is expected in the Lower Oconomowoc River Subwatershed. Although the hazard posed by improper disposal or storage of manure during other times of the year was not assessed, it may be important. These additional hazards will be further investigated during implementation of this watershed project.

There are estimated to be 269 acres of cropped organic soils in the area draining to the lower Oconomowoc River. About two-thirds of these acres are in the Lower Oconomowoc River Subwatershed, with the remainder in the Battle Creek Subwatershed. Some of this area may have been ditched or tiled for drainage purposes, and as such would have a significant potential to contribute soluble phosphorus to surface waters if fertilizer applications are not properly managed.

Urban Land Use and Nonpoint Pollutant Sources

This discussion is divided into two parts. The first part concerns developing areas as pollution sources. Developing areas are considered to include a wide array of situations including urban renewal projects, individual site development within the existing urban area, or new subdivision development. The second part concerns existing urban areas as pollution sources. These areas include established residential, commercial, industrial, highway, and open space land uses.

Developing Areas

Little development was occurring on land within the inventory corridor at the time land use was surveyed for this project. However, land development patterns are dynamic and often unpredictable, and accurate predictions of the extent, timing, and location of lands that will be undergoing development are difficult to make. Two areas of particular concern in this area include a large construction site on rolling lands adjacent to the Oconomowoc River within the City of Oconomowoc. This site, which includes a new armory complex currently under construction, has a high potential to contribute sediment to the Oconomowoc River if not properly managed. The other concern is the pending reconstruction of 5.4 miles of State Highway 135 in Jefferson County, between State Highway 16 and County Highway B. The Plan Development Advisory Committee for the Oconomowoc project expressed its concern to the Wisconsin Department of Transportation over potential impacts on river water quality. However, topography in this area is relatively flat, all drainages will remain as grassed swales, there will be no work done on bridges or overpasses which span the river, and the length of road reconstruction adjacent to the river will be minimal.

Table X-2. Pollutant Loading From Urban Land Uses In The Area Draining to the Lower Oconomowoc River

Land Use	Area(acres)	Estimated Lead Loading (Pounds/Year)
Low Density Residential	113	1
Medium Density Residential	317	25
High Density Residential	13	2
Commercial	49	28
Industrial	34	16
Recreation/ Open Land	151	2
TOTAL	677	74

The magnitude of pollutant loading from construction sites was discussed in Chapter VIII, and indicates that even a small amount of construction can result in tremendous pollutant loadings to waterways. The water quality impacts from construction site runoff are well documented, and include loss of recreation areas and fish habitat through siltation, and nutrient enrichment of waterbodies (Pitt, 1985). If water quality is to be protected or improved, there is a need to control pollutant generation and transport from areas undergoing development, even if they cover areas less than one acre.

Pollutant generation from these areas continues even after construction has been completed and the areas are considered established. This pollutant generation and transport can be a problem if post-development storm water management is not taken into account during site design. Pollutant generation from established urban areas in the area draining to the lower Oconomowoc River is described in the following section.

Existing Urban Areas

Urban lands comprised 677 acres, or seven percent of the lands inventoried in the area draining to the lower Oconomowoc River. These urban lands occur mainly within the City of Oconomowoc.

Table III-11 shows the pollutant generation from lands within the urban inventory corridor of this area. Since most of this area is connected to the river via storm sewer, the proportion of the pollutants that actually reach the river from these areas will be very high. This table shows that about 150 pounds of phosphorus, 37 tons of suspended solids, and almost 74 pounds of lead are delivered to the lower Oconomowoc River each year by all lands within the urban inventory corridor. Although lead is the only toxic material listed in Table III-11, it indicates the presence of the other toxic materials mentioned in Chapter VIII.

Both the importance of different land uses and the importance of different urban sub-basins within the area draining to the river were evaluated. These two approaches are discussed in more detail in Chapter VIII. Results for this are discussed below.

Table X-2 shows the acreage and estimated lead loading from different urban land uses in the area draining to the lower Oconomowoc River. Land cover in the urban inventory corridor is dominated by low and medium residential areas, which account for 64 percent of the area, and recreation/open land, which accounts for an additional 22 percent of the area. The most significant sources of lead and other urban toxic pollutants include commercial, industrial, and medium density residential land uses. Commercial and industrial land uses cover only 12 percent of the urban area, but contribute 60 percent of the lead load. The medium density residential areas cover about 46 percent of the urban area and contribute one-third of the lead load.

In the City of Oconomowoc, nineteen urban sub-basins draining to the lower Oconomowoc River were delineated and analyzed for pollutant loadings. Table X-3 identifies the most important sub-basins, based on the proportion of industrial and commercial land use and the sub-basin pollutant loading. The five critical sub-basins identified in this area are LL, PP, QQ, S, and ZZZ.

Table X-3. Important Urban Sub-basins in the Area Draining to the Lower Oconomowoc River.

Urban Sub-basin	Storm Sewers	Area (acres)	Portion of Subwatershed's Urban Area Located In This Sub-basin	Sub-basin Contributes Significantly to the Subwatershed's Lead Loading	Sub-basin Contains A Significant Portion of the Subwatershed's Critical Land Uses(1.)
LL	Yes	78	12%	X	X
PP	Yes	60	9%	X	X
QQ	Yes	84	12%	X	X
S	Yes	31	4%	X	
ZZZ	No	249	37%	X	X
TOTAL		502	74%		

1. Includes sub-basins that contain at least 5% of the subwatershed's sewered commercial or industrial land uses. Sub-basin ZZZ is included because it contains a large commercial area that drains down steeply sloped drainages. Grassed swales provide little infiltration in this area.

The locations of these sub-basins and their storm water discharges are included in Map VIII-1. These 5 areas encompass 502 acres, or 74 percent of the inventoried urban lands. Table X-4 provides more detailed information concerning these sub-basins. They include 70 percent of the industrial land uses, 99 percent of the commercial land uses, and 85 percent of the lead loading.

WATER RESOURCES OBJECTIVES

Lower Oconomowoc River

Recreational, fish, and aquatic life uses are important in the lower Oconomowoc River. The objectives for the Nonpoint Source Control Program are to protect the stretch of the lower Oconomowoc River from the Lac LaBelle dam to county road BB, and to improve the water quality and habitat in the river below this point. This will be done by reducing pollutant loads to Lac LaBelle, as outlined in Chapter IX, and by reducing the sediment loading to the river from both the Battle Creek and Lower Oconomowoc River subwatersheds. As a secondary consideration, the nutrients from animal waste sources will also be controlled. These efforts will be made in conjunction with rehabilitation of the fish population in the lower Oconomowoc River.

RURAL NONPOINT SOURCE CONTROL STRATEGY

The proposed strategy for controlling rural nonpoint pollutant sources is presented below. Changes may be needed in the inventory data as each site in the rural areas is visited by project staff during implementation. When this occurs, changes in the rural pollution control strategy may be made to reflect the new information.

Pollutant Management Categories for each major type of source are as follows:

1. Upland Sheet and Rill Erosion Sources

   Table III-7 shows that 1,021 acres of control practices will be needed in the area draining to the lower Oconomowoc River in order to bring the sheet and rill erosion rate on these lands down to a range acceptable for purposes of water quality protection. Conservation tillage will be the practice most widely recommended, with an estimated 1,001 acres needed. In addition, 20 acres of pasture management will be needed.

   Table III-7 also shows that application of conservation tillage and pasture management practices on upland areas will reduce soil erosion by 48 percent in the area. This will still leave some lands eroding at a rate exceeding three t/a/y, however. Additional practices are needed on 81 acres, and would result in an additional 260 tons per year of soil erosion control. This would bring the total soil erosion control in this area to 50 percent.

   - Management Category I. These are the ranked farms in the area draining to the lower Oconomowoc River which cumulatively contribute the top 80 percent of the portion of the soil erosion that is occurring at a rate greater than three tons/acre/year, or those farms

Table X-4.Land Use and Pollutant Loading Characteristics of Important Urban Sub-basins in the Area Draining to the Lower Oconomowoc River

	% of Urban Pollutant Load From Sub-Basin			% Land Use In Sub-Basin	
Urban Sub-basin	Lead	Phosphorus	Sediment	Industrial	Commercial
LL	18%	20%	20%	54%	1.
PP	12%	12%	11%	13%	26%
QQ	23%	23%	21%	1.	14%
S	9%	7%	9%		1.
ZZZ	23%	17%	15%		53%
TOTAL	85%	79%	76%	70%	99%

1. Values represent less than 5% of the total for the subwatershed.

having at least 100 tons/year of soil erosion targeted for control. Any single field in the inventory corridor eroding at a rate exceeding seven t/a/y will be placed in this management category as well.

- Management Category II. The remaining lands in this area that have soil loss exceeding three t/a/y will be placed in this management category.

- Management Category III. Fields that are currently losing less than three t/a/y are not eligible for cost sharing, and are placed in this management category.

Since the rural upland sheet and rill erosion survey did not assess waterway or roadside erosion sites, the need for controlling these sources will be assessed by project staff during implementation. Management categories will be assigned to these sources by project staff at the time they are assessed.

2. Barnyard Runoff Sources

- Management Category II. All barnyards in the area draining to the lower Oconomowoc River that are contributing phosphorus to surface waters are placed in this management category.

- Management Category III. Barnyards that are well buffered from the surface channel network, and that produce no loading of phosphorus to the surface waters according to the ARS Model, are placed in this management category.

3. Runoff of Winterspread Manure

- Management Category II. All livestock operations that spread manure on critical lands during the winter are placed in this management category.

- Management Category III. Farms that currently receive no winterspread manure on critical acres are placed in this management category for manure spreading.

Project staff will identify during project implementation those livestock operations that pose a threat to water quality due to improper disposal or storage of animal waste during other times of the year. Management categories assigned based on winterspreading alone may be modified to take these other problems into account.

4. Other Agricultural Nonpoint Pollution Sources

Drainage from tiled and cropped organic soils may be locally significant, and will be the covered as part of a special information and education program dealing with proper fertilizer application.

Table X-5. Cost-Effectiveness of Stormwater Detention Basins and General Infiltration For Reducing The Urban Pollutant Load To the Lower Oconomowoc River

	Sub-basin Location	Size of Detention (2.)	% Urban Pollutant Load Reduction		Capital Cost(1.)			Total Cost per % Lead Removed
			Lead	Phosphorus	State Share (3.)	Local Share (4.)	Total	
Detention								
	QQ	3.0 acres	18%	13%	$84,000	$36,000	$120,000	$6,700
	ZZZ	8 acres	18%	9%	$226,800	$97,200	$324,000	$18,000
	LL	3.5 acres	14%	11%	$98,000	$42,000	$140,000	$10,000
	PP	2.5 acres	10%	7%	$70,000	$30,000	$100,000	$10,000
	S	1 acre	7%	4%	$28,000	$12,000	$40,000	$5,700
	Subtotal	18.0 acres	67%	44%	$506,800	$217,200	$724,000	
Infiltration								
	(5.)		15%	12%	$214,550	$91,950	$306,500	$20,400
TOTAL			82%	56%	$721,350	$309,150	$1,030,500	

1. Figures do not include land costs.
2. Sizing could be reduced. See text for explaination.
3. The state share will be 70% of the total capital cost.
4. The local share will be 30% of the total capital cost. In addition, there will be annual operation and maintenance costs, which are not reflected in the figures.
5. Assumes infiltration of 50% of rooftops and parking surfaces in the commercial and industrial areas, regardless of their location in the watershed.

URBAN POLLUTION CONTROL STRATEGY

The urban pollution control strategy addresses both developing and established urban areas in the area draining to the lower Oconomowoc River. This strategy builds upon that for Fowler Lake, presented in Chapter VIII.

Although the pollutant loads coming from the established urban areas within the City of Oconomowoc must be considered important and in need of control, the fact is that the opportunities for retrofitting these areas with additional control measures discussed later on in this strategy are very limited. Although these opportunities will be evaluated and pursued as part of this project, the most fruitful rewards are most likely to come from protection efforts directed towards the developing areas.

Strategy For Developing Urban Areas

Development can be expected in the City of Oconomowoc, in the towns of Ixonia and Concord (Jefferson County), and in the towns of Summit and Oconomowoc (Waukesha County). The strategy for these areas includes taking steps to assure that construction site erosion, and future storm water runoff from these developing areas, do not cause water quality degradation of the Oconomowoc River.

1. Chapter VIII contains recommendations for the City of Oconomowoc, the Town of Oconomowoc and Waukesha County concerning the control of construction site erosion. The administration and enforcement of applicable ordinances or codes by these entities will also protect the lower Oconomowoc River.

   Steps outlined in Chapter VIII for the control of construction site erosion should also be taken by Jefferson County, and the towns of Summit, Ixonia, and Concord.

2. The review of zoning and development projections recommended for the City of Oconomowoc in Chapter VIII should include lands in the lower Oconomowoc River Subwatershed.

3. The Department of Natural Resources, the Wisconsin Department of Transportation, and the Jefferson County LCC should work closely together in assuring that the State Highway 135 reconstruction project has a minimal impact on water quality in the Oconomowoc River.

Strategy For Established Urban Areas

Chapter VIII summarizes the stormwater management practices currently used by the City of Oconomowoc, and the process used to develop additional recommendations for the City. The same process was used to develop recommendations for city lands draining to the lower Oconomowoc River.

Table X-5 presents cost-effectiveness information developed specifically for the application of infiltration and detention practices applied to urban lands in the City of Oconomowoc that drain to the lower Oconomowoc River. The table shows the effectiveness of detention basins in reducing the urban phosphorus and lead load to the river. The effectiveness of infiltration is also

presented. Assumptions made about the control practices referenced in this table are presented in the parallel discussion in Chapter VIII.

The lead load to the lower Oconomowoc River would be decreased by about 83 percent if infiltration were increased in the commercial and industrial areas, and detention was provided for stormwater runoff coming from the five critical sub-basins. The phosphorus load would be decreased by about 56 percent. As the table shows, not all components of this strategy are equally cost effective. The control strategy for the established urban area in the City of Oconomowoc draining to the lower Oconomowoc River is an extension of that recommended in Chapter VIII for the protection of Fowler Lake. The feasibility study on detention basins should include those critical sub-basins identified in Table X-5.

CHAPTER XI

THE LAKE KEESUS SUBWATERSHED

EXISTING WATER RESOURCE CONDITIONS

The Lake Keesus Subwatershed, including the surface area of the lake, encompasses 2,651 acres. Lake Keesus is the only major surface water resource in the subwatershed. The location of this subwatershed is shown on Map II-1 in Chapter II.

Lake Keesus

Lake Keesus is a glacial, spring-fed lake. The lake is 237 acres in surface area, has a maximum depth of 42 feet, and an average depth of 16.7 feet. The estimated residence time for water in the lake is five to seven years, based on the lake volume and an estimate of annual runoff from the watershed to the lake. This residence time is relatively long compared to residence times of the lakes connected by the Oconomowoc River.

Lake Keesus has occasional algae blooms, although algae growth is not considered a serious use problem. Between 1968 and 1977, an annual application of 60 to 110 pounds of algicides was applied to the lake to control the algae (DNR file data). Aquatic weed growths are considered to cause more of a use problem than algae growth (Wisconsin Department of Natural Resources, 1975).

Water quality information for Lake Keesus was collected between 1973 and 1981 (DNR file data). During the fall periods of 1973 and 1974, when the lake was mixed, the total phosphorus concentrations in the lake were .09 mg/l and .065 mg/l respectively. During the spring periods of 1974 and 1975, when the lake was mixed, the total phosphorus concentrations were .035 mg/l and .125 mg/l respectively. More information is needed to adequately characterize the phosphorus concentrations in Lake Keesus. However, it can be stated that the phosphorus concentrations are generally high. These concentrations indicate a potential for Lake Keesus to develop more serious water quality problems.

The oxygen depletion measured in the bottom waters of Lake Keesus during periods of winter and summer stratification is indicative of a eutrophic lake. The monitoring conducted during 1973-1975 showed that oxygen depletion occurred at depths of 30 feet to the lake bottom during the months of February, July, and September. Dissolved oxygen concentrations fell below five mg/l during these months at depths ranging from 10 to 40 feet. Neither winterkill nor summerkill of lake fishes has been reported as a problem, however.

Elevated phosphorus concentrations in the bottom waters during these times when dissolved oxygen concentrations were low or nonexistent indicate that the lake's bottom sediments are nutrient rich and may act as a source of phosphorus to the overlying lake waters. During the months of February, July, and September, the concentrations of total phosphorus in the bottom waters were .11 mg/l - .16 mg/l, .32 mg/l, and .63 mg/l respectively. These

concentrations were two to 20 times higher than the phosphorus concentrations in the surface waters on the same dates. Resuspension of phosphorus from the lake bottom would tend to increase the proportion of phosphorus entering the lake that is available in the surface waters for algae growth, or in the outlet waters for downstream transport.

Lake Keesus has a panfish-gamefish assemblage. Gamefish include walleye, northern pike, and largemouth bass. Public access to the lake is limited. Although there are five access points, four are private concessions and the fifth, a road crossing at the outlet to the lake, is posted to prohibit parking. The state owns over 1,000 feet of shoreline on the southwest corner of the lake, but it is not developed as a public access. Overall, public access to Lake Keesus is considered by the Department of Natural Resources to be inadequate for purposes of utilizing the fishery (Threinen, 1982).

In summary, Lake Keesus can be considered a mesotrophic, or moderately fertile lake, based on its algae and weed characteristics and its lack of winterkill problems (Wisconsin Department of Natural Resources, 1975; Martin et al., 1983). The lake may have a potential to be more eutrophic, however, based on the total phosphorus concentrations measured in the lake.

LAND USE AND NONPOINT POLLUTANT SOURCES

Table III-4 shows the portion of the Lake Keesus Subwatershed inventoried for land use and nonpoint pollutant sources. The inventory corridor included 1,123 acres, or 42 percent of the subwatershed. Rural lands in the inventory corridor covered 744 acres; urban lands in the inventory corridor covered about half that area, or 379 acres.

Table III-5 shows the composition of rural lands inventoried in the subwatershed. Row crops comprise the most significant part of the rural land use. These croplands cover 464 acres, or 62 percent of the rural inventory area. Two-thirds of the acres in row crops, or 298 acres, are planted in rotation. The remaining one-third of the cropland acres, or 166 acres, are planted to row crops year after year. Little of this cropland has conservation practices applied at this time.

The remaining acreage has little potential for generating pollutants. Grasslands and wetlands cover 155 acres, or 21 percent of the rural inventory corridor, while well-managed woodlots cover 112 acres, or 15 percent of the rural inventory corridor. Table III-6 summarizes rural sheet and rill erosion characteristics for the subwatershed. An estimated 1,382 tons of soil are eroded in the Lake Keesus Subwatershed each year as a result of this upland sheet and rill erosion. Nearly one-third of the sheet and rill erosion in the subwatershed is coming from lands eroding soil at a rate less than three t/a/y. These lands are not targeted for control practices. The remaining 68 percent of the sheet and rill erosion is coming from lands targeted to receive control practices. Twenty-eight percent of the sheet and rill erosion is coming from lands losing soil at a rate between three and five tons/acre/year, and 39 percent is coming from lands losing soil at a rate of five to 10 tons/acre/year. No lands were inventoried that were losing soil at a rate exceeding 10 tons/acre/year.

Table III-7 shows that 183 acres of control practices will be needed to bring the sheet and rill erosion rate on these lands down to a range acceptable for purposes of water quality protection. Conservation tillage would be sufficient to provide the necessary degree of control on all 183 acres, and will be the practice most widely recommended. Table III-7 also shows that application of conservation tillage on eroding upland areas will reduce the soil loss on lands constituting a high pollution hazard by 54 percent

A determination was made during the initial phases of the inventory that neither roadside erosion or streambank erosion along the channel draining Lake Keesus were widespread enough to warrant a detailed survey. A detailed assessment of gully erosion in rural portions of the inventory corridor was not made during this nonpoint source inventory. Streambank, roadside and gully stabilization needs may be found in some areas by LCC staff during project implementation. For example, one site of waterway erosion has been reported by lakeshore homeowners to exist along the northern shoreline of the lake. The LCC staff will record any areas of gully erosion, streambank erosion, and roadside erosion in the subwatershed during project implementation.

Tables III-8 and III-9 show the pollution potential from animal waste in the Lake Keesus Subwatershed. These tables show that animal waste is of little concern as a source of phosphorus in this subwatershed. Table III-8 shows that of the six livestock operations in the subwatershed, five are either hydrologically disconnected from Lake Keesus, or are so well buffered from the lake that the phosphorus is filtered from the runoff water before entering the surface channel network. The sole barnyard that contributes phosphorus to the surface channel network constitutes only a small portion of the phosphorus load to the lake.

Table III-9 shows that there is only one livestock operation in the subwatershed where winterspreading of manure may be taking place on critical lands. Thirteen critical acres are estimated to be spread from this livestock operation each winter. Although this land is relatively flat, it is drained by an extensive network of drainage channels, and hence is an area of high pollution potential. Table III-11 shows the pollutant generation from lands within the urban inventory corridor of the Lake Keesus Subwatershed. This table shows that about 12 tons of suspended solids, 58 pounds of phosphorus, and 27 pounds of lead are generated annually by all lands within the urban inventory corridor.

Table XI-1 shows the composition and pollution potential of the different urban land uses in the Lake Keesus Subwatershed. This table shows that traditional urban land uses, such as residential, commercial, industrial, and construction areas, encompass about 63 percent of the land uses inventoried in the urban corridor. The remaining areas are actually rural land uses contained within the urban inventory corridor. The residential, commercial, industrial, and construction areas generated 85 to 90 percent of the pollutants from within the urban inventory corridor.

Table XI-1 shows that the most important urban land use, both in area and in pollutant generation, is low and medium density residential. These areas are located principally along or near the lakeshore. Although these residential

Table XI-1. Estimated Pollutant Generation From Urban Land Uses In The Lake Keesus Subwatershed(1.)

		Pollutant Generation(Lbs./Year)		
Land Use	Area(acres)	Suspended Solids	Phosphorus	Lead
Low Density Residential	126	2823	5	1
Medium Density Residential	111	17535	46	20
High Density Residential	0	0	0	0
Commercial	1	700	2	2
Industrial	0	0	0	0
Construction	0	0	0	0
SUBTOTAL	238	21059	53	23
Other(2.)	141	3363	5	4
TOTAL	379	24442	58	27

1. Data compiled by the Southeastern Wisconsin Regional Planning Commission.
2. These lands include rural land uses contained within the urban area. Wetlands, woodlands, recreation lands, and open lands are included.

areas already have, for the most part, characteristics that limit the generation and transport of pollutants to these lakes, they can pose a water pollution threat where housekeeping practices are poor. Lawn fertilizers and pesticides, leaves, ashes from burning leaves, grass clippings, and improperly disposed waste oil or household chemicals can all contaminate the lakeshore waters.

In addition, improperly functioning septic systems may occur in the subwatershed, posing a threat to the lake's water quality. As of 1975, there were an estimated 212 privately owned on-site sewage disposal units in the subwatershed. Of these, 117 systems, or 55 percent, were located on soils having severe or very severe limitations for the use of such systems (SEWRPC, 1979).

Roadside erosion sites, gully erosion sites, and other sites where erosion requires stabilization were not specifically identified in the urban areas of the subwatershed as part of this priority watershed project. However, needs in these areas may be found and identified during implementation of this priority watershed plan, and management categories will be assigned.

WATER RESOURCES OBJECTIVES

The water resource goal for Lake Keesus has been established by the Southeastern Wisconsin Regional Planning Commission. The goal is to provide a level of water quality in the lake suitable for full recreational use and support of a warmwater fishery. In order to accomplish this, the planning commission has established a criterion of .02 mg/l total phosphorus in the lake during the period of spring mixing (SEWRPC, 1979). A secondary criterion of .03 mg/l total phosphorus during the period of spring mixing has been suggested for southeastern Wisconsin lakes as a means of achieving "good" water quality (Lillie and Mason, 1983).

There is inadequate information available for the Lake Keesus Subwatershed to indicate what water quality improvements are actually feasible through the Nonpoint Source Control Program. For example, more information is needed to determine the present phosphorus concentrations in the lake, the phosphorus load to the lake, the relative importance of different phosphorus sources, the percent reduction needed to meet the water quality goals established for lakes in the region by the regional planning commission, and the feasible reduction that can be achieved through nonpoint source controls.

However, some general statements can be made concerning phosphorus sources and the ability to control them. A significant phosphorus source is upland erosion. This source can be reduced by about half. Atmospheric deposition and septic systems may be important phosphorus sources, but neither can be controlled through the Nonpoint Source Control Program. Urban runoff is a relatively minor source of phosphorus, and further control is limited. Although control of livestock waste sites is feasible, the overall contribution of animal waste pollution control practices in achieving the phosphorus reduction goals for the lake would also be minor. The importance of animal waste control practices for reduction of pathogens that may be transported to the lake is unknown.

The Nonpoint Source Control Program objectives for Lake Keesus will be to maintain the the current recreational potential of the lake, by helping to keep nuisance algae conditions from worsening and by restricting the potential transport of pathogens to the lake. This will be accomplished by reducing, through the program, the transport of nutrients from eroding croplands and residential urban areas, and the potential transport of pathogens from the few existing areas where animal waste may pose a pollution hazard.

RURAL NONPOINT SOURCE CONTROL STRATEGY

The proposed strategy for controlling rural nonpoint pollution sources is presented below. Changes may be needed in the inventory data as the watershed plan is implemented. As this occurs,the strategy will be amended to reflect new information.

Pollutant Management Categories for major types of nonpoint sources are as follows:

1. Upland Sheet and Rill Erosion Sources

   - Management Category I. These are the ranked farms in the Lake Keesus Subwatershed which cumulatively contribute the top 75 percent of the portion of the soil erosion that is occurring at a rate greater than three tons/acre/year. This includes farms that exceed 60 tons/year of soil loss targeted for control. In addition, any single field in the inventory corridor eroding at a rate exceeding seven t/a/y will be placed in this management category.

   - Management Category II. The remaining lands in the Lake Keesus Subwatershed that have soil erosion exceeding three t/a/y will be placed in this management category.

   - Management Category III. Fields that are currently losing less than three t/a/y are not eligible for cost sharing, and are placed in this management category.

   Since the upland sheet and rill erosion survey did not assess waterway, gully, or streambank erosion sites, the need for controlling these sources will be assessed during implementation. Management categories for problem sites will be assigned at that time. The waterway erosion site identified by lakeshore homeowners to exist along the northern shore of the lake will be evaluated during project implementation, and a management category assigned.

2. Barnyard Runoff Sources

   - Management Category II. The only barnyard contributing phosphorus to surface waters in this subwatershed is placed in this management category.

   - Management Category III. Barnyards that are well buffered from the surface channel network, and that produce no loading of phosphorus to the surface waters according to the ARS Model, are not eligible for cost sharing.

3. Runoff of Winterspread Manure

- Management Category II. Livestock operations that winterspread manure on critical lands in the Lake Keesus Subwatershed are placed in this management category.

- Management Category III. Farms that currently receive no winterspread manure on critical acres are placed in this management category for manure spreading.

In some situations, the inability to safely spread manure during the spring or summer may result in a water pollution hazard. This type of problem will be assessed, and management categories assigned, by project staff during implementation.

4. Shoreline Erosion

- Management Category III. In general, lakeshore erosion sites will be placed in this category, unless a significant impact on public use of the lake can be shown.

URBAN POLLUTION CONTROL STRATEGY

Information and education programs will be the main tool used to control pollution associated with the urban land uses in the Lake Keesus Subwatershed. The goal of the information and education program will be to promote good housekeeping practices in the subwatershed, so that the amounts of nutrients, sediment, and hazardous materials available for transport to the lake will be reduced. Details of the information programs for urban areas are presented in Chapter XIV.

The adequacy of existing ordinances in Waukesha County and the towns of Lisbon and Merton to control construction erosion and stormwater runoff in the Lake Keesus Subwatershed should be investigated. As explained in Chapter XIV, the Nonpoint Source Control Program will encourage, and provide some support, for the modification or development of such ordinances where it is felt appropriate for water quality purposes.

In addition, practices needed to control gully erosion and roadside erosion in urban areas will also be eligible for cost sharing. These sites will be identified during the LCC staff during project implementation, and management categories assigned at that time.

INTEGRATION OF PROGRAMS IN ACHIEVING WATER RESOURCES OBJECTIVES

A better assessment of the threat to Lake Keesus posed by septic systems is needed. Where necessary, control of polluting systems should be pursued so that possible gains from the Nonpoint Source Control Program are not lost.

Better public access to Lake Keesus is needed to fully realize any water resources benefits that result from the Nonpoint Source Control Program.

CHAPTER XII

THE PINE LAKE SUBWATERSHED AND THE BEAVER LAKE SUBWATERSHED

EXISTING WATER RESOURCE CONDITIONS

The Pine Lake Subwatershed and Beaver Lake Subwatershed are discussed in the same chapter due to their similarities in both water resource conditions and nonpoint pollutant sources.

The two subwatersheds are located adjacent to one another, just east of the Oconomowoc Chain of Lakes. Including water surfaces, the Pine Lake Subwatershed encompasses 2,222 acres, and the Beaver Lake Subwatershed encompasses 1,398 acres. Beaver Lake and Pine Lake are the only surface water resources in the subwatersheds. These subwatersheds are located on Map II-1 in Chapter II.

Pine and Beaver Lakes

Beaver Lake and Pine Lake are both spring-fed seepage lakes, with limited flow occurring from Beaver Lake to Pine Lake, and from Pine Lake to Cornell Lake. Beaver Lake is 316 acres in surface area, has a maximum depth of 49 feet. and is composed of two separate lake basins. Pine Lake is an elongated lake basin, having a surface area of 703 acres and a maximum depth of 85 feet (Poff and Threinen, 1963b).

Both lakes have very good water quality, and generally lack any noticeable algae, weed, or fish kill problems. Measurements of phosphorus in Pine Lake have been unreliable in the past due to suspected arsenic interference with the measurements taken. The predicted phosphorus concentration, based on estimated nutrient loading to the lake, is only .02 mg/l. This estimated level of nutrient enrichment is relatively low. The estimate is supported by periodic measurements of water clarity and chlorophyll-a made in the lake between 1973 and 1981. Secchi depth measurements made in Pine Lake during June, July, August, and September of 1973, 1974 and 1979 to 1981 showed very good water clarity. During this time, secchi measurements ranged from eight feet to 15 feet, and averaged 11 feet. Chlorophyll-a measurements made during the summer months of 1979-1981 ranged from less than five ug/l to 10 ug/l, and averaged about five ug/l. All of these chlorophyll concentrations are indicative of a low amount of algae growth.

Beaver Lake has similar water quality conditions. Phosphorus concentrations measured in 1974, 1975, and 1978, during spring periods when the lake was mixed, ranged from .01 mg/l to .03 mg/l, and averaged .02 mg/l. Water clarity measurements averaged about nine feet.

Both lakes have gamefish/panfish assemblages. Pine Lake contains panfish, largemouth bass, northern pike, walleye, and cisco. Beaver Lake has a similar fishery, consisting of largemouth bass, northern pike, perch, and bluegills. The lake chubsucker, a "watch species," was recently collected from both lakes (Fago, 1982). Public access is considered inadequate for Pine Lake. Although there is access via a town road, parking is prohibited within one-half mile of

the access by ordinance of the Village of Chenequa. The Department of Natural Resources recently purchased public access on Beaver Lake, but it is currently undeveloped. Until development of the access site, access will be limited to a location along State Highway 83. Parking at this access site is currently prohibited, however.

In summary, these two lakes currently exhibit very good water quality characteristic of mesotrophic lakes. However, public access limitations effectively restrict most recreational uses of these lakes to lakeshore property owners.

LAND USE AND NONPOINT POLLUTION SOURCES

Table III-4 shows the portions of the Pine Lake and Beaver Lake subwatersheds inventoried for land use and nonpoint pollution sources. The inventory corridor for Pine Lake included 684 acres, or 30.8 percent of the subwatershed. The inventory corridor for Beaver Lake included 928 acres, or 66.4 percent of the subwatershed. In both subwatersheds, urban land uses dominated the inventory corridor, reflecting the extensive residential use of the lakeshores.

Table III-5 shows the composition of rural lands inventoried in these subwatersheds. In both cases, the predominant land uses in the agricultural inventory corridor are those having a low potential to generate sediment and associated pollutants. For example, in the Pine Lake Subwatershed, only 28 of the 193 agricultural acres in the inventory corridor are in row crops. The remaining acres are in woodlot, pasture, wetland, and grassland. Similarly, in the Beaver Lake Subwatershed, only 74 of the 309 agricultural acres in the inventory corridor are in row crops, with the remaining acres in woodlot, pasture, wetland, and grassland. Although little of the agricultural acreage is in row crops, there are few conservation practices applied to these croplands at this time.

Table III-6 summarizes rural sheet and rill erosion characteristics for these two subwatersheds. In the Pine Lake Subwatershed, an estimated 199 tons of soil are eroded each year as a result of upland sheet and rill erosion. Nearly one-third of the sheet and rill erosion in the subwatershed is coming from lands losing soil at a rate less than three t/a/y. These lands are not targeted for control practices. The remaining 71 percent of the sheet and rill erosion is coming from lands losing soil at a rate of five to 10 t/a/y. No lands were inventoried that were losing soil at a rate exceeding 10 tons/acre/year.

In the Beaver Lake Subwatershed, an estimated 301 tons of soil are lost each year as a result of upland sheet and rill erosion. Over 50 percent of the sheet and rill erosion in the subwatershed is coming from lands losing soil at a rate less than three t/a/y. These lands are not targeted for control practices.

Table III-7 shows that very few acres of control practices will be needed to bring the sheet and rill erosion rate in these subwatersheds down to a range acceptable for purposes of water quality protection. In the Pine Lake Subwatershed, 18 acres of conservation tillage would be sufficient to provide

the necessary degree of control. This would result in a 54 percent decrease in the sediment producing potential of these lands. In the Beaver Lake Subwatershed, 14 acres of conservation tillage and four acres of pasture management will result in a 32 percent reduction in the sediment producing potential of these lands. However, additional practices would be needed to bring the soil erosion on all these lands down to three t/a/y. If these additional practices are applied, a reduction of about 40 percent in the sediment production potential could be achieved.

A determination was made during the initial phases of the inventory that roadside erosion was not widespread enough to warrant a detailed survey. A detailed assessment of gully erosion in rural portions of the inventory corridor was not made during this nonpoint source inventory, either. Roadside and gully stabilization needs may be found in some areas by LCC staff during project implementation. The LCC staff will record areas of gully erosion and roadside erosion in the subwatersheds during project implementation.

There are no livestock operations in either of these two subwatersheds. Consequently, the pollution potential from livestock waste and the need for livestock waste control practices were not considered.

Table III-11 shows the pollutant generation from lands within the urban inventory corridor of these two subwatersheds. These estimates do not reflect the filtering effects that may occur as the urban runoff waters flow overland towards the lakes. Consequently, only a portion of the pollutant loads shown in Table III-11 will actually reach the lakes. This portion has not been quantified, however.

In the Pine Lake Subwatershed, about 10 tons of suspended solids, 39 pounds of phosphorus, and 23 pounds of lead are generated annually by all lands within the urban inventory corridor. In the Beaver Lake Subwatershed, about 18 tons of suspended solids, 86 pounds of phosphorus, and 42 pounds of lead are generated annually by all lands within the urban inventory corridor.

Table XII-1 shows the composition and pollution potential of the different urban land uses, such as residential, commercial, industrial, and construction areas, encompass about 64 percent of the land uses inventoried in the urban corridor. The remaining areas are actually rural land uses contained within the urban inventory corridor. The residential, commercial, industrial, and construction areas generated 55 percent of the suspended solids, 88 percent of the phosphorus, and 80 percent of the lead from the urban inventory corridor. The most important urban land uses in terms of pollutant generation are low and medium density residential. These areas are located principally along or near the lakeshore. Although these residential areas already have, for the most part, characteristics that limit the generation and transport of pollutants to these lakes, they can pose a water pollution threat where housekeeping practices are poor. Lawn fertilizers and pesticides, leaves, ashes from leaf burning, grass clippings, and improperly disposed waste oil or household chemicals can all contaminate the lakeshore waters.

Improperly functioning septic systems may occur in the Beaver Lake Subwatershed, posing a threat to lake water quality. As of 1975 there were an estimated 239 privately owned on-site sewage disposal units. Of these, 111

Table XII-1. Estimated Pollutant Generation From Urban Land Uses In The Beaver Lake Subwatershed(1.)

		Pollutant Generation(Lbs./Year)		
Land Use	Area(acres)	Suspended Solids	Phosphorus	Lead
Low Density Residential	245	5518	10	0.2
Medium Density Residential	149	23464	61	27
High Density Residential	0	0	0	0
Commercial	4	2453	5	6
Industrial	0	0	0	0
Construction	0	0	0	0
SUBTOTAL	398	31435	76	33
Other(2.)	221	25507	10	8
TOTAL	619	56942	86	41

1. Data compiled by the Southeastern Wisconsin Regional Planning Commission.
2. These lands include rural land uses contained within the urban area. Wetlands, woodlands, recreation lands, and open lands are included.

systems, or 46 percent, were located on soils having severe or very severe limitations for the use of such systems (SEWRPC, 1979).

Future land-use projections for the year 2000 predict the entire Beaver Lake drainage basin will be developed for residential use. If construction erosion and stormwater runoff are not properly regulated, the pollutant loads that can result from this type of activity could have serious consequences for Beaver Lake. A short discussion of the impacts that construction erosion can have on surface waters is presented in the chapter for Fowler Lake.

Table XII-2 shows the composition and pollution potential of the different urban land uses in the Pine Lake Subwatershed. This table shows that traditional urban land uses, such as residential, commercial, industrial, and construction areas, encompass about 55 percent of the land uses inventoried in the urban corridor. The remaining areas are actually rural land uses contained within the urban inventory corridor. The residential, commercial, industrial, and construction areas generated 75 percent of the suspended solids and phosphorus, and nearly all of the lead from the urban inventory corridor.

The most important urban land uses in terms of area is low density residential. These areas are located principally along or near lakeshore. Although these residential areas already have, for the most part, characteristics that limit the generation and transport of pollutants to the lake, they can pose a water pollution threat where housekeeping practices are poor. Lawn fertilizers and pesticides, leaves, ashes from leaf burning, grass clippings, and improperly disposed waste oil or household chemicals can all contaminate the lakeshore waters. In terms of pollutant generation, the runoff from State Highway 16, shown in Table XI-2 as commercial land use, is of equal importance to the residential areas as a source of suspended solids and phosphorus. The highway, however, generates most of the lead in the subwatershed.

In addition, improperly functioning septic systems may occur in the Pine Lake Subwatershed, posing a threat to lake water quality. As of 1975 there were an estimated 163 privately owned on-site sewage disposal units. Of these, 84 systems, or 52 percent, were located on soils having severe or very severe limitations for the use of such systems (SEWRPC, 1979).

Roadside erosion sites, gully erosion sites, and other sites where erosion requires stabilization were not specifically identified in the urban areas of these subwatersheds as part of this priority watershed project. However, needs in these areas may be found. These needs will be identified during implementation of this priority watershed plan.

WATER RESOURCE OBJECTIVES

The water resource goals for Pine and Beaver lakes have been established by the Southeastern Wisconsin Regional Planning Commission. The goals are to provide levels of water quality in these lakes suitable for full recreational use and support of warmwater fisheries. In order to accomplish these goals, the planning commission has established a criterion of .02 mg/l total

Table XII-2. Estimated Pollutant Generation From Urban Land Uses In The Pine Lake Subwatershed(1.)

		Pollutant Generation(Lbs./Year)		
Land Use	Area(acres)	Suspended Solids	Phosphorus	Lead
Low Density Residential	310	6945	12	3
Medium Density Residential	0	0	0	0
High Density Residential	0	0	0	0
Commercial	12	8271	18	19
Industrial	0	0	0	0
Construction	0	0	0	0
SUBTOTAL	322	15216	30	22
Other(2.)	169	4651	9	1
TOTAL	491	19867	39	23

1. Data compiled by the Southeastern Wisconsin Regional Planning Commission.
2. These lands include rural land uses contained within the urban area. Wetlands, woodlands, recreation lands, and open lands are included.

phosphorus in both lakes during the period of spring mixing (SEWRPC, 1979). This level of water quality already exists in Beaver lake, and may already be characteristic of Pine Lake.

Tables XII-3 and XII-4 show the estimated relative importance of different phosphorus sources for the Pine Lake and Beaver Lake subwatersheds. Although these estimates of relative importance are very crude, the total estimated phosphorus loads upon which they are based are reasonable based on the in-lake phosphorus concentrations measured in these lakes.

Table XII-3 points out that the pollution sources to be addressed through the Nonpoint Source Control Program account for only 13 percent of the phosphorus load to Beaver Lake. Based on the possibility of controlling 25 percent of the urban phosphorus load and 54 percent of the rural phosphorus, the priority watershed project can be expected to achieve only a three percent phosphorus load reduction to Pine Lake. For Beaver Lake, a 25 percent reduction in the urban phosphorus load and a 40 percent reduction phosphorus from rural lands would provide an overall phosphorus load reduction of six percent through the Nonpoint Source Control Program.

These reductions will not result in any changes in lake water quality, but will contribute to the maintenance of existing conditions. The objective of the Nonpoint Source Control Program for both the Pine Lake and Beaver Lake subwatersheds is to maintain the aesthetic qualities of the lakes. This will be done by reducing the loads of phosphorus and urban toxic materials to these lakes through urban and rural nonpoint source control practices. In addition, the lakes will be protected from future construction erosion and stormwater runoff by encouraging development of necessary ordinances.

RURAL NONPOINT SOURCE CONTROL STRATEGY

The proposed strategy for controlling rural nonpoint pollutant sources is presented below. Changes may be needed in the inventory data as the watershed plan is implemented. As this occurs, the strategy will be amended to reflect new information.

The appropriate Management Categories for upland and shoreline erosion are as follows:

1. Upland Sheet and Rill Erosion Sources

   - Management Category II. All lands in the Pine Lake and Beaver Lake subwatersheds that have soil erosion exceeding three t/a/y will be placed in this management category.

   - Management Category III. Fields that are currently eroding less than three t/a/y are not eligible for cost sharing, and are placed in this management category.

   Since the upland sheet and rill erosion survey did not assess gully or roadside erosion sites, the need for controlling these sources will be assessed during implementation. Management categories for problem sites will be assigned at that time.

Table XII-3. Feasibility of Reducing The Phosphorus Loading To Pine Lake

Pollutant Source Category	Estimated Annual Phosphorus Load In Pounds (and %) From Different Sources		Portion of Phosphorus Load That Can Reasonably Be Removed From The Source Category	Feasible Phosphorus Load Reduction(1.)
Agricultural Runoff (sediment phosphorus)	20	(4%)	54%	2%
Agricultural Runoff (soluable phosphorus)	10	(2%)	5%	0%
Urban Runoff	39	(6%)	25%	1%
Septic Systems(2.)	243	(36%)	-	-
Atmospheric Deposition (2.)	352	(52%)	0%	0%
	Total: 664			
				Total without control of septic systems: 3%

1. This figure = (column B)*(column C).
2. SEWRPC, 1979. A Regional Water Quality Management Plan For Southeastern Wisconsin--2000: Vol. 2.

2. Shoreland Erosion

- Management Category III. In general, lakeshore erosion sites will be placed in this category, unless a significant impact on public use of the lake can be shown.

URBAN POLLUTION CONTROL STRATEGY

Information and education programs will be the main approach used to control pollution associated with the urban land uses in the Pine Lake and Beaver Lake subwatersheds. The goal of the information and education programs will be to promote good housekeeping practices in the subwatersheds, so that the amounts of nutrients, sediment, and hazardous materials available for transport to the lake will be reduced. Details of the information programs for urban areas are presented in Chapter XIV.

A closer assessment of the need and practicability of controlling lead and other toxic materials in the urban runoff to Pine Lake from State Highway 16 will be made by the Department of Natural Resources during plan implementation.

The adequacy of existing ordinances in Waukesha County, the Town of Merton, and the Village of Chenequa to control construction erosion and stormwater runoff in the Pine Lake and Beaver Lake subwatersheds should be investigated, with priority put on protecting Beaver Lake. As explained in Chapter XIV, the Nonpoint Source Control Program will encourage, and provide some support, for the modifications or development of such ordinances where it is felt appropriate for water quality purposes.

In addition, practices needed to control gully erosion and roadside erosion in urban areas will also be eligible for cost sharing. These sites will be identified during the LCC staff during project implementation, and management categories assigned at that time.

INTEGRATION OF PROGRAMS IN ACHIEVING WATER RESOURCES OBJECTIVES

A better assessment of the threat to these lakes posed by septic systems is needed. Where necessary, control of polluting systems should be pursued so that possible gains from the Nonpoint Source Control Program are not lost.

Better public access to Pine Lake is needed to fully realize any water resources benefits that result from the Nonpoint Source Control Program. Similarly, development of the state-owned public access on Beaver Lake is needed.

Table XII-4. Feasibility of Reducing The Phosphorus Loading To Beaver Lake

Pollutant Source Category	Estimated Annual Phosphorus Load In Pounds (and %) From Different Sources		Portion of Phosphorus Load That Can Reasonably Be Removed From The Source Category	Feasible Phosphorus Load Reduction(1.)
Agricultural Runoff (sediment phosphorus)	30	5%	40%	2%
Agricultural Runoff (soluable phosphorus)	12	2%	5%	0%
Urban Runoff	86	14%	25%	4%
Septic Systems(2.)	321	53%	-	-
Atmospheric Deposition (2.)	158	26%	0%	0%
Total:	607			Total without control of septic systems: 6%

1. This figure = (column B)*(column C).
2. SEWRPC, 1979. A Regional Water Quality Management Plan For Southeastern Wisconsin--2000: Vol. 2.

CHAPTER XIII

THE MOOSE LAKE SUBWATERSHED AND THE SILVER LAKE SUBWATERSHED

EXISTING WATER RESOURCE CONDITIONS

The Moose Lake Subwatershed, nestled along the northeastern edge of Okauchee Lake, is the smallest of the Oconomowoc River subwatersheds. Including the surface area of the lake, the subwatershed encompasses only 650 acres. The Silver Lake Subwatershed, located just south of Oconomowoc Lake, encompasses about 1,400 acres. These subwatersheds are shown on Map II-1 in Chapter II, are both discussed in this chapter for convenience.

Moose Lake

Moose Lake is a small (81 acres) landlocked glacial lake. The lake has a maximum depth of 61 feet, and an average depth of 29 feet. The water is generally clear, and the bottom composed mainly of sand and gravel. The average trophic status indices, based on satellite telementry data collected between 1979-1981, are 43 for water clarity, and 44 for chlorophyll (Martin, et at., 1983). According to Table III-2, these indices are indicative of very good water quality. According to The Areawide Water Quality Management Plan for Southeastern Wisconsin, general water quality conditions have included occasional algae blooms and some nuisance growths of aquatic weeds (SEWRPC, 1979).

The fishery in Moose Lake is composed of panfish, largemouth bass, northern pike, and rainbow trout. There is no public frontage on the lake, however, and public access is lacking.

Silver Lake

Silver Lake is also landlocked. It has a surface area of 222 acres, a maximum depth of 44 feet, and an average depth of 32 feet. The water is generally clear, and the bottom predominantly sand. The average trophic status indices, based on satellite telemetry data collected between 1979-1981, are 48 for water clarity and 47 for chlorophyll (Martin, et al., 1983). According to Table III-2, these indices are indicative of good water quality. According to A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000, general water quality conditions have included occasional algae blooms, nuisance growth of aquatic weeds, high nutrient concentrations, and oxygen depletion in the lake's bottom waters during certain times of the year (SEWRPC, 1979a).

The fishery in Silver Lake is a mixture of panfish and largemouth bass. Access to Silver lake is limited to a walk-in site.

LAND USE AND NONPOINT POLLUTANT SOURCES

Moose Lake Subwatershed

Table III-4 shows that 275 acres of the Moose Lake Subwatershed were inventoried for nonpoint pollutant sources. This acreage was evenly split between urban and rural land uses.

The rural acreage in this inventory corridor is comprised almost exclusively of woodlot, wetland, and grassland, as shown in Table III-5. These land uses have little potential to generate sediment. Tables III-6 and III-7 reflect this low potential. The estimated total annual soil loss in the rural inventory corridor is only 36 tons/year. All of this erosion occurs at rates less than three t/a/y. There are no livestock operations in the subwatershed.

The urban acreage in the Moose Lake Subwatershed is comprised mostly of low and medium density residential areas. These two land uses make up nearly 100 acres in the inventory corridor. Commercial lands comprise another ten acres.

Table III-11 shows the estimated amount of pollutants generated from the urban areas in the Moose Lake Subwatershed. About 25 pounds of lead is generated per year from these urban lands, with the total load from medium density residential and commercial lands being about the same. About 40 pounds per year of phosphorus is estimated to be generated from these urban lands. According to estimates presented for the entire Moose Lake Subwatershed in A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000, (SEWRPC, 1979a), the rural land uses accounted for about nine percent of the estimated annual phosphorus loading to Moose Lake, and the urban areas accounted for about six percent. Most of the loading (about 75 percent) was estimated to be from septic systems. During 1975, it was estimated that 102 of the 143 systems were located on soils having limitations for safe disposal of domestic wastes. By the year 2000, however, it is expected that most of these systems will be served by sanitary sewers, making the remaining systems an insignificant phosphorus source.

The potential threat to Moose Lake lies in developing urban areas with the subwatershed. It is estimated that the urban acreage in the subwatershed will increase from 212 acres to 483 acres. A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000 estimates that construction erosion, if controlled, will contribute a significant amount of phosphorus and sediment to Moose Lake. After development, these new urban areas will increase the urban loading of nutrients, sediment, and toxic materials. The significance of this increase will depend on what precautions are taken to reduce runoff from these areas once development is completed.

Silver Lake Subwatershed

Table III-4 shows that 385 acres of this subwatershed were inventoried for nonpoint pollutant sources. Most of this acreage was rural.

Three-fourths of the rural acreage in this inventory corridor is comprised of land uses having little potential to generate pollutants. These included ungrazed woodlots, wetlands, grasslands, and pastures, as shown in Table III-5. Most of the remaining rural acreage in the inventory corridor, however, is comprised of continuous row crops which have a fairly high potential to generate pollutants. Table III-6 shows that almost three-fourths of the 564 tons/year lost from the rural lands is coming from lands losing soil at a rate exceeding five t/a/y.

Animal waste is not a great concern in the Silver Lake Subwatershed. There is only one livestock operation, which contributes a small amount of pollutants to the lake due to barnyard runoff.

The urban acreage in this subwatershed is comprised of low density residential (22 acres), medium density residential (11 acres), and commercial (12 acres) land uses.

Table III-11 shows the estimated amount of pollutants generated from the urban areas in the Silver Lake Subwatershed. About 24 pounds of lead are generated each year, with the commercial land uses providing over 90 percent of this material. About 28 pounds of phosphorus are estimated to be produced each year. According to the estimates presented for the entire Silver Lake Subwatershed in A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000 (SEWRPC, 1979a), the rural land uses accounted for about 13 percent of the estimated annual phosphorus loading to Silver Lake, and the urban areas accounted for about 32 percent. About 29 percent of the loading was estimated to be from septic systems. During 1975, it was estimated that 43 of the 176 systems were located on soils having limitations for safe disposal of domestic wastes. By the year 2000, however, it is expected that many of these systems will be served by sanitary sewers, making the remaining systems an insignificant phosphorus source.

The potential threat to Silver Lake lies in developing urban areas within the subwatershed. The regional water quality plan estimates that construction erosion, if uncontrolled, will contribute a significant amount of phosphorus and sediment to the lake. After development, these new urban areas may increase the total urban pollutant loading. The significance of this increase will depend on what precautions are taken to reduce runoff from the developed area.

Roadside Erosion and Gully Erosion

Roadside erosion and gully erosion sites were not inventoried in these two subwatersheds as part of this planning process. Conservation needs in these areas will be identified by local staff using implementation of this watershed project.

WATER RESOURCES OBJECTIVE

The objective of the Nonpoint Source Control Program for both of these lakes is to maintain the existing level of water quality.

RURAL NONPOINT SOURCE CONTROL STRATEGY

In the Moose Lake Subwatershed, no agricultural management needs have been identified to date in the rural areas. All soil losses occur at rates less than three t/a/y. Practices to control soil loss from such lands are not eligible through this program. Needs related to animal waste management have not been identified. If areas of gully or roadside erosion are found during implementation of this project, local staff will document the severity of the problems and assign management categories to them.

In the Silver Lake Subwatershed, Management Categories are as follows:

1. Upland Sheet and Rill Erosion

   - Management Category I: The ranked lands which cumulatively contribute the top 32 percent of the pollution potential from this source, or landowners having at least 180 tons/year of soil erosion targeted for control. In addition, any single field losing soil at a rate exceeding seven t/a/y is placed in this management category.

   - Management Category II: The remaining lands losing soil at a rate exceeding three t/a/y.

   - Management Category III: Fields that currently lose soil at rates less than three t/a/y are placed in this management category.

2. Barnyard Runoff Sources

   - Management Category II: The only barnyard contributing phosphorus to Silver Lake is placed in this management category.

3. Runoff of Winterspread Manure

   - Management Category III: There are no critical acres estimated to be winterspread with manure from the livestock operation in the subwatershed, therefore the one livestock operation is placed in this management category for this pollution source.

If improper storage or spreading of manure at other times of the year poses a water quality threat, this management category may be amended.

URBAN NONPOINT SOURCE POLLUTION CONTROL STRATEGY

Information and education will be the main approach used to control pollution associated with the urban areas in these subwatersheds. The Information and Education Plan, presented in Chapter XIV, provides details of this proposed effort.

The adequacy of existing ordinances to control construction site erosion and runoff from newly established urban areas should be evaluated by units of government in both subwatersheds. For Moose Lake, this includes: Waukesha County, Town of Merton, and the Village of Chenequa. For Silver Lake, this includes Waukesha County, the Town of Summit and the City of Oconomowoc. Chapter XIV details assistance that will be made available to these units of government through the Nonpoint Source Control Program for reviewing and modifying local ordinances and codes.

9535A

THE OCONOMOWOC RIVER PRIORITY WATERSHED PROJECT

DETAILED PROGRAM FOR IMPLEMENTATION

CHAPTER XIV

IMPLEMENTATION PLAN

INTRODUCTION

The voluntary installation of corrective land management practices to control critical nonpoint sources of pollutants will be the mechanism used for achieving the water quality objectives identified in this plan for the Oconomowoc River Priority Watershed Project.

There are two types of funds that will be made available through the Wisconsin Nonpoint Source Water Pollution Abatement Program to assist in this effort. The first type is called the state cost share fund. State cost share funds will be provided to landowners and land operators to cover a percentage of the costs of installing the practices. The second type is called the local assistance fund. Monies from this fund will be made available to cities, villages, and counties to cover the work effort required to implement this priority watershed project over the eight year period it is expected to operate.

The purpose of this chapter is to serve as a guide for the efficient implementation of the recommendations identified in this priority watershed plan. This chapter discusses:

1. The tasks necessary to implement the recommendations in the Management Plan
2. The agencies and units of government responsible for carrying out those tasks
3. The time frame for completion of those tasks
4. The type and amount of staff needed
5. The cost of carrying out the project
6. The information and education program
7. Project tracking and evaluation activities

AGENCIES INVOLVED AND THEIR RESPONSIBILITIES

Department of Natural Resources

The Department of Natural Resources (DNR) has overall administrative responsibility for the Wisconsin Nonpoint Source Water Pollution Abatement Program, of which the Oconomowoc River Priority Watershed Project is a part. The DNR is responsible for 1) administering the cost sharing and technical assistance funds for the project, 2) conducting water quality and fish surveys

Table XIV-1

Relationship between landowners, local management agencies, and the Department of Natural Resources in the Oconomowoc River Priority Watershed Project.

Role	Entity	Receive Cost share & tech. asst. for installation of Mgt. practices	Enter into cost share agreements with landowners to provide tech. & financial supp. for installation of mgt. practices	Enter into local asst. agreements with DNR to increase staff for tech. asst.	Enter into Nonpoint Source Grant Agreement with DNR to make cost share monies available to landowners
Local Mgmt. Agency	City		X	X	X
	Village		X	X	X
	County		X	X	X (Waukesha)
Land-owner/ Oper-ator	Individual	X			
	Corporation	X			
	Partnership	X			
	Town	X			
	Town San. District	X			
	Inland Lake District	X			
	City	X			
	Village	X			
	County	X			
	State Agency	X			

and 3) evaluating the watershed project. The Department will also play a role in assisting local units of government to review and modify or to adopt provisions in local ordinances as necessary to provide for adequate control of construction site erosion and urban stormwater runoff from developing lands. For urban structural practices, the Department will be involved in the development and approval of practice designs.

Local Management Agencies

The Wisconsin Nonpoint Source Control Program is implemented by local management agencies. A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000 (1979) designated five local units of government for the control of urban and rural nonpoint pollutant sources in southeastern Wisconsin. These include counties, cities, villages, town sanitary districts, and lake districts. Not all of these units of government are designated to provide all services needed to control nonpoint pollutant sources. The development and implementation of control plans is the designated responsibility of counties, cities, village, town sanitary districts, and lake districts, but providing technical and fiscal support is the designated responsibility of county government.

In the Wisconsin Nonpoint Source Control Program, however, the definition of local management agencies is more limited, with responsibility for local implementation residing only with cities, villages and counties. Under Wisconsin statutes, these agencies are responsible for local implementation, and only these local management agencies can enter into the grant agreements with the DNR that are needed to make state monies available for project staffing and installation of Best Management Practices.

The general interrelationships that will exist in the Oconomowoc River Priority Watershed Project between landowners, local management agencies, and the Department of Natural Resources are shown in Table XIV-1. Note that these units of government may also receive cost sharing assistance to help control nonpoint sources of pollutants on lands they own or operate.

More specifically, cities, counties, and villages in the Oconomowoc River Priority Watershed Project have the responsibility to:

1. Assist with the development and approval of the priority watershed plan

2. Recommend revisions to the plan to allow for necessary changes as the project is implemented

3. Carry out education and information programs about nonpoint source pollution and land management needs within the watershed project area

4. Contact all owners and operator of lands identified as significant nonpoint pollutant sources in the watershed plan, within one year of the date this plan is approved

5. Enter into cost share agreements with landowners or operators

6. Provide Best Management Practice technical design and installation assistance for all Best Management Practices specified on cost share agreements, and determine priorities for technical assistance to landowners

7. Certify installation, operation, and maintenance of Best Management Practices

8. Prepare and maintain adequate fiscal management and technical assistance files

9. Coordinate Nonpoint Source Control Program cost sharing monies with local cost sharing sources

10. Screen applications for variances of the established cost sharing rates

11. Report to the DNR on project progress

12. Prepare annual or periodic work plans for activities necessary to implement this watershed project

Based on the identification of critical nonpoint pollutant sources in the Oconomowoc River Watershed, and the necessary management activities to bring these sources under control, management agencies in the watershed can expect to concentrate their efforts on specific activities as follows:

A. Waukesha, Washington, Jefferson Counties:

   1. Project and financial management

   2. Information and education

   3. Landowner contacts in unincorporated areas

   4. Develop cost share agreements and conservation plans for landowners in unincorporated areas; enter into cost share agreements with landowners in unincorporated areas

   5. Provide for the design, installation, and certification of management practices for landowners in unincorporated areas

   6. Provide limited technical assistance in areas of planning and practice design, installation, and certification to incorporated municipalities, wherever possible

   7. Assist towns, villages, and cities in the review of construction erosion and stormwater runoff control ordinances for developing areas, wherever possible

   8. Review and revise, as necessary, county ordinances for the control of construction site erosion and urban stormwater runoff from developing areas

B. City of Oconomowoc

1. Conduct a review of city development patterns to identify future detention basin sites for developing areas

2. Conduct a study to determine the feasibility of detention and infiltration practices recommended in this watershed plan

3. Contact critical landowners within the city, consistent with the results of the feasibility study, and enter into cost share agreements with landowners within the city; install detention basins consistent with feasibility study

4. Evaluate the need to modify stormwater management and construction erosion control ordinances for developing areas within the city; revise ordinances as needed.

C. Villages of Slinger, Chenequa, Lac La Belle, Merton, Nashotah, Oconomowoc Lake:

1. Review the need to modify or adopt ordinances for the control of construction erosion and stormwater runoff in developing areas; revise ordinances as needed

Although neither towns nor lake districts are management agencies for grant purposes under the Wisconsin Nonpoint Source Control Program, their involvement in the Oconomowoc River Priority Watershed Project is important. The towns of Erin, Hartford, Polk, Richfield, Lisbon, Merton, Oconomowoc, Summit, Concord, and Ixonia should review their need to modify or adopt ordinances for the control of construction erosion and stormwater runoff in developing areas. Lake districts and associations will also play an important role, serving as focal points for educational activities to be conducted as part of this watershed project. In addition, the coordination of lake district or association activities such as weed harvesting with the activities carried out under the Nonpoint Source Control Program will be needed to fully achieve the water resources goals established for these lakes.

Waukesha County was selected as the lead management agency for the Oconomowoc River Priority Watershed Project by the other agencies involved. Waukesha County is thus responsible for coordinating activities among all other management agencies in the watershed. The county is also contractually and financially responsible to the State of Wisconsin for overall management of the project, and is responsible for coordinating the activities of all the agencies involved. However, Waukesha County is not responsible for the separate contractual agreements made by other management agencies. Such agreements include cost share agreements between landowners or operators and other management agencies, and local assistance agreements entered into between cities, villages, other counties, and the DNR.

Cooperating Agencies

The local management agencies in the Oconomowoc River Watershed Priority Watershed Project will receive assistance from cooperating agencies in implementing the watershed project. These cooperating agencies include:

1. Soil Conservation Service (USDA-SCS)): This federal agency works through the county Land Conservation Committees (LCC). The county SCS personnel worked with other project personnel to provide inventories of conservation needs and estimated costs of Best Management Practices. The SCS will provide technical assistance for installing conservation practices. They also will aid the county in planning, designing, layout, and certification of practice installation

2. University of Wisconsin Extension (UW-Extension): County Extension agents will provide assistance in planning, coordinating and conducting public information, education, and participation efforts.

3. Agricultural Stabilization and Conservation Service (USDA-ASCS): This federal agency will work with the county Land Conservation Committees in coordinating state cost share funds, made available through the Nonpoint Source Control Program, and federal funds, made available through such programs as the Agricultural Cropland Program (ACP) and the Conservation Reserve Program (CRP).

4. Southeastern Wisconsin Regional Planning Commission (SEWRPC): Commission staff, which have provided technical and planning assistance throughout preparation of this plan, will continue to provide technical assistance and educational services to Waukesha and Washington counties during plan implementation.

Plan Development Advisory Committee

The Oconomowoc River Watershed Plan Development Advisory Committee (PDAC), which served during plan preparation as a formal advisory committee of the SEWRPC, will continue to exist throughout implementation of this plan. The committee will meet upon request of its chairman to keep abreast of project progress and to discuss issues and problems that arise during implementation.

COST SHARE FUNDS

Management Practices Eligible for Cost Share Assistance Under the Nonpoint Source Control Program

Best Management Practices (BMPs) are defined as those practices, techniques, or measures which are determined to be the most effective, practicable means of preventing or reducing pollutants from rural and urban nonpoint sources to a level compatible with achieving water quality goals. Landowners and land operators, including local units of government, are eligible to receive funding for specified BMPs used to control critical pollution sources in the Oconomowoc River Priority Watershed Project.

The 14 Best Management Practices for which cost share funding is available are listed in Chapter NR 120 of the Wisconsin Administrative Code, and are briefly described below. NR 120 specifies that the standards, specifications, and design criteria for these management practices shall be those specified in the SCS Technical Guide for Wisconsin (current dates), unless alterative, less restrictive design criteria exist that will achieve the same level of control. Where standards, specifications, and design criteria for a practice

on a particular site are not found in the technical guide, the management agency signing the cost share agreement must notify the Department of Natural Resources, which will identify acceptable criteria. The approved BMPs are:

1. Contour Farming: Contour farming includes plowing, preparing land, planting and cultivating on the contour of the land. This practice is an effective, low cost means of reducing the water pollution from eroding cropland. Contour plowing is eligible for cost sharing when it is applied by itself. However, it is a required component of other practices such as contour strip cropping, terraces, and conservation tillage.

2. Contour and Field Strip Cropping: Contour strip cropping involves growing crops on the contour in alternating strips of close-growing crops, clean tilled or conservation tilled row crops, and grass or legumes. This practice is particularly compatible with dairy farming, where hay and grain are produced each year. Field strip cropping is used on undulating topography, where it is not possible to meet the stringent contouring requirements of contour strip cropping. These are effective, low cost practices.

3. Conservation Tillage: Conservation tillage includes a number of different planting, tilling, and cultivating methods designed to leave a vegetative residue on the soil. This practice effectively reduces soil loss, and also reduces the runoff of nutrients and pesticides if properly managed.

   In the Oconomowoc River Watershed, Conservation Tillage I refers to practice "C6" in NR 120 (Conservation tillage except for No-Till). This practice is applied primarily to lands in rotation and is installed in one season. When used in conjunction with contour strips, the cost share rates for the two practices will be added together. Conservation Tillage II refers to the "Special Practice" presented in Appendix B. This practice is meant for lands planted to row crops year after year, and installation may be phased in over a three year period.

   Conservation tillage is a relatively low cost practice that will be extensively recommended to landowners in this watershed.

4. Grassed Waterways: Grassed waterways includes natural or constructed watercourses which are shaped, graded, and established in a suitable vegetative cover as needed to prevent erosion by runoff waters. This practice is used mainly to carry runoff diversion waters, and to prevent the formation or worsening of gullies that can form in croplands. The practice is also used in urban areas, such as where grass swale drainages are an alternative to curbs and gutters. This is a moderately expensive, but frequently needed practice.

5. Terraces and Diversions: Terraces and diversions are earthen berms constructed to divert excess water to sites where it can be safely transported, and to break up long, erosive slopes on cropland. This practice is effective, but is extremely expensive and should only be used in special cases where other less costly alternatives are not practicable.

6. Critical Area Stabilization: Critical area stabilization involves planting suitable vegetation, such as trees or permanent grassland, on highly erosive areas such as roadsides, gullies, intermittent stream channels, and steeply sloped land. The practice is applicable in urban and rural areas.

7. Settling Basins: Settling basins are impoundments created to retain sediment and other pollutants associated with runoff waters. These include structures such as erosion control dams, desilting reservoirs, sediment basins, detention basins, debris basins, and similar types of structures. These basins must generally be designed as "wet basins" for purposes of water quality protection. This practice is applicable in urban and rural areas.

8. Livestock Exclusion From Woodlots: Livestock exclusion involves using fencing, or other means, to keep livestock from entering erodible slopes in woodland areas.

9. Shoreline Protection: Shoreline protection involves measures to stabilize and protect streambanks or lakeshores from breakdown and from erosion. This practice could include fencing to control livestock access to streams; rip-rap, gabions, or some form of retaining wall; shoreline shaping and seeding; and livestock or machinery crossings. The practice is applicable in urban and rural areas.

10. Barnyard Runoff Management: Barnyard runoff management is a system designed to reduce the quantity of manure-related pollutants that wash from barnyards into lakes and streams. The control system involves using many components designed to safely divert clean water around the barnyard, to prepare the barnyard surface for proper management, and to filter and safely direct runoff waters generated from the barnyard surface.

11. Manure Storage: Manure storage involves a structure for the temporary storage of manure. Manure storage will be cost shared when the project staff determines it is needed for a farmer to avoid spreading manure on critical lands during winter periods when incorporation is not possible, or when needed to store manure for short periods during the spring when saturated soils prevent spreading of manure on otherwise suitable lands.

    Manure storage is not always needed to safely utilize animal wastes. Changes in waste utilization may not require storage, particularly when the manure stack can be controlled as part of a barnyard runoff control system, and where the landowner has enough land where manure can be winterspread without adverse water quality impacts.

12. Infiltration Systems: An infiltration system includes structures such as dutch drains, porous pavement, lattice blocks and dry wells, or grassed drainageways. These systems increase infiltration and reduce runoff from impervious surfaces. Grassed drainageways also provide some pollutant filtering. This practice is mainly used in urban areas to control source area runoff from roofs and parking lots. Its application is limited, however, to areas where it will not cause groundwater contamination.

13. Leaf Collection: Leaf collection is the collection or management of leaves, seeds, grass clippings, or other vegetative matter in order to prevent leaching and transport of nutrients to lakes and streams.

14. Street Sweeping: Street sweeping includes mechanical or vacuum cleaning of streets and the cleaning of catchment basins, in order to reduce the amount of vegetative matter, debris, and particulates containing nutrients and toxic materials that enters surface waters.

The Nonpoint Source Control Program allows for special management practices where needed. These are practices which are innovative or rarely used, which are effective, but are not specifically described in NR 120. These practices must be approved by the designated management agencies under whose jurisdiction they will be used. The Department of Natural Resources must determine the maximum cost share rates applicable to such practices.

There have been five special practices identified by designated management agencies for use in the Oconomowoc River Priority Watershed Project. These practices include:

1. Conservation Tillage (Continuous Row Cropping)
2. Construction Erosion and Runoff Control Ordinances
3. Cover Crop, Wind Erosion Control
4. Field Windbreak, Wind Erosion Control
5. Strip Cropping, Wind Erosion Control

These practices are described in Appendix B to this plan.

Management Practices Not Eligible For Cost Share Assistance Under the Nonpoint Source Control Program

Not all management practices will be cost shared through the Nonpoint Source Control Program, even though they may be needed to control pollutant loading to surface or groundwaters. Cost share assistance will not be provided for the following management practices:

1. Mining
2. Silviculture, except for farm woodlots
3. Small-scale on-site human waste disposal systems such as septic system or holding tanks
4. Practices installed primarily for flood control purposes
5. Practices which have land drainage as the primary objective
6. Practices which are normally and routinely used in farming, such as fertilizer and irrigation water management, pesticide management, or crop rotation

Ordinances to control construction erosion and post-construction runoff from lands undergoing development are considered Best Management Practices. In some cases, ordinances will be required as practices specified on cost share agreements for towns, villages cities, or counties. The conditions under which this requirement applies are specified in the section of this chapter entitled Cost Share Condition. Financial assistance will be made available

Table XIV-2 State Cost Share Rates For Best Management Practices Installed in the Oconomowoc River Priority Watershed Project

Best Management Practice[1]	Cost Share[2] Rate	Optional Flat[2] Payment/Acre
Contour Farming	50%	$6/acre[3]
Contour Strip Cropping	50%	$12/acre[3]
Field Strip Cropping	50%	$10/acre[3]
Conservation Tillage I	50%	$8/acre
*Conservation Tillage II	50%	$45/acre
*Cover Crop, Field Break, Strip Crop for Wind Erosion Control	70%	
Cropland Diversion	70%	
Cropland Terrace	70%	
Waterway	70%	
Grade Stabilization Unit[4]	70%	
Critical Area Stabilization[4]	70%	
Settling Basin[4]	70%	
Barnyard Runoff Control	70%	
Manure Storage	70% ($6000 max.)	
Shoreline Protection[4]	70%	
Livestock Exclusion	70%	
Infiltration System	50%	
*Construction Erosion and Runoff Control Ordinance	0%[5]	

* These are special practices, and are described in Appendix B.

1 Under the proposed revisions to NR 120, the following changes are made. The Conservation Tillage I and II practices are replaced with a reduced tillage practice which includes a modified form of no till. The settling basins practice is deleted since it is included in a number of other practices. Roofs for manure storage facilities and animal lots and concrete paving of barnyards are added for critical groundwater quality situations. The manure storage facility practice is split into long-term and short-term manure storage facilities. The urban Best Management Practices are grouped into one practice called structural urban Best Management Practices.

2 Under the proposed revisions to NR 120, the following changes are made. The cost share rate for Conservation Tillage I is changed to $15 per acre for one year for crops in rotation. The maximum amount for long-term manure storage facilities is increased to $10,000 with no more than $5,000 for manure transfer equipment. The maximum for short-term manure storage is $6,000 with no more than $3,000 for manure transfer equipment. The prohibition on federal dollars being used as a local share is removed to provide counties with greater flexibility in arranging cost sharing with landowners and land operators.

3 These rates apply to the installation of the basic practice. Additional activities, such as tiling or obstruction removal needed to support the management practice, may be cost shared at 50 percent of the additional cost. Each county will establish a policy of cost sharing for tiling in its portion of the watershed project.

4 Management agencies may increase the state cost share rate for these practices up to 80 percent, by matching each percent increase in state cost sharing. This does not apply where the management agency is the beneficiary of the cost share funds.

5 Financial assistance for the development and modification of ordinances will be made available through local assistance agreements.

for ordinance development or revision, but will not take form of a cost share payment. Because of this, ordinances must appear on cost share agreements as "noncost shared practices".

Cost Share Rates

Cost share rates used in the Oconomowoc River Priority Watershed Project are presented in Table XIV-2. Where two or more practices are of equal effectiveness in the control of pollutants, the maximum cost share amount shall be based on the lowest cost alternative, provided it is consistent with the use and management of the land in question.

The local share of practice installation cost, or that portion remaining after the state cost share funds are applied, can be provided in several ways. It may be provided by the landowner or operator, either as payment to a contractor or as in-kind labor provided by the landowner or operator. The local share may also be made up of cost share assistance coordinated from other nonfederal or nonstate sources, such as county cost share funds or funds donated for this purpose by lake districts or individuals. Other state and federal funds may not be used to provide the local share of the costs for practices cost shared under the Nonpoint Source Control Program.

The Cost Share Agreement

Funds are available through the Nonpoint Source Control Program to help eligible landowners and operators, including local units of government, install management practices needed to control nonpoint pollution sources.

Although the funds are provided by the State of Wisconsin, their use in the Oconomowoc River Priority Watershed Project will be administered at the local level by Waukesha County. The procedures to be used in administering these funds are explained later in this section.

All recipients of cost share funds must first enter into a cost sharing agreement with the appropriate management agency. Table XIV-3 lists the management agencies that may enter into cost share agreements with eligible landowners or operators in the Oconomowoc River Watershed. A copy of the cost share agreement form can be found in Appendix A of this plan.

The cost share agreement must include all Best Management Practices needed to control significant nonpoint pollution sources in eligible areas owned or operated by the recipient of the cost share funding. This includes Best Management Practices that may not be cost shared through the Nonpoint Source Control Program but are nonetheless needed to protect water quality. Examples include practices normally and routinely used in growing crops, such as crop rotations; sound utilization of animal wastes; and safe management of fertilizers or pesticides, Upon signing the cost share agreement, the landowner agrees to operate and maintain both the cost shared and noncost shared management practices needed to protect water quality. The landowner also agrees not to apply any land use or practice that defeats the purpose of practices installed under the agreement.

Table XIV-3. Parties to Cost Share Agreements in the Oconomowoc River Priority Watershed Project

Land Owner or Operator[1]	Management Agency
Individual landowner or operator in an unincorporated area	Waukesha, Washington, Jefferson County
Individual landowner or operator in an incorporated area	City of Oconomowoc; Villages of Slinger; Oconomowoc, Lake Merton, Nashotah, Chenequa, LaBelle
City of Oconomowoc	Waukesha County
Towns of Merton, Oconomowoc, Lisbon, Summit, Delafield	Waukesha County
Villages of Merton, Nashotah, Chenequa, LaBelle, Oconomowoc Lake	Waukesha County
Towns of Erin, Richfield, Polk, Hartford	Washington County
Village of Slinger	Washington County
Towns of Ixonia, Concord	Jefferson County
Washington, Waukesha, Jefferson Counties	See No. 2

[1] A land operator must have sufficient construction and maintenance easements to comply with conditions on the cost share agreement.

[2] If a county needs to sign a cost share agreement for work on county land, the Department of Natural Resources must be notified before the agreement is developed.

7034A

The management agency agrees to pay to the landowner the agreed upon cost share money upon installation of each practice on the agreement. Technical assistance costs, such as those for practice design and certification, are generally provided by the management agency, using financial support from the Wisconsin Nonpoint Source Control Program. In instances where the management agency cannot provide the technical assistance, alternative arrangements will be developed by the management agency in cooperation with other management agencies and the Department of Natural Resources.

The period for entering into cost share agreements is limited to three years from the date a Nonpoint Source Grant Agreement is signed by Waukesha County and the Department of Natural Resources. An extension of this three-year period can be granted by the Department of Natural Resources at the request of Waukesha County.

Once a cost share agreement is signed, the grant recipient has five years to complete installation of all practices includes on the the cost share agreement. This five year period can also be extended by the Department of Natural Resources, but only on a case-by-case basis for individual cost share agreements. The landowner must initiate any request for an extension of this practice installation period by petitioning the management agency that signed the agreements. The management agency then makes a recommendation to the Department of Natural Resources to either extend or maintain the specified installation period. The Department of Natural Resources may grant extensions based upon: 1) economic hardship, 2) construction delays, 3) where the lands under agreement change ownership, 4) where additional practices are added to the cost share agreement, 5) or for other reasons deemed appropriate to accomplish the goals of the Nonpoint Source Control Program. There is a limit to extending installation periods. Cost share agreements installation periods may not extend past the duration of the Nonpoint Source Grant Agreement. This will be an eight year period starting with the final approval of the priority watershed plan.

Cost Share Conditions

The general conditions agreed to by landowners or operators signing cost share agreements are specified in NR 120 and are also a part of the cost share agreement.

An evaluation of the importance of specific sources in the watershed has been made, and nonpoint sources of water pollution needing control are those specified in the plan to be in Management Categories I and II. Sources may be reevaluated during implementation, provided that the criteria specified in the plan for sources in each subwatershed are met. Additional sources identified for the first time during implementation must be assigned a Management Category by project staff prior to development of a cost share agreement.

A landowner or operator, including local units of government, must agree to include on a cost share agreement all Best Management Practices needed to control significant nonpoint pollution sources on eligible lands he or she owns or operates. In this watershed, sources in Management Category I are critical. Those sources in Management Category II are eligible, but inclusion on the cost share agreement is at the landowner's option.

Where practices need to control sources in Management Categories I and II are included in a cost share agreement, the practices to control the Category I sources must be scheduled for installation before those practices needed to control sources in Management Category II.

Practices will be cost shared to control pollutants coming from lands undergoing development only in those instances where there is no reasonable mechanism for the unit of government to recoup the practice cost from the developer.

Development and enforcement of ordinances to control construction erosion and post-construction runoff from lands undergoing development will be required as a condition for cost sharing of other urban practices when both of the following conditions are met:

1. The land development is actually taking place, or anticipated to occur within the project grant period.

2. The sedimentation or runoff from the land development will either negatively affect the function of the other cost shared practices, or will cause a water quality problem by itself.

In cases where the ordinance is required as a condition of the cost share agreement, the ordinance will be listed on the agreement as a noncost shared practice, and will carry with it a condition that it be enforced.

There will be cases where the development of these ordinances is desirable, but is not required as a condition of cost sharing other practices. The Nonpoint Source Control Program will encourage the development of these ordinances in these cases.

Administering the Cost Share Funds: DNR - Lead Management Agency Procedures

Cost share funds are transferred from the state to the lead management agency (Waukesha County) by the Nonpoint Source Grant Agreement (see Appendix A for a copy of this form). The grant agreement only controls the cost share funds, that is, money for the installation of Best Management Practices. Several items are defined on this agreement including:

1. The parties of the agreement (DNR and Waukesha County)

2. The watershed project the agreement is to be used for

3. The amount of cost share funds that can be committed in the watershed under the agreement.

4. The eligible period for entering into cost share agreements

5. The effective period of the grant

6. Eligible practices which can be cost shared

7. The sites eligible for the cost sharing funds

8. Conditions which the DNR and the county must follow to be in mutual compliance with the agreement

Advance money will be available to Waukesha County through the Nonpoint Source Grant Agreement in order to establish the watershed cost share fund account in the county. In this way, the landowners can be rapidly reimbursed as control practices are installed.

As landowners are reimbursed from the project account for completed practices and the balance is drawn down, the lead management agency will forward the appropriate documents to DNR. The Department will in turn reimburse the county so that the county's account always has a balance. The necessary documentation for a reimbursement request from the county includes:

1. The "Cost Share Calculation and Practice Certification Form" (Form #3200-53) for each landowner who was reimbursed,

2. A "Request for Advance or Reimbursement Form" (Form #3400-70) which indicates total prior pay requests and the amount of reimbursement being requested, and

3. A "Reimbursement Claims Worksheet" (Form #4400-47) which lists the landowners who were paid from the reimbursement request.

Examples of these forms are included in Appendix A.

The initial amount of the Nonpoint Source Grant Agreement is less than the project will likely need throughout the project period. The agreement will be amended to increase this "grant amount" as practices are cost shared. At no time should Waukesha County allow the total costs of the practices under cost share agreement to exceed the total amount of funds in the grant agreement.

Administering the Cost Share Funds: Local Procedures

The following procedures will be used at the local level to process cost share agreements and cost share monies:

1. Waukesha County signs the Nonpoint Source Grant Agreement (Form 3400-67, Appendix A) with the Department of Natural Resources and sets up a project account. The county requests advanced monies from the DNR (Form 3200-54, Appendix A) to be placed in the project account.

2. Waukesha County sets up and maintains a project account ledger in accordance with NR 120 and the Nonpoint Source Grant Agreement. This ledger must be kept up to date, reflecting monies received, encumbered, and expended.

3. A soil and water conservation plan is developed between the local field office staff and the grant recipient. Following this, a cost share agreement form (3400-68) is drafted and signed by the grant recipient. If the cost share agreement exceeds $50,000 in state share, the management agency developing the agreement will submit the agreement to the DNR for review and approval prior to having the agreement signed by either the landowner or the management agency.

4. The cost share agreement, or amendment, is reviewed, approved, and signed by the management agency.

5. The management agency sets up a file for each grant recipient with whom it enters into a cost share agreement. The file must contain materials sufficient to comply with NR 120. The original cost share agreement and any amendments are placed in this file. Copies of the agreement and amendments are distributed to the grant recipient, Waukesha County, and the DNR.

6. Waukesha County updates the project ledger.

7. Using approved practice designs and plans provided by the management agency, the grant recipient obtains a contractor as needed to complete the practice installation. The appropriate management agency will ensure that cost containment procedures are used for practice installation. Examples might include settling average unit costs, range of practice cost, bidding, and the use of public work groups such as the Wisconsin Conservation Corps.

8. Where practice installation costs will exceed the estimated total cost (stated on the cost share agreement) for the practice by $500 or more, the grant recipient will contact the management agency and request to amend the agreement before additional construction begins (Form 3400-68A, Appendix A).

9. The management agency reviews the request and, if justified, amends the cost share agreement.

10. The amendment is signed by the grant recipient and the management agency and copies distributed according to Step 5.

11. Following installation, the practice is certified as properly installed by the management agency. A copy of the practice certification form (Form 3400-53, Appendix A) is sent to the landowner and the original is placed in the grant recipient's file.

12. The grant recipient submits bills to the management agency.

13. The management agency reviews the bills and approves them for payment. The management agency updates the recipient's file.

14. The management agency submits an approval for payment to Waukesha County. A copy of the practice certification form must be included with the request.

15. The Waukesha County Finance Director reviews the voucher and approves its payment.

16. Waukesha County makes the cost share payment to the grant recipient from the project account. The county may issue a two party check where applicable.

17. After the project ledger is updated, the check is forwarded to the local office to be issued to the grant recipient. A copy of the check should be placed in the grant recipient's file, and after payment is completed, a copy of the cancelled check is also placed in the grant recipient's file.

18. Waukesha County requests of the DNR reimbursement for payments made from the project account (Form 3400-54, Appendix A). The reimbursement request must contain a list of grant recipients included in the request and copies of practice certification forms for each practice included in the request.

    Upon approval by the DNR, some of these activities conducted by management agencies may be delegated to other management agencies in cases where the originally identified agency does not have the capability to complete the task.

Estimated Budget for Cost Sharing

Table XIV-4 shows the estimated quantities and costs of management practices needed in the Oconomowoc River Watershed. The total construction cost of all needed practices is estimated to be $4,181,000. A 100 percent rate of landowner participation would require $2,840,000 in state cost share assistance. Because 100 percent landowner participation is not likely to occur in a voluntary program, a participation rate of 75 percent will be used to estimate budget needs. At a 75 percent rate of landowner participation, $2,129,000 in state cost share assistance would be required.

EDUCATIONAL PROGRAM FOR THE OCONOMOWOC RIVER PRIORITY WATERSHED PROJECT

Introduction

The objectives of this educational program are 1) to provide everyone in the watershed with knowledge of the problems and solutions related to water quality; 2) to supply information about the priority watershed project; 3) to educate landowners about practices that will result in reduced nonpoint source pollution; and 4) to teach the skills and management needed by landowners to become efficient users of soil and water conservation practices. The educational program will address Best Management Practices such as conservation tillage, grassed waterways, rotation of crops, streambank protection, manure handling, and other conservation practices which will be eligible for cost sharing. The education staff will assist farmers with any problems that they encounter with their new farming practices.

The educational activities for the Oconomowoc River Priority Watershed Project are designed to put up-to-date information into the hands of all people living in the entire watershed. By the use of various educational methods, farmers and the general public will be able to learn about the watershed project and how they can reduce erosion and nonpoint source pollution.

The University of Wisconsin-Extension will develop an informational network which will include the use of newspapers, newsletters, fact sheets, meetings, radio and television to promote communication between project personnel and

Table XIV-4. Quantity and Costs of Urban and Rural Best Management Practices to be Cost-Shared through the Oconomowoc River Priority Watershed[1]

Best Management Practice	Estimated Need	Average Cost/Unit	Total Cost	Cost-Share Rate Flat Fee	Cost-Share Rate %	Cost-Sharing Amount Required at 100% Level of Participation	Cost-Sharing Amount Required at 75% Level of Participation
AGRICULTURAL							
Conservation Tillage	4,600 ac						
Continuous Row Crops	400 ac	$90/ac[2]	$36,000	$45/ac[2]	50%	$18,000	$14,000
Crop Rotations	4,200 ac	$30/ac	$126,000	$15/ac	50%	$63,000	$47,000
Contour Strips	900 ac	$24/ac	$22,000	$12/ac	50%	$11,000	$8,000
Grassed Waterways	95 ac	$2,000 ac	$190,000		70%	$133,000	$100,000
Terraces	30,000 ft	$3/ft	$90,000		70%	$63,000	$47,000
Grade Stabilization	10 units	$5,000	$50,000		70%	$35,000	$26,000
Critical Area Stabilization	400 ac	$100/ac	$40,000		70%	$28,000	$2,000
Streambank Protection	20,000 ft						
Shaping/Seeding	15,000 ft	$2/ft	$30,000		70%	$21,000	$16,000
Rip-rap	5,000 ft	$25/ft	$125,000		70%	$88,000	$66,000
Livestock Crossings	10	$3,000/ac	$30,000		70%	$21,000	$16,000
Streambank Fencing							
Shoreline Protection[3]	700		$100,000		70%	$70,000	$70,000
Barnyard Runoff Management	39	$8,000	$312,000		70%	$218,000	$164,000
Manure Management[4]	63						
Long-term	13	$10,000	$130,000	(10,000 max)	70%	$91,000	$68,000
Short-term	50	$10,000	$500,000	(6,000 max)	70%	$300,000	$225,000
ESTABLISHED URBAN							
Urban Stormwater Detention	35 ac	$40,000/ac	$1,400,000		70%	$980,000	$735,000
Urban Stormwater Infiltration	100 ac infiltrated	$10,000/ac infiltrated	$1,000,000		70%	$700,000	$525,000
			$4,181,000			$2,840,000	$2,129,000

[1] Information presented in this table was developed for general budgeting purposes only, and is not meant to establish limits on project activities or expenditures.

[2] Assumes a 3-year installation period.

[3] Refers to the Tierney Bay Channel Improvement Project.

[4] Need is based only on analysis of winterspreading manure. In addition to the 63 operations listed, there are an additional 22 operations that do not winterspread manure on critical land but which may need short-term storage.

landowners in the watershed. Opportunities for communication between farmers who have entered the project and their neighbors who have not signed up will be identified and used to increase information exchange.

The following groups have been identified for specific attention from the information and education programs:

1. Farmers, landowners, and operators
2. Lakeshore owners
3. Contractors
4. Developers
5. Lake area homeowners
6. Lake district residents
7. General public
8. Wisconsin Dept. of Transportation
9. Local municipalities
10. Public officials
11. Local newspaper reporters
12. Wetland owners
13. New residents
14. Sportsman's groups
15. Landscaping services
16. Garden clubs
17. Owners of septic systems and holding tanks

In order to accomplish the objectives listed earlier, it is going to take a tremendous amount of cooperation, not only between natural resource agencies, but also by the general public in the watershed. This spirit of cooperation will be a focal point throughout the project.

The goal of this program is analogous to the old saying, "Teach a man to fish and he'll eat everyday, catch a fish for him and he'll eat for today only." This information and education program is intended to provide as much knowledge as possible on the relationship between land use and water quality, so that when the watershed project is over, the public can use this new knowledge and continue improving the water quality in the Oconomowoc River Watershed.

Newsletters

A biannual newsletter will be published to provide current information on a wide variety of water quality concerns that can best be addressed by the people themselves. The newsletters will be designed to educate landowners on Best Management Practices which can be adopted through self-initiation. The newsletter will also focuses on increasing the public's awareness of land use and water quality relationships, and how the watershed project can assist everyone in the watershed in accomplishing the goals of long term, improved water quality.

Individuals and special interest groups will be featured in the newsletter to acknowledge their special efforts. Monitoring the progress of the watershed project and current events will also be covered in the newsletter.

Each newsletter will address a specific theme, such as the efforts of municipalities; crop residue management and conservation tillage; managing animal waste; Best Management Practices for lakeshore owners; interagency cooperation; and cost sharing.

The responsibility of the newsletter lies primarily with the county LCCs and UW-Extension, with assistance from SEWRPC and DNR.

Landowner Visitations

There will be three types of landowner visitations conducted by project staff. The first type, landowner contacts, is designed to make landowners in critical areas aware of their land management problems; to discuss the priority watershed project and how the landowner can become involved in improving water quality; and to discuss with the farmer what types of management practices would best fit in with his or her farm operations. This type of contact sets the stage for developing a cost share agreement and conservation plan and is the cornerstone of the watershed project.

The second type of contact, conservation tillage reference, will be for those landowners desiring to participate in the conservation tillage planter rental program, or who otherwise would like more specific consultation concerning conservation tillage. A list of these people will be generated as part of the initial "landowner contact" previously described.

During these visits, the field office staff can verify inventory findings and rank the water quality problems. The more detrimental the problem is to water quality, the higher the priority for control. Landowners must then address the highest priority items first once they sign up for the project.

These farm visitations are necessary to help landowners develop a total conservation plan that will address the farm as a whole. The conservation plan will be specifically tailored to meet the objectives of the landowner's operation, as well as any water quality problems they may have.

Finally, landowners will require several follow-up visits in order to help them implement their cost share agreements. This guidance and assistance is a must during the transition from conventional farming to conservation farming. To accomplish this objective, 150 to 250 farm visitations per year will be the responsibility of the county LCC, SCS, and UW-Extension personnel. This type of contact will be part of the annual status review conducted with each program participant.

News Releases

News releases will be used to inform the public on the progress and accomplishments of the watershed project. They will also announce activities such as meetings, tours, and demonstrations. The news releases will be used to highlight individuals and groups that have cooperated with the watershed project. A positive public image of the watershed program is essential to its success; the news releases are intended to accomplish this objective.

News releases will be used to inform the public on the status of legislation relative to water quality issues and to encourage anyone interested in the priority watershed project to contact the local LCC offices for more information.

In order to accomplish these objectives, it will be the responsibility of UW-Extension, county LCCs, and SCS to issue 10 news releases per year, or more when current issues dictate.

A revised list of radio and television stations and newspapers will be drafted. This list will also show the watershed area, important addresses, deadline days, and contact people.

Tours and Demonstrations

Public tours and demonstrations will be conducted as a component of the Oconomowoc River Priority Watershed Project.

These activities will focus on conservation tillage, barnyard runoff control systems, and the Best Management Practices used by municipalities, contractors, and private lakeshore owners. The objective will be to allow all concerned parties to see first-hand how approved Best Management Practices have been installed, how they function, and the water quality benefits derived through the installation of these practices. In theory, seeing is believing, and landowners will better understand how each practice benefits water quality. This new knowledge should then encourage landowners to use these practices to solve their water quality problems. Landowners whose practice installations are a part of the tours will be encouraged to relate to the participants the benefits, problems, and possibly the special management techniques associated with the installation and maintenance of their practices.

Urban management practices designed to reduce urban stormwater runoff and construction site runoff will also be demonstrated. Existing practices will be used in those demonstrations to the extent possible. Emphasis will be placed on the infiltration of runoff from commercial and industrial rooftops and parking lots, and on stormwater detention for the existing urban area. Practices designed to reduce runoff and erosion from developing areas will be identified and demonstration tours developed to show these practices. Specifically, tours to view Best Management Practices to be installed by the Wisconsin Department of Transportation during the construction of Highways 16 and 135 will be conducted.

Tours to show conservation tillage will include the Washington and Waukesha county tillage plots, the Oconomowoc High School tillage plots, and several key farm operations located in the watershed. Different crops planted in different residues will be observed. A no-till planter will be demonstrated along with several different tillage tools, and crop residues will be measured. An emphasis will be placed on residue management and how different tilage tools or components affect surface residue.

Field data will be gathered from farmers who are using conservation tillage. Information concerning machinery, herbicide, seed, fuel, labor, and insecticide costs will be gathered along with information on yields and net return per acre. This information will be published and made available to landowners in the watershed so they can compare their methods of farming with conservation tillage.

Tours of several animal waste systems will be held to show a variety of waste systems, ranging from nine-month storage pits to barnyard runoff control systems with lift stations, gravity fed filter beds, clean water diversions, buffer strips, and cattle crossings. The demonstration projects installed

under the priority watershed project will be included on tours. The nutrient value of manure, and various aspects of winter and summer spreading will also be discussed.

Model yards for lakeshore owners will be established. The goal is to establish one model yard for each of the ten major lakes in the watershed. These demonstration sites will require the cooperation of key lakeshore property owners. The model yards will include Best Management Practices such as shoreline stabilization, critical area stabilization, grass buffer strips, procedures for recycling yard wastes, and infiltration techniques for controlling lot runoff. Lawn maintenance; use of fertilizers, herbicides, and insecticides; and septic tank maintenance will also be discussed.

The tours and demonstrations discussed above will be the responsibility of the county LCCs, SCS, and UW-Extension. Landowners, special extension agents, and any other agency that participated in the project will be encouraged to assist. Information educational packets will be distributed with the contents to reflect tour subjects.

Tillage Survey

A tillage survey will be conducted in the spring of each of the eight years the project is in effect. Fifteen to 20 percent of the eligible cropland within the watershed will be observed and identified as to whether or not erosion from each of the fields are below the allowable soil loss. The results of this survey will be published for distribution. Survey results will enable staff to get an idea of how successful the watershed project is on a yearly basis.

Watershed Slide Program and Best Management Practices Reference Books

Each of the three field offices will receive a set of books which will have pictures of installed Best Management Practices. The practices will be both vegetative and structural in nature.

Also, a slide set showing local problems and the various Best Management Practices used to solve these problems will be prepared and shown to groups in cities, towns, and villages. This slide set will show the need for controls and encourage the adoption of ordinances for construction site erosion control and urban runoff controls.

The reference picture books and the slide set are intended to show, through existing problems, the need for control of pollutants from urban and rural areas. These pictures will also aid landowners and municipalities in choosing effective control practices while developing their conservation plans.

Primary responsibility of composing and presenting these items will lie with the county LCCs, SCS, and UW-Extension staffs.

Information/Education Packets

Five hundred information/education packets will be prepared. The objective of these packets is to promote the Oconomowoc River Priority Watershed Project

and the Best Management Practices which are used to protect and improve water quality. These packets will be distributed during every phase of project implementation.

The purpose of these packets is to provide the land user with both the history of the priority watershed project, and educational materials available to help address his or her specific goals. When landowners receive a well prepared packet, they will be able to educate themselves and choose the best alternative to solve their water quality problems. They will also be able to make those Best Management Practices a manageable part of their normal operation since they will understand the principles and effects of the Best Management Practices installed.

The contents of the educational packets might include a SCS job sheet on Best Management Practices, a design sketch with standards and specifications on installation and maintenance, a cost share contract and procedures for contracting, a list of cost share practices and rates, information on urban runoff controls, sample construction erosion control ordinances, UW-Extension fact sheets, conservation tillage equipment brochures, procedures for planter rental, pictures of Best Management Practices, newsletters, soils information, project timetable and aerial maps.

In addition to the packets, two brochures will be prepared to increase local municipal and homeowner participation. These brochures will provide guides for municipalities or homeowners who want to participate on their own.

The primary responsibility for preparing, distributing and printing these materials lies with the county LCCs, SCS, UW-Extension, and DNR staffs.

Group Meetings

The objective of group meetings is to encourage individuals to pool their efforts to more effectively address a common goal. When acting as a group, a broader perspective can be attained. Group efforts are usually better planned, provide a greater impact, and are more widely recognized for their accomplishments. It is hoped that these meetings will encourage groups of people to address water quality concerns.

These group meetings will address the following topics: what nonpoint source pollution is; how the Oconomowoc River Priority Watershed Project was selected; the history behind the project; the watershed boundaries; the need for improving water quality; who will be responsible for implementation; examples of Best Management Practices; practices that will be eligible for cost sharing and cost share levels; and what educational activities will be used during implementation.

The group meetings will also be used as a forum to discuss private on-site domestic waste system, including septic systems and holding tanks with emphasis placed on proper sizing, location, installation, and maintenance. Although the control of pollution coming from these private domestic site disposal systems is not cost shared as part of the Nonpoint Source Control Program, these systems are recognized as an important potential pollutant source in this watershed. Materials developed and printed under other state

and local programs will be used to convey critical information to urban homeowners and municipal officials at the urban meetings, and to farmers at the agricultural meetings. Since agricultural land is used for disposal of septage and sludge, information concerning proper disposal site characteristics will be given to farmers, who may be asked for permission to use their lands or disposal sites by private haulers.

Where appropriate, existing information concerning the proper sizing, location, installation, and maintenance of privately owned on-site domestic waste disposal systems will also be included in the informational packets provided to landowners. Although funds for the control of pollution coming from septic systems and holding tanks are not available through the Nonpoint Source Control Program, cooperation with state and local programs to control pollution associated with private on-site domestic waste disposal will be encouraged through the information and education activities being conducted through the watershed project. However, Nonpoint Source Control Program monies may not be used to either develop or print the informational materials disseminated as part of this cooperative effort.

It will be emphasized during group meetings that since this project utilizes a complete watershed approach, it needs the cooperation of groups as well as individuals in order to be successful in improving and maintaining water quality. In order to accomplish this objective, several large and small group meetings to address both urban and rural nonpoint source pollution control will be scheduled throughout a the implementation of the priority watershed project. These meetings will be organized as follows.

Agricultural Meetings

Local farmers will be invited, by township, to meet informally to discuss animal waste management systems and alternatives to conventional tillage. These special meetings will identify how different practices influence water quality. The discussion on conservation tillage will capitalize on the positive aspects of conservation tillage such as savings of soil, time, and money. In addition, commonly perceived negative aspects of conservation tillage such as special management and equipment, increased weed pressure, and fertilizer incorporation will be addressed. The economic benefits will be the major emphasis of these meetings; testimony from the individual farmers on their experiences with tillage alternatives will also be encouraged.

These meetings will be incorporated with the conservation tillage and animal waste demonstration projects.

Urban Meetings For Homeowners

Land Conservation Committee staff will develop meetings to discuss what Best Management Practices homeowners can adopt to improve water quality. These homeowners' meetings will be coordinated with lake district and associations' activities to make use of these existing citizens groups. The meetings will also be coordinated with the model yard demonstration projects to be installed as part of the priority watershed program. Two meetings per lake will be held over the first four years. Housekeeping practices, identified by the Southeastern Wisconsin Regional Planning Commission in A Regional Water Quality Management Plan for Southeastern Wisconsin (1979a), will be emphasized.

Urban Meetings for Municipal Officials

Meetings will be schedule with officials representing individual cities, towns, villages, and counties in the Oconomowoc River Priority Watershed Project in an effort to establish or modify ordinances for the control of construction site erosion and urban stormwater runoff. Information concerning street sweeping, leaf collection, and road salting practices will also be presented and discussed.

Urban Meetings For Developers

Workshops will be held with developers, contractors, and builders in each county to introduce concepts of construction and post-construction erosion and stormwater runoff control, alternative control practices available, applicable ordinances in effect, and proposed ordinance changes. These workshops will be coordinated with any demonstration activities in the watershed concerning control of pollutants from developing and established urban areas.

At each type of meeting discussed above, information and education packets will be distributed, and the content of the packets should reflect the subjects presented at each meeting.

The primary responsibility for organizing, scheduling and conducting the agricultural group meetings will lie with the Washington, Waukesha, and Jefferson county LCCs, SCS, and UW-Extension staffs. In working with municipalities on runoff control ordinances, responsible agencies will include Waukesha County Park and Planning, Washington County Park and Planning, Waukesha, Washington, and Jefferson County Land Conservation Committees, the City of Oconomowoc, Soil Conservation Service, and the Department of Natural Resources.

Planter Rental and Tillage Specialist Program

Planter Rental

An Allis Chalmers 4-row, 38-inch, no-till planter will be acquired through the Department of Natural Resources for the purpose of planting conservation tillage fields within the watershed boundary. The objective of the planter rental program is to provide landowners with the experience of managing row crop production through conservation tillage without making a major investment in equipment. The referrals for the planter rental program will come through landowner contracts made as part of the priority watershed program.

As part of the planter rental program, the Land Conservation Committees for Waukesha, Washington, and Jefferson counties will work with the Department of Natural Resources to develop a staffing plan for the planter, to determine a fee structure for landowners, and to determine limitations on acreage planted per landowner and the number of years that a landowner can become involved in the demonstration program before committing to a cost share agreement.

Sixty conservation tillage and no-till signs (1' x 2' with iron posts) will be purchased and distributed to tillage participants within the watershed. The signs will visually promote conservation tillage and program participation, and should install a sense of purpose with program participants.

Table XIV-5.
Number and Cost of Educational Activities for the Oconomowoc River Priority Watershed Project[1]

Activity	Cost/Unit		Project Year 1	2	3	4	5	6	7	8	Total
Newsletter	$600	Number	2	2	2	2	2	2	2	2	16
		Cost	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$1,200	$9,600
News Releases	$ 0	Number	10	10	10	10	10	10	10	10	80
		Cost									$0
Tours and Demonstrations											
Conservation Tillage	$500	Number	3	3	3	3	3				15
		Cost	$1,500	$1,500	$1,500	$1,500	$1,500				$7,500
Animal Waste	$200	Number	2	2							4
		Cost	$400	$400							$800
Urban Eco-Yard [2]	$200	Number	4	3	3						10
		Cost	$800	$600	$600						2,000
Highway Construction	$200	Number		2	2						4
		Cost		$400	$400						$800
Urban BMP's		Number									
		Cost									
Ready Reference Books [3]	$ 40	Number	6								6
		Cost	$240								$240
Slide Program [3]	$100	Number	3								3
		Cost	$300								$300
Information/Education Packets [3]	$200	Number	500								500
		Cost	$1,000								$1,000
Group Meetings [4]											
Agricultural Practices	$ 50	Number	5	5							10
		Cost	$250	$250							$500
Urban Practices											
Homeowners	$ 50	Number	5	5	5	5					20
		Cost	$250	$250	$250	$250					1,000
Municipal Officials	$ 50	Number	3	3							6
		Cost	$150	$150							$300
Developers, Builders	$200	Number	1	1	1						3
		Cost	$200	$200	$200						$600
Planter Rental Program [5]	$ 0	Number									
		Cost									
	Total Cost:		$5,750	$4,450	$3,650	$2,450	$2,200	$1,200	$1,200	$1,200	$24,600

1 Activities are described in the text. Staffing costs are not included.
2 Includes establishment of one eco-yard for each of the ten major lakes.
3 These materials will be used throughout the 8 year period, with emphasis on the first 3 years during the period when cost-share agreements are being signed.
4 Agricultural meetings will take place in each town, and conservation tillage will be the emphasis of each meeting. Homeowners meetings will center around each of the 10 lakes (2 mtgs/lake). Municipal officials will be grouped by city, town, and village to discuss construction erosion and stormwater mgt. ordinances. Groupings will occur in each county.
5 See staffing plan.

Conservation Tillage Specialist

A tillage specialist will be available through the watershed project to provide landowners with information concerning conservation tillage operation. In conjunction with the planter rental program, the specialist will work with each landowner throughout his or her trial, or demonstration, period so that the tillage method is properly explained. This activity, known as "conservation tillage referral," was discussed under the section entitled "Landowner Visitations."

Staffing and Budget Needs for Educational Programs

Tables XIV-5 and 6 show the cost and local staff support needed to conduct the information and education program for this project. The costs incurred by management agencies to conduct these activities will be reimbursed by the DNR. Staffing will also be supported through the appropriate local assistance agreements.

LOCAL ASSISTANCE STAFFING NEEDS

In the Oconomowoc River Priority Watershed Project, the principal local management agencies expected to provide technical and project management services, either directly or through the procurement of contracted help, include Jefferson, Waukesha, and Washington counties, and to a more limited extent, the City of Oconomowoc.

Table XIV-7 shows the estimated project workload anticipated to develop in Waukesha, Washington, and Jefferson counties. In making the workload estimates, a workload factor of 100 percent was used for activities that will occur independently of landowner willingness to sign cost share agreements. A workload factor of 75 percent was used for activities that require landowners to sign cost share agreements before the activity can be completed. Table XIV-7 shows that about 30,000 staff hours may be required over the eight year period, with about 11,600 hours required in Washington County, about 13,800 hours in Waukesha County, and about 4,600 hours in Jefferson County.

In order to estimate the annual level of local staff commitment required by each county to complete the workload estimated in Table XIV-7, the workload was schedule over the eight year project period. This information is presented in Table XIV-8. The activities in Table XIV-8 are separated into three groups for each county. The first group of activities include those which will only develop if landowners sign cost share agreements. The hours associated with these activities are not scheduled out over the eight year project period since their occurrence and annual distribution are uncertain. The second group of activities represents the existing workload, regardless of landowner willingness to sign cost share agreements. These hours have been scheduled out over the eight year project period. The third group of activities includes project and fiscal management and is a subset (that is, also included) in the second group of activities.

During the first three project years, Washington County can expect a minimum annual workload of about 1,000 hours. If cost share agreements are signed, this workload will increase due to work needed to complete design and

Table XIV-6. Staffing Needed to Complete the Education Program for the Oconomowoc River Priority Watershed.

Activity	Hours/Activity	Staff Hours Needed Per Year: Wash	Wauk	Jeff	Total	Years to be Done
*Newsletter	40	10	60	10	80	Years 1-8, all counties
News Releases	2	6	8	6	20	Years 1-8, all counties
Tours and Demonstrations						
Conservation Tillage	80	80	80	80	240	years 1-5, all counties
Animal Waste	24	24	24		48	Years 1-2, Waukesha, Washington
Urban Eco-Yard	24	24	72		96	Year 1, Washington Year 1-3, Waukesha
Highway Construction Urban BMP's	24		24	24	48	Years 2-3, Waukesha, Jefferson
*Ready Reference Books and I/E Packets	40	40	40	40	120	Year 1, all counties
*Slide Program	80	8	64	8	80	Year 1, all counties
Group Meetings						
Agricultural	24	48	48	24	120	Years 1-2, all counties
Urban						
Homeowners	16	16	72		88	Years 1,3, Washington Years 1-4, Waukesha
Municipal Officials	32	64	96	32	192	Year 1, Waukesha Year 2, Washington, Jefferson
Developers	40	40	40	40	120	Year 1, 2, or 3 in each county
*Planter Rental Program						
Planting [1]	15-30 people/yr.		150-300		150-300	Years 1-3, all counties
Landowner Consultation before planting and during growth	10 hr/individual		150-300		150-300	Years 1-3, all counties

[1] Accounts for 40-80% of the landowners in management category I for upland erosion.

* Waukesha County will be the lead management agency for these activities.

Table XIV-8.

Estimated Local Technical Assistance Staffing Needs For The Oconomowoc River Priority Watershed Project.

County	Activities	Project Workload(Hrs.)	Projected Annual Workload(Hrs.) 1	2	3	4	5	6	7	8
Washington	BMP Design, Installation, Certification; Conservation Planning For Noncritical but eligible landowners; Cost Share Agreement Status Reviews[1]	7200	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
	Project Mgt.; I&E; Landowner Contacts; Conservation Planning For Critical, Eligible Landowners[2]	4390	1080	990	820	350	350	270	260	270
	Estimated Hours For Activities That Are Not Reimbursible By The DNR[3]	2000	250	250	250	250	250	250	250	250
Waukesha	BMP Design, Installation, Certification; Conservation Planning For Noncritical but eligible landowners; Cost Share Agreement Status Reviews; I&E[5, 1]	8150	[4]	[4]	[4]	[4]	[4]	[4]	[4]	[4]
	Project Mgt.; I&E[6]; Landowner Contacts; Conservation Planning For Critical, Eligible Landowners[2]	5660	1300	1170	1170	460	450	370	370	370
	Estimated Hours For Activities That Are Not Reimbursible By The DNR[3]	2800	350	350	350	350	350	350	350	350
Jefferson	BMP Design, Installation, Certification; Conservation Planning For Noncritical but eligible landowners; Cost Share Agreement Status Reviews[1]	2290	(4.)	(4.)	(4.)	(4.)	(4.)	(4.)	(4.)	(4.)
	Project Mgt.; I&E; Landowner Contacts; Conservation Planning For Critical, Eligible Landowners[2]	2270	500	450	320	250	250	170	170	160
	Estimated Hours For Activities That Are Not Reimbursible By The DNR[3]	1200	150	150	150	150	150	150	150	150

[1] Extent of workload is dependant upon voluntary cooperation by landowners.
[2] This workload will exist independent of landowners' willingness to sign cost share agreements.
[3] These are the estimated hours needed for project/financial management, and constitute the local commitment.
[4] Distribution of these hours will depend on demand of the workload and when it develops.
[5] That portion of the I&E hours needed to service the conservation tillage planter rental program are placed here.
[6] I&E hours, except those noted above, are placed here.

Table XIV-7.

Estimated Local Technical Assistance Workload For The Oconomowoc River Priority Watershed Project[1]

Activity	County[2]	Units Needed	Workload Factor[3]	Hours per Unit	Project Years In Which Work Is Expected To Be Done	Total Workload For Activity(Hrs.
Project/Fin. Mgt.	WA	8 years		250/yr	Years 1-8	2000
	WK	8 years		350/yr	Years 1-8	2800
	J	8 years		150/yr	Years 1-8	1200
Information & Education(4.)	WA	8 years		(5.)	Years 1-8	880
	WK	8 years		(5.)	Years 1-8	2370
	J	8 years		(5.)	Years 1-8	780
Landowner Contacts(6.)	WA	45 people		6 hrs ea.		
		70 people		4 hrs ea.	Years 1-3	550
	WK	50 people		6 hrs ea.		
		76 people		4 hrs ea.	Years 1-3	600
	J	4 people		6 hrs ea.		
		41 people		4 hrs ea.	Years 1-3	190
Development of Conservation Plan & Cost Share Agreement (7.)	WA	40 people	1.0	24 hrs ea.	Years 1-3	960
		70 people	.75	10 hrs ea.	Years 1-3	530
	WK	47 people	1.0	24 hrs ea.	Years 1-3	1130
		73 people	.75	10 hrs ea.	Years 1-3	550
	J	4 people	1.0	24 hrs ea.	Years 1-3	100
		33 people	.75	10 hrs ea.	Years 1-3	250
Cost Share Agreement Status Reviews	WA	115 CSA's	.75	3 hrs ea./yr	Years 2,4,6,8	1040
	WK	126 CSA's	.75	3 hrs ea./yr	Years 2,4,6,8	1130
	J	45 CSA's	.75	3 hrs ea./yr	Years 2,4,6,8	400
BMP DESIGN/INSTALLATION/CERTIFICATION:						
Conservation Tillage	WA	94 people (1310 ac.)	.75	4 hrs ea.	Years 1-8	280
	WK	128 people (2710 ac.)	.75	4 hrs ea.	Years 1-8	380
	J	34 people (550 ac.)	.75	4 hrs ea.	Years 1-8	100
Waterways	WA	40 ac.	.75	24 hrs/ac.	Years 1-8	720
	WK	50 ac.	.75	24 hrs/ac.	Years 1-8	900
	J	5 ac.	.75	24 hrs/ac.	Years 1-8	90
Terraces	WA	10000 ft	.75	.04 hrs/ft.	Years 1-8	300
	WK	15000 ft.	.75	.04 hrs/ft.	Years 1-8	450
	J	5000 ft.	.75	.04 hrs/ft.	Years 1-8	150
Grade Stabilization	WA	10 units	.75	70 hrs/unit	Years 1-8	530
	WK					
	J	1 unit		70 hrs/unit	Years 1-8	70
Critical Area Stabilization	WA	150 ac.	.75	.5 hrs/ac.	Years 1-8	60
	WK	200 ac.	.75	.5 hrs/ac.	Years 1-8	80
	J	50 ac.	.75	.5 hrs/ac.	Years 1-8	20
Streambank Rip-rap	WA	1000	.75	.15 hrs/ft.	Years 1-8	110
	WK	5000 ft.	.75	.15 hrs/ft.	Years 1-8	560
	J					
Streambank Shape/Seed	WA	4000	.75	.10 hrs/ft.	Years 1-8	300
	WK	15000 ft.	.75	.10 hrs/ft.	Years 1-8	1130
	J	1000	.75	.10 hrs/ft.	Years 1-8	80

Table XIV-7 Continued.

Activity	County[7]	Units Needed	Workload Factor[1]	Hours per Unit	Project Years In Which Work Is Expected To Be Done	Total Workload For Activity(Hrs.)
Contour Strips	WA	500 ac.	.75	.30 hrs/ac.	Years 1-8	110
	WK	200 ac.	.75	.30 hrs/ac.	Years 1-8	50
	J	200 ac.	.75	.30 hrs/ac.	Years 1-8	50
Stream Crossings	WA	3	.75	16 hrs ea.	Years 1-8	40
	WK	5	.75	16 hrs ea.	Years 1-8	60
	J	-	.75	16 hrs ea.	Years 1-8	--
Barnyard Control	WA	20 yards	.75	80 hrs ea.	Years 1-8	1200
	WK	10 yards	.75	80 hrs ea.	Years 1-8	600
	J	9 yards	.75	80 hrs ea.	Years 1-8	540
Manure Storage(Long)	WA	9 units	.75	80 hrs ea.	Years 1-8	540
	WK	2 units	.75	80 hrs ea.	Years 1-8	120
	J	2 units	.75	80 hrs ea.	Years 1-8	120
Manure Storage(Short)	WA	24 units	.75	80 hrs/ea.	Years 1-8	1440
	WK	15 units	.75	80 hrs/ea.	Years 1-8	900
	J	7 units	.75	80 hrs/ea.	Years 1-8	420
Urban Stormwater Detention[8]	City of Oconomowoc	35 ac. of detention			Years 2-8	
Urban Stormwater Infiltration[8]	City of Oconomowoc	100 ac. infiltrated			Years 2-8	
Urban Practice Feasibility Study[8]	City of Oconomowoc				Year 1	
Urban Development Projections[8]	City of Oconomowoc				Year 1	

LOCAL PROJECT HOURS:	
WA	11590
WK	13810
J	4560
TOTAL:	29960

These estimates are only approximate, and will be used for budgeting and staffing. They will not limit the actual workload needed to achieve project objectives.

WA=Washington; WK=Waukesha; J=Jefferson

This is the factor used to estimate the proportion of the needed work that will actually develop. The project goal, however, is to complete all the work necessary to meet the project objectives.

The estimated workload for servicing the conservation tillage planter rental program(1350 hrs.) is assigned to Waukesha County.

For details of the information/education staffing needs, refer to the detailed analysis presented elsewhere in this chapter.

These contacts are based on 6 hrs. for landowners having at least one pollution source in management category I, and a less intensive effort (2 hrs.) made to contact landowners having pollutant sources only in management category II. Ineligible landowners will not be contacted, unless a specific request is made. Conservation tillage referral time, and annual status reviews are listed separately in this table.

More intensive conservation planning (24 hrs. landowner) is anticipated for landowners having one or more pollutant sources in management category I; a less intensive effort is anticipated for eligible individuals with less severe problems.

This workload has yet to be developed, and will depend upon the results of the feasibility study to be conducted and the landowners' abilities to install practices.

installation activities. For Waukesha and Jefferson counties, minimum annual workloads are expected to be about 1,200 hours and about 400 hours, respectively. Likewise, success in gaining landowner cooperation will result in increased workloads.

The Department of Natural Resources will assist the counties in carrying out these activities. The Department will provide funding, through Local Assistance Agreements with each county, for the additional staff needed to carry out most of the workload. However, each county will provide a portion of the workload at its own expense, as part of a county commitment to the watershed project. In general, the county commitment will be equivalent to the project management and fiscal management activities. The hours estimated for these activities are presented for each county in Table XIV-8 as the third group of activities.

The City of Oconomowoc will also incur a workload, although it was not estimated. Activities that will take place within the first year include a feasibility analysis of implementing the urban management practices recommended for the city in this management plan, and a projection of growth patterns in the city's developing areas, so that future detention basin sites can be identified before they are lost through development. Ultimately, practices may need to be designed and installed, both on city land and on privately owned land, for purposes of infiltration. These activities will be eligible for assistance, whether the city hires additional staff of its own or procures professional services from outside firms or agencies.

The Nonpoint Source Control Program will provide financial assistance to units of government for developing or revising ordinances that control construction erosion and runoff from lands undergoing development. This assistance will be made through the Local Assistance Agreement. The Local Assistance Agreement will be entered into between the local unit of government and the Department of Natural Resources. The agreement will specify minimum criteria that the ordinance must meet, based on a case-by-case review. Where enforcement of the ordinance is required as a condition to a cost share agreement, the Department of Natural Resources will have the authority of final approval. Where the enforcement of the ordinance is not required as a condition of a cost share agreement, then the Department will review the ordinance but will not exercise any final approval.

The staffing needed to inspect for compliance with these ordinances will be considered under the local assistance agreement signed between the city, counties, and the Department of Natural Resources.

PROJECT TRACKING

For a project as complicated and as long in duration as this watershed project, there is a need for a detailed tracking system. This system will be used to keep up-to-date on the accomplishments, and the work yet to be done, and will help to schedule activities in the future.

The following information will be recorded:

1. Landowner contacts: Who has been contacted; when; what is their management category; who is left to contact

2. Update of inventory information: If changes have occurred from the inventoried conditions, these changes should be noted

3. Landowner contracts: What sources were controlled: what the new pollutant levels are (such as new erosion rate or phosphorus runoff); what does this represent in terms of the objectives set for each subwatershed

4. Status of the Cost Share Agreement: What has been designed, installed, and certified; whether the schedule of installation is still accurate

5. Construction Erosion and Stormwater Managemenmt Ordinances: What units of government have made needed revisions

Tracking will be recorded by each county using two forms. One form is a list of landowners and their pollutant management categories. The form, to be updated quarterly by the county, will indicate the dates when landowners are contacted and when a cost share agreement is signed. Updated forms will be submitted to the DNR periodically for review.

The second form is a "Landowner Tracking Form." A separate form is filled out for each landowner after the landowner has been contacted. Space is provided for the landowner name, location, and comments for the county field person after each contact. There is also a section for updating the landowner's inventory situation if the inventory information is no longer accurate. Finally, if a cost share agreement with the appropriate management practices is signed, there is space to record the amount of pollution control anticipated. These forms will be kept in the county and made available to the Department for evaluation of the project's progress.

THE OCONOMOWOC RIVER PRIORITY WATERSHED PROJECT
PROJECT EVALUATION
CHAPTER XV

EVALUATION PLAN

Two approaches will be used to evaluate the progress and success of the Oconomowoc River Priority Watershed Project. One will involve assessing the changes in land use practices and the reductions in pollutant loads as a result of the project. The other approach will involve measuring changes in water quality, habitat, and water resource characteristics. Each approach is discussed in more detail below.

Changes in Land Use Practices and Pollutant Loads

Nonpoint sources of pollution have been degrading water quality for a long period of time, and the changes in water quality which result from the control of the sources will occur gradually over a period of time. Because of this, there is a need for an evaluation procedure that will indicate progress before the actual changes in water quality can be measured. This evaluation approach allows for such an assessment of the project to be made.

The base line conditions of the watershed with respect to nonpoint sources of pollution has been estimated through the inventory process. The changes in these conditions will be documented throughout the project through the use of the Landowner Tracking Forms discussed in the last sections. Each time a cost share agreement is signed, the anticipated changes in upland soil loss, barnyard runoff phosphorus load, critical acres of land spread with manure, or streambank erosion will be recorded on the tracking sheet by the county. This will be done for practices that are cost shared through the Nonpoint Source Control Program as well as those not cost shared. These tracking sheets will be turned in to DNR on an annual basis or upon request by the Department.

Since nonpoint source control practices may be installed with cost share funds obtained outside of this program, such as the federal ACP program, the land condition changes that result from these practices will also be recorded by the county on the tracking sheets and kept on file by the county.

This evaluation effort has three benefits. One, as mentioned before, is that it allows for an indication of the progress of the project before changes in water quality are apparent. Secondly, this evaluation will guide the Department on which water bodies are most likely to show changes as a result of the level of practice installation. Finally, project tracking will help to schedule the annual workload.

Changes in Water Quality, Habitat, and Water Resource Use

The objectives set for each water body usually are related to a fishery change or improvement, or to other recreational uses. In order for those objectives to be met, several steps must be accomplished. First, the pollutant loads must be reduced through the installation of the control practices. Second, the

water quality and physical characteristics must respond to the reduction in the loading. Third, the aquatic life (fish, algae, weeds) must, in turn, respond to the improvements in the water quality and habitat.

Several water resource measurements will be used to help indicate if the objectives are being met. Many of these techniques will be the same ones that were used to help determine the present conditions of the water bodies.

Water quality improvement will be evaluated by conducting water resources assessments previous to implementing nonpoint source controls and after the controls have been implemented. The water resource evaluations will be designed to determine if water resource objectives set forth in the water quality plan are achieved through implementing nonpoint source pollution controls.

Water resource evaluations will be conducted on selected lakes and streams. Friess Lake, North Lake, and Lac LaBelle will be monitored. Mason Creek and Rosenow Creek will be evaluated to assess water quality and fisheries improvements.

Lake evaluations will be designed to estimate changes in lake trophic status and nutrient loadings. Friess Lake, North Lake, and Lac LaBelle will be included in the Wisconsin Department of Natural Resources Lakes Trends Monitoring Program designed to evaluate long term changes in lake trophic status. These lakes were selected since they exhibit the best potential to evaluate long term changes in water quality.

Monitoring protocol will be as defined by lake trends monitoring protocol which will evaluate water chemistry, aquatic plants, algae, zooplankton, and fisheries. All lakes within the Oconomowoc River Watershed will be encouraged to develop self monitoring programs with technical assistance from the Department. The lakes' evaluations will begin in 1986.

Evaluation monitoring will be conducted on Mason Creek and Rosenow Creek to determine if water quality objectives are obtained in the streams. The evaluation and methodology that will be used is currently being developed by Wisconsin Department of Natural Resources' Bureau of Water Resources Management. This methodology will be ready for use in 1986.

A bacteriological survey will be conducted throughout the streams in the watershed. Approximately 20 to 30 sites will be monitored in accordance with the methodology set forth in NR 104, Wisconsin Administrative Code.

9535A

BIBLIOGRAPHY

Ball, J. 1982. Stream classification guidelines for Wisconsin. Unpublished Technical Bulletin (no number), Wisconsin Department of Natural Resources, Madison.

Bannerman, R., K. Baun, M. Bohn, P.E. Hughes, and D.A. Graczyk. 1983. Evaluation of urban nonpoint source pollution management in Milwaukee County, Wisconsin: Volume I: Urban stormwater characteristics, pollutant sources and management by street sweeping. U.S. EPA PB 84-114164. U.S. Environmental Protection Agency, Chicago.

Carlson, R.E. 1977. A trophic status index for lakes. Limnology and Oceanography 22:361-69.

Chesters, G., J.G. Konrad, and G.V. Simsiman. 1979. Menominee River pilot watershed study, Volume I: summary and recommendations. U.S. EPA 905/4-79-029. U.S. Environmental Protection Agency, Chicago.

Dillon, P.J. and F.H. Rigler. 1975. A simple method for predicting the capacity of a lake for development based on lake trophic status. Journal Fisheries Research Board of Canada 32:1519-31.

Fago, D. 1982. Distribution and relative abundance of fishes in Wisconsin: Greater Rock River Basin. Wisconsin Department of Natural Resources Technical Bulletin Number 136. 120 pp.

Garn, H. and H.A. Perrot. 1977. Recommended methods for classifying lake condition, determining lake sensitivity, and predicting lake impacts. Hydrology Paper Number 2. U.S. Forest Service, Eastern Region. 49 pp.

Hansen, J., M. Sesing, P. Hughes and D. Graczyk. 1983. Evaluation of urban nonpoint source pollution management in Milwaukee County, Wisconsin:Volume III:study site characteristics, experimental methods and quality assurance program. U.S. EPA PB 84-114180. U.S. Environmental Protection Agency, Chicago.

Hilsenhoff, W. 1982. Using a biotic index to evaluate water quality in streams. Wisconsin Department of Natural Resources Technical Bulletin Number 132. 22 pp.

Lillie, R.A. and J.W. Mason. 1983. Limnological characteristics of Wisconsin lakes. Wisconsin Department of Natural Resources Technical Bulletin Number 138. 116 pp.

Mace, S.E. 1980. Study completion report, detergent phosphorus ban. Wisconsin Department of Natural Resources Staff Report.

Madison, F.W., J.L. Arts, S.J. Berkowitz, E.E. Salmon, and B.B. Hagman. 1979. Washington County project, final report. U.S. EPA Document Number 905/9-80-003. U.S. Environmental Protection Agency, Chicago.

Martin, R.H., E.O. Boebel, R.C. Dunst, O.D. Williams, M.V. Olsen, R.W. Merideth, Jr., and F.L. Scarpace. 1983. Wisconsin lakes - a trophic assessment using LANDSAT digital data. Wisconsin Department of Natural Resources, Wisconsin Lakes Classification Survey Project. 294 pp.

Miller, B.A. 1979. Predicting phosphorus loads from agricultural watersheds. University of Wisconsin - Madison. Draft M.S. Thesis. 157 pp.

Moore, C.I. 1979. Predicting phosphorus loads from livestock wastes for the Wisconsin Great Lakes Basin. University of Wisconsin-Madison. M.S. Thesis. 108 pp.

Petersen, J.B., F.W. Madison, K.A. Kelling, L.R. Massie, T.C. Daniel and G.W. Jackson. 1985. Guidelines for the land application of animal wastes. University of Wisconsin - Extension, Madison.

Pitt, R. 1985. Draft construction site erosion and stormwater management plan and model ordinance. Wisconsin Department of Natural Resources, Madison. 259 pp.

Poff, R.J., R. Piening and C.W.Threinen. 1968. Surface water resources of Jefferson County. Wisconsin Department of Natural Resources, Madison. 70 pp.

Poff, R.J., and C.W. Threinen.

1963[a]. Surface water resources of Washington County. Wisconsin Department of Natural Resources, Madison. 65 pp.

1963[b]. Surface waters of Waukesha County. Wisconsin Department of Natural Resources, Madison. 69 pp.

Southeastern Wisconsin Regional Planning Commission (SEWRPC).

1978. Water quality of lakes and streams in southeastern Wisconsin: 1964-1975. Southeastern Wisconsin Regional Planning Commission, Waukesha. 593 pp.

1979[a]. A regional water quality management plan for southeastern Wisconsin: 2000; Volume II: Inventory findings. Southeastern Wisconsin Regional Planning Commission, Waukesha. 617 pp.

1979[b]. A regional water quality management plan for southeastern Wisconsin: 2000; Volume III: Recommendations. Southeastern Wisconsin Regional Planning Commission, Waukesha. 309 pp.

1980. A water quality management plan for Lac La Belle, Waukesha County, Wisconsin. Southeastern Wisconsin Regional Planning Commission, Waukesha. 126 pp.

1981. A water quality management plan for Okauchee Lake, Waukesha County, Wisconsin. Southeastern Wisconsin Regional Planning Commission, Waukesha. 164 pp.

1982. A water quality management plan for North Lake, Waukesha County, Wisconsin. Southeastern Wisconsin Regional Planning Commission, Waukesha. 139 pp.

1983. A water quality management plan for Friess Lake, Washington County, Wisconsin. Southeastern Wisconsin Regional Planning Commission, Waukesha. 131 pp.

1983. Rural and urban nonpoint source water pollution control recommendations for the drainage area directly tributary to Lac LaBelle. SEWRPC Staff Memorandum. Southeastern Wisconsin Regional Planning Commission, Waukesha. 35 pp.

1984. Study on the stormwater runoff for the City of Oconomococ industrial park area. SEWRPC Letter Report, July 12, 1984. Southeastern Wisconsin Regional Planning Commission, Waukesha. 20 pp.

1985. A water quality management plan for Oconomococ Lake, Waukesha County, Wisconsin. Draft. Southeastern Wisconsin Regional Planning Commission, Waukesha. 151 pp.

Threinen, C.W. 1982. Access status for the southeast district with recommendations for a future program. Wisconsin Department of Natural Resources Administrative Report Number 14. 23 pp.

Szewczykowski, P. 1983. An evaluation of Mason Creek to support trout. Unpublished student intern paper. Wisconsin Department of Natural Resources.

United States Army Corps of Engineers.

1975[a]. Oconomowoc River floodplain information-Oconomowoc, Wisconsin. U.S. Army Corps of Engineers, Rock Island, Illinois.

1975[b]. Reconnaissance report for section 205 flood control project North Lake, Waukesha County, Wisconsin. U.S. Army Corps of Engineers, Rock Island District, Rock Island, Illinois.

United States Geological Survey (USGS).

1984. Letter report to the Lac LaBelle management district. United States Geological Survey.

1985. Water quality characteristics of Fowler Lake, Wisconsin (Draft Report Number 86). United States Geological Survey.

Wisconsin Department of Natural Resources.

1975. Classification of Wisconsin lakes by trophic condition. Wisconsin Department of Natural Resources, Madison. 107 pp.

1976. Upper Rock River Drainage Basin Report. Wisconsin Department of Natural Resources, Madison.

Young, R.A., M.A. Otterby, and A. Roos. 1982. An evaluation system to rate feedlot pollution potential. U.S. Department of Agriculture-Agricultural Research Service. 78 pp.

APPENDIX A

FORMS USED IN ADMINISTERING A PRIORITY WATERSHED PROJECT

State of Wisconsin
Department of Natural Resources

NONPOINT SOURCE GRANT AGREEMENT
Section 144.25, Wis. Stats.
Form 3400-67 Rev. 3-84

Wisconsin Nonpoint Source Water
Pollution Abatement Program

☐ Priority Watershed Project

☐ Local Priority Project

PART I. Purpose

To set out the conditions and restrictions under which the Wisconsin Department of Natural Resources (Department) will reimburse

_____ .

lead designated management agency (DMA), for funds used for the cost-sharing of best management practices (BMP) to control nonpoint sources

of water pollution through the _____

_____ project.

PART II. Grant Administration Data

1. Designated Management Agency/Recipient	5. Grant Number
2. Authorized Representative	6. Department District
Title	7. Maximum Grant Amount
3. Street or Route	8. Eligible Period for Entering Into Cost-Sharing Agreements
City, State, Zip Code	9. Installation Period _____ Years from the signing of the cost-sharing agreement
4. Telephone Number (Include Area Code)	10. Grant Period From _____ Through _____

11. Eligible Costs
Eligible costs are those costs incurred for the installation of the BMPs listed on line 12 of part II on the sites listed on line 13 of part II. Costs for BMPs on which installation is started before the signing of a cost sharing agreement between the landowner or user and the DMA are not eligible costs. Costs for BMPs which do not meet the specifications and conditions of sec. NR 120.13, Wis. Admin. Code, are not eligible costs.

12. Eligible Best Management Practices

13. Eligible Sites

PART III. Conditions

The Department and the DMA, in mutual consideration of the provisions of this document, do hereby agree as follows:

1. This agreement is subject to the provisions of Section 144.25, Wis. Stats.

2. This agreement is subject to the provisions of Chapter NR 120, Wis. Admin. Code.

3. The Department shall reimburse the DMA for a percentage of each eligible cost incurred by the DMA during the grant period listed on line 10 of part II. The amount of each eligible cost to be reimbursed shall be determined in accordance with sec. NR 120.14, Wis. Admin. Code. The total amount reimbursed by the Department shall not exceed the maximum grant amount listed on line 7 of part II. The DMA shall provide the Department with itemized payment requests on forms to be provided by the Department.

4. The DMA shall use the cost-sharing agreement form provided by the Department for all contracts reimbursable through this agreement.

5. The DMA shall document that all best management practices for which reimbursement is requested under this agreement meet the technical specifications and design criteria identified in Section NR 120.10(4), Wis. Admin. Code, and any other conditions set out in this agreement.

6. Quarterly during the grant period, the DMA shall submit a progress report to the Department including the following:

   A. The number of cost-sharing agreements signed during that quarter;

   B. The number of eligible grant recipients who have indicated an interest in entering into cost-sharing agreements during that quarter, but have not done so;

   C. The amount of funds included in cost-sharing agreements during that quarter;

   D. The number or units of each best management practice included in cost-sharing agreements during that quarter;

   E. The number or units of each best management practice installed during that quarter; and

   F. Other measurements of participation or accomplishment agreed upon by the DMA and the Department.

7. DMA accountability.

   A. Financial management. The DMA is responsible for maintaining a financial management system which shall adequately provide for:

      (1) Accurate, current and complete disclosure of the financial results of each cost-sharing agreement awarded in accordance with generally accepted accounting principles and practices, consistently applied, regardless of the source of funds.

      (2) Records which identify adequately the source and application of funds for grant-supported activities. These records shall contain information pertaining to grant awards and authorizations, obligations, unobligated balances, assets, liabilities, outlays and income.

      (3) Effective control over and accountability for all project funds, property, and other assets.

      (4) Comparison of actual with budgeted amounts for each grant.

      (5) Procedures for determining the eligibility and allocability of costs in accordance with the provisions of Sections NR 120.10 and NR 120.12, Wis. Admin. Code.

      (6) Accounting records which are supported by source documentation.

      (7) Audits to be made by the DMA or at its direction to determine, at a minimum, the fiscal integrity of financial transactions and reports, and the compliance with the terms of the grant agreement. The DMA shall schedule such audits with reasonable frequency, usually annually, but not less frequently than once every 2 years, considering the nature, size and complexity of the activity.

      (8) A systematic method to assure timely and appropriate resolution of audit findings and recommendations.

   B. Records. The following record and audit policies are applicable to this grant and to all cost-sharing agreements awards under this grant.

      (1) The DMA shall maintain books, records, documents, and other evidence and accounting procedures and practices, sufficient to reflect properly:

         (A) The amount, receipt, and disposition by the DMA of all assistance received for the project, including both state assistance and any matching share or cost-sharing; and

         (B) The total costs of the project, including all direct and indirect costs of whatever nature incurred for the performance of the project for which this grant has been awarded. In addition, contractors of DMAs, including contractors for professional services, shall also maintain books, documents, papers, and records which are pertinent to this grant award. The foregoing constitute "records" for the purposes of this section.

(2) The DMA's records and the records . its contractors, including professional services contracts, shall be subject at all reasonable times to inspection, copying, and audit by the Department.

(3) The DMA and contractors of DMAs shall preserve and make their records available to the Department:

(A) Until expiration of 3 years from the date of final settlement, or

(B) For such longer periods, if required by applicable statute or lawful requirement; or

(C) If a grant is terminated completely or partially, the records relating to the work terminated shall be preserved and made available for a period of 3 years from the date of any resulting final termination settlement.

(4) Records which relate to appeals, disputes, litigation on the settlement of claims arising out of the performance of the project for which a grant was awarded, or costs and expenses of the project to which exception has been taken by the Department or any of its duly authorized representatives, shall be retained until any litigation, claims or exceptions have been finally resolved and all periods of limitation with respect to any and all appeals have expired.

C. Audit.

(1) Preaward or interim audits may be performed on grant applications and awards.

(2) A final audit shall be conducted after the submission of the final payment request. The time of the final audit will be determined by the Department and may be prior or subsequent to final settlement. Any payment made prior to the final audit is subject to adjustment based on the audit. DMAs and subcontractors of DMAs shall preserve and make their records available pursuant to condition 7B of part III of this agreement.

8. This agreement will remain in effect beyond the grant period described in part II, line 10 through the maintenance period for all best management practices cost-shared. During the grant period, either the DMA or the Department may on thirty (30) days written notice, unilaterally and without cause, shorten the grant period of this agreement without liability, except that: (1) the Department shall reimburse the DMA for all eligible costs incurred against cost-sharing agreements signed before the final date of the amended grant period, (2) the DMA shall report to the Department annually providing information as described in condition 6 of part III of this agreement, (3) the DMA shall be accountable to the Department as described in condition 7 of part III of this agreement, and (4) the DMA shall enforce all provisions of all cost-sharing agreements in effect as of the final date of the grant period.

9. In connection with the performance of work under this agreement, the DMA agrees not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition, developmental disability as defined in s. 51.01(5) Wis. Stats., sexual orientation or national origin. This provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Except with respect to sexual orientation, the DMA further agrees to take affirmative action to ensure equal employment opportunities. The DMA agrees to post in conspicuous places, available for employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the nondiscrimination clause.

10. Agreements estimated to be ten thousand dollars ($10,000) or more require the submission of a written affirmative action plan. DMAs with an annual work force of less than ten employees are exempted from this requirement.

11. This agreement, together with the specifications in the bid request (if any), referenced parts and attachments shall constitute the entire agreement and previous communications or agreements pertaining to this agreement are hereby superseded. Any contractual revisions including cost adjustments and time extensions must be made by an amendment to this agreement or other written documentation, signed by both parties at least 30 days prior to the ending date of this agreement.

12. The Department agrees that the DMA shall have sole control of the method, hours worked, and time and manner of any performance under this agreement other than as specifically provided herein. The Department reserves the right only to inspect the job site or premises for the sole purpose of insuring that the performance is progressing or has been completed in compliance with the agreement. The Department takes no responsibility for supervision or direction of the performance of the agreement to be performed by the DNR or the DMA's employees or agents. The Department further agrees that it will exercise no control over the selection and dismissal of the DMA's employees or agents.

State of Wisconsin
Department of Natural Resources

By _____

Date Signed _____

Authorized Representative of Lead
Designated Management Agency

By _____

Date Signed _____

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT PROGRAM COST-SHARE AGREEMENT

SECTION 144.25, WIS. STATS.
FORM 3400-68 REV. 8-82

Cost-Share Agreement Number	Total Est. Grant Amount $
Name of Grant Recipient	Telephone Number
Street or Route	
City, State, Zip Code	
Legal Description of Property	
Name of Landowner (if other than Grant Recipient)	Telephone Number
Street or Route	
City, State, Zip Code	
Installation Period From	To

Name of Designated Mgt. Agency	Telephone Number
Street or Route	
City, State, Zip Code	

SECTION 1. AGREEMENT PROVISIONS

1. The grant recipient agrees:
   A. To install the best management practice(s) listed in section 2 consistent with the specifications listed in section 3 during the installation period identified above.
   B. To operate and maintain each best management practice for the life span identified in section 2.
   C. To certify, on forms provided by the designated management agency, best management practices installed under this agreement are being maintained.
   D. To repay the full amount of the cost-share payments made and forfeit all rights to future cost-share payments if:
      (1) Any best management practice is rendered ineffective during its life span due to improper maintenance, operation or neglect;
      (2) The applicable conditions identified in section 3 are not met; or
      (3) The grant recipient adopts any land use or practice which defeats the purposes of the best management practices.
   E. To retain responsibility for this agreement if a change in ownership occurs unless the new owner assumes, in writing, the operation and maintenance of the best management practices and other provisions of this agreement pertaining to the grant recipient.
   F. Not to discriminate against contractors because of age, race, religion, color, handicap, sex, physical condition, developmental disability, or national origin, in the performance of responsibilities under this agreement.
2. The designated management agency agrees:
   A. To provide technical assistance for best management practices identified in section 2.
   B. To make cost-share payment after receipt of a payment request and evidence of completion status.
3. Satisfactory evidence of completion status will consist of a technical performance report signed by a technician assigned by the designated management agency.
4. The total state cost-share payment for each practice identified in section 2 shall be based on the cost-share rate for the practice as applied to the eligible costs actually incurred, as substantiated to the designated management agency. If the total cost-share payment for a practice identified in section 2 exceeds the estimated grant amount for that practice, payment of the overrun will be made only if there are funds available.
5. The agreement may be amended, by mutual agreement, during the installation period as long as the changes will provide equal or greater pollution control.

SECTION 2. BEST MANAGEMENT PRACTICES, COSTS, INSTALLATION SCHEDULE, LIFE SPANS

This section contains all best management practices, both those eligible for cost-sharing and those not eligible, needed to control significant nonpoint sources in eligible areas owned or operated by the grant recipient.

1. Cost-shared best management practices

Location (Field Number)	Practice Code	Practice Title	Quantity	Units	Estimated Total Cost	Cost-Share Rate	Estimated Cost-Share Amount	Cost-Sharing From Other Programs*	Year of Installation	Practice Life-span
				Total		Total		*Identify program		

2. Noncost-shared best management practices

Location (Field Number)	Practice Code	Practice Title	Quantity	Units	Year of Installation	Practice Life-span

SECTION 3. BEST MANAGEMENT PRACTICE CONDITIONS

Attached are the conditions for each best management practice listed in section 2.

Grant Recipient or Authorized Representative's Signature	Date Signed	Authorized Representative of Des. Mgt. Agency - Signature	Date Signed
Title		Title	

State of Wisconsin
Department of Natural Resources

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT PROGRAM COST-SHARE AGREEMENT AMENDMENT
Section 144.25, Wis. Stats.
Form 3400-68A 4-83

Cost-Share Agreement Number	Amendment Number
Name of Grant Recipient	
Name of Designated Mgt. Agency	
New Total Est. Grant Amount	

1. Cost-shared best management practices ADDED

Location (Field Number)	Practice Code	Practice Title	Quantity	Units	Estimated Total Cost	Cost-Share Rate	Estimated Cost-Share Amount	Cost-Sharing From Other Programs*	Year of Installation	Practice Life-span
				New Total		New Total		*Identify program		

2. Cost-shared best management practices DELETED

Location (Field Number)	Practice Code	Practice Title	Quantity	Units	Estimated Total Cost	Cost-Share Rate	Estimated Cost-Share Amount	Cost-Sharing From Other Programs*	Year of Installation	Practice Life-span
				New Total		New Total		*Identify program		

3. Cost-shared best management practices CHANGED

Location (Field Number)	Practice Code	Practice Title	Updated Quantity	Units	Updated Estimated Total Cost	Cost-Share Rate	Updated Estimated Cost-Share Amount	Cost-Sharing From Other Programs*	Year of Installation	Practice Life-span
				Change (+/−)		Change (+/−)		*Identify program		

Grant Recipient or Authorized Representative's Signature	Date Signed	Authorized Representative of Des. Mgt. Agency — Signature	Date Signed
Title		Title	

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT PROGRAM – COST SHARE CALCULATION AND PRACTICE CERTIFICATION FORM
Section 144.25, Wis. Stats.
Form 3200-53 9-82

_____ Priority Watershed Project: _____ County

Agreement Number	Name and Address
Telephone Number (Include Area Code)	

COST SHARE CALCULATION

Practice Code	Practice Name	Units Installed	*	Total Cost of Practice	Cost Share %	Cost Share For Practice
				$		$
					TOTAL	$

*Place 0 if there are more of this type of practice on this agreement to install.
Place 1 if these units complete the installation of this practice for this agreement.

Amount Paid	Check Number	Check Date YY – MM – DD

PRACTICE CERTIFICATION

I certify the above practice or practices and practice units have been installed in accordance with the appropriate standards and specifications.

Signature	Title	Date Signed

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

REQUEST FOR ADVANCE OR REIMBURSEMENT
WISCONSIN FUND - NONPOINT SOURCE PROGRAM

SECTION 144.25, WIS. STATS.
FORM 3200-54 5-83

Complete Items 1 through 8 and 13 for all payment requests. See instructions on reverse side for completing Items 9 through 12. Send one copy of this form to:

Wisconsin Department of Natural Resources
Bureau of Finance, Audit Section
Box 7921
Madison, Wisconsin 53707

1. GRANTEE/DMA	2. COUNTY	3. GRANT NO.	4. PAY. REQ. NO.
5. MAIL CHECK TO:	6. PERIOD COVERED BY THIS REPORT (MO-DAY-YR): FROM	TO	
	7. TYPE OF PROJECT ☐ PRIORITY WATERSHED ☐ LOCAL PRIORITY	8. TYPE OF REQUEST ☐ ADVANCE ☐ PARTIAL ☐ FINAL	

	AMOUNT	LEAVE BLANK DNR USE ONLY
9. Request for Advance Payment		
a. Initial State Grant Amount		
b. Advance Payment Requested (Maximum 10% of Above)		
10. Summary of Payment Requests		
a. Reimbursement Requested This Claim (From Form 4400-47)		
b. Total Prior Pay Requests (Including Advance)		
c. Total All Payment Requests to Date		
11. Computation of Maximum Partial Payment		
a. Total Cumulative Grant to Date		
b. Enter 95% of Above Total		
12. Computation of Net Payment Due		
a. Enter 95% of Total Cumulative Grant (Line 11b. Above)		
b. Less: Total Prior Payment Requests (Line 10b. Above)		
c. Net Payment Due (Line 12a. Minus Line 12b.)		
	Amount Allowed This Claim	

13. CERTIFICATION:

I certify that to the best of my knowledge and belief the billed costs of expenditures are based on actual payments of record and are in accordance with the terms of the project agreement and the reimbursement represents the grant share due which has not been previously requested.

Auditor Initials _____

Date _____

Bur. Finance Initials _____

Date _____

SIGNATURE OF AUTHORIZED REPRESENTATIVE

DATE SIGNED

TYPED OR PRINTED NAME AND TITLE

TELEPHONE NO. (INCLUDE AREA CODE & EXTENSIONS)

APPENDIX B

SPECIAL BEST MANAGEMENT PRACTICES

APPENDIX B

Special Practice: Construction Site Ordinance

A. Ordinances must contain the following to meet the minimum requirements of the Department of Natural Resources:

1. Provisions to minimize the amount of sediment and other pollutants reaching the waters of the state during the development of lands

2. Provisions to manage the runoff water volume and rate during both the development period and afterwards to prevent adverse environmental impact such as flooding,channel modification and streambank erosion

3. Provisions to manage the infiltration levels of the developed area to prevent adverse changes to normal dry weather flows in receiving streams

4. Provisions to manage the amount of pollutants from the developed site so that waters of the state will not be adversely impacted

5. A statement of activities subject to the ordinance

6. Standards and criteria and other conditions

7. Permit application and issuance procedures

8. Administration and enforcement procedures

9. Violation penalties

10. Appeal procedures

B. Ordinances must apply to all construction activities, including the following, to meet the minimum requirements of the DNR:

1. Residential dwelling construction including single family home construction

2. Commercial, institutional and industrial buildings and associated yards and lots

3. Utility and transportation system construction

Where the ordinance is required as a condition of a cost share agreement or a Nonpoint Source Grant Agreement, the ordinance shall be reviewed and approved by the Department of Natural Resources.

3. A good growth and stand must be maintained for the practice life.

4. The practice must be maintained for a minimum of 5 years after the year of installation.

5. Cost-sharing is not authorized for the planting of vegetation which is normally used for forage or cash cropping purposes.

C. Rates

1. Cost-sharing will cover 70% of the authorized costs for the first year of installation.

D. Specifications: SCS Technical Guide specifications #589

Special Practice: Wind Erosion Control - Windbreak

A. Description: A strip or belt of trees or shrubs established within or adjacent to a field. The major purpose will be to reduce wind erosion throughout the year.

B. Conditions

1. Cost-sharing is authorized for:

   a. Planting trees or shrubs as needed for restoring or establishing field wind preaks.
   b. Permanent fences need to protect the planted area from grazing, excluding boundary road fences.

2. Before including this practice on a cost share agreement, the county shall discuss the fields in question with the DNR.

3. Cost-sharing is not authorized for planting orchard trees or plantings for ornamental purposes.

4. Plantings must be protected from fire and grazing.

5. Chemicals used in performing this practice must be federally, state, and locally registered and must be applied strictly in accordance with authorized registered uses, directions on the label, and other federal or state policies and requirements.

6. Wildlife and environmental protection considerations must be given when designing this practice.

7. The system shall be maintained for a minimum of 10 years following the calendar year of installation.

C. Rates

1. Cost-sharing will cover 70% of the authorized costs for the first year of installation.

D. Specifications: SCS Technical Guide specifications #'s, 382, 392, 650

4. Cultivation after planting is permitted to control weeds and required to break a surface crust.

5. A moldboard plow or other tillage or cultivation implement may be used only once every 5 years if required to alleviate insect, weed, or disease problems.

Special Practice: Wind Erosion Control - Cover Crop

A. Description: A crop of close-growing grasses, legumes, or small grain drown primarily for seasonal protection of the soil from wind erosion. It's purpose is to control wind erosion during periods when the major crops do not furnish adequate cover.

B. Conditions

1. Cost-sharing is authorized for seed and the seed planting operation

2. A good growth and stand must be maintained until the following spring

3. Before including this practice or a cost share agreement the county shall discuss the fields in question with the DNR.

4. Cost-sharing is not authorized for

a. volunteer stands of vegetation
b. designated acreage conservation reserve

5. The practice must be maintained for 5 years after the initial year

C. Rates

1. Cost-sharing will cover 70% of the authorized costs for the first year of installation.

D. Specifications: SCS technical Guide specification #340

Special Practice: Wind Erosion Control - Stripcropping

A. Description: Growing wind resisting crops in strips alternating with row crops and arranged at angles to offset adverse wind effects on the soil. Includes any perennial herbaceous vegetative wind barrier that reduces wind velocities of both leeward and windward flow of air across a land surface.

B. Conditions

1. Cost-sharing is authorized for fertilizers, eligible seed and seed planting operation.

2. Before including this practice or a cost-share agreement, the county shall discuss the fields in question with the DNR.

Special Practice: Conservation Tillage on Croplands Planted in Row Crops Year After Year.

A. Description: Tillage and/or planting practices which leave roughened surfaces and substantial amounts of crop residue on the soil surface after crops are planted. Generally, the system consists no more than using one primary tillage pass in the fall or spring and no more than 2 passes with light or secondary tillage equipment prior to planting.

Croplands planted in row crops year after year are defined as fields where corn, soybeans or other crops grown in rows are normally grown on that specific field at least four out of five years. The installation period of the practice is considered to be three years. Chisel systems, ridge or till-plant systems, and disking systems are included under the definition of conservation tillage.

"No-till" systems can be used only if conditions which limit runoff of nutrients and pesticides are included.

B. Condition:

1. Cost sharing is authorized, up to the maximum specified in this plan, for costs necessary to convert to reduced tillage systems.

2. Cost-sharing shall not be authorized where a satisfactory tillage system is currently used.

3. The practice must be operational and certified the third year of the installation period. Payments for the first and second years may only be made if the appropriate system is used and appropriate levels of surface cover are achieve.

For example, if the appropriate system is used and the appropriate level of surface cover and other requirements are achieved the first year, the cost-sharing payment will be made. If requirements are not achieved in the first year, cost-sharing payment will not be made that year. Then if the requirements are achieved in the second year, payments for the first and second year will be made, etc.

C. Specifications:

1. The minimum amount of ground cover after planting shall be at least 30%.

2. The tillage and planting shall be performed as close to the counter as practical.

3. Fertilizes, herbicides, and insecticides applied shortly before, at the same time, or shortly after planting shall be injected, in-row applied, or incorporated. If no-till systems are used and injection or in-row application is not applicable, chemicals may not be applied to crop residue and residue shall be moved aside to allow application of chemicals directly on the soil and followed by a method of incorporation.

Roadside excav. dig if "project staff" ~~LCD~~ OK. p.75