URBAN HOUSEKEEPING PRACTICES

Street sweeping practices and conveyance systems were inventoried for the major urban areas in the watershed. These practices affect the portion of pollutants accumulated on urban surfaces that will be carried to streams by runoff. Street sweeping removes some of the particulate pollutants from street and parking lot surfaces before they can be transported to surface waters. The greatest benefit is realized by weekly sweeping of commercial and industrial areas throughout the spring, summer and fall.

URBAN POLLUTANT LOADS

Information regarding land uses, stormwater conveyance, and urban housekeeping practices was used to predict the existing and anticipated future delivery of nonpoint source loads from urban areas. Five pollutants (sediment, phosphorus, lead, zinc, and copper) were chosen to characterize the sources and severity of urban nonpoint pollution. Urban nonpoint sources described below include: runoff from existing urban areas including established commercial, industrial, institutional, freeways and residential land uses; and runoff from areas where new urbanization is anticipated.

Estimated current (1986) average annual urban nonpoint pollutant loads for each municipality are shown in Table III-7. The areas evaluated include urban land uses in the cities of De Pere and Green Bay; the villages of Allouez and Ashwaubenon; and the towns of Bellevue and Scott.

The city of Green Bay contributes more than 50 percent of the estimated urban sediment, phosphorus, zinc, lead and copper loads delivered annually to the watershed's streams and to Green Bay. This is to be expected, as the city of Green Bay is the largest urban area and has some of the most intensive urban land uses.

The total annual sediment load from urban areas is estimated at 11,300 tons per year. This constitutes about 25 percent of the total annual sediment load from all rural and urban sources. The most important source of sediment reaching surface waters from urban areas is construction site erosion. A rate of 30 tons per acre per year was used to estimate the sediment load from construction sites (Bannerman, 1983). That analysis indicated that more than 70 percent of the sediment load originates from construction erosion.

Overall, urban nonpoint contributions of phosphorus, zinc, lead and copper to streams and to Green Bay are moderate. Freeways, industrial areas, commercial areas and high density residential areas are the greatest contributors of pollutants on a per acre basis. When compared with larger urbanized areas in the state, the relative amount of these intensive urban land uses is not great. However, storm water runoff and snowmelt convey these pollutants to surface waters at concentrations that can be acutely toxic.

Table III-7. Existing 1986 Land Use and Pollutant Loads

MUNICIPALITY	Acres	%	SEDIMENT* Tons/Yr	SEDIMENT* %	PHOSPHORUS Tons/Yr	PHOSPHORUS %	ZINC Tons/Yr	ZINC %	LEAD Tons/Yr	LEAD %	COPPER Tons/Yr	COPPER %
C. of Green Bay	18,390	59%	5,920	52%	3.54	64%	2.15	69%	0.73	68%	0.30	68%
C. of De Pere	4,830	15%	1,622	14%	0.71	13%	0.30	10%	0.11	10%	0.04	10%
T. of Bellevue	3,440	11%	1,094	10%	0.38	7%	0.26	8%	0.10	9%	0.04	9%
V. of Allouez	2,935	10%	590	5%	0.63	11%	0.25	8%	0.08	7%	0.04	8%
T. of Scott	1,054	3%	94	1%	0.05	1%	0.02	1%	0.01	1%	0.00	1%
V. of Ashwaubenon	762	2%	1,989	18%	0.22	4%	0.15	5%	0.05	5%	0.02	5%
Total	*31,411*	*100%*	*11,309*	*100%*	*5.51*	*100%*	*3.12*	*100%*	*1.08*	*100%*	*0.44*	*100%*

*Includes construction site erosion

Source: Wisconsin Department of Natural Resources.

Medium density residential areas can also generate significant quantities of urban nonpoint source pollution, primarily because of their predominance. Medium density residential areas are also significant sources of pesticides, bacteria, and household or automotive maintenance products dumped into the storm sewer system. Low density residential areas are important where the improper use and disposal of pesticides, fertilizers, and automotive maintenance products occurs.

Runoff from new urban areas has the potential to further degrade stream water quality unless storm water management controls are incorporated during development. Table III-8 also shows the increase in urban nonpoint source sediment loading that will occur in the watershed in the year 2010 if new urban source areas are not controlled.

SUBWATERSHED DISCUSSIONS

The following discusses the characteristics, water quality conditions and objectives, nonpoint sources, and other pollution sources for the subwatersheds comprising the East River Priority Watershed. This information is the basis for the strategy presented in Chapter IV, "Management Actions" for controlling nonpoint source pollution and achieving improved water quality in the watershed. Urban nonpoint source pollutant loading information by subwatershed is contained in Table III-9.

EAST RIVER SUBWATERSHED

The East River Subwatershed is a 74-square mile area containing the Upper East River, Middle East River and Lower East River drainage areas. The Upper East River area originates in Calumet and Manitowoc Counties and continues north to Mallard Road in Brown County. The Middle East River area is in the center of the subwatershed, stretching from Mallard Road to the confluence of Bower Creek and the East River. The Lower East River area begins at the north end of the Middle East River area continuing downstream to the confluence of the East and Fox Rivers.

Cropland is the predominant land use, occupying 28,600 acres or 60 percent of the area. Approximately 120 miles of streams drain the East River Subwatershed. The East River is 33.3 miles long--6.3 miles are intermittent and 27 miles are perennial.

The remaining stream network is comprised of six unnamed perennial streams (16.1 miles) and 38 unnamed intermittent streams (71 miles). Many of the intermittent tributaries are high gradient streams that drain the western face of the Niagara escarpment.

Table III-8. Anticipated Year 2010 Land Uses and Pollutant Loads

Municipality	Acres	%	SEDIMENT Tons/Yr	SEDIMENT %	PHOSPHORUS Tons/Yr	PHOSPHORUS %	ZINC Tons/Yr	ZINC %	LEAD Tons/Yr	LEAD %	COPPER Tons/Yr	COPPER %
C. of Green Bay	22,149	55%	6562	51%	4.74	56%	3.00	58%	1.03	57%	0.43	57%
C. of De Pere	6,587	16%	1959	15%	1.37	16%	0.72	14%	0.26	14%	0.10	13%
T. of Bellevue	5,338	13%	1518	12%	1.16	14%	0.84	16%	0.31	17%	0.13	17%
V. of Allouez	3,412	9%	643	5%	0.75	9%	0.31	6%	0.10	6%	0.05	8%
T. of Scott	1,414	4%	101	1%	0.07	1%	0.03	1%	0.01	1%	0.00	0%
V. of Ashwaubenon	948	2%	2,068	16%	0.34	4%	0.27	5%	0.09	5%	0.04	5%
Greenleaf	236	1%	10	0%	0.03	0%	0.01	0%	0.00	0%	0.00	0%
Total	*40,084*	*100%*	*12,861*	*100%*	*8.46*	*100%*	*5.18*	*100%*	*1.80*	*100%*	*0.75*	*100%*

Source: Wisconsin Department of Natural Resources.

Table III-9. Existing 1986 Urban Pollutant Loads by Subwatershed

			SEDIMENT		PHOSPHORUS		ZINC		LEAD		COPPER	
Subwatershed	Acres	%	Tons/Yr*	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%	Tons/Yr	%
Lower Fox	8,686	34%	1,140	51%	2.28	51%	1.54	58%	0.91	54%	0.23	56%
Lower East	8,208	32%	533	15%	1.23	28%	0.61	23%	0.42	25%	0.10	24%
Middle East	1,605	6%	59	12%	0.14	3%	0.06	2%	0.02	1%	0.01	2%
Lower Bower	334	1%	16	5%	0.04	1%	0.02	1%	0.01	1%	0.01	2%
East Bay	2,725	11%	43	1%	0.13	3%	0.04	2%	0.02	1%	0.01	2%
Mahon Creek	1,343	5%	43	16%	0.10	2%	0.06	2%	0.11	7%	0.01	2%
West Bay	2,773	11%	252	0%	0.53	12%	0.33	12%	0.19	11%	0.05	12%
Total	*25,674*	*100%*	*2,085*	*100%*	*4.45*	*100%*	*2.64*	*100%*	*1.69*	*100%*	*0.41*	*100%*

* Does not include construction erosion.

Source: Wisconsin Department of Natural Resources.

Water quality evaluations reveal that the entire East River and many of its tributaries are degraded. Low dissolved oxygen levels and degraded habitat are present throughout the East River system. Turbidity increases as one travels upstream from the Main Street Bridge to the WNFL Radio Tower then decreases at about the confluence of Bower Creek. Water quality monitoring indicates that turbidity levels decrease in the winter. This suggests that suspended sediment concentrations decrease during periods of limited runoff indicating that significant water quality improvement could occur with effective nonpoint source controls (Quinlan, 1989). As previously discussed, the lower seven miles of the East River is effected by a seiche effect from Green Bay. The seiche effect tends to keep sediment suspended in the water column.

Data from a U.S. Geological Survey (USGS) monitoring station operated at Monroe Street during 1986 was used to estimate a sediment loading rate of 125 tons per square mile per year ($T/mi^2/yr$) and a total phosphorus loading rate of 1,128 pounds per square mile per year ($lbs/mi^2/yr$). Water chemistry data showed this area to be in a degraded state with biological oxygen demand (BOD) load levels of 11.00 milligrams per liter (mg/l), total phosphorus levels of 1.91 mg/l, fecal streptococcus levels of 730,000 colonies/100 milliliter (ml) and fecal coliform levels of 1,410,000 colonies/100 ml. USGS sample results for monitoring stations at Allouez Avenue and Highway 32 also had high BOD, total phosphorus, fecal streptococcus and fecal coliform levels.

The East River from its headwaters to Midway Road, Brown County and all tributaries (105.3 stream miles) have a biological stream use classification of FAL-C (Warm Water Forage Fish Communities). FAL-C streams are capable of supporting an abundant, diverse community of forage fish (shiners, daces, minnows) and other aquatic life (insects, clams, crayfish). The remainder of the East River (13.4 miles) has a biological stream use classification of FAL-B (Warm Water Sport Fish Community). FAL-B streams are capable of supporting a community of warm water sport fish (bass, walleye, pike) or serving as spawning areas for warm water sport fish. Walleye, smallmouth bass, largemouth bass, and yellow perch are found in the lower four miles of the East River.

WATER RESOURCES OBJECTIVES

- Improve and protect the water quality of the East River, Fox River and Green Bay by reducing nutrients levels.

- Reduce phosphorus delivery to the East River and its tributary streams by a high level (70 percent). This will also reduce phosphorus loading to the Fox River and Green Bay.

- Improve the aquatic habitat for resident fish populations in the East River, Fox River and Green Bay by reducing sedimentation.

Reduce sediment delivery to the East River and its tributary streams by a high level (50 percent). This will reduce sedimentation of the East River, Fox River, and Green Bay.

- Restore farmed wetlands and maintain existing wetlands. Many of these areas store and filter runoff,help maintain stable base flows in streams and provide wildlife habitat.

- Reduce concentrations of toxic compounds in urban storm water runoff to achieve state water quality standards.

NONPOINT SOURCES

Barnyard Runoff: One hundred fifty-four (154) barnyards are located in this subwatershed. An estimated 1,400 pounds of phosphorus (34 percent of the phosphorus attributable barnyard runoff) drains to streams and drainage ways during a 3.5" rainfall event. Only the Bower Creek Subwatershed has a greater phosphorus load attributable to barnyards.

Upland Erosion: Erosion from cropland and other rural land uses contribute an estimated 7,100 tons of sediment annually to streams and drainage ways. This sediment constitutes 41 percent of the upland sediment load in the watershed. Importantly, sediment reduction efforts will prioritize cropland erosion in the East River Subwatershed.

Gully Erosion: Slight, moderate or severe gully erosion occurs at 80 sites where an estimated 4,800 tons of sediment are eroding annually. This subwatershed has the most severe gully erosion with 46 percent of the sites and sediment load attributed to this type of erosion.

Streambank Erosion: The East River Subwatershed has more miles of streambank affected by erosion than any other portion of the watershed. An estimated 40 percent of the streambanks were eroding, slumping or trampled by livestock. More than 88 percent of the sediment loading attributable to streambank erosion in the rural portions of the watershed occurs here.

OTHER POLLUTION SOURCES

A variety of other potential surface and groundwater pollution sources exist in the East River Subwatershed. These include discharges from two municipal treatment plants, industrial process waste from two cheese factories and cooling water discharges. Other sources include salvage yards and septage waste disposal sites. These regulated discharges have not been shown to be having a significant adverse impact on water

quality. The potential exists for groundwater contamination from the five active landfills and ten abandoned landfills in the subwatershed.

BOWER CREEK SUBWATERSHED

The Bower Creek Subwatershed is a 42-square mile area comprised of the Upper Bower (4.7 square miles) and Lower Bower (37.3 square miles) drainage areas. The Upper Bower Creek originates at the headwaters of Bower Creek and continues downstream to Sunnyview Road--Lower Bower begins at Sunnyview Road and continues to confluence of Bower Creek and the East River. The Bower Creek Watershed was divided into two subwatersheds because a USGS monitoring station is located at Sunnyview Road.

Cropland is the predominant land use. Approximately 53 miles of streams and tributaries drain the subwatershed. The Bower Creek is 14.2 miles long--11.9 miles are intermittent and 2.3 miles are perennial. The remaining stream network is comprised of 13 unnamed intermittent tributaries that drain to Bower Creek.

Streams in the Bower Creek Subwatershed have a biological stream use classification of FAL-C (Warm Water Forage Fish Communities). These streams are capable of supporting an abundant, diverse community of forage fish (shiners, daces, minnows) and other aquatic life (insects, clams, crayfish). A 30-foot high waterfall located near County Trunk Highway M precludes fish migration upstream.

The fisheries habitat is degraded. Water quality, based on Hilsenhoff Biotic Indices, is poor in the Upper Bower Creek and fair in the Lower Bower Creek. Hughes (1988) found minimum dissolved oxygen levels for the 1985/1986 study period were commonly below 5 mg/l with concentrations as low as 1-2 mg/l at Sunnyview Road. During periods of minimum discharge, the dissolved oxygen sampling station on Upper Bower Creek was essentially a stagnant pool. Hughes (1988) reported that the Upper Bower Creek had the highest mean concentrations for BOD-5, total phosphorus, fecal coliform and fecal streptococcus of the sites monitored in the Fox River, East River and Bower Creek) during 1985-1986. Bower Creek exceeded the acceptable coliform level for recreational uses 91 percent of the time, with levels reaching two million colonies per 100 milliliter (Hughes, 1988). Agricultural discharges were suspected of significantly contributing to the degraded water quality.

According to the Groundwater Contamination Susceptibility in Wisconsin Report (Schmidt, 1987) the Lower Bower drainage area is "moderately susceptible to groundwater contamination". This does not mean that groundwater contamination has taken place, but that there is the potential for groundwater contamination. This potential is based on depth to bedrock, bedrock type, depth to water table, soil characteristics and surficial deposits not on land usage. Scrays Hill, located in the Lower

Bower Creek area has contaminated wells located in the Scrays Hill area. These wells were contaminated with Trichloroethane (TCE) from an unknown source.

WATER RESOURCES OBJECTIVES

- Improve and protect the water quality of Bower Creek and the East River by reducing nutrient levels.
- Reduce phosphorus delivery to Bower Creek and its tributary streams by a high level (70 percent). This will also reduce phosphorus loading to the East River and Green Bay.
- Improve the aquatic habitat for resident fish populations in Bower Creek and the East River by reducing sedimentation.
- Reduce sediment delivery to Bower Creek and its tributary streams by a high level (50 percent). This will reduce sedimentation of the East River and Green Bay.
- Restore farmed wetlands and maintain existing wetlands. Many of these areas store and filter runoff, help maintain stable base flows in streams and provide wildlife habitat.
- Reduce concentrations of toxic compounds in urban storm water runoff to achieve state water standards.

NONPOINT SOURCES

Barnyard Runoff: One hundred twenty-eight (128) barnyards are located in this subwatershed. An estimated 1,590 pounds of phosphorus (39 percent of the phosphorus attributable barnyard runoff) drains to streams and drainage ways during a 3.5 inch rainfall event. Phosphorus loading to streams from barnyards in this area is the highest in the watershed.

Upland Erosion: Erosion from cropland and other rural land uses contribute an estimated 4,500 tons of sediment annually to streams and drainage ways. This sediment constitutes 26 percent of the upland sediment load in the watershed. Only the East River Subwatershed is a larger contributor of sediment from upland sources.

Gully Erosion: Slight, moderate or severe gully erosion occurs at 28 sites where an estimated 1,600 tons of sediment are eroding annually. This subwatershed has the

second most severe gully erosion with 16 percent of the sites and sediment load attributed to this type of erosion.

Streambank Erosion: Ten locations encompassing approximately 37 percent of the length of streambanks were eroding, slumping or trampled by livestock.

OTHER POLLUTION SOURCES

A variety of other potential surface and groundwater pollution sources exist in the Bower Creek Subwatershed. These include discharges from a cheese factory and septage waste disposal sites. These regulated discharges have not had a significant adverse impact on water quality. As discussed above, private wells in the Scrays Hill area have been contaminated with TCE. The impact on stream water quality probably is not significant.

BAIRD CREEK SUBWATERSHED

The Baird Creek Subwatershed is a 25-square mile area located in the middle of the East River Watershed. Streams in this area have been altered by the increased flows and pollutant loads typical of an area undergoing a rapid rate of urbanization. Residential and commercial land uses predominate in this area. Park lands encompass approximately 330 acres, including the 270-acre Baird Creek Parkway.

Principle streams are the main stem of Baird Creek and 10 unnamed intermittent tributaries. The total length of streams in the area is 31.1 miles--3.5 miles are perennial and 27.6 miles are intermittent. Approximately 3.5 stream miles of Baird Creek are categorized as FAL-B (Warm Water Sport Fish Communities) and the remainder of Baird Creek and all tributaries (a total of 27.6 miles) are categorized as FAL-C (Warm Water Forage Fish Communities). FAL-B streams are capable of supporting a community of warm water sport fish (bass, walleye, pike) or serving as spawning areas for warm water sport fish. Walleye are known to migrate up Baird Creek during their spring spawning (Quinlan, 1989). FAL-C streams are capable of supporting an abundant, diverse community of forage fish (shiners, daces, minnows) and other aquatic life (insects, clams, crayfish).

Water quality evaluations revealed that Baird Creek is in a degraded state. The fish habitat rating for this area is poor to fair. Dissolved oxygen levels of less than 5 mg/l have been recorded. However, water clarity is fair to good which serves to dilute the otherwise turbid character of the East River downstream from the confluence with Baird Creek.

WATER RESOURCES OBJECTIVES

- Improve and protect the water quality of Baird Creek and the East River by reducing nutrient levels.

  Reduce phosphorus delivery to Baird Creek and its tributary streams by a high level (70 percent). This will also reduce phosphorus loading to the East River and Green Bay.

- Improve the aquatic habitat for resident fish populations in Baird Creek and the East River by reducing sedimentation.

  Reduce sediment delivery to Baird Creek and its tributary streams by a high level (50 percent). This will reduce sedimentation of the East River and Green Bay.

- Restore farmed wetlands and maintain existing wetlands. Many of these areas store and filter runoff, help maintain stable base flows in streams and provide wildlife habitat.

- Reduce concentrations of toxic compounds in urban storm water runoff to achieve state water standards.

NONPOINT SOURCES

Barnyard Runoff: Seventy-four (74) barnyards are located in this subwatershed. An estimated 574 pounds of phosphorus (14 percent of the phosphorus attributable barnyard runoff) drains to streams and drainage ways during a 3.5-inch rainfall event. Phosphorus loading to streams from barnyards in this area is exceeded only in the East River and Bower Creek Subwatersheds.

Upland Erosion: Erosion from cropland and other rural land uses contribute an estimated 2,200 tons of sediment annually to streams and drainage ways. This sediment constitutes 13 percent of the upland sediment load in the watershed. Only the East River and Bower Creek Subwatersheds are larger contributors of sediment from upland sources.

Gully Erosion: Slight, moderate or severe gully erosion occurs at 15 sites where an estimated 895 tons of sediment are eroding annually. This sediment source is not as severe as in other parts of the watershed but locally can have significant impacts on water quality and aquatic habitat in small tributary streams.

Streambank Erosion: No significant areas of streambank erosion were identified in the rural portions of the watershed.

OTHER POLLUTION SOURCES

A variety of other potential surface and groundwater pollution sources exist in the Baird Creek Subwatershed. These include primarily cooling water discharges from four industries. These regulated discharges have not had significant adverse impacts on water quality. A leaking underground gasoline storage tank has been identified as a high priority for replacement.

FOX RIVER SUBWATERSHED

The Fox River Subwatershed is a 31.5 square mile area containing the Upper Fox River, Middle Fox River, and Lower Fox River drainage areas. The Upper Fox River area originates at the Wrightstown dam and continues downstream to the Rapide Croche Dam. The Middle Fox River area originates at the Rapide Croche Dam and stretches downstream to the De Pere Dam. The Lower Fox River area originates at the De Pere Dam and continues downstream to the mouth of the Fox River.

Principal water courses included in the 28 miles of streams draining this area include the Fox River (18 miles) and 11 unnamed intermittent tributary (10 miles) streams. The upstream portion of the subwatershed contains primarily rural land uses. The remainder of the subwatershed is comprised of a mixture of intensive urban areas and rural land uses. The Lower Fox drainage area contains some of the most intensely industrialized areas in Wisconsin. Paper mills, coal and other bulk storage areas, industrial areas and a large section of downtown Green Bay.

The Fox River is categorized as FAL-B (Warm Water Sport Fish Communities) and the tributaries are FAL-C (Warm Water Forage Fish Communities). FAL-B streams are capable of supporting a community of warm water sport fish (bass, walleye, pike) or serving as spawning areas for warm water sport fish. The FAL-C tributary is capable of supporting an abundant, diverse community of forage fish (shiners, daces, minnows) and other aquatic life (insects, clams, crayfish).

U.S. Geological Survey monitoring data from 1974-1981 for the Fox River at Wrightstown indicated that the Fox River contributes 16 $T/mi^2/yr$ of sediment and 172 pounds per square mile per year ($lbs/mi^2/yr$) of phosphorus (Hughes, 1988). At this site the remedial action plan goal of instream total phosphorus levels of 0.1 - 0.125 mg/l is often exceeded. Fecal coliform and streptococcus counts are also high at this location with levels reaching 5,300 and 3,700 colonies/100 ml respectively. Total phosphorus

loads at Rapide Croche Dam for 1980 - 1982 were 325.66, 266.40 and 224.10 (lbs/m³), respectively (Hughes, 1988).

The Green Bay Health Department's data from 1979-1989 show that high bacteria levels were found in the Fox River at the Walnut Street Bridge and near the discharge of the Green Bay Metropolitan Sewerage District. Coliform counts of over 100,000 colonies/100 ml were found in 1988. At other times coliform counts were less than 10 colonies/100 ml at the Walnut Street Bridge and in the Fox River.

Groundwater contamination has taken place at several manufacturing sites throughout this area. At one site used for chrome plating, the Preventive Action Limit (PAL) for cadmium was exceeded in samples analyzed for cadmium in three out of seven test wells. Samples from two of the seven wells exceeded the PAL for chromium. At the site used for zinc plating, samples in four out of the six wells tested exceeded the PAL for zinc; no wells exceeded enforcement standards for cadmium; five out of the six exceeded environmental standards for chromium. The PAL was exceed in two out of the six wells for lead, but environmental standards were not exceeded.

WATER RESOURCES OBJECTIVES

- Improve and protect the water quality of the Fox River and Green Bay by reducing nutrient levels.

- Reduce phosphorus delivery to the Fox River and its tributary streams by a high level (70 percent). This will also reduce phosphorus loading to Green Bay.

- Improve the aquatic habitat for resident fish populations in the Fox River and Green Bay by reducing sedimentation.

- Reduce sediment delivery to the Fox River and its tributary streams by a moderate level (30 percent). This will reduce sedimentation of the Fox River and Green Bay.

- Restore farmed wetlands and maintain existing wetlands. Many of these areas store and filter runoff, help maintain stable base flows in streams and provide wildlife habitat.

- Reduce concentrations of toxic compounds in urban storm water runoff to achieve state water standards.

NONPOINT SOURCES

Barnyard Runoff: Twenty-eight (28) barnyards are located in this area. An estimated 210 pounds of phosphorus (five percent of the phosphorus attributable barnyard runoff in the watershed) drains to streams and drainage ways during a 3.5 inch rainfall event. Overall, pollution sources upstream of the watershed are have a much greater impact on water quality in the Fox River than the pollution attributable to barnyard runoff.

Upland Erosion: Cropland and other related rural lands occupy only about 6,100 acres, or 35 percent of the Fox River Subwatershed. Erosion from cropland and other rural land uses contribute an estimated 1,100 tons of sediment annually to the Fox River and tributary streams. This sediment constitutes only seven percent of the upland sediment load in the watershed. As discussed above, urban land uses predominate in this portion of the watershed. In addition, the impact of upstream sediment sources is of greater concern than sediment contributions from eroding cropland.

Gully Erosion: Slight, moderate or severe gully erosion occurs at 15 sites where an estimated 1,000 tons of sediment are eroding annually. This sediment source is not as severe as in other parts of the watershed but locally can have significant impacts on water quality and aquatic habitat in small tributary streams.

Streambank Erosion: Ten locations encompassing approximately 20 percent of the length of streambanks were eroding or slumping. However, the amount of sediment attributable to streambank erosion is not significant and no areas of cattle access were identified.

OTHER POLLUTION SOURCES

There are numerous dischargers of wastewater, industrial process water and cooling water in the Fox River Subwatershed. These are regulated by the DNR through general, industrial and municipal permits. Regulatory efforts will continue to result in significant improvements in water quality in the Fox River. Reductions in nutrients and sediment attributable to nonpoint sources will also help improve water quality in the Fox River and Green Bay.

Leaking underground storage tanks containing primarily gasoline and diesel fuel have been found at 13 locations in this subwatershed. The DNR Lake Michigan District is prioritizing the cleanup of these sites through implementation of the Leaky Underground Storage Tank (LUST) program.

HOLLAND WILDLIFE SUBWATERSHED

The Holland Wildlife Subwatershed is a four-square mile area located in the headwaters area of the East River. The principal land use in the area is cropland, however 536 acres are included in a state owned wildlife management area. The 3.7 miles of streams in this area include three unnamed small tributaries of the East River. All streams in this subwatershed are categorized as FAL-C (Warm Water Forage Fish Communities) and are capable of supporting an abundant, diverse community of forage fish (shiners, minnows) and other aquatic life (insects, clams, crayfish).

A moderate potential for groundwater contamination exists in this area. It is based on depth to bedrock, bedrock type, depth to water table, soil characteristics and structural deposits not on land usage. Best management practices that protect groundwater should be prioritized in this subwatershed.

WATER RESOURCES OBJECTIVES

- Improve and protect the water quality of the East River by reducing nutrients levels.

- Reduce phosphorus delivery to the tributary streams by a high level (70 percent). This will also reduce phosphorus loading to the East River.

- Improve the aquatic habitat for resident fish populations in the East River by reducing sedimentation.
  Reduce sediment delivery to the tributary streams by a low level (25 percent). This will reduce sedimentation of the East River.

- Restore farmed wetlands and maintain existing wetlands. Many of these areas store and filter runoff, help maintain stable base flows in streams and provide wildlife habitat.

NONPOINT SOURCES

Barnyard Runoff: Seventeen barnyards are located in this area. An estimated 104 pounds of phosphorus (three percent of the phosphorus attributable barnyard runoff in the watershed) drains to streams and drainage ways during a 3.5 inch rainfall event. Overall, barnyards are not as significant a pollution source as they are in other parts of the watershed. However, controls are warranted given the smaller sized streams and their limited ability to assimilate pollutants.

Upland Erosion: Erosion from cropland and other rural land uses contribute an estimated 400 tons of sediment annually to streams and drainage ways. This sediment constitutes only two percent of the upland sediment load in the watershed. However, as described above the sensitive nature of these smaller streams does not diminish the need to provide some measure of control of the sediment load from these areas.

Gully Erosion: Slight and moderate gully erosion occurs at an estimated four sites where an estimated 200 tons of sediment are eroding annually. This sediment source is not as severe as in most of the rest of the watershed but locally can have significant impacts on water quality and aquatic habitat in small tributary streams.

Streambank Erosion: No areas of streambank erosion were identified in this subwatershed.

OTHER POLLUTION SOURCES

One abandoned landfill is located in this subwatershed. No evidence of groundwater or surface water contamination attributable to this site has been found.

GREEN BAY DIRECT DRAINAGE AREA

The Green Bay direct drainage area is comprised of five subwatersheds--Red Banks, Wequiock Creek, Mahon Creek, East Bay and West Bay--encompassing 34-square miles. These subwatersheds drain directly to Green Bay via 13 small intermittent streams with a total length of 24 miles. The named tributaries are Red Banks Creek, Wequiock Creek and Mahon Creek.

Land uses in these subwatersheds are variable. Urban land uses predominate in the West Bay and Mahon Creek Subwatersheds. Wequiock Creek, Red Banks and East Bay are primarily rural with a significant amount of cropland. The University of Wisconsin - Green Bay and its associated arboretum and parkway are located in the Mahon Creek Subwatershed. A waterfall in Wequiock Creek where it crosses under Highway 54/57 is a popular scenic attraction.

Water quality information for the small streams draining these areas is limited. However, they are impacted by a combination of rural nonpoint sources, construction erosion and urban runoff. Sediment deltas are present at the mouths of most of the small tributaries draining into Green Bay. These deltas prevent valuable game fish such as northern pike, from entering these tributaries during spring spawning. The DNR fish managers are focusing their efforts to produce a "trophy" northern pike fishery in Green Bay.

All streams in these subwatersheds have a biological stream use classification of FAL-C (Warm Water Forage Fish Communities). The streams in this subwatershed are capable of supporting an abundant, diverse community of forage fish (shiners, daces, minnows) and other aquatic life (insects, clams, crayfish).

According to the Groundwater Contamination Susceptibility in Wisconsin Map (DNR, UWEX & GNHS, 1987), Wequiock Creek and Red Banks Subwatersheds range from "moderately susceptible to groundwater contamination to most susceptible to groundwater contamination". Evidence is not available to determine the type and extent of groundwater contamination in this area.

WATER RESOURCES OBJECTIVES

- Improve and protect the water quality of Red Banks Creek, Wequiock Creek, Mahon Creek and Green Bay by reducing nutrients levels.
- Reduce phosphorus delivery to Red Banks Creek, Wequiock Creek and Mahon Creek by a high level (70 percent). This will also reduce phosphorus loading to Green Bay.
- Improve the aquatic habitat for resident fish populations in Red Banks Creek, Wequiock Creek, Mahon Creek and Green Bay by reducing sedimentation.
- Reduce sediment delivery to Red Banks Creek, Wequiock Creek and Mahon Creek by a low level (25 percent). This will reduce sedimentation of Green Bay.
- Restore farmed wetlands and maintain existing wetlands. Many of these areas store and filter runoff, help maintain stable base flows in streams and provide wildlife habitat.
- Reduce concentrations of toxic compounds in urban storm water runoff to achieve state water standards.

NONPOINT SOURCES

Barnyard Runoff: Fifty-five (55) barnyards are located in three of the five subwatersheds--Wequiock Creek (31), Red Banks (20) and Mahon Creek (4). Cumulatively these yards are contributing about 237 pounds of phosphorus (six percent of the phosphorus attributable barnyard runoff in the watershed) to streams and drainage ways during a 3.5 inch rainfall event. Overall, barnyards are not as significant a pollution source as they are in other parts of the watershed. However, controls are warranted given the smaller sized streams, proximity to Green Bay and their limited ability to assimilate pollutants.

Upland Erosion: Erosion from cropland and other rural land uses is a concern in the Wequiock Creek, Red Banks, East Bay and Mahon Creek Subwatersheds. Cumulatively, more than 1,800 tons of sediment (primarily from the 10,000 acres of cropland) is contributed annually to streams and drainage ways. This sediment constitutes only 10 percent of the upland sediment load in the watershed. However, as described above the sensitive nature of these smaller streams and the need to reduce the size of the deltas at the stream mouths does not diminish the need to control the sediment sources in these areas.

Gully Erosion: Slight, moderate and severe gully erosion is a concern in the Wequiock Creek (12 sites), Red Banks (12 sites), East Bay (5 sites) and Mahon Creek (3 sites) Subwatersheds. Cumulatively an estimated 2,000 tons of sediment are eroding annually from these areas. This sediment source is not as severe as in most of the rest of the watershed but locally can have significant impacts on water quality and aquatic habitat.

Streambank Erosion: No areas of streambank erosion were identified in these subwatersheds.

OTHER POLLUTION SOURCES

A variety of other potential surface and groundwater pollution sources exist in the five subwatersheds including abandoned landfills, septage waste and sludge disposal sites, salvage yards and leaking underground storage tanks. These regulated pollution sources have not had significant adverse impacts on water quality. A leaking underground gasoline storage tank has been identified in this area as high priority for replacement.

CHAPTER IV
MANAGEMENT ACTIONS

INTRODUCTION

This chapter identifies the nonpoint source controls to be implemented under the East River Priority Watershed Project. These controls are based primarily on water quality information, the results of the nonpoint source evaluations, and the identified levels of reduction for sediment and phosphorus needed to achieve the water quality objectives.

The first portion of this chapter establishes eligibility criteria and management categories for the rural nonpoint sources. The criteria and management categories determine which sources are eligible for financial and technical assistance under the priority watershed project. The second section identifies the need for and mechanisms to implement urban nonpoint source controls.

ELIGIBILITY CRITERIA AND MANAGEMENT CATEGORIES

ELIGIBILITY CRITERIA

Eligibility criteria determine which pollutant sources will receive funding under the East River Priority Watershed Project. The criteria are typically expressed in terms of the severity of a pollutant source. For example in rural areas if more than five pounds of phosphorus are attributed to a particular barnyard site, then the owner may be eligible for cost-share assistance under the priority watershed. These criteria are based on:

1. The biological and recreational stream classification and the impacts of nonpoint sources on water quality.

2. Pollution load reductions specific to the subwatershed that are needed to achieve water quality conditions that support biological and recreational uses.

3. Watershed-wide pollutant load reductions needed to achieve downstream water quality objectives in the East River and Green Bay.

MANAGEMENT CATEGORIES

Management categories identify the priorities for addressing nonpoint sources. Changes in management categories for pollution sources may be necessary as a result of a change in the operation of a farm, for example, or other circumstances which occurred since completion of the inventories. Application of eligibility criteria necessary for changing management categories is described below.

1. ***Management Category I:*** Nonpoint sources in this category are eligible for funding and/or technical assistance under the priority watershed project. The sources in this category contribute a significant amount of the pollutants impacting surface and/or groundwater quality. A reduction in their pollutant load is essential for achieving the priority watershed project's water quality objectives.

   Control of all pollution sources in this category is required as part of any cost-share agreement. For example, if a landowner has several pollution sources on his/her property (barnyard, streambank erosion, cropland erosion), which are in this category, then all of these sources need to be controlled to meet the conditions of the agreement.

2. ***Management Category II:*** Nonpoint sources in this category are also eligible for funding and/or technical assistance under the priority watershed project. Sources in this category together contribute less of the pollutant load than those included in Management Category I. However, their control may be essential to achieve water quality objectives because of the need to offset sources in Management Category I, which are not controlled under the voluntary approach of the priority watershed project.

   Inclusion of sources in this category on cost-share agreements is optional, although the success of the priority watershed project may depend on their control. An example would be a landowner whose cropland is in Management Category I but who also has other nonpoint sources in Management Category II. The cost-share agreement for control of the cropland erosion need not stipulate control of the other nonpoint sources. However, county project staff implementing the project should encourage control of all Management Category II sources.

3. ***Management Category III:*** Nonpoint sources in this category are not eligible for funding and/or technical assistance under the priority watershed project. Sources in this category do not contribute a significant amount of the pollutants impacting surface and/or groundwater quality. A reduction in their pollutant load is not essential for achieving the priority watershed project's water quality objectives.

An example of a pollution source in this category would be cropland eroding at a very high rate which, because of its location, is not contributing a significant amount of sediment to a lake or stream.

RURAL NONPOINT SOURCE MANAGEMENT ACTIONS

Rural nonpoint source eligibility criteria and management categories were developed for:

- Sites where barnyard runoff drains to surface water and wetlands.
- Areas used for winterspreading manure which may impact water quality.
- Croplands and other rural land uses where eroded soil is washing into streams.
- Sites where streambank erosion is affecting water quality and/or aquatic habitat.
- Sites where gully erosion is affecting water quality.

BARNYARD RUNOFF

Phosphorus reduction goals for the East River Priority Watershed consistent with the objectives of the Lower Green Bay Remedial Action Plan were discussed in Chapter III. Additionally, phosphorus reduction goals were established for each subwatershed consistent with the water quality objectives of the streams in those areas. Overall a 70 percent reduction in phosphorus for barnyards draining to surface water is needed to achieve downstream water quality improvement. Eligibility criteria and the number of eligible barnyards are presented in Table IV-1.

A total of 167 barnyards will be eligible for funding under the priority watershed project. Subwatersheds with the greatest number of eligible barnyards are the East River (59 sites), Lower Bower Creek (43 sites) and Baird Creek (26 sites). The remainder (39 sites) are included in six other subwatersheds.

No specific eligibility criteria were developed for barnyards draining to internally drained areas. Field investigations will be conducted jointly by the county project management staff, water resource management investigators from the DNR's Lake Michigan District Office, and staff from the DATCP. The DNR and county file data and/or a site visit will be used for the investigation. Information to be used includes, but is not limited to, the following: a mechanical analysis of the soil; site-specific determination of depth to bedrock or groundwater; herd size; barnyard management; location of the barnyard with respect to groundwater recharge areas; and groundwater quality information.

Table IV-1. Eligibility Criteria for Barnyards

Subwatershed	Phosphorus Control Goal (%)	Current Phosphorus Load (Lbs)	Phosphorus Control Target (Lbs)	# of Barnyards
East River	84	> 5.0	5.0	59
Bower Creek				
Upper Bower	85	> 10.0	10.0	11
Lower Bower	83	> 5.0	5.0	43
Baird Creek	82	> 5.0	5.0	26
Fox River	75	> 10.0	10.0	8
Holland Wildlife	67	> 10.0	10.0	6
Wequiock Creek	79	> 5.0	5.0	9
Red Banks	82	> 10.0	10.0	3
Mahon Creek	90	> 10.0	10.0	2
Total				*167*

*Eligibility for internally drained barnyards will be determined on site, during implementation by the County LCD, DATCP and DNR.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; the Land Conservation Departments of Brown and Calumet Counties

The DNR, DATCP, and the county project management will jointly determine a management category for each barnyard. Low-cost alternatives to reduce the groundwater contamination potential will be eligible for cost-sharing under the priority watershed project. However, if site conditions require use of high-cost practices to solve the problem, further site-specific investigations including groundwater monitoring will be conducted prior to making a final determination of cost-share eligibility.

RUNOFF FROM AREAS WINTERSPREAD WITH LIVESTOCK MANURE

A reduction in the quantity of phosphorus that originates from "critical areas" winterspread with livestock manure is needed to achieve subwatershed-specific and watershed-wide water quality objectives. Achievement of phosphorus reduction goals for the priority watershed project depends on reducing phosphorus by an amount roughly equivalent to the amount attributed to barnyard runoff.

As previously discussed, critical acres are lands with steep slopes and agricultural land located in flood prone areas. Runoff from such areas has a high potential to contribute phosphorus and other pollutants to surface water. The computation of critical acres is derived from field information from the upland sediment erosion inventory and manure production based on livestock numbers from the barnyard inventory. The determination of critical acres resulting from the analysis process is shown in Table IV-2. The critical acres in this table are intended to approximate the actual conditions in the watershed for the purpose of establishing planning goals and a list of landowner contacts. The overall reduction goal of the criteria presented in the table are to reduce phosphorus from this source by about 70 percent in the watershed, about the same overall percent reduction as for barnyards draining to surface water.

Application of these criteria to the 538 critical acres in the watershed is shown in Table IV-2. The result is that approximately 300 critical acres are classified as Management Category I and approximately 200 acres are Management Category II. Management Category I includes those livestock operators in the top 45 percent of the critical acres and areas where manure is spread in or near sensitive wetlands, or where a threat of groundwater contamination exists. Management Category II includes those livestock operators which together own the next 35 percent of the critical acres spread during winter.

The management categories for critical acres are used initially to establish a priority list for contacting landowners. Those in Management Category I (15 landowners) are contacted first, followed by individuals in Management Category II (29 landowners). An additional group of landowners will be contacted during implementation including landowners with acres needed for spreading which the inventory indicated had no spreadable acres available, and livestock operations which already have a manure storage facility (total of about 30 landowners). The additional 60 livestock operations may be found to have actual manure spreading practices needing improvement.

A site visit determines the number of livestock: the presence, type, and adequacy of manure storage facilities, and manure spreading practices that likely will contribute to pollution of surface water and groundwater resources. The method used to estimate the need for manure storage facilities will be consistent with the overall nutrient management standards included in the ***Soil Conservation Service Technical Guide***. This evaluation will consider each fields potential to deliver phosphorus-laden runoff to

surface waters. The quantity of manure that can be spread on "safe" fields can then be compared to the total quantity of manure to be spread during the critical winter months. The degree to which an operation is deficient in safe spreading sites will determine eligibility and manure management options. This information is used to estimate the number of critical acres on which manure is winterspread. Acreage criteria in Table IV-2 are used to assign a management category to each landowner establishing their eligibility for funding under the priority watershed project.

Table IV-2. Eligibility Criteria and Management Categories for Winterspread Manure Winterspread Manure

Number of Critical Acres Winterspread*	Management Category	Estimated # of Operations	Estimated # of Critical Acres	% of Acres
10 acres or more	I	15	303	56%
3 to 9.9 acres **	II	89	199	37%
0 to 2.9 acres	III	151	36	7%
Total		*255*	*538*	*100%*

* These acreages apply to individual landowners.

** This category includes additional landowners to be contacted to determine need for manure management.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and Land Conservation Departments of Brown and Calumet Counties.

CROPLAND AREAS DELIVERING SEDIMENT TO SURFACE WATER

Eligibility criteria were established for the 150-square miles of eroding upland areas delivering sediment to surface waters. These criteria, the number of parcels and associated acreage eligible for funding under the priority watershed project, and the total amount of sediment anticipated to be controlled are shown in Tables IV-3 and IV-4.

An estimated 18,290 acres are eligible for funding and essential for control (Management Category I). Although the acres in Management Category I are the most likely to be controlled by installing erosion control or sediment reduction practices, an additional

31,000 acres (approximately) are eligible for control and are included in Management Category II. Management Category II fields of Table IV-4 are above the sediment reduction goals outlined in Table IV-3. Installation of management practices will reduce the amount of sediment delivered to surface water by varying amounts in each subwatershed. Installation of these practices will also reduce the amount of sediment delivered in the entire watershed by about 2,000 tons or 11 percent if all of the Management Category I acres are treated.

Subwatersheds with the greatest number of eligible acres in Management Category I are the East River (8,983 acres), Bower Creek (4,964 acres), and Baird Creek (1,810 acres). Together these subwatersheds contain about 80 percent of the eligible acres in both Category I and II. The subwatersheds of East River (1,060 tons), Bower Creek (432 tons), and Baird Creek (195 tons) account for 86 percent of the delivered sediment to be controlled under Management Category I.

STREAMBANK SITES DELIVERING SEDIMENT TO SURFACE WATER

Reduction goals for streambank erosion were established based on the approximately 80 miles of streams included in the subwatersheds identified as having the most severe erosion from streambanks. The eligibility criteria and management categories can be found in Table IV-5.

Each landowner with streambank erosion accelerated by livestock access must control 50 percent of the erosion from their streambank sites (Management Category I). A total of 18 sites contributing about 650 tons of sediment are included in Management Category I. An additional 68 sites having 10 or more tons of sediment produced and which produce an estimated total of 3,623 tons of sediment are eligible for control in Management Category II. These sites do not have livestock access and will be more difficult and costly to control. The East River (259 tons to control) and Bower Creek (66 tons to control) are the only streams found during the inventory to have streambank erosion associated with livestock access.

GULLY EROSION SITES DELIVERING SEDIMENT TO SURFACE WATER

The eligibility criteria and management categories for sites producing sediment from gully erosion are shown in Table IV-6. Estimates were only generated for the number of sites and the sediment produced for sites included in Management Category I.

All sites producing three or more tons of erosion are included in Management Category I. It is estimated that 174 sites included in Management Category I produce 10,400 tons of sediment. The East River (80 sites producing 4,770 tons) and Bower Creek (28 sites

producing 1,590 tons) account for about 60 percent of the sediment in Management Category I.

Sites will be identified during implementation as part of the conservation planning process using the concentrated flow erosion estimating procedure developed by the USDA Soil Conservation Service. The control of gully erosion will be based on the criteria stated in Table IV-6. All gullies identified as producing erosion will be eligible for funding under the watershed project.

Table IV-3. Eligibility Criteria and Management Categories

Subwatershed	Management Category	Criteria: Sediment Delivery (tn/ac/yr)			Criteria: Soil Loss (tn/ac/yr)*
Upper East	I	over	0.10	&	over T-1
	II	over	0.10	&	under T-1
Middle East	I	over	0.13	&	over T-1
	II	over	0.13	&	under T-1
Lower East	I	over	0.10	&	over T-1
	II	over	0.10	&	under T-1
Upper Bower Creek	I	over	0.11	&	over T-1
	II	over	0.11	&	under T-1
Lower Bower	I	over	0.11	&	over T-1
	II	over	0.11	&	under T-1
Baird Creek	I	over	0.08	&	over T-1
	II	over	0.08	&	under T-1
Upper Fox River	I	over	0.18	&	over T-1
	II	over	0.18	&	under T-1
Middle Fox	I	over	0.14	&	over T-1
	II	over	0.14	&	under T-1
Lower Fox	Primarily Urban Land Uses In This Subwatershed				
Holland Wildlife	I	over	0.19	&	over T-1
	II	over	0.19	&	under T-1
Green Bay Direct Drainage					
Wequiock Creek	I	over	0.13	&	over T-1
	II	over	0.13	&	under T-1
Red Banks	I	over	0.13	&	over T-1
	II	over	0.13	&	under T-1
East Bay	I	over	0.16	&	over T-1
	II	over	0.16	&	under T-1
Mahon Creek	I	over	0.45	&	over T-1
	II	over	0.45	&	under T-1

* T-1 means that the criteria is based on soil loss at one ton less than T or the tolerable soil loss level.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade and Consumer Protection; and Land Conservation Departments of Brown and Calumet Counties.

Table IV-4. Rural Uplands Targeted for Sediment Control

Subwatershed	Total Load (tons/yr)	Management Category I			Management Category II*			Potential Control
		Acres	Control (tons/yr)	Control (%)	Acres*	Control (tons/yr)	Control (%)	
Upper East	3,300	3,905	299	9%	3,474	1,341	41%	50%
Middle East	3,348	4,869	739	22%	3,869	957	29%	51%
Lower East	467	209	22	5%	1,560	153	33%	37%
Bower Creek	4,495	4,964	432	10%	10,147	1,813	40%	50%
Baird Creek	2,195	1,810	195	9%	5,960	924	42%	51%
Fox River	1,132	1,787	85	8%	645	331	29%	37%
Holland Wildlife	395	184	59	15%	568	39	10%	25%
Gr Bay Dir Drng								
Wequiock Creek	891	145	31	3%	2,685	188	21%	25%
Red Banks	448	226	36	8%	1,005	74	17%	25%
East Bay	293	95	1	0%	1,006	73	25%	25%
Mahon Creek	195	96	66	34%	17	0	0%	34%
Totals	*17,159*	*18,290*	*1,965*	*11%*	*30,936*	*5,893*	*34%*	*46%*

It is unlikely that "Category II" parcels will have a high participation rate. Thus a more realistic control level for sediment is shown in the Control % column under "Category I" fields.

* The acres to be managed in this category do not include acres already listed in Category I that will be reduced to the sediment reduction goal.

* Assumes 50% of this category will be controlled.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and Land Conservation Departments of Brown and Calumet Counties

Table IV-5. Eligibility Criteria and Management Categories for Streambank Erosion and Habitat Degradation

Subwatershed *	% Control Goal **	Category I Sediment Loss (tons/yr)	Control Goal (tons/yr)	Banks With Cattle Access *** (ft)	Category II Sediment Loss # (tons/yr)
East River	50%	518	259	91,575	3,076
Bower Creek	50%	132	66	8,250	51
Baird Creek	50%	0	0	0	31
Fox River	50%	0	0	0	465
Totals		*650*	*325*	*99,825*	*3,623*

* Does not include subwatersheds inventoried with no streambank erosion.

** % Control is applied on a landowner basis; each landowner must control the percent of sediment equal to the control goal for the subwatershed (this is a Management Category I requirement). Sites with erosion not due to cultural activities are excepted from this requirement. These sites are Management Category II.

*** Each participating landowner must restrict livestock access from any perennial stream in the watershed where there is evidence of streambed damage or streambank erosion from livestock.

\# All sites without livestock access with an estimated 10 tons of erosion or more are eligible for funding (Management Category II).

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and Land Conservation Departments of Brown and Calumet Counties.

Table IV-6. Eligibility Criteria and Management Categories for Gully Erosion

Subwatershed *	Category I ** Sediment Loss (tons/yr)	Category II *** Sites (number)
East River	4,770	80
Bower Creek	1,590	28
Baird Creek	895	15
Fox River	960	15
Holland Wildlife	220	4
Green Bay Direct Drainage		
Wequiock Creek	685	12
Red Banks	750	12
East Bay	320	5
Mahon Creek	210	3
Totals	*10,400*	*174*

* Does not include subwatersheds inventoried with no streambank erosion.

** All gully erosion sites producing 3 or more tons of erosion are in Management Category I.

*** All gully erosion sites identified as needing treatment during implementation that are less than 3 tons of erosion are Management Category II.

Source: Wisconsin Department of Natural Resources; Wisconsin Department of Agriculture, Trade, and Consumer Protection; and Land Conservation Departments of: Brown and Calumet Counties.

URBAN NONPOINT SOURCE MANAGEMENT ACTIONS

Urban pollutant loadings were calculated for eight municipalities. Within this chapter, quantitative results are given for the pollutants of suspended solids, copper, zinc, and phosphorus. Qualitatively, descriptions are given for other pollutants of polychlorinated biphenyls (PCBs), pesticides, and polycyclic aromatic hydrocarbons (PAHs). Also in this chapter are reduction goals for the quantitative pollutants, along with management alternatives needed to met these goals. In addition, estimated costs will be included with this chapter.

URBAN NONPOINT SOURCE POLLUTANTS

While there are many different types of pollutants in urban stormwater, certain pollutants cause more concern than others. In a study conducted in Madison and Milwaukee, Wisconsin in 1990, a number of inorganic and organic pollutants were considered critical to water resources. Critical is defined as exceeding an acute toxicity level and an occurrence of at least 10 percent. Acute toxicity levels of these pollutants are found in the Wisconsin Administrative Codes NR 102, 105, and 210. Of these critical pollutants, suspended solids, lead, copper, zinc, and phosphorus were estimated for the eight different municipalities within the watershed. Listed below is a short description and possible sources of these estimated pollutants:

Lead: Lead is common pollutant found in most samples of urban runoff. Lead exceeded an acute toxicity at least once for all sites sampled, with Event Mean Concentrations (EMC) ranging from 3 to 570 micrograms per liter (ug/l), with the average EMC of 22.3 ug/l. The acute toxicity level of lead is 60.9 ug/l at a water hardness of 24. Probable sources include automobiles and industrial areas.

Copper: Copper was found to be toxic in at least 45 percent of all samples taken. The EMCs range from 3 to 210 ug/l, with an average EMC of 23.2 ug/l. The acute toxicity level of copper is 9.3 ug/l with a water hardness of 24. Sources of copper include automobiles and industrial areas.

Zinc: Zinc was found to be toxic in at least 45 percent of all samples taken. The EMCs ranged from 50 to 1500 ug/l, with an average EMC of 179 ug/l. The acute toxicity level of zinc is 66 ug/l with a water hardness of 24. Probable sources of zinc include automobiles, industry, and rooftop downspouts.

Suspended Solids: This pollutant is always found in urban runoff. Suspended solids were found to exceed at least 52 percent of all samples taken. The Wisconsin Pollutant Discharge Elimination System (WPDES) permit limit is 45 milligrams per liter (mg/l). The range of EMCs was from 2 to 1660 mg/l, with an

average EMC of 123 mg/l. While many sources contribute suspended solids, the majority comes from construction site erosion.

Phosphorus: At the most, phosphorus was found to exceed the permit level 11 percent of the time. The permit level is one part per million for the Great Lakes. The EMCs ranged from .09 to 1.7 mg/l. The average EMC was .3 mg/l. Phosphorus comes from many different sources, but major concerns are fertilizer use, and leaf refuse left in the street.

These concentrations are applied to water volumes that are generated by the Source Loading and Management Model (SLAM) for the land uses within the East River Watershed.

While the pollutants listed below are not estimated for the East River Watershed, they still pose a threat and should be considered in the overall discussion of problem pollutants:

PCB: PCBs are found in urban stormwater in small amounts. The EMCs range from .10 to 10 ug/l, with a median of .02 ug/l. One hundred percent of the samples taken exceed the human cancer criteria found in NR 105. Sources for this pollutant include storage areas and airborne deposition.

Pesticides: A number of different herbicides and insecticides are found in urban stormwater. Most herbicides found in urban stormwater pose little threat to the aquatic environment, but insecticides may threaten groundwater sources. Twenty-six pesticides have been detected in urban stormwater, with some of these being corn herbicides.

PAH: Polycyclic Aromatic Hydrocarbons (PAHs) are formed by incomplete combustion when organic compounds are burned with insufficient oxygen. Suspended particles and biota can absorb these materials. At least 60 percent of the samples taken exceed the human cancer criteria found is NR 105.

Bacteria: Surface water bacteria guidelines were exceeded at least 90 percent of the time. The EMCs ranged from 60 to 9,600 counts per 100 mg/l. The average EMC was 6,466 counts per mg/l, with the exceedence level of 400 mg/l.

REDUCTION GOALS

The reduction goals for urban stormwater are based on meeting the limits set forth in Wisconsin Administrative Codes NR 102 and NR 105. These codes set toxicity standards for wastewater discharge limits throughout the state. The East River Technical Advisory Committee also agreed with these goals.

The basic concept of the reduction goals are to take the stormwater discharges below a level of acute toxicity for the majority of storms. The pollutants of lead, copper and zinc were used to set the reduction goals on a municipality basis. Listed in Table IV-7 are the reduction goals for existing and planned urban areas. For example, copper concentrations for existing land use in the city of Green Bay need to be reduced 51 percent to meet this goal; for the future land use the reduction goal for copper is 70 percent; if these pollutants can be reduced to levels below acute toxicity, other problem pollutants will also be reduced.

Another factor to address are the Federal Stormwater Regulations, and how these regulations affect the watershed plan. On November 16, 1990, the United States Environmental Protection Agency (EPA) published a final rule regulating municipal and industrial stormwater discharges. Most industrial facilities and incorporated municipalities over 100,000 people need to obtain a stormwater permit. This permit is a three phase process in which the permit application must be submitted, a monitoring program must take place for a certain period of time, and a control strategy must be implemented. The permit requirements will include best management practices to prevent pollutants from entering stormwater. These practices could range from storing materials indoors to wet detention basins.

Table IV-7. Reduction Goals by Urban Areas - East River Watershed

Municipalities	Existing Lead	Existing Zinc	Existing Copper	Planned Lead	Planned Zinc	Planned Copper
Village of Allouez	0%	40%	40%	0%	57%	55%
Village of Ashwaubenon	2%	63%	62%	45%	80%	79%
Town of Bellevue	6%	61%	63%	25%	72%	71%
City of De Pere	0%	41%	42%	9%	67%	66%
City of Green Bay	0%	51%	51%	17%	70%	68%
Greenleaf	-	-	-	0%	0%	0%
Town of Scott	0%	21%	27%	0%	41%	33%

There will also be some numeric limits imposed on certain pollutants, but these have yet to be determined.

Most likely the municipalities that currently do not fall under the EPA regulations, will in the future. In 1993, the next phase of permits will be required for municipalities under 100,000 people. At this time, the cut-off limit is not known.

MANAGEMENT ALTERNATIVES

The urban stormwater management strategies for this watershed are broken into existing and future land uses. Table IV-8 lists the management alternatives selected for this watershed. The management scenarios are done on each of the eight urban areas. The two key concepts that must be understood are the relationship between existing and future land use development, and the idea of critical nonpoint source polluting land uses.

Table IV-8. East River Watershed Urban Alternatives
Existing and Planned Areas
* Do nothing.
* Detention on one-half of critical areas.
* Detention on all critical areas.
* Detention on all critical areas and weekly street sweeping.

The idea behind existing and future land use development relates back to maintaining the quality of the waterbodies at a state no worse than they are now, and hopefully improving the quality of the waterbodies to the state described in Chapter III. This entails a combining of both the existing pollutant numbers along with the future pollutant loading numbers to obtain an "ultimate" loading number for a municipality. This "ultimate" loading number is for the year 2010.

The critical nonpoint source pollution caused by land uses also needs to be considered. The techniques used to estimate pollutant loads rely on land use definitions. Each land use is assigned a pollutant loading number and estimates are made for a yearly pollutant load both in EMCs and pounds per year. When working through the management alternatives, the first target of control are those land uses causing the heaviest pollution, with the land uses causing the least pollution second. In essence, this should target the majority of pollutants with the least amount of land when costs are applied. In some cases, some of the land uses that contribute lighter pollutant loadings will also have to be included to obtain the desired reductions needed.

The next part of this chapter will discuss the critical land uses and control strategies for the seven urban areas. A complete listing of all the pollutant reductions and controls are found in Appendix C.

VILLAGE OF ALLOUEZ

The village of Allouez has 2,935 acres of existing land use, and is anticipating growth on an additional 477 acres for a total of 3,412 acres by the year 2010. Of these total acres, 2,328 acres have been labeled critical, or about 68 percent. Tables III-7 and III-8 list the existing and the planned loadings with a total loading for the year 2010.

Table IV-9 indicates that the wet detention ponds are needed on the existing industrial, commercial, freeways, high density residential, and medium density residential areas. These are the critical lands that will be eligible for cost-sharing dollars. In the future, land uses such as commercial, institutional, high density residential and one-half of the medium density residential areas will need to be detained. Cost-sharing dollars will be available for design work, but not installation. By controlling these land uses, reductions for lead will reach 64 percent, copper 45 percent, zinc 56 percent, phosphorus 40 percent, and suspended solids 78 percent.

Table IV-9. Village of Allouez Control Strategy
Existing Land Use - Wet detention ponds on all commercial, industrial, high density residential, medium density residential, and freeway areas. Approximately **17 acres** of wet detention ponds are needed on existing lands.
Future Land Use - Wet detention ponds on all commercial, institutional, high density residential, and one-half of medium density residential areas. Approximately **two acres** of wet detention ponds are needed on future lands.
A total of approximately 19 acres of wet detention ponds for the village of Allouez.

VILLAGE OF ASHWAUBENON

The village of Ashwaubenon has 763 acres of existing land use, and is anticipating growth on an additional 187 acres for a total of 950 acres by the year 2010. Of these 950 acres, 481 acres have been labeled critical, or about 50 percent of the total acreage. As shown in Tables III-7 and III-8, the existing and planned loadings are given along with the total loading for the year 2010.

Wet detention ponds are needed on the existing industrial, commercial, freeways, and high density residential areas (see Table IV-10); these are the critical lands that will be eligible for cost sharing dollars. In future land use, commercial, industrial, office park and medium density residential areas will need to be detained. Cost-sharing dollars will be available for design work, but not installation. By controlling these land uses, reductions for lead will reach 76 percent, copper 56 percent, zinc 67 percent, phosphorus 39 percent, and suspended solids 81 percent.

Table IV-10. Village of Ashwaubenon Control Strategy
Existing Land Use: Wet detention ponds on all commercial, industrial, high density residential, and freeway areas. Approximately **five acres** of wet detention ponds are needed on existing lands. Future Land Use: Wet detention ponds on all commercial, industrial, office park, and medium density residential areas. Approximately **three acres** of wet detention ponds and street sweeping once a week for these future lands. *A total of approximately eight acres of wet detention ponds for lands within the village of Ashwaubenon.*

TOWN OF BELLEVUE

The town of Bellevue has 3,441 acres of existing land use, and is anticipating growth on an additional 1,899 acres for a year 2010 total of 5,340 acres. Of these 5,340 acres, 2,251 acres have been labeled critical, or about 42 percent. As shown in Table III-7 and III-8, the existing and planned loadings are given with a total loading for the year 2010.

Table IV-11 shows that wet detention ponds are needed on the existing industrial, commercial, freeways, high density residential, and medium density residential areas; these are the critical lands that will be eligible for cost sharing dollars. In future land use, commercial, institutional, high density residential, and medium density residential areas will need to be detained and swept. Cost sharing dollars will be available for design work, but not for installation. By controlling these land uses, reductions for lead will be 76 percent, copper 56 percent, zinc 69 percent, phosphorus 43 percent, and suspended solids 88 percent.

It should be noted that the town of Bellevue will over time be incorporated by the city of Green Bay. Ultimately, the city of Green Bay will be responsible for stormwater within this area.

CITY OF DE PERE

The city of De Pere has 4,830 acres of existing land use, and is anticipating growth on an additional 1,758 acres for a total of 6,587 acres by the year 2010. Of these 6,587 acres, 1,998 acres have been labeled critical, or about 30 percent of the total acreage.

As shown in Tables III-7 and 8, the existing plus the planned loadings are given with a total loading for the year 2010.

Table IV-11. Town of Bellevue Control Strategy
Existing Land Use: Wet detention ponds on all commercial, industrial, high density residential, and medium density residential areas. Approximately **11 acres** of wet detention ponds are needed on existing lands.
Future Land Use: Wet detention ponds and street sweeping on all commercial, institutional, office park, high density residential, and medium density residential areas. Approximately **20 acres** of wet detention ponds and street sweeping once a week for these future lands.
A total of approximately 31 acres of wet detention ponds, and street sweeping once a week for future lands within the town of Bellevue.

Table IV-12 shows that wet detention ponds are needed on the industrial, commercial, freeways, and high density residential areas; these are the critical lands that will be eligible for cost sharing dollars. In future land use, commercial, industrial, high density residential and medium density residential areas will need to be detained. Cost sharing dollars will be available for design work, but not installation. By controlling these land uses, reductions for lead will be 68 percent, copper 50 percent, zinc 60 percent, phosphorus 50 percent, and suspended solids 68 percent.

Table IV-12. City of De Pere Control Strategy
Existing Land Use: Wet detention ponds on all commercial, industrial, high density residential, and freeway areas. Approximately **eight acres** of wet detention ponds are needed on existing lands.
Future Land Use: Wet detention ponds on all commercial, industrial, high density residential, and medium density residential areas. Approximately **23 acres** of wet detention ponds are needed on future lands.
A total of approximately 31 acres of wet detention ponds for the city of De Pere.

CITY OF GREEN BAY

The city of Green Bay has 18,391 acres of existing land use, and is anticipating growth on an additional 3,675 acres for a total of 22,066 acres by the year 2010. Of these 22,066 acres, 6,673 acres have been labeled critical, or about 30 percent. As shown in Tables III-7 and III-8, the existing plus planned loadings are given with a total loading for the year 2010.

Table IV-13 shows that wet detention ponds are needed on the existing industrial, commercial, freeways, and high density residential areas; these are the critical lands that will be eligible for cost sharing dollars. In future land use, commercial, industrial,

institutional, office park, high density residential and medium density residential areas will need to be detained. Cost sharing dollars will be available for design work, but not for installation. By controlling these land uses, reductions for lead will be 69 percent, copper 51 percent, zinc 62 percent, phosphorus 30 percent, and suspended solids 68 percent.

Table IV-13. City of Green Bay Control Strategy
Existing Land Use: Wet detention ponds on all commercial, industrial, high density residential, and freeway areas. Approximately **80 acres** of wet detention ponds are needed on existing lands.
Future Land Use: Wet detention ponds on all commercial, industrial, office park, institutional, high density residential, and medium density residential areas. Approximately **33 acres** of wet detention ponds are needed on future lands.
A total of approximately 113 acres of wet detention ponds for the city of Green Bay.

GREENLEAF

Greenleaf has no existing urban land use within the watershed, but is anticipating a growth of 238 acres for a total of 238 acres by the year 2010. Of these 238 planned acres, 89 acres have been labeled critical, or about 37 percent of the total acreage. As shown in Tables III-7 and III-8, the existing and planned loadings are given with a total loading for the year 2010.

Table IV-14 indicates that in the future, medium density residential areas will need to be detained. Cost sharing dollars will be available for design work, but not for installation. By controlling these land uses, reductions for lead will be 63 percent, copper 53 percent, zinc 69 percent, phosphorus 42 percent, and suspended solids 88 percent.

Table IV-14. Greenleaf Control Strategy
Existing Land Use: No controls.
Future Land Use: Wet detention ponds on all medium density residential areas. Approximately **.7 acres** of wet detention ponds are needed on future lands.
A total of approximately .7 acre of wet detention ponds for Greenleaf.

TOWN OF HUMBOLDT

The town of Humboldt has 0 acres of existing urban land use, and is anticipating growth on an additional 85 acres for a year 2010 total of 85 acres. Of these 85 acres, 76 acres have been labeled critical, or about 90 percent. As shown in Tables III-7 and III-8, the existing plus planned loadings are given with a total loading for the year 2010.

Within Table IV-15, we find that the future land uses of commercial, industrial areas and medium density residential will need to wet pond dentation plus street sweeping once a week. Cost sharing dollars will be available for design work, but not installation. By controlling these land uses, reductions will for lead will be 94 percent, copper 62 percent, zinc 71 percent, phosphorus 70 percent, and suspended solids 97 percent.

It should be noted that the town of Humboldt over time will be incorporated by the city of Green Bay. Ultimately, the city of Green Bay will be responsible for stormwater within this area.

Table IV-15. Town of Humboldt Control Strategy
Existing Land Use - No Controls.
Future Land Use - wet detention ponds on all commercial, industrial, and medium density residential areas. Approximately .7 Acre of wet detention ponds are needed on future lands.
A Total Of Approximately .7 Acre Of Wet Detention Ponds For The Town of Humboldt.

TOWN OF SCOTT

The town of Scott has 1,055 acres of existing land use, and is anticipating growth on an additional 360 acres for a total of 1,416 acres by the year 2010. Of these 1,416 acres, 25 acres have been labeled critical, or about 2 percent. As shown in Tables III-7 and III-8, the existing and planned loadings are given with a total loading for the year 2010.

Table IV-16. Town of Scott Control Strategy
Existing Land Use: Wet detention ponds on one-half of the commercial, and one-half of the industrial areas. Approximately **.3 acres** of wet detention ponds are needed on existing lands.
Future Land Use: Wet detention ponds on all commercial, and industrial areas. Approximately **.2 acres** of wet detention ponds are needed on future lands.
A total of approximately .5 acres of wet detention ponds for the town of Scott.

Table IV-16 indicates that wet detention ponds are needed on one-half of the existing industrial areas and one-half of the existing commercial areas; these are the critical lands that will be eligible for cost sharing dollars. In future land use, commercial, and industrial areas will need to be detained. Cost sharing dollars will be available for design work, but not for installation. By controlling these land uses, reductions for lead will be 41 percent, copper 35 percent, zinc 47 percent, phosphorus 11 percent, and suspended solids 40 percent.

If all the municipalities are combined, Table IV-17 shows that the overall control for pollutants ranges from approximately 33 to 73 percent.

Table IV-17. East River Watershed Overall Control Rates for Urban Areas (lbs/year)

Pollutant	Existing + Planned Load	Residual Load After Controls	% Controlled
Lead	3,642	1,076	70.5%
Copper	1,493	717	52.0%
Zinc	10,340	3,850	62.8%
Phosphorus	16,982	11,286	3.5%
Suspended Sediments	8,317,729	2,246,621	73.05%

Tables IV-18, IV-19, IV-20, and IV-21 summarize the control practices used by each municipality. Three municipalities--town of Bellevue, Greenleaf, and the city of De Pere will street sweep once a week in developing areas. All municipalities are recommended to have some type of detention ponds both on existing and planned land areas. To summarize, this plan recommends approximately 123.4 acres of wet detention acres for existing land uses, and 77.5 acres for planned land uses, for a total of approximately 200 acres of wet detention within the watershed.

URBAN BEST MANAGEMENT PRACTICES

There are four general classes of management practices used to reduce water quality problems that urban stormwater flows and the associated pollutant loads cause. These are: source reduction practices; infiltration practices; wet detention practices; and streambank erosion control practices.

SOURCE REDUCTION PRACTICES

These practices are meant to curb the generation of urban pollutants as close to the source as possible. Ideally, pollutant generation is stopped. At a minimum, pollutants that are generated are controlled prior to entering the storm sewer

Source area controls are generally non-structural in commercial and residential areas, relying instead on changes in products people use and in the way people live. Reducing the amount of automobile traffic in an area would be one example of a source control, since automobiles are the source of many urban pollutants. The current programs that remove lead from gasoline and asbestos from automobile brake linings are also examples of source controls. In other cases, such as for industrial materials storage areas, control of runoff may require a structure.

Table IV-18. Selected Preliminary Design criteria for Infiltration Devices and Wet Detention Basins.

Practice	Design Criteria	
Wet Detention	1. Percent of drainage required as pond surface for 90% control of solids.	
	Freeways	2.8%
	Industrial	2.0%
	Commercial	1.7%
	Institutional	1.7%
	Residential	0.8%
	Open Space	0.6%
	2. Permanent pond minimum 5 ft. deep when constructed.	
	3. Minimum 10 ft. shelf around pond perimeter.	
	4. Minimum 5:1 side slope to edge of pond.	
	5. Pond shape must be minimum 3:1 length to width ratio.	
	6. Maintain minimum pond depth of 3 ft.	
	7. Minimum 25 ft. vegetated buffer strip.	
	8. Protect outlet channel from erosion.	
	9. Minimum depth to groundwater 3 ft.*	
Infiltration Devices		
Grass Swales	1. Minimum grade of 0.5% and maximum of 5%.	
	2. Maximum side slopes of 3:1.	
	3. Minimum depth to groundwater 3 ft.*	
	4. Maximum flow velocity 6 fps.	
	5. Check infiltration rates annually.	
	6. Prevent compaction during construction.	
	7. Sweep streets to prevent clogging.	
Infiltration Trenches	1. Minimum depth to groundwater 3 ft.*	
	2. Pretreatment necessary (e.g., grass filter strip, wet detention basin, trap etc.).	
	3. Trench must be wider than it is deep.	
	4. Observation well must be installed.	
	5. Check infiltration rates annually.	
	6. Do no put near water supply wells.	
Infiltration Basins	1. Minimum depth to groundwater 3 ft.*	
	2. Test soil infiltration rates at least 5 ft. below the surface.	
	3. Do not put near water supply wells.	
	4. Pretreatment necessary (e.g., wet detention basin).	
	5. Prevent compaction of soil.	

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

Table IV-19. Average concentrations of heavy metals in bottom sediments of a wet detention pond located in Madison, Wisconsin (1).

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

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

Source: Wisconsin Department of Natural Resources

Table IV-20. Comparison of land spreading criteria for metals and the mass of metals contained in sediments taken from a wet detention pond located in Madison, Wisconsin(1).

	Mass of Metal (lbs/acre-inch)		Spreading Criteria(3)	
Metal	Inlet(2)	Rest of Pond(2)	Annual	Total
Lead	15	11		445
Cadmium	0.2	0.2	.45	4.4
Zinc	39	30		225
Copper	5	4		110
Nickel	3	2		45

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

(2) Based on average concentrations.

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

Source: Wisconsin Department of Natural Resources

Table IV-21. Additional Street Sweeping Requirements by Municipality (once a week for critical lands)		
Municipality	Existing Areas	Planned Areas
Village of Allouez	NO	NO
Village of Ashwaubenon	NO	YES
Town of Bellevue	NO	YES
City of De Pere	NO	NO
City of Green Bay	NO	NO
Greenleaf	NO	NO
Town of Scott	NO	NO

Source area controls that prevent the generation of pollutants, such as the removal of lead from gasoline and asbestos from brake linings, are ultimately the most effective. However this type of control cannot be readily initiated at the local level. Regional and often national action is required. citizen action that leads to this type of control is an important component of a long range urban management strategy.

Source area controls that rely on housekeeping practices, such as pet waste control programs and judicious use of lawn and garden products, can be initiated locally. These types of controls are an inexpensive and vital component of any urban stormwater management program. Information and education efforts are critical in supporting this approach since this type of urban action is only as good as the collective effort made by the general public responsible for carrying it out. Several source control alternatives recommended in this watershed are:

- Reduce the use of galvanized roof materials and gutters, a primary source of zinc in urban runoff.
- Remove pet wastes immediately from lawns, sidewalks, and streets so that bacteria contamination of urban runoff can be reduced.
- Manage the timing, amount and type of fertilizer and pesticide applications in urban areas.
- Properly dispose automobile waste fluids, such as radiator water and engine oil, to keep them out of the storm sewer system.

- Remove leaves and street dirt from street and parking lot surfaces through municipal sweeping and leaf collection.
- Reduce the amount of vehicle traffic.
- Reduce the areal extent of parking lots.
- Encourage that urban developments take place on lands within urban service area boundaries.
- Base zoning of land use, in part, on site suitability for stormwater management practices needed to meet water quality, habitat, and flood related objectives.
- Strictly limit construction site erosion.
- Keep use of street de-icing compounds to a minimum.

Increasing stormwater volumes and peak flows are responsible in part for streambank erosion. Consequently, reducing stormwater flows through infiltration and detention can be considered a source area control approach to streambank erosion problems. Stream bank erosion control will require a combination of stormwater flow management and stabilization of eroding sites.

INFILTRATION PRACTICES

The volume of urban runoff transporting pollutants to surface waters during a rainstorm is directly related to the amount of impervious urban area that is directly connected to the receiving waters. Impervious areas include rooftops, parking lots, streets, and sidewalks. Directly connected areas are those that drain directly to storm sewer pipes or Concrete channels.

Reducing pollutant transport to surface waters involves disconnecting the urban stormwater flow. This is accomplished by increasing the infiltration of stormwater into the ground. Stormwater infiltration on a suitable site will effectively reduce all major stormwater pollutants. In addition to reducing pollutant loads, groundwater infiltration can help stabilize the hydrology of small urban streams. This occurs because infiltration helps to maintain stream base flows during dry periods, and will decrease peak flow discharges responsible for streambank erosion and habitat scouring. Infiltration can be used jointly with wet detention where needed to augment the water resources management capabilities of the less versatile wet detention pond. In addition, infiltration can be used in the drainage area to a wet pond in order to reduce the pond size required to control stormwater pollutants.

Infiltration practices may be located very close to an urban source area, such as a parking lot or large rooftop, or located at the end of a storm sewer pipe that collects runoff from a larger area. Practices that promote on-site infiltration include porous pavements, redirecting roof downspouts to grassy areas, and directing runoff waters to infiltration trenches. These practices are generally most applicable to small source areas such as rooftops and parking lots. The transport system that carries stormwater from impervious surfaces to surface waters can also be built to infiltrate stormwater. Grassed swale drainage systems, for example, work primarily through infiltration. Finally, infiltration basins can be located at storm sewer outlets for larger drainage areas. In this case, the basin is considered an off-site or end-of-pipe control measure.

Not all sites are appropriate for the use of infiltration practices. Heavy or poorly drained soils may limit the effectiveness of infiltration devices or result in practices too large to be practical. Slopes may limit the use of grassed swales in residential areas.

Most importantly, precautions must be taken when infiltrating urban stormwater to prevent groundwater contamination. Runoff from residential rooftops and driveways, and from rooftops in institutional, commercial, and non-manufacturing industrial areas can generally be infiltrated with little risk of groundwater contamination. Runoff from parking lots in institutional and commercial areas, and from separate employee or visitor parking lots in non-manufacturing industrial areas can be infiltrated provided that some form of pretreatment is provided. Pretreatment devices, such as grit chambers with surface baffles or wet detention ponds, will reduce some of the pollutants available for groundwater contamination.

Infiltration de vices placed in these areas should be monitored to assure that groundwater contamination is not occurring. Highly contaminated runoff, such as that from storage and loading areas in commercial and industrial areas should not be infiltrated.

All infiltration devices should have a minimum separation distance of three feet between the bottom of the infiltration device and the water table or bedrock surface. Infiltration may also need to be restricted within certain distances of municipal wells. Finally, infiltration should occur wherever possible through a filtering layer of soil and sod.

WET DETENTION PRACTICES

Wet detention ponds are effective at controlling Particulate pollutants and can be designed to control peak flow discharges. Consequently, they can be employed to serve many needs including pollution control, flood control, and control of stormwater flows that may be causing streambank erosion and streambed scour, These ponds have limited effectiveness in controlling urban pollutants in the dissolved state, and cannot effectively reduce the total stormwater volume or enhance stream base flows. The wet pond can be

situated near a small source area, such as a parking lot, but are more commonly used to control runoff coming from a larger area.

Wet detention ponds must be lined in areas where potential groundwater contamination from the pond is a concern.

STREAMBANK EROSION CONTROL PRACTICES

A combination of traditional and innovative techniques will be needed to control streambank erosion and scour in urban streams. Traditional practices such as riprap or gabions may be most appropriate in some places. However, there is a need to test innovative approaches that are less expensive and provide better shoreline habitat than rock riprap. Reshaping upper channel banks to allow dissipation of stream energy, and use of bioengineering techniques for stabilizing eroding banks may be promising approaches, either as alternatives or additions to more traditional techniques. Detention ponds and infiltration devices in upland areas will probably be needed also to reduce the erosive streamflow velocities and peak discharges.

USING EASEMENTS TO SUPPORT URBAN POLLUTION CONTROL PRACTICES

Easements may be used to support wetland restoration, critical area stabilization, and shoreline buffers in urban areas in order to reduce the water quality impacts of stormwater runoff. Use of these practices as stormwater runoff control measures, and the use of easements to support these practices, must be reviewed on a case-by-case basis by the DNR. The same general rules set forth for the use of easements in rural areas also apply to urban stream reaches.

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

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

In order to meet water resources goals for the Sheboygan River and principal tributary streams, the combined effect of all practices must achieve about a 60 percent reduction of lead loads from existing areas and reduce to the maximum extent possible pollutant loads from new development. In addition, existing urban stormwater flows must be reduced sufficiently to help rehabilitate areas of active streambank erosion and habitat scour. In planned urban areas throughout the watershed, impacts on stream hydrology

must be minimized. Conformance of individual practices to the following guidelines will assure that the total level of control is adequate, provided the recommended plan is fully implemented.

STANDARDS

The following preliminary standards should be used to guide the design of individual practices. These preliminary standards w 11 be superseded by standards developed as part of the model ordinance for stormwater, which the DNR is preparing.

1. Wet detention ponds in existing and planned urban areas should be designed to control 90 percent of the incoming suspended sediment load. This will be achieved by trapping the 5 micron particle size. This will provide approximately 70 percent control of the annual lead load from lands tributary to the pond. Where retro-fitted, ponds should be located to control runoff primarily from the critical land uses. Where planned as part of new development, ponds should be located to control runoff from all land uses.

2. Wet detention ponds in existing urban areas should contribute to reducing stream velocities to speeds that do not erode banks or scour habitat.

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

4. Infiltration devices in existing and planned urban areas should infiltrate all runoff from the one-inch storm. Infiltration basins and grassed swales are most effective, since they control runoff from all impervious surfaces (roofs, streets, parking lots) in contributing area. If infiltration trenches are used that control selected impervious surfaces, such as parking lots and rooftops only, control efficiency drops significantly since street runoff remains uncontrolled. Where retro-fitted, these devices should be located to control runoff primarily from the critical land uses. Where planned as part of new development, ponds should be located to control runoff from all land uses. In locating practices, infiltration rates should be carefully considered as these are prime determinants of the pollution control efficiency for infiltration practices, particularly in non-residential areas.

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

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

DESIGN CRITERIA

NR 120.14(22) requires that the DNR participate in the practice design process, and approve detailed practice designs. Selected preliminary design criteria for wet detention ponds and infiltration devices are presented in Table IV-18.

It is important to note the inclusion of pretreatment and groundwater monitoring in the practice design for infiltration devices. Providing pretreatment for these devices will greatly reduce required maintenance to reduce clogging and restore infiltration. Pretreatment could include a sediment trap, a wet detention pond, a grass filter strip, or street sweeping. Selected practices should be equipped with groundwater monitoring wells to assure that groundwater contamination remains within acceptable bounds. Finally, all detention and infiltration urban structural practices should be equipped with signs that clearly identify that the site contains urban stormwater pollutants. Such signs should also carry warnings, where appropriate, against using stormwater practices in ways which could endanger public health. Wet detention ponds should not be used for consumptive fishing, swimming, or wading. Infiltration basins might pose a hazard if used during dry periods as open recreational space, due to possible suspension of contaminated dust. These risks should be further investigated.

INFORMATION AND EDUCATION ELEMENT

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

ENVIRONMENTAL AND PUBLIC HEALTH CONCERNS

Public concern has been expressed about the potential economic, environmental and public health impacts of stormwater detention ponds. Concern has been expressed about the toxicity of sediments and water in wet detention ponds and the danger posed to humans and wildlife. Concern was also expressed about the disposal of contaminated sediments and the costs which may be incurred in finding and utilizing suitable disposal technology.

Information was collected in 1990 about the water and sediment quality in a wet detention pond serving a mixed residential and commercial area in Madison, Wisconsin.

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

POND WATER QUALITY

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

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

In addition to these tests, acute toxicity was evaluated through a 24 hour exposure bioassay test using water fleas as the test organisms. All samples tested completely negative, showing no mortality.

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

POND SEDIMENT QUALITY

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

The concentrations of eight heavy metals (lead, cadmium, zinc, copper, nickel, arsenic, chromium, and cyanide) were measured in sediment taken from a detention pond serving a mixed residential area in Madison, Wisconsin. Results are presented in Table IV-19. The were evaluated to determine whether the sediments could be land spread or placed

in a conventional land fill, as opposed to requiring disposal in a special hazardous waste landfill at a significantly greater cost.

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

In addition to heavy metals, organic pollutants were also measured in detention pond sediments. These included the pesticides diazanon, chlordane and DDT, PCB, PAH'S, and phthalate esters. The chlordane concentrations are highest, and need to be evaluated to determine if they would require special disposal.

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

Table IV-19 shows that the concentrations of lead and cadmium in sediments would not restrict land spreading. Concentrations of lead in sediments throughout the detention pond are well below the limit of 250 mg/kg specified in NR 204. Concentrations of cadmium throughout the pond are also well below the 10 mg/kg threshold specified in NR 204.

Table IV-20 shows the maximum amount of various metals that can be applied through land spreading, as set forth in NR 204, and the mass load of theses metals that would be applied with one acre-inch of sediments taken from the Madison detention pond. As shown, zinc would pose the greatest restriction for general applications. For application to crops directly consumed by humans, annual restrictions on cadmium applications would be most restrictive.

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

POLLUTANT BIOACCUMULATION

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

Table IV-22. Wet Detention Acres by Land Use -- Existing Land Coverage

	Residential					
Municipality	Med	High	Com	Industrial	Freeway	*Total*
Village of Allouez	13.0	0.5	1.5	0.3	2	*17.3*
Village of Ashwaubenon		1.2	1.3	2.7	0.4	*5.6*
Town of Bellevue	3.1	0.6	1.5	2.7	3.4	*11.3*
City of De Pere		0.6	2.9	4.0	1.2	*8.7*
City of Green Bay		7.9	17.5	36.3	18.5	*80.2*
Greenleaf						
Town of Scott			0.2	0.1		*0.3*
Total	*16.1*	*10.8*	*24.9*	*46.1*	*25.5*	*123.4*

Table IV-23. Wet Detention Acres by Land Use - Planned Land Coverage							
	Residential						
Municipality	Med	High	Com	Industrial	Institutional	Freeway	*Total*
Village of Allouez	1.1	0.3	0.3		0.3		*2.0*
Village of Ashwaubenon				0.5	2.6		*3.2*
Town of Bellevue	6.5	0.1		8.0			*20.1*
City of De Pere		1.5	4.1	0.5	8.7		*17.7*
City of Green Bay	13.9	8.4	0.1	14.5	0.1		*32.9*
Greenleaf	0.7	1.9	2.5				*0.7*
Town of Scott			0.1	0.1			*0.2*
Total	*31.2*	*3.8*	*8.1*	*34.0*	*0.4*		*77.5*

Table IV-24. Detention Requirements by Municipality (acres)			
Municipality	Existing Areas	Planned Areas	*Total lbs/yr*
Village of Allouez	17.3	2.0	*19.3*
Village of Ashwaubenon	5.6	3.2	*8.8*
Town of Bellevue	11.3	20.1	*31.4*
City of De Pere	8.7	17.7	*26.4*
City of Green Bay	80.2	32.9	*113.1*
Greenleaf		0.7	*0.7*
Town of Scott	0.3	0.2	*0.5*
Total	*123.4*	*77.5*	*200.9*

PART TWO
DETAILED PROGRAM FOR IMPLEMENTATION

CHAPTER V: LOCAL GOVERNMENT'S IMPLEMENTATION PROGRAM

CHAPTER VI: INTEGRATED RESOURCE MANAGEMENT ACTIVITIES

CHAPTER V
LOCAL GOVERNMENT'S IMPLEMENTATION PROGRAM

INTRODUCTION

This chapter identifies the means for implementing the rural and urban management actions for nonpoint source controls described in Chapter IV. It is divided into two major sections. The first describes the county's nonpoint source implementation strategy for rural areas. The second section contains the elements of the cities' and villages' nonpoint source control implementation strategy for the urban and developing portions of the watershed. Included in the implementation program for rural and urban areas is an information and education strategy. The success of this priority watershed project depends on the aggressive implementation of these three nonpoint source control strategies.

More specifically this chapter identifies:

- The agencies and units of government responsible for carrying out the identified tasks.
- The best management practices (BMPs) necessary to control pollutants on the critical sites identified in Chapter IV.
- The cost-share budget.
- The cost containment policies.
- The cost-share agreement reimbursement procedures including administrative procedures for carrying out the project.
- Staffing needs including total hours per year and number of staff to be hired.
- Schedules for implementing the project.
- The involvement of other programs.
- The information and education activities that will be carried out in the project area.

- The project budget including the expense for cost-sharing; and staffing for technical assistance, administration, and the information and education program.

PROJECT PARTICIPANTS: ROLES AND RESPONSIBILITIES

LANDOWNERS AND LAND OPERATORS

Owners and operators of public and private lands are important participants in the priority watershed program. They will adopt BMPs which reduce nonpoint sources of water pollution and protect and enhance fish, wildlife and other resources. Landowners and land operators in the East River Watershed eligible for cost-share assistance through the priority watershed program include: individuals; Brown County and Calumet County; other governmental units described in NR 120.02(19) Wisconsin Administrative Code (Wis. Adm. Code); corporations; and the state of Wisconsin.

Brown and Calumet Counties are the primary units of government responsible for implementing this plan in rural areas. The Brown and Calumet County Land Conservation Committees (LCC) will act for the respective County Boards and be responsible contractually and financially to the state of Wisconsin for management of the project in areas with rural land uses. The County LCCs will coordinate the activities of all other local agencies involved with the rural portion of the project.

The specific responsibilities for these counties are defined in s. NR 120.04, Wis. Adm. Code, and are summarized below:

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

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

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

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

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

- Design BMPs and verify proper practice installation.

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

- Prepare and submit annual work plans for activities necessary to implement the project. The Brown and Calumet County LCDs shall submit a workload analysis and grant application to the Department of Agriculture, Trade and Consumer Protection (DATCP) as required in s. Ag. 166.50.

- Prepare and submit to the DNR and DATCP the annual resource management report required under s. NR 120.21(7). Wis. Adm. Code, to monitor project implementation by tracking changes in the nonpoint source inventory, and quantifying pollutant load reductions which result from installing BMPs.

- Participate in the annual watershed project review meeting.

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

DEPARTMENT OF NATURAL RESOURCES

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

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

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

Financial Support. Financial support for implementation of the priority watershed project is provided to each county in two ways--a local assistance grant agreement, and a nonpoint source grant agreement. These agreements are described later in this chapter. The DNR may also enter into cost-share agreements directly with local or state units of government for the control of pollution sources on land the governments own or operate.

Project Evaluation. The DNR has responsibility for priority watershed project monitoring and evaluation activities. These efforts determine if changes in water quality occur as BMPs and other pollution controls are installed or implemented. The water quality evaluation and monitoring strategy for the East River Watershed are included in Chapter VIII. The DNR documents the results of monitoring and evaluation activities in interim and final priority watershed project reports.

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

Other Responsibilities.

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

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

DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION: The role of the Department of Agriculture, Trade and Consumer Protection (DATCP) is identified in Section 144.25, stats., Chapter 92 stats., and NR 120. In summary, the DATCP will:

- Manage a training program for the staff involved with project's implementation.

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

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

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

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

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

- Participate in the annual project review meetings.
- If the need arises, assist in developing technical standards for agricultural BMPs, and provide technical assistance to county staff concerning application of these practices.

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

OTHER AGENCIES

The East River Priority Watershed Project will receive assistance from:

Soil Conservation Service (SCS). This agency works through the local LCC to provide technical assistance for planning and installing conservation practices. The local SCS personnel will work with the county staff to provide assistance with technical work. Personnel from the Area SCS office will provide staff training and engineering assistance for BMPs. Efforts will be made by the DATCP to assist the SCS to coordinate the East River Priority Watershed Project with the conservation compliance and other conservation provisions of the 1985 and subsequent federal farm bills.

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

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

AGRICULTURAL BEST MANAGEMENT PRACTICES

BEST MANAGEMENT PRACTICES ELIGIBLE FOR COST-SHARING AND THEIR RATES

Best management practices (BMPs) are those practices identified in NR 120 which are determined in this watershed plan to be the most effective controls of the nonpoint sources of pollution. The practices eligible for cost-sharing under the East River Priority Watershed Project are listed in Table V-1. The cost-share rates for each BMP are listed in the table also. The design and installation of all BMPs must meet the conditions listed in NR 120. Generally, these practices use specific standard specifications included in the ***SCS Field Office Technical Guide***. In some cases additional specifications may apply. The applicable specifications for each BMP can be found in NR 120.14.

The following is a brief description of some of the most commonly used cost-shared BMPs included in Table V-1. A more detailed description of these practices can be found in NR 120.14.

Table V-1. State Cost-Share Rates for Best Management Practices

BEST MANAGEMENT PRACTICE	STATE COST-SHARE RATE
Contour Farming	50% (1.)*
Contour Strip Cropping	50% (1.)*
Field Strip Cropping	50% (1.)*
Field Diversions and Terraces	70%
Grassed Waterways	70%
Reduced Tillage	50%
Critical Area Stabilization	70% (2.)
Grade Stabilization Structures	70%
Agricultural Sediment Basins	70%
Shoreline and Streambank Stabilization	70%
Shoreline Buffers	70% (2.)
Barnyard Runoff Management	70%
Animal Lot Relocation	70%
Manure Storage Facilities	70% **
Livestock Exclusion from Woodlots	50%
Wetland Restoration	70% (2.)
Roofs for Barnyard Runoff Management and Manure Storage Facilities	70%
Nutrient and Pesticide Management	50% (3.)

1. Flat rates for these BMPs can be found in Table V-6.
2. Easements may be entered into with landowners' plan in conjunction with these BMPs. See Chapter IV for possible applications of these easements.
3. Spill control basins have a state cost-share rate of 70 percent.

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

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

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

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

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

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

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

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

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

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

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

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

Barnyard Runoff Management: Structural measures such as gutters, downspouts, or diversions to redirect surface runoff around the barnyard, and collect, convey and temporarily store runoff from the barnyard. Cattle mounds are eligible for cost-sharing if they meet the criteria for eligibility agreed upon by the DATCP, the DNR and the county LCD.

Manure Storage Facility: A structure for the storage of manure for a period of time that is needed to reduce the impact of manure as a nonpoint source of pollution. Livestock operations where this practice applies are those where manure is winterspread on fields

that have a high potential for runoff to lakes, streams and groundwater. The facility is needed to store and properly spread manure according to a management plan.

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

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

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

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

Nutrient Management: The management and crediting of nutrients for the application of manure and commercial fertilizers, and crediting for nutrients from legumes. Management includes the rate, method, and timing of the application of all sources of nutrients to minimize the amount of nutrients entering surface or groundwater.

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

Wetland Restoration: Wetland restoration is an eligible BMP with the primary justification being water quality improvement. Restoration techniques include: plugging or breaking up of existing tile drainage systems, plugging of open channel drainage systems and fencing of livestock out of a wetland.

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

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

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

- Prior converted wetlands downslope or upslope from fields identified as critical upland sediment sources through the WIN model. Restoration of wetlands in these situations will do one of two things; create a wetland filter which reduces

the pollutants from an upslope field(s) to a water resource, or reduce the volume and/or velocity of water flowing from an upslope wetland to a downslope critical field. Two eligibility conditions must be met to use wetland restoration in this situation:

1. All upland fields draining to the wetland must be controlled to a soil loss rate less than or equal to two tons per acre per year (T/A/Y).
2. One or more of these same fields must still have a sediment loss rate (after the application of any erosion control measures) greater than the "sediment delivery rate" listed in Table IV-3 for the appropriate subwatershed.

EASEMENTS TO SUPPORT AGRICULTURAL BEST MANAGEMENT PRACTICES AND WETLAND RESTORATION

Program funds may be used to purchase land easements to support best management practices involving establishment of permanent vegetative cover including shoreline buffers, critical area stabilization, wetland restoration.

Easements shall be for a period of no less than 20 years, although perpetual easements are preferred. The easement will be developed as an agreement separate from the cost-sharing agreement for the best management practice. A condition for entering into an easement is that all Category I nonpoint sources be included on a signed cost-share agreement.

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

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

EASEMENTS TO SUPPORT CRITICAL AREA STABILIZATION AND SHORELINE BUFFERS

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

Riparian lands along "high priority" water resources: These are the highest priority areas for obtaining easements to support critical area stabilization and shoreline buffer practices. These streams have the potential to benefit most from permanent vegetative cover in the riparian zone. Added benefits include enhancement of aquatic habitat and improved public access to surface waters.

"High priority" waters include those perennial and intermittent streams in the following subwatersheds: East River, Bower Creek, Baird Creek (rural portions).

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

Other Portions of the Watershed: Easements may also be used to support critical area stabilization and shoreline buffers in other portions of the watershed. However, the easement must offer pollution control at a cost that is competitive with that of other controls. For example, the easement should be lower or similar in cost to expensive practices (such as terraces or agricultural sediment basins) for continuous row crops where the only other alternative is retiring the land.

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

EASEMENTS TO SUPPORT WETLAND RESTORATION

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

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

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

- Practices to be funded through other programs.
- Practices previously installed and necessary to support cost-shared practices.
- Changes in crop rotations and other activities normally and routinely used in growing crops or which have installation costs that can be passed on to potential consumers.
- Changes in location of unconfined manure stacks involving no capital cost.
- Manure spreading management.
- Other activities that the DNR determines are necessary to achieve the objectives of the watershed project.

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

- Operation and maintenance of cost-shared BMPs,
- Actions in which drainage of land or clearing of land is the primary objective.
- Practices already installed.
- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program or covered in other ways by Chapter 147 of the Wisconsin Statutes (including livestock operations with more than 1,000 animal units, or livestock operations issued a notice of discharge under Chapter NR 243).
- Septic system controls or maintenance.
- Dredging activities.
- Silvicultural activities.
- Bulk storage of fertilizers and pesticides.
- Activities and structures intended primarily for flood control.
- Practices required to control sources which were adequately controlled at the time the cost-share agreement was signed.

- Other practices or activities determined by the DNR not to meet the objectives of the program.

RURAL PROGRAM BUDGET

COSTS OF INSTALLING BMPs

The quantity and type of management practices that are required to meet this project's water quality objectives are listed in Tables V-3, V-4, and V-5. The capital cost of installing the BMPs are listed in this table assuming landowner participation rates of 100 percent and 75 percent. Also included are the units of measurement and cost-share amount per unit for the various BMPs.

The capital cost of installing the BMPs in Brown and Calumet Counties is approximately $7.4 million and $.2 million dollars, respectively, assuming 100 percent participation.

- State funds necessary to cost-share this level of control would be about $4,980,490 and $143,260 for Brown and Calumet Counties, respectively.

- The local share provided by landowners and other cost-share recipients would be about $1,901,010 and $67,350, respectively.

At a 75 percent level of participation, the state funds needed to cover capital installation would be about $3.1 million and $107,445 for Brown and Calumet Counties, respectively.

EASEMENT COSTS

Chapter IV identifies where nonpoint source program funds can be used to purchase easements. The estimated cost of purchasing easements on eligible lands in Brown and Calumet Counties is shown in Table V-3 through V-4. At 100 percent participation, the estimated purchase price of easements on eligible lands would be $750,000 and $20,000 in Brown and Calumet Counties, respectively. At 75 percent participation, the cost would be $562,500 and $15,000; respectively. The easement costs would be paid entirely by the state.

RURAL IMPLEMENTATION COST-CONTAINMENT PROCEDURES

Chapter NR 120 requires that cost-containment procedures be identified in this plan. The cost-containment procedures to which Brown and Calumet Counties will use are described below.

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

BIDS

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

AVERAGE COSTS

Average costs will be used in Calumet and Brown Counties for all structural BMPs not requiring bids (see above) and with an estimated cost equal to or less than $5,000 and for all non-structural BMPs not using a flat rate, unless the cost-share recipient decides, and the county agrees, to bid the installation of the BMPs.

Table V-3. Cost-Share Budget Needs for Rural Management Practices in Brown County

Management Needs	Number		Cost/Unit	Total Cost (1)	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*Best Management Practices								
Upland Sediment Control								
Change in Crop Rotation	22,000	ac	NA(3)	0	0	0	0	0
Contour Cropping	600	ac	$6	3,600	3,600	(2)	2,700	(2)
Contour Strip Cropping	600	ac	$12	7,200	7,200	(2)	5,400	(2)
Reduced Tillage (4)	2,200	ac	$45	99,000	99,000	(2)	74,250	(2)
Reduced Till.(5)	600	ac	$15	9,000	9,000	(2)	6,750	(2)
Critical Area Stabilization	400	ac	$200	80,000	56,000	24,000	42,000	18,000
Grass Waterways	72	ac	$3,500	252,000	176,400	75,600	132,300	56,700
Field Diversions & Terraces	20,000	ft	$4	80,000	56,000	24,000	42,000	18,000
Grade Stabilization	22	ea	$6,500	143,000	100,100	42,900	75,075	32,175
Agricultural Sediment Basin	30	ea	$15,000	450,000	315,000	135,000	236,250	101,250
Pasture Management	200	ac	NA	0	0	0	0	0
Shoreline Buffers(6)	182	ac	$150	27,300	19,110	8,190	14,333	6,143
Buffer Strips								
Wetland Restoration	54	ea	$2,000	108,000	75,600	32,400	56,700	24,300
Animal Waste Management								
Barnyard Runoff Control								
Complete System	131	ea	$20,000	2,620,000	1,834,000	786,000	1,375,500	589,500
Clean Water Diversion	30	ea	$4,000	120,000	84,000	36,000	63,000	27,000
Manure Storage Facility (7)	60	ea	$22,000	1,320,000	600,000	396,000	450,000	297,000
Manure Spreading Management	538	ac	NA	0	0	0	0	0
Roofs for Barnyards	3	ea	$37,500	112,500	78,750	33,750	59,063	25,313
Streambank Erosion Control								
Shape and Seeding	58,450	ft	$4	233,800	163,660	70,140	122,745	52,605
Fencing	52,675	ft	$2	105,350	73,745	31,605	55,309	23,704
Rip-Rap	26,750	ft	$25	668,750	468,125	200,625	351,094	150,469
Livestock/Machinery Crossing	4	ea	$4,000	16,000	11,200	4,800	8,400	3,600
Subtotal:				$6,455,500	$4,230,490	$1,901,010	$3,172,868	$1,425,758
*Easements	750	ac	$1,000	750,000	750,000	0	562,500	0
Totals				$7,205,500	$4,980,490	$1,901,010	$3,735,368	$1,425,758

(1) Total cost to control identified critical pollution sources.
(2) Local share consists of labor and any additional equipment costs.
(3) NA means that cost- share funds are not available for this practice.
(4) This practice is reduced tillage on continuous row, or long rotational croplands.
(5) This practice is reduced tillage, including no-till, on short rotation croplands or for establishing forage crops.
(6) Shoreline Buffer practice needs will be determined during implementation.
(7) Maximum cost-share is $10,000 of which a maximum of $5,000 can be for waste transfer.
Source: Wisconsin Department of Natural Resources; Wisc. Department of Agriculture, Trade and Consumer Protection; and Land Conservation Department of Brown and Calumet Counties.

Table V-4: Cost-Share Budget Needs for Rural Management Practices in Calumet County

Management Needs	Number	Cost/Unit	Total Cost (1)	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*Best Management Practices							
Upland Sediment Control							
Change in Crop Rotation	250 ac	NA(3)	0	0	0	0	0
Contour Cropping	20 ac	$6	120	120	(2)	90	(2)
Contour Strip Cropping	20 ac	$12	240	240	(2)	180	(2)
Reduced Tillage (4)	40 ac	$45	1,800	1,800	(2)	1,350	(2)
Reduced Till.(5)	10 ac	$15	150	150	(2)	113	(2)
Critical Area Stabilization	40 ac	$200	8,000	5,600	2,400	4,200	1,800
Grass Waterways	3 ac	$3,500	10,500	7,350	3,150	5,513	2,363
Field Diversions & Terraces	1,000 ft	$4	4,000	2,800	1,200	2,100	900
Grade Stabilization	2 ea	$6,500	13,000	9,100	3,900	6,825	2,925
Agricultural Sediment Basin	1 ea	$15,000	15,000	10,500	4,500	7,875	3,375
Pasture Management	0 ac	NA	0	0	0	0	0
Shoreline Buffers(6)	0 ac	$150	0	0	0	0	0
Buffer Strips							
Wetland Restoration	2 ea	$2,000	4,000	2,800	1,200	2,100	900
Animal Waste Management							
Barnyard Runoff Control							
Complete System	5 ea	$20,000	100,000	70,000	30,000	52,500	22,500
Clean Water Diversion	1 ea	$4,000	4,000	2,800	1,200	2,100	900
Manure Storage Facility (7)	3 ea	$22,000	66,000	30,000	19,800	22,500	14,850
Manure Spreading Management	0 ac	NA	0	0	0	0	0
Streambank Erosion Control							
Shape and Seeding	0 ft	$4	0	0	0	0	0
Fencing	0 ft	$2	0	0	0	0	0
Rip-Rap	0 ft	$25	0	0	0	0	0
Livestock/Machinery							
Crossing	0 ea	$4,000	0	0	0	0	0
Subtotal:			$226,810	$143,260	$67,350	$107,445	$50,513
*Easements	20 ac	$1,000	20,000	20,000	0	15,000	0
Totals			*$246,810*	*$163,260*	*$67,350*	*$122,445*	*$50,513*

(1) Total cost to control identified critical pollution sources.
(2) Local share consists of labor and any additional equipment costs.
(3) NA means that cost- share funds are not available for this practice.
(4) This practice is reduced tillage on continuous row, or long rotational croplands.
(5) This practice is reduced tillage, including no-till, on short rotation croplands or for establishing forage crops.
(6) Shoreline Buffer practice needs will be determined during implementation.
(7) Maximum cost-share is $10,000 of which a maximum of $5,000 can be for waste transfer.
Source: Wisconsin Department of Natural Resources; Wisc. Department of Agriculture, Trade and Consumer Protection; and Land Conservation Department of Brown and Calumet Counties.

Table V-5. Cost-Share Budget Needs for Rural Management Practices in the East River Watershed

Management Needs	Number		Cost/Unit	Total Cost (1)	100% Participation State Share	100% Participation Local Share	75% Participation State Share	75% Participation Local Share
*Best Management Practices								
Upland Sediment Control								
Change in Crop Rotation	22,250	ac	NA(3)	0	0	0	0	0
Contour Cropping	620	ac	$6	3,720	3,720	(2)	2,790	(2)
Contour Strip Cropping	620	ac	$12	7,440	7,440	(2)	5,580	(2)
Reduced Tillage (4)	2,240	ac	$45	100,800	100,800	(2)	75,600	(2)
Reduced Till.(5)	610	ac	$15	9,150	9,150	(2)	6,863	(2)
Critical Area Stabilization	440	ac	$200	88,000	61,600	26,400	46,200	19,800
Grass Waterways	75	ac	$3,500	262,500	183,750	78,750	137,813	59,063
Field Diversions & Terraces	21,000	ft	$4	84,000	58,800	25,200	44,100	18,900
Grade Stabilization	24	ea	$6,500	156,000	109,200	46,800	81,900	35,100
Agricultural Sediment Basin	31	ea	$15,000	465,000	325,500	139,500	244,125	104,625
Pasture Management	0	ac	NA	0	0	0	0	0
Shoreline Buffers(6)	182	ac	$150	27,300	19,110	8,190	14,333	6,143
Buffer Strips								
Wetland Restoration	56	ea	$2,000	112,000	78,400	33,600	58,800	25,200
Animal Waste Management								
Barnyard Runoff Control								
Complete System	136	ea	$20,000	2,720,000	1,904,000	816,000	1,428,000	612,000
Clean Water Diversion	31	ea	$4,000	124,000	86,800	37,200	65,100	27,900
Manure Storage Facility (7)	63	ea	$22,000	1,386,000	630,000	415,800	472,500	311,850
Manure Spreading Management	538	ac	NA	0	0	0	0	0
Roofs for Barnyards	3	ea	$37,500	112,500	78,750	33,750	59,063	25,313
Streambank Erosion Control								
Shape and Seeding	58,450	ft	$4	233,800	163,660	70,140	122,745	52,605
Fencing	52,675	ft	$2	105,350	73,745	31,605	55,309	23,704
Rip-Rap	26,750	ft	$25	668,750	468,125	200,625	351,094	150,469
Livestock/Machinery								
Crossing	4	ea	$4,000	16,000	11,200	4,800	8,400	3,600
Totals				*$6,682,310*	*$4,373,750*	*$1,968,360*	*$3,280,313*	*$1,476,270*
*Easements	770	ac	$1,000	770,000	770,000	0	577,500	0
Totals				*$7,452,310*	*$5,143,750*	*$1,968,360*	*$3,857,813*	*$1,476,270*

(1) Total cost to control identified critical pollution sources.

(6) Shoreline Buffer practice needs will be determined during implementation.

Table V-6. Estimated County LCD Staff Needs for Project Implementation

Activity	Project Years When Work Will Be Done	BROWN COUNTY 75% Landowner Participation (Staff Hours)	BROWN COUNTY 50% Landowner Participation (Staff Hours)	CALUMET COUNTY 75% Landowner Participation (Staff Hours)	CALUMET COUNTY 50% Landowner Participation (Staff Hours)
Project & Financial Management	1-8	10,400	10,400	320	320
Information & Education Program	1-8	0	0	0	0
Pre-Contract Office Inventory; Landowner Contacts & Progress Tracking	1-8	4,358	2,905	135	90
Conservation Planning; Cost Share Agmt. Development	1-3	10,356	6,904	268	179
Practice Design & Installation	1-8				
Upland Sediment Control		12,852	8,568	370	247
Barnyard Runoff Control		12,510	8,340	393	262
Manure Spreading Mgmt. & Storage		5,888	3,925	405	270
Streambank Erosion Control		9,440	6,294	0	0
Training	1-8	2,560	2,560	60	60
Total LCD Workload:		68,363	49,895	1,951	1,428
Estimated Staff Required for Years 1-3:		12,725 per yr	9,023 per yr	359 per yr	255 per yr
Estimated Staff Required for Years 4-8:		6,038 per yr	4,565 per yr	175 per yr	133 per yr

Source: Wisconsin Department of Natural Resources, Wisc. Department of Agriculture, Trade, and Consumer Protection; and Land Conservation Departments of Brown and Calumet Counties

The average costs to be used will be sent to the DNR and DATCP for approval prior to the counties signing cost-share agreements. This average cost list will be reviewed periodically and appropriate changes made. If changes are made the list will be forwarded to the DNR and DATCP for final approval before the changes are used for calculating cost-share agreements and payments.

FLAT RATES

BMPs using flat rates are shown in Table V-7. The rates shown are the state's share of the practice installation costs.

Table V-7. Practices Using a Flat Rate for State Cost-Share Funding

Best Management Practice	Flat Rate
Contour Farming	$ 6.00/ac.
Strip Cropping	$12.00/ac.
Field Strip Cropping	$10.00/ac.
Reduced Tillage	$15.00/ac. (1.)
Reduced Tillage	$45.00/ac. (2.)

(1) Reduced tillage systems for short crop rotations, and establishment of forages and small grains (includes no-till)
(2) Reduced tillage systems for continuous row cropping or long rotations (does not include no-till).

RURAL IMPLEMENTATION COST-SHARE AGREEMENT REIMBURSEMENT PROCEDURES

NONPOINT SOURCE GRANT AGREEMENT AND ADMINISTRATION

General Information: The Nonpoint Source Grant Agreement is the means for transmitting funds from the DNR (through the Nonpoint Source Pollution Abatement Program) to Brown and Calumet Counties for use in funding the state's share of cost-share agreements. Cost-share agreements are the means to transmit funds from the counties to the landowners.

A portion of the nonpoint source grant is forwarded to Brown and Calumet Counties to allow the county to set up an "up front" account. Funds from this account are used by the county to pay landowners after practices are installed under the project. As this account is drawn down, the county will request reimbursements from DNR to replenish the account. The counties will submit reimbursement requests on a quarterly basis. This reimbursement schedule will insure that the "up front" account balance is maintained at an adequate level. The Nonpoint Source Grant Agreement will be amended annually to provide funding needed for cost-sharing for the year. The funds obligated under cost-share agreements must never exceed the total funds in the Nonpoint Source Grant Agreement.

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

COST-SHARE AGREEMENT AND ADMINISTRATION

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

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

If landownership changes, the cost-share agreement remains with the property and the new owner is legally bound to carry out the provisions. NR 120.13(9) and (10), Wis.

Adm. Code have more information on changes of landownership and the recording of cost-share agreements.

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

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

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

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

- During the first three months of the implementation period, all landowners or operators with eligible nonpoint sources will receive from the county a mailing explaining the project and how they can become involved.

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

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

- The county will contact all eligible landowners (as defined above) not signing cost-share agreements by personal letter six months prior to the end of the cost-share, sign-up period.

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

The development of farm conservation plans will be the primary method used to develop cost-share agreements. These plans are specific to a particular landowner and are a comprehensive approach to the abatement of the nonpoint sources of pollution, and the conservation of soil and other resources. The farm plan takes into consideration the ability to sustain the agricultural resources and the management decisions of the owner or operator.

Landowners who spread livestock manure on critical acres (defined in Chapter III) during the winter period, and whose acreage is in Management Category I, will have a manure spreading plan developed for their livestock operation if they elect to participate in the program. Landowners in Management Category II may have a spreading plan developed. Participants in the watershed project will be required to limit winterspreading of livestock manure in accordance with the criteria listed in Chapter IV.

If manure storage facilities are cost-shared a manure spreading plan is required. The plan will not allow winter-spreading of manure on critical acres for landowners receiving cost-sharing for manure storage facilities.

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

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

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

2. Landowner agrees to participate with the watershed project, and signs a request for cost-share assistance.

3. A farm conservation plan is prepared by the county.

4. The landowner agrees with the plan, a cost-share agreement is prepared and both documents are signed by the landowner and the county. Two copies of the cost-share agreement (CSA) are sent to the DNR Lake Michigan District nonpoint source coordinator and a copy is given to the landowner. The CSA will be recorded by the county through the county register of deeds.

5. Practices are designed by the county, or their designee, and a copy of the design is provided to the landowner.

6. Landowner obtains the necessary bids or other information required in the cost-containment policy.

7. Amendments to the CSA are made if necessary.

8. The county staff oversees practice installation.

9. The county verifies the installation.

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

11. Land Conservation Committees or their designated representative and if required, county boards, approve cost-share payments to landowners.

12. Checks are issued by the county to the respective landowners and project ledgers are updated.

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

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

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

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

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

- Grade stabilization structures and agricultural sediment basins with embankment heights between 15 and 25 feet, and impoundment capacities of 15 to 50-acre feet.

- Streambanks to be controlled using riprap or other materials with banks over six feet high.
- Animal lot relocation.
- Roofs over barnyards or manure storage facilities.

LOCAL ASSISTANCE GRANT AGREEMENT ADMINISTRATION

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

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

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

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

BUDGET AND STAFFING NEEDS

This section estimates the funding and staffing required to provide technical assistance for the rural portion of this project. These estimates are based on needs identified for Brown and Calumet Counties.

Staff Needs: Table V-8 lists the total estimated staff needed to implement the project in Brown and Calumet Counties; respectively. Figures are provided for both the 50 percent and 75 percent levels of participation. A total of about 12,700 staff hours is required (1,820 hours per staff year) in Brown County and 400 staff hours in Calumet County to implement this plan at a 75 percent landowner participation rate.

The Land Conservation Departments in Brown and Calumet Counties will hire 4.0 staff and 0.2 staff, respectively in each of the first three years of the project. The counties will assess the number and type of staff required for the final five years of the project based on the actual landowner participation following the three year cost-share sign-up period.

SCHEDULES

GRANT DISBURSEMENT AND PROJECT MANAGEMENT SCHEDULE

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

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

The disbursement of the grants (Local Assistance and Nonpoint Source) to Brown and Calumet Counties will be based on an annual workload analysis and grant application process. The estimated grant disbursement schedule based on 75 percent participation by eligible landowners is found in Table V-9 for Brown and Calumet Counties.

INVOLVEMENT OF OTHER PROGRAMS

COORDINATION WITH STATE AND FEDERAL CONSERVATION COMPLIANCE PROGRAMS

The East River Priority Watershed Project will be coordinated with the conservation compliance features of the Wisconsin Farmland Preservation Program (FPP) administered by DATCP, and the Federal Food Security Act (FSA) administered by the Soil Conservation Service. The DATCP will assist Brown and Calumet Counties and the

SCS offices to identify landowners within the watershed that are subject to the compliance provisions of FPP and FSA. Conservation Farm Plans were completed for all landowners in FSA on December 31, 1989. Brown and Calumet County completed FPP plans in 1988.

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

Some eroding uplands in Management Categories I and II may need control (in addition to that required for meeting sediment delivery targets) in order to meet soil erosion program goals established in other state and federal programs. Where this occurs, technical and financial assistance from the Wisconsin Nonpoint Source Pollution Abatement (NPS) Program can be used to support practice design and installation on these critical lands. This assistance applies only under conditions where the additional control needed to meet soil erosion goals can be achieved using low cost practices.

Table V-8. Technical Assistance Staff Needs

	BROWN COUNTY			CALUMET COUNTY		
	BMP Need	Hourly Rate	Total Hours	BMP Need	Hourly Rate	Total Hours
Best Management Practice						
Upland Sediment Control						
Change in Crop Rotation	22,000 ac	0.05	1,100	250 ac	0.05	12.5
Contour Cropping	600 ac	0.18	108	20 ac	0.18	3.6
Contour Strip Cropping	600 ac	0.4	240	20 ac	0.4	8
Reduced Tillage	2,200 ac	0.15	330	40 ac	0.15	6
Reduced Tillage (No-till)	600 ac	0.15	90	10 ac	0.15	1.5
Critical Area Stabilization	400 ac	0.5	200	40 ac	0.5	20
Grassed Waterways	72 ac	40	2,880	3 ac	24	72
Field Diversions and Terraces	20,000 ft	0.04	800	1,000 ft	0.04	40
Grade Stabilization	22 ea	70	1,540	2 ea	70	140
Agricultural Sediment Basins	30 ea	110	3,300	1 ea	110	110
Livestock Fencing from Woodlots	0 ft	0.05	0	0 ft	0.05	0
Pasture Management	200 ac	0.1	20	0 ac	0.1	0
Wetland Restoration	54 ea	40	2,160	2 ea	40	80
Shoreline Buffers	182 ea	24	4,368	0 ea	24	0
Subtotal			*17,136*			*493.6*
Animal Waste Management						
Complete System	131 ea	120	15,720	5 ea	100	500
Clean Water Diversion	30 ea	24	720	1 ea	24	24
Manure Storage Facility	56 ea	120	6,720	4 ea	120	480
Manure Spreading Management	113 ea	10	1,130	6 ea	10	60
Roofs for Barnyards	3 ea	80	240	0		
Subtotal			*24,530*			*1,064*
Shape and Seeding	58,450 ft	0.1	5, 845	0 ft	0.1	0
Fencing	52,675 ft	0.05	2,633,75	0 ft	0.05	0
Rip-Rap	26,750 ft	0.15	4,012.5	0 ft	0.15	0
Livestock/Machinery Crossings	4 ea	24	96	0 ea	24	0
Subtotal		*12,587.2*				*0*
Totals		*54,253.2*				*1,557.6*
Pre-contact Office Inventory	415	2	830	15	2	30
Landowner Contacts	830	3	2,490	30	2	60
Progress Tracking	415	2	830	15	2	30
Subtotal			*4,150*			*120*
Conservation Planning	415	20	8,300	15	12	180
Cost Share Agreement Development	415	8	3,320	15	6	90
Subtotal			*11,620*			*270*
Plan Revisions & Status Reviews & Monitoring	625	3.5	2,187.5	25	3.5	87.5
Subtotal			*2,187.5*			*87.5*
Update Inventory	415	4	1,660	15	4	60
Subtotal			*1,660*			*60*

Table V-9. Grant Disbursement Schedule at 75% Landowner Participation Rate

Brown County

Item	Project Year 1	2	3	3-8
Cost-Share Funds: Practices	$634,574	$1,269,147	$1,269,147	$0
Cost-Share Funds: Easements	112,500	225,000	225,000	0
Local Assistance Staff Support	261,378	261,378	261,378	620,119
Information/Education: Direct	0	0	0	0
Other Direct (travel, supplies, etc.)	15,040	15,040	15,040	30,080
Total	*$1,023,492*	*$1,770,566*	*$1,770,566*	*$650,199*

Calumet County

Item	Project Year 1	2	3	3-8
Cost-Share Funds: Practices	$21,491	$42,982	$42,982	$0
Cost-Share Funds: Easements	5,000	5,000	5,000	0
Local Assistance Staff Support	6,598	6,598	6,598	16,081
Information/Education: Direct	0	0	0	0
Other Direct: (travel, supplies, etc.)	3,200	3,200	3,200	6,400
Total	*$36,289*	*$57,780*	*$57,780*	*$22,481*

Source: Wisconsin Department of Natural Resources; Wisc. Department of Agriculture, Trade, and Consumer Protection; and the Land Conservation Departments of Brown and Calumet Counties.

URBAN PROGRAM FOR IMPLEMENTATION

TIMING AND SEQUENCING OF URBAN MANAGEMENT PROGRAM

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

Relationship of the Urban Management Program to the Federal Storm Water Permit Program: As discussed in Chapter I, "Plan Purpose and Legal Status" a federal storm water permit program will begin during the implementation phase of this priority watershed project. The requirements of the federal storm water program will result in the issuance of permits under the Wisconsin Pollution Discharge Elimination System (WPDES) for discharging storm water to surface water and controlling construction erosion on sites five acres in size or larger. The city of Green Bay and some industries will fall under the requirements of the federal program.

Implementation of the urban nonpoint source control recommendations in this plan will meet some of the requirements of the federal program. However, it is uncertain if financial assistance will be available for requirements specified in a storm water permit. Consequently, communities and industries are encouraged to begin implementation of this plan's recommendations to take advantage of grant funds currently available under the NPS Program.

Core Elements of the Urban Management Program: The "core" elements of the urban nonpoint source control program applicable to local units of government include basic measures that can be implemented without further study. Adopting a community-specific core program is the first step in the implementation process. As such, communities will need to commit within the first three years of the project to implement the core program. This is a requirement to receive technical and financial assistance through the priority watershed project.

This requirement applies only to the receipt of funds used directly by the municipality as a grantee, such as where the municipality installs, owns, and operates a management practice. It does not apply to those instances where the municipality acts as a grantor, passing cost-share funds through to private landowners. This means that individual landowners could receive cost-share funds from the DNR for the installation of

management practices prior to a municipality's agreement to conduct core elements of the urban program.

The basic elements of the "core" program are:

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

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

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

"Segmented" Elements of the Urban Management Program: The "segmented" elements of the urban nonpoint source program include those requiring site-specific investigations prior to implementation. It is anticipated that many of these segmented elements will be implemented individually as discrete nonpoint source control practices. An example would be construction of one or more detention ponds in a given subwatershed following completion of an engineering feasibility study.

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

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

The detailed engineering feasibility studies should set forth the allocation of local costs between municipalities where more than one municipality contributes runoff to an urban structural practice. The allocation should result in an equitable distribution of costs

based on the contribution of each municipality to the total pollutant loading or stormwater runoff volume being controlled.

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

The basic elements of the segmented program are:

- Conduct detailed engineering studies to determine the best means to implement community-specific nonpoint source control measures for existing urban areas. This element will also consider accelerated street sweeping as a component of the control strategy for existing urban areas.

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

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

- Develop, as needed, management plans for planned urban development. These plans will identify the type and locations for structural urban BMPs.

- Adopt and enforce a comprehensive storm water management ordinance consistent with the state's "model" storm water ordinance (under preparation). Following adoption of a stormwater management guidebook, development of a stormwater management ordinance will be incorporated into the "core" program.

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

PROGRAM PARTICIPANTS--ROLES AND RESPONSIBILITIES

The specific roles and responsibilities for program participants are summarized below. The primary participants include local units of government (cities, villages, towns,

counties); the DNR; other agencies; landowners and land operators. Where applicable, the roles and responsibilities are discussed according to the previously described "core" and "segmented" approaches to project implementation. As noted in Chapter I, "Plan Purpose and Legal Status", implementation begins following approval of this priority watershed plan by the counties, DATCP, and DNR.

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

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

- Adopt an adequate ordinance, develop administrative procedures, and determine staff needs to enforce a construction erosion control ordinance in cities and villages within 12 months of the start of implementation.
- Identify the roles and responsibilities of towns and counties for controlling construction erosion in unincorporated areas within six months of the start of implementation. Adopt adequate ordinances, develop administrative procedures, and determine staff needs to enforce a construction erosion control ordinance in unincorporated areas within 12 months of the start of implementation.

- Develop and implement a community-specific program of urban "housekeeping" practices which reduce urban nonpoint source pollution. This may include but is not limited to a combination of information and education efforts, adoption of ordinances regulating pet wastes, and changes to the timing and scheduling of leaf collection. The content of the community specific program and a schedule for implementation will be negotiated by the local unit of government and the DNR within 12 months of the start of implementation.

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

- Prepare and submit annual work plans for staff and activities necessary to implement the project.

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

- Participate in the annual watershed project review meeting.

The NPS Program funding for Brown and Calumet Counties for carrying out agricultural management recommendations is not contingent upon county-wide construction site erosion control.

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

- Identify within six months of the start of implementation, the high priority segments the community wishes to pursue in existing and planned urban areas through the priority watershed project. This list can be amended throughout the eight-year project period.

- Conduct engineering feasibility and site location studies for urban nonpoint source control practices in high priority areas for existing urban development. The type and manner of practice installation will be guided by the above referenced detailed engineering studies. A commitment to implementing the recommendations will be required as a condition for subsequent financial assistance for these studies.

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

- Enter into cost-share agreements for eligible BMPs.

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

    a) Design or contract for the design of BMPs and verify proper practice installation.

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

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

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

Where more than one municipality contributes runoff to a control practice, the DNR will enter into cost-share agreements consistent with an equitable allocation based on municipal contributions to the pollutant loads and stormwater volumes being controlled.

3. Practice maintenance is the responsibility of the grant recipient. In some cases, urban stormwater pollutants are generated wholly or in part by a community different than that in which the stormwater control practice is located. An example is the potential use of wet detention in a county park to control urban pollutants generated from the city of Green Bay.

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

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

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

- Submit information needed for project evaluation to the DNR.

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

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

Core Program Roles and Responsibilities--

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

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

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

4. Review and approve annual project implementation reports.

5. Participate in the annual watershed project review meeting.

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

Segmented Program Roles and Responsibilities--

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

2. Develop a comprehensive storm water management ordinance for planned urban development. Assist communities with adoption and enforcement of storm water management ordinances.

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

4. Enter into nonpoint source cost-share agreements with the eligible lands the local unit of government owns or operates.

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

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

7. Approve stormwater management plans. Approval will be based upon the ability of the plan to meet the pollution reduction goals for a particular subwatershed. The results of recently completed and anticipated future water quality monitoring will be used to "fine-tune" the direct application of reduction goals in specific areas.

Landowners and Land Operators: In some situations, private landowners will install BMPs on their property. As such, they can be important participants in the urban

implementation strategy. Eligible landowners will participate in the project by signing cost-share agreements with local units of government. Maintenance responsibility can be allocated using agreements similar to those discussed above.

Other Agencies with Urban Implementation Responsibilities:

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

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

BEST MANAGEMENT PRACTICES (BMPS)

BMPs Eligible For Cost-Sharing And Their Rates: THE BMPs are those practices identified in NR 120 determined in this watershed plan to be the most effective in reducing nonpoint sources of pollution. Design and installation of the BMPs previously described under the rural implementation strategy must meet the conditions listed NR 120.

Generally, these practices use specific standard specifications in ***The U.S. Soil Conservation Service Field Office Technical Guide.*** Specifications for the structural urban practices were described in Chapter IV, "Nonpoint Source Control Needs." The DNR will provide technical assistance for the application of these practices. Eligible practices and the state's cost-share rates are listed below in Table V-10.

Using Easements To Support Urban Pollution Control Practices: Easements may be used to support wetland restoration, critical area stabilization, and shoreline buffers in urban areas to reduce the water quality impacts of stormwater runoff. Use of these practices as stormwater runoff control measures, and the use of easements to support these practices, must be reviewed on a case-by-case basis by the DNR. The same general rules set forth for the use of easements in rural areas also apply to urban stream reaches.

Table V-10. State's Cost-Share Rates for Urban Management Practices	
Best Management Practice	State Cost-Share Rate
Critical Area Stabilization	70% (1)
Grade Stabilization Structures	70%
Shoreline and Stream Bank Stabilization	70%
Shoreline Buffers	70% (1)
Wetland Restoration	70% (1)
Structural Urban Practices	70% (2)
Street Sweeping	50% (3)

(1) Easements may be used in conjunction with these practices.
(2) Applies only to structures for established urban areas.
(3) This is an alternative best management practice not listed in NR 120, of the Wisconsin Administrative Code. See Appendix D for more information.

Source: Wisconsin Department of Natural Resources.

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

- Operation and maintenance of cost-shared BMPs.
- Construction erosion control practices.
- Structural BMPs for new urban development. New urban development is construction activity beginning after the DNR approves this watershed plan.
- The BMPs installed prior to signing cost-share agreement.

- Activities covered under the Wisconsin Pollution Discharge Elimination System (WPDES) Program.
- On-site septic system controls or maintenance.
- Dredging activities.
- Activities and structures intended primarily for flood control.
- Purchase of land.
- Storm water conveyance systems.
- Minimum levels of street sweeping and leaf collection.

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

Limits on funding eligibility are meant to apply only to the priority watershed program as administered under existing administrative code. These limits are not meant to preclude separate budgetary or contractual financial assistance agreements. Such agreements might be developed under new state or federal programs, or with other units of government. This plan endorses the use of funds procured through such agreements to implement plan recommendations.

NONPOINT SOURCE GRANT AGREEMENT AND ADMINISTRATION

The nonpoint source grant agreement is the means for transmitting funds from the DNR to local units of government to provide cost- sharing for installing the urban BMPs. In some cases the municipality will act only as a grantee. In this case, the municipality will use grant funds for practices it will install, own and operate.

Alternately, the municipality will play an additional role as a grantor. In these situations, the municipality will pass the cost- share funds it has received from the DNR to private landowners who install, operate and maintain the practices. When this occurs, the municipality will enter into a separate cost-sharing agreement with the private landowner receiving the state funds.

The procedures for administering nonpoint source grant agreements and cost-share agreements parallel those contained in this plan's rural implementation strategy prescribed in Chapter NR 120 of the Administrative Code.

COST-SHARE AGREEMENT AND ADMINISTRATION

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

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

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

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

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

- Streambank protection practices or critical area stabilization practices are being considered.
- Wetlands or other wildlife habitat components will be adversely affected by installation of BMPs.

The DNR staff will assist by:

- Identifying streambank protection practices that benefit fish and wildlife.
- Identifying wildlife habitat components that could be incorporated into vegetative filter strips along streams or in upland areas.
- Providing technical assistance when the installation of BMPs will require the removal of obstructions or other wildlife habitat by proposing measures to minimize impact on wildlife habitat.
- Assisting to resolve questions concerning effects of nonpoint source BMPs on wetlands.

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

LOCAL ASSISTANCE GRANT AGREEMENT ADMINISTRATION

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

Activities described in the "core" and "segmented" elements of the urban implementation strategy are eligible for financial assistance. The type of eligible activities and the amount of state funds available are described in Table V-11.

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

Table V-11. Urban Implementation Strategy Measures Eligible for State Funding	
Activity	Support Rate
Development of Construction Erosion Control Ordinances	100%
Development of Storm Water Management Ordinances	100%
Engineering Studies for Existing Urban Areas; Studies for Planned Urban Areas	100% (1)
Design and Engineering for Structural Best Management Practices	100%
Development of Alternative Financing and Administrative Strategies	100%
Staff for Enforcing Construction Erosion and Storm Water Management Ordinances	100% (2)
Additional Staff Needed for Accelerated Street Sweeping	100% (2)

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

Source: Wisconsin Department of Natural Resources.

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

URBAN BUDGET AND STAFFING NEEDS

Cost estimates for implementing the construction site erosion control associated with the "core" urban program are presented below. Tables V-12 and V-13 present the estimated costs of implementing the recommendations for existing urban areas. All of these costs are associated with the "segmented" urban program. Table V-14 shows the community-specific costs of preparing detailed engineering feasibility studies needed before practices for controlling pollutant loads in runoff from existing urban areas are designed and installed.

Table V-12 and V-13 presents estimated community-specific costs of implementing the wet detention and street sweeping recommendations.

Engineering Feasibility/Siting Studies: Detailed engineering feasibility studies will be needed for existing urban development to evaluate alternative practices, and to choose and site practices. Most of these studies will probably be carried out by the private sector, with most of the cost borne by the DNR. The studies are used to choose and site stormwater practices in areas of new development. Most of these studies will probably also be carried out by the private sector, with the cost borne partly by the DNR and partly by local units of government.

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

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

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

Table V-12. Estimated Costs of Wet Detention Component for Existing Urban Lands in the East River Watershed

MUNICIPALITY	TOTAL CAPITAL COST		COST(1)	STATE COST SHARE (70%)(2)			MUN COST SHARE (30%)(3)		
City of Allouez	$692,000	to	$1,211,000	$484,400	to	$847,700	$207,600	to	$363,300
City of Ashwaubenon	$224,000	to	$392,000	$156,800	to	$274,400	$67,200	to	$117,600
Twn of Bellevue	$452,000	to	$791,000	$316,400	to	$553,700	$135,600	to	$237,300
City of De Pere	$348,000	to	$609,000	$243,600	to	$426,300	$104,400	to	$182,700
City of Green Bay	$3,208,000	to	$5,614,000	$2,245,600	to	$3,929,800	$962,400	to	$1,684,200
Greenleaf	$0	to	$0	$0	to	$0	$0	to	$0
Twn of Scott	$12,000	to	$21,000	$8,400	to	$14,700	$3,600	to	$6,300
Total	$4,936,000	to	$8,638,000	$3,455,200	to	$6,046,600	$1,480,800	to	$2,591,400

ESTIMATED COSTS OF WET DETENTION COMPONENT FOR PLANNED URBAN LANDS IN THE EAST RIVER WATERSHED

MUNICIPALITY	TOTAL CAPITAL COST(4)		
City of Allouez	$80,000	to	$140,000
City of Ashwaubenon	$128,000	to	$224,000
Twn of Bellevue	$804,000	to	$1,407,000
City of De Pere	$708,000	to	$1,239,000
City of Green Bay	$1,316,000	to	$2,303,000
Greenleaf	$28,000	to	$49,000
Twn of Scott	$8,000	to	$14,000
TOTAL	$3,100,000	to	$5,425,000

1. Assumes a cost of $40,000 - $70,000 per acre of wet pond surface, does not include annual operation and maintenance costs. Factors such as relocation of homes and re-routing of storm sewers may be required, and would ADD TO THE TOTAL COST described in the text.

2. Includes 70% of capital costs (excluding land purchase and sewer work) and 100% design work.

3. Does not include annual operation and maintenance costs, which are estimated at 5% a year.

4. No cost sharing dollars are available for planned or developing areas.

Table IV-13. Estimated Costs of the Street Sweeping Component for Planned Urban Lands in the East River Watershed	
MUNICIPALITY	COST(1)
City of Allouez	$0
City of Ashwaubenon	$11,800
Twn of Bellevue	$90,800
City of De Pere	$0
City of Green Bay	$0
City of Greenleaf	$0
Twn of Scott	$0
Total	*$109,100*

1. Based on $25.00 a curb mile/ 28 passes a year

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

Table V-12 presents cost information for installing wet detention ponds in existing urban areas. The cost information assumes 100 percent detention of existing critical land uses. The total cost for installing these ponds in densely urbanized areas, such as in the city of Green Bay, ranges from $40,000 to $70,000 per surface acre of pond depending on the need to condemn and relocate existing structures such as homes or businesses.
The lower cost assumes that open land is available for purchase, but that extensive rerouting of the storm sewer system is required. The upper end of the cost range assumes that land is completely developed and condemnation of existing businesses or homes would be required. Both figures assume that the cost of pond excavation and development, such as the construction of pond inlet and outlet structures and pond landscaping, costs about $40,000 to $70,000 per acre.

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

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

Cost of Installing Structural Practices in Planned Urban Areas: Table V-12 presents an estimate of the cost for wet detention in planned urban areas. The factors that make retro-fitting so expensive should not be of concern in developing areas, as good planning can assure that land is set aside and stormwater practices located in harmony with the conveyance systems.

An estimated $3.1 - 5.4 million will be required to install wet detention in the planned urban areas. Land costs would be additional. The entire cost would be borne locally, as NPS Program funds are not used for practices in areas of new development.

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

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

One way to internalize costs is to assess the source of each stormwater pollutant. This requires the identification of sources responsible for pollutant generation. This plan endorses investigations that identify sources of urban pollutants so that pollutant generation can be reduced. If pollutant generation cannot be reduced, this identification would provide an alternative means of assigning pollution control costs.

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

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

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

Cost of Street Sweeping in Existing Urban Areas: Table V-13 shows the estimated cost of sweeping 50 percent of the critical urban land uses as part of a program that phases in the required level of wet detention. The costs presented in the table assume a total cost of $25 per curb mile. Principal component costs include wages and salaries (34 percent), indirect labor benefits and overhead (nine percent), maintenance and fuel (25 percent), equipment depreciation (16 percent), and litter disposal (16 percent). The total annual cost of improving local street sweeping programs to the accelerated level recommended in this plan is about $109,100. The annual state share would be approximately $59,100 and the annual local share about $50,000.

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

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

Cost of Installing Construction Erosion Control Practices: It is assumed that construction site practices will average $250 per acre. Using this unit cost, it will require an estimated $2.1 million to install construction site erosion control practices in the watershed. All of

this cost will be borne locally by the private sector to meet requirements of local ordinances.

Cost of Administering Construction and Stormwater Control Ordinances: It is estimated that 5 staff years of effort will be needed in the watershed. Assuming a unit cost of $40,000 per staff per year, the administrative cost is estimated to be $200,000 per year. Over the eight-year life of the project, the estimated cost is $1.9 million. The NPS Program will support 100 percent of the required staff for five years. The remaining three years would be funded locally, probably in part through permit fees. Each local unit of government is expected to continue supporting these administrative costs as needed in the years following the end of this watershed project.

PROJECT COST SUMMARY

Table V-14 presents a summary of estimated costs for implementing the rural and urban portions of this watershed project. The estimated total project cost is $24 million to $30 million. Rural recommendations will require 32 percent of this total to implement. The remainder of the cost is associated with controls in the existing and planned urban areas.

The most expensive aspects of the recommended plan include engineering feasibility studies and construction of structural practices to control stormwater pollution from existing urban areas. This plan element is anticipated to cost about $6.5 million to $10.8 million, or 28 percent of the total plan cost. This cost can be partly defrayed by state cost-share assistance through the NPS Program, but most of the cost ($1.5 million) would be borne by local governments and individual landowners under existing state cost-share guidelines.

Control of construction site erosion is estimated to cost about $2.1 million.

In addition to these costs, an estimated $75,000 will be needed for non-staff related information and education expenses over the initial three years of the watershed project. These costs, in addition to those needed to support a regional education specialist are supported entirely by the DNR. A detailed discussion of the rural and urban information and education strategy is presented in the next section.

INFORMATION AND EDUCATION IMPLEMENTATION PROGRAM

This information and education strategy (Appendix C) is based upon recommendations of the East River Watershed Urban and Rural Technical, and Information and Education Subcommittees, agency staff and the East River Watershed Advisory Committee. The strategy also includes elements from the Milwaukee River Urban

Water Quality Information and Education Strategy and survey data from the Milwaukee River Priority Watershed Program.

Table V-14. Summary Costs, in Millions of Dollars, of Implementing Plan Recommendations in Urban and Rural Areas of the East River Watershed.

	Total Cost	State Share	Local Gov't[1]	Landowner Share
RURAL RECOMMENDATIONS				
Management Practices	7.4	5.2 (70%)	0	2.2 (32%)
Easements	.8	.8 (100%)	0	0
Local Staffing	1.4	1.4 (100%)	0	0
URBAN RECOMMENDATIONS				
Existing Areas[2]				
Feasibility Studies	1.5	1.5 (100%)	0	0
Detention Ponds	4.9 to 8.0	3.4 (70%)	1.5 (30%)	
Street Sweeping	.1	.04 (44%)	.06 (56%)	0
PLANNED AREAS				
Erosion Controls[3]				
-Practices	2.1	0	0	2.1 (100%)
-Administration	1.9	1.2 (63%)	0.7 (37%)	0
Stormwater Controls[2]				
-Stormwater Plans	.8	.8 (100%)	0	0
-Detention Ponds	3.1 to 5.4	0	0	3.1 to 5.4 (100%)
WATERSHED TOTAL	24 to 30	14.4	2.3	7.4 to 9.7

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

Source: Wisconsin Department of Natural Resources.

PURPOSE AND OBJECTIVES

This education plan includes recommendations for both general audiences and targeted audiences. This approach recognizes that target audiences will be responsible for actions that can produce substantial improvements in water quality for the watershed's streams and potentially lower Green Bay. At the same time, this education plan acknowledges the importance of general audiences for influencing short and long-term management decisions and increasing awareness of both the watershed project and overall environmental concerns. The general audiences may also pursue activities that produce substantial water quality improvements. An example would be support for local adoption of comprehensive construction erosion control ordinances.

1. Target Audiences (those who must act):

   - Business and industry (includes builders, contractors and realtors).
   - Local elected and appointed officials.
   - Farmers and rural absentee landowners.

2. General Audiences (those who can support and promote change):

   - Conservation and environmental groups.
   - Agricultural organizations and producer groups.
   - Rural homeowners.
   - Fishing, boating and other recreational user groups.
   - Civic and service organizations.
   - Youth.
   - Teachers and youth leaders.
   - General public/concerned citizens.
   - Business and industry associations.
   - Religious organizations.

DESIRED OUTCOMES

During the priority watershed project sign-up period, information and education activities will be organized by the following desired outcomes (in order of priority):

- Watershed Project Participation Encouraged By:

  1. Cost-sharing agreements with local units of government,businesses and rural landowners.
  2. Regulation (ordinances) and demonstrations.

- Support for the Watershed Project Through Understanding, Acceptance and Advocacy of Project Goals:

- Individual Action (without cost-sharing assistance):

  1. Homeowners practicing good "housekeeping" regarding the use and disposal of fertilizers, automotive products and there household hazardous wastes.
  2. Farmers using environmentally sound nutrient and pest management programs.

- Increased Awareness About the Priority Watershed Project:

  These desired outcomes complement the educational objectives listed below. The order of priority will change, however, as the project moves from sign-up to implementation then through evaluation.

OBJECTIVES

The information and education strategy objectives will help meet the overall watershed project goals. The objectives include:

- Generate an awareness/understanding of the watershed project.

- Encourage participation in, and support for, the watershed project.

- Encourage the use of urban and rural nonpoint source pollution control measures.

- Generate an awareness of nonpoint source pollution and water quality problems.

- Create a sense of responsibility, or ethic, for the natural resources within the Fox River Basin.

CHAPTER VI
INTEGRATED RESOURCE MANAGEMENT ACTIVITIES

INTRODUCTION

This portion of the plan describes how the priority watershed project will be coordinated with the Wisconsin Department of Natural (DNR) fisheries and wildlife management programs. The main focus is to comply with integration issues related to improving fish and wildlife habitat by installing best management practices (BMPs) and developing conservation easements in eligible areas. The methods for integration are presented below.

IDENTIFYING WILDLIFE AND FISHERY NEEDS

The Brown County and Calumet County staffs will consult with the DNR's Lake Michigan District wildlife management and fisheries management staff to optimize the management benefits of nonpoint source control BMPs. Specifically, the county staff will contact the DNR staff if:

- Streambank protection practices, agricultural sediment basins, or critical area stabilization practices are being considered.
- Fence rows, rock piles, wetlands, or other wildlife habitat components will be adversely affected by installation of agricultural BMPs.

The DNR staff will assist county staff by:

- Identifying streambank protection practices that benefit fish and wildlife.
- Identifying wildlife habitat components that could be incorporated into vegetative filter strips along streams or in upland areas.
- Reviewing placement of agricultural sediment basins to assure that negative impacts on stream fish and aquatic life do not occur and recommending wildlife habitat components.

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

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

PART THREE
PROJECT EVALUATION

CHAPTER VII: PROGRESS ASSESSMENTS

CHAPTER VIII: EVALUATION MONITORING

CHAPTER VII
PROGRESS ASSESSMENTS

INTRODUCTION

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

This chapter is divided into four sections:

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

RURAL ADMINISTRATIVE REVIEW

Evaluating progress in project administration and in reducing pollutant loads will be accomplished primarily by the Brown and Calumet County Land Conservation Departments, and reported on a regular basis to the DNR and DATCP.

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

ACCOMPLISHMENT REPORTING

The Computer Assisted Management and Planning System (CAMPS), is a computer data management system that has been developed by the U.S. Soil Conservation Service (SCS). The SCS, DNR and DATCP use CAMPS to meet accomplishment reporting

requirements of all three agencies. The county collects data on administrative accomplishments using CAMPS, which then is provided to the DNR and DATCP for program evaluation.

The following data will be provided quarterly by the counties to the DNR and DATCP:

- Status of landowner contacts.
- Completed I&E activities.
- Number of farm conservation plans prepared for the project.
- Number of cost-share agreements signed.
- Number of farm conservation plan and cost-share agreement status reviews completed.
- Number of farms and acres of cropland checked for proper maintenance of the BMPs.

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

FINANCIAL EXPENDITURES

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

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

The counties will provide the following information annually:

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

TIME SPENT ON PROJECT ACTIVITIES

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

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

RURAL POLLUTION LOAD REDUCTION

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

STREAMBANKS

Brown and Calumet Counties will calculate changes in streambank sediment in terms of tons of sediment and length of eroding sites. A tally will be kept of the landowners contacted, the amount of streambank sediment being generated at the time of contact,

and changes in erosion levels estimated after installing the BMPs. This information will be summarized and submitted to the DNR annually.

UPLAND SEDIMENT SOURCES

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

BARNYARD RUNOFF

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

MANURE SPREADING

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

URBAN ADMINISTRATIVE REVIEW

ACCOMPLISHMENT REPORTING

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

- Scheduled information and education activities.
- Completion of construction site erosion control ordinance modification or adoption.
- Acres of construction activity with adequate erosion control plans.
- Acres of construction activity monitored for compliance with provisions of ordinance and erosion control plans.

- Identification of needed changes in housekeeping.

- Implementation of housekeeping program changes.

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

- Existing 1986 urban acres, by land use, covered by engineering feasibility studies.

- Acres of new post-1986 urban development, by land use, covered by plans for controlling urban pollutant loads and stormwater flows.

- Acres of new post-1986 urban development, by land use, not covered by plans for controlling urban pollutant loads and stormwater flows.

- Stormwater ordinance adoption or modification.

- Feet and tons of eroding streambanks addressed in detailed engineering feasibility studies.

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

FINANCIAL EXPENDITURES, TIME SPENT ON PROJECT ACTIVITIES

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

URBAN POLLUTANT LOAD CHANGES

Local units of government will provide the following information annually to the DNR to evaluate changes in urban pollutant loading:

- Existing 1986 urban acres, by land use, served by urban stormwater practices, and information requested by the DNR concerning practice characteristics.

- Acres of new post-1986 urban development, by land use, served by stormwater practices, and information requested by the DNR concerning practice characteristics.

- Acres of new post-1986 urban development, by land use, not served by stormwater practices.

- Acres of construction site activity served by adequate erosion control practices.
- Acres of construction site activity not served by adequate erosion control practices.
- Changes in streambank erosion, in tons and feet of erosion, due to installation of erosion control and flow reduction practices.

The community's source reduction activities to reduce urban pollutant loadings should also be acknowledged. Although the effect on urban pollutant loadings may not be quantifiable, accomplishments should be recognized and publicized as having a positive impact on efforts to reduce pollutant loads.

CHAPTER VIII
EVALUATION MONITORING PLAN

INTRODUCTION

The water resources of the East River Watershed will be monitored to measure trends in water quality. Monitoring activities will be targeted to demonstrate progress in achieving the water quality objectives of the watershed plan. Monitoring will be done throughout the eight-year implementation period, and afterward, will continue for two open water seasons. Therefore, monitoring will not be completed until the year 2001. Monitoring will be tailored to determine the effectiveness of the best management practices (BMPs) installed in the watershed. Monitoring may also show the effectiveness of the streambank ordinance proposed by Brown County. Since the watershed's main objectives are to reduce the phosphorus and sediment loading to Green Bay, most of the monitoring will target these two parameters.

Four agencies will be collecting data from the East River Watershed. These agencies are: the United States Geological Survey (USGS); the Green Bay Metropolitan Sewerage District (GBMSD); the Green Bay Health Department; and the Department of Natural Resources (DNR). Data from these four agencies will be used in the evaluation of the watershed program. Table VIII-1 includes the monitoring schedule by agency for the East River Priority Watershed Project. Table VIII-2 includes the summary of monitoring costs.

SUMMARY OF WATERSHED MONITORING

This is a summary of the ***East River Water Quality Evaluation Plan*** (Herman, 1991). For further details refer back to the actual evaluation plan.

UNITED STATES GEOLOGICAL SURVEY

Bower Creek, County Trunk Highway "MM" was selected as one of the state's Master Monitoring Stations. The USGS in conjunction with the DNR established this station. The objectives behind this monitoring station are to "understand the changes that occur

in water quality and stream habitat before, during and after land use changes, resulting from watershed management practices; and to define and understand the processes that control the changes resulting from management practices" (USGS, 1990). Emphasis will be placed on storm-event monitoring. The USGS will monitor runoff events and compute storm-event constituent loads as well as total annual loads for Bower Creek. This study will look at various monitoring techniques and schedules. Recommendations will be made on the type and frequency of monitoring necessary to evaluate the success of the priority watershed program. These recommendations will be used to tailor future watershed monitoring activities. Bower Creek was selected as the master monitoring station for this watershed in part because of previous monitoring done by the USGS from 1985 to 1986 (Hughes, 1988). When comparing loading per acre, the Bower Creek Subwatershed is believed to be the highest sediment and phosphorus contributor to the Lower Fox River (Hughes 1988). Bower Creek also has a small drainage area, which better facilitates relating loading per acre. Water chemistries, continuous dissolved oxygen levels, temperatures, bacteria counts, flows, sedimentation rates, macroinvertebrates/biotic index samples, and pesticides will be monitored at this site. Refer to United States Geological Survey's ***Trends in Water Quality and Stream Habitat in Priority Watersheds*** (1990) for details in monitoring and analyses. Biotic Index samples will be collected above and below the waterfalls during Fall 1990, Spring and Fall 1991 through 1997, and 1999 and 2000.

GREEN BAY METROPOLITAN SEWERAGE DISTRICT

Proposed monitoring includes water chemistries (23 stations), continuous dissolved oxygen and temperature levels (seven stations), sediment contamination monitoring (approximately 10 stations) and water toxic substance monitoring (seven stations) for areas inside and adjacent to the boundaries of the East River Watershed. See the ***GBMSD River/Bay Monitoring Program Summary*** (Sachs, 1968) for details on parameters and locations.

GREEN BAY HEALTH DEPARTMENT

The Green Bay Health Department monitors bacteria levels at several locations on the Fox River and lower Green Bay area. Monitoring takes place weekly during the open water season. The Green Bay Health Department is planning to continue this monitoring. Total plate, fecal coliform, and fecal strep counts are run on the samples. Water temperature, secchi disk readings, pH, and conductivity readings are also collected at the time of sampling. Information regarding monitoring locations, sampling periods, and results can be received through the Green Bay Health Department.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

The DNR will be monitoring the streams of the East River Watershed throughout the life of this project. Monitoring was designed specifically for this project. The DNR staff time was estimated in Table VIII-4.

The DNR has established six water chemistry, flow, bacteria, habitat evaluation, and macroinvertebrate collection stations (Table VIII-3). These were selected because previous background data had been collected at these sites. Sampling took place in Fall 1990 and spring 1991, and will continue during the Spring and Fall 1994, 1999 and 2000.

Table VIII-1. Recommended East River Priority Watershed Monitoring Schedule by Agency

Monitoring Activity	Agency	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Water Chemistries	USGS	12 storm, 8 snowmelt and 12 base flow events/year through 1997										
	GBMSD	weekly May through October---------->										
	DNR (B.I. stns)	fa	sp			sp/fa					sp/fa	sp/fa
	DNR (BMP stns)			su	su		su					
DO/Temp (continuous)	GBMSD	ows	ows	ows	ows	ows	ows	ows	ows	ows	ows	ows
	USGS	continuous open-water D.O. and continuous temp monitoring through 1997										
	DNR		su			su			su		su	su
Bacteria	USGS	12 storm, 8 snowmelt and 12 base flow events/year through 1997										
	GB Health Dept	weekly during open water season---------->										
	DNR	fa	sp			sp/fa					sp/fa	sp/fa
Flows	USGS	continuous---------->										
	DNR	fa	sp			sp/fa					sp/fa	sp/fa
Sedimentation	USGS	12 storm, 8 snowmelt and 12 base flow events/year through 1997										
Sediment Depth	DNR	fa	sp			sp/fa					sp/fa	sp/fa
Habitat Eval.	DNR	fa	sp			sp/fa					sp/fa	
Sediment Toxic Substance	GBMSD	su		su		su		su		su		su

(continued) Table VIII-1. Recommended East River Priority Watershed Monitoring Schedule by Agency

Monitoring Activity	Agency	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Water Trace Contaminants	GBMSD	Three times per year ---------->										
Macroinvertebrates entire watershed	DNR	Oct	Apr			Apr/Oct					Apr/Oct	Apr/Oct
(Bower Cr-USGS stn)	DNR	Oct	Apr/ Oct	Apr/ Oct	Apr/ Oct	Apr/Oct	Apr/ Oct	Apr/ Oct	Apr/O ct		Apr/Oct	Apr/Oct
Fisheries	DNR	su		su					su			

Abbreviations:

ows - open-water season
sp - spring
su - summer
fa - fall
Apr - mid April
Oct - mid October

Table VIII-2. East River Priority Watershed Monitoring Costs by Agency and Year (1)

Agency	Monitoring Activity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
USGS(2)	(all activities) Water Chemistries D.O./temp. Bacteria Flows Sedimentation	$64,000/yr---------->										
BMSD	(all activities) Water Chemistries D.O./temp. Sediment toxic substance Water column toxic substance	99,000	90,000	99,000	90,000	99,000	90,000	99,000	90,000	99,000	90,000	99,000
GB Health Dept.	Bacteria(3)											
DNR Water	Chemistry Parameters	1200	1200	4800	4800	2400	4800				2400	2400
	D.O./temp.(4)	450	450	450	450	450	450	450	450	450	450	450
	Bacteria	70	70		140						140	140
	Flows(4)	50	50	50	50	50	50	50	50	50	50	50
	Sediment Depth	No actual cost, only staff time										
	Biotic Index (6 stns)	414	414		2484						828	828
	BI @ USGS Stn.	207	414	414	414	414	414	414	414		414	

(continued) Table VIII-2. East River Priority Watershed Monitoring Costs by Agency and Year (1)

Agency	Monitoring Activity	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
	Fisheries	No actual cost, only staff time										
	Habitat Evaluation	No actual cost, only staff time										

(1) Based on 1990 Costs.
(2) During Fiscal Year 1991 40 percent of cost was borne by USGS and 60 percent is borne by DNR and/or other supporting agencies. Cost-share rates will be negotiated each year of the project.
(3) Based upon the same cost that the State Lab of Hygiene would charge DNR for doing the same analysis.
(4) Maintenance costs.
(5) Maintenance costs, gas, etc.

A biotic index/chemical parameter list with costs and numbers of samples is included in Table VIII-2. Water chemistries are collected through grab samples and the analysis is done at the Wisconsin State Laboratory of Hygiene. Flows are measured through use of a Marsh/McBirney Flow Meter. Bacteria samples are collected through grab samples and counts are done by the Wisconsin State Laboratory of Hygiene. Habitat evaluation forms are filled out at all biotic index sites and all fish survey sites. Macroinvertebrates are collected using Hilsenhoff's kick method. Macroinvertebrates are keyed at the University of Wisconsin--Steven's Point and HBI and other indices are used in the analysis. Three replicate biotic index samples will be collected at each station both Spring and Fall 1994. This is done to check monitoring accuracy.

Additional water chemistries will be collected above and below best management practices (BMPs). This monitoring will take place during 1992, 1993 and 1995. The same chemical parameters (Table VIII-5) will be collected at these sites. Different BMPs should be monitored each year. Monitoring will take place every two weeks for 6 month periods. Monitoring will take place on the same day each of the two weeks (i.e. Monday).

Fishery monitoring will be conducted by the DNR at the stations identified in 1985 (Table VIII-3). Monitoring will be conducted using fyke nets, a three man-boomshocker and backpack and/or stream-shockers as stream conditions warrant. Summer mid-project surveys in 1992 and 1994 and a post-project survey in 1999 are recommended. Fish contamination monitoring will be conducted through the Lake Michigan District's normal sampling procedures.

Dissolved oxygen and temperature monitoring (through use of YSI model 56 meters with OMNIDATA dataloggers attached) will be conducted by the DNR for a two-week period each month for the months of June, July and August on the Upper East River and Baird Creek during 1991, 1994, 1997, 1999 and 2000. Exact locations will be selected by the DNR water quality biologist and the Brown County Land Conservation Department.

A computer search (Groundwater Information Network) will take place at the interim and conclusion of the implementation stage of the watershed project to look at groundwater. Data will be compared to pre-implementation data.

DATA MANAGEMENT

Results of the monitoring will be reported in annual (calendar year) summaries. These summaries will be included in the watershed project's annual review. Each water quality report will summarize the past year's monitoring, relate it to previous monitoring results, and make recommendations for changes in the monitoring plan. At the end of the project, there will be an overall monitoring report describing the water quality impacts of the project. All of the reports will include statistical analysis where the data base will allow.

Table VIII-3. DNR Monitoring Stations, East River Watershed, Brown County.

Location	Stream	Subwatershed	Survey Type	Storet Number
East Lawn Park	East River	Lower East River	FM/H	
Midway Rd	East River	Middle East River	FM/H	
Meadowlark Rd	East River	Middle East River	FM/H	
Hwy 32	East River	Middle East River	BI/C/B/F/H	053494
Hwy 57	Creek 20-14	Middle East River	FM/H	
Wrightstown Rd	Creek 20-15	Middle East River	FM/H	
Hwy 57	Creek 20-15	Middle East River	FM/H	
Partridge Rd	Creek 20-15	Middle East River	FM/H	
School Rd	Creek 29-7	Middle East River	FM/H	
Hwy 57	Creek 29-7	Middle East River	FM/H	
Partridge Rd	Creek 29-7	Middle East River	FM/H	
Townline Rd	East River	Upper East River	FM/H	
CTH "Z"	East River	Upper East River	FM/H	
Fair Rd	Creek 6-5	Upper East River	FM/BI/C/B/F/H	053493
Bunker Hill Rd	Creek 31-14	Upper East River	FM/H	
Fair Rd	Creek 31-14	Upper East River	FM/H	
CTH "V"	Bower Creek	Lower Bower Creek	FM/BI/C/B/F/H	053497
CTH "MM"	Bower Creek	Lower Bower Creek	FM/H	
Sunnyview Rd.	Bower Creek	Lower/Upper Bower Cr.	BI/C/B/F/H	053495
Northview Road	Baird Creek	Baird Creek	BI/C/B/F/H	053498
Moon Valley Rd.	Baird Creek	Baird Creek	FM/H	
Woodside Rd	Baird Creek	Baird Creek	FM/H	
Nicolet Drive	Mahon Creek	Mahon Creek	BI/C/B/F/H	053492

Abbreviations:

FM - Fish Management Surveys
BI - Biotic Index
C - Water Chemistries
B - Bacteria
F - Flows
H - Habitat Evaluation

Table VIII-4. East River Monitoring Plan DNR Staff Time Estimate (DAYS)

Element	Calendar Year										
	90	91	92	93	94	95	96	97	98	99	2000
Water Chemistries (2)	1	1	5	5	2	5				2	2
Dissolved Oxygen Monitoring		3						3		3	3
Habitat Evaluation (2)	1	1			2					2	2
Biotic Index(2)	1	1			3					2	2
Master Monitoring Stn Macroinvertebrate(1)	1	2	2	2	2	2	2	1		2	2
Fisheries			?		?					?	?
Reporting	2	3	1	1	5	5	1	1		5	5
TOTAL DAYS	6	11	8	8	14	12	3	5	0	16	16
TOTAL HOURS	48	88	64	64	202	96	24	16	0	194	194

(1) Macroinvertebrates were collected in Fall 1990, and will continue during Spring and Fall 1991 - 1996 and 1999, and Spring 1997.

(2) Water chemistries, habitat evaluation and biotic index samples collected in Fall 1990, spring 1991, and will continue in Spring and Fall 1994 and 1999.

Table VIII-5. Department of Natural Resources' East River Priority Watershed Water Chemistry/Biotic Index Monitoring Schedule and Laboratory Analytical Costs

Parameter	Cost per Analysis (1990 Dollars)	Number of Analyses per Water Year 90	91	92	93	94	95	96	97	98	99	2000
NO_2+NO_3	7.15	6	6	24	24	12	24				12	12
NH_3-N	9.75	6	6	24	24	12	24				12	12
TKN	9.75	6	6	24	24	12	24				12	12
CL-	9.75	6	6	24	24	12	24				12	12
Tot. P.	9.75	6	6	24	24	12	24				12	12
Dis. P.	9.75	6	6	24	24	12	24				12	12
Ca	6.50	6	6	24	24	12	24				12	12
Mg	6.50	6	6	24	24	12	24				12	12
Na	6.50	6	6	24	24	12	24				12	12
K	8.45	6	6	24	24	12	24				12	12
pH	3.30	6	6	24	24	12	24				12	12
So_4	9.75	6	6	24	24	12	24				12	12
Color	7.80	6	6	24	24	12	24				12	12
Turbidity	5.85	6	6	24	24	12	24				12	12
Tot.Solids	9.75	6	6	24	24	12	24				12	12
T.V.Solids	6.50	6	6	24	24	12	24				12	12
Sus.Solids	9.75	6	6	24	24	12	24				12	12
V.S.Solids	6.50	6	6	24	24	12	24				12	12
COD	12.50	6	6	24	24	12	24				12	12
BOD	17.55	6	6	24	24	12	24				12	12
Chl_a	26.00	6	6	24	24	12	24				12	12
MFCC	5.00	6	6	24	24	12	24				12	12
F.Strep	5.00	6	6	24	24	12	24				12	12
B.I.[1]	69.00	9	9	6	6	42	6	6	6		18	18

(1) 9 samples = 6 B.I. stations with 1 sample/station and Bower Creek Station with 3 samples/station. 6 samples = Bower Creek Stations spring and fall monitoring with 3 samples/station/season. 42 samples = To check collection techniques, 3 replicates/station both spring and fall at B.I. stations plus the normal 3 samples/season for Bower Creek station. 18 same as 9 with samples both in spring and fall.

During 1994 an interim report will be written. A summary, to date, of water quality monitoring and analyses will be included in this report. At the end of the project, there will be an overall monitoring report describing the water quality impacts of the project. All of the reports will include statistical analysis where the data base will allow.

The USGS station quarterly and annual data reports will be prepared and transmitted to the DNR in a timely fashion. See ***Evaluation of Water-Quality Trends in Priority Watersheds*** (USGS - 5/18/90) for a list of plots and tables to be included in their quarterly and annual reports. An interim report for Bower Creek will be prepared midway through the life of the watershed project and will include preliminary evaluations using data collected to date. Recommendations concerning the design of the remaining data-collection effort will be made. A final report for Bower Creek will be prepared at the end of the project and will present observed trends in the water quality data, and discuss the effectiveness of the management practices in achieving project goals. Beginning in Fiscal Year 1993, approximately one journal article per year will be prepared discussing noteworthy aspects of the data collection and evaluation effort. The papers will be co-authored by the USGS and DNR personnel.

DATA ANALYSES

The USGS will use various statistical techniques to estimate trends in discharge and selected water quality constituents. "Techniques for estimating the probability of a given constituent exceeding a given level will be developed and applied to the data collected during the USGS study. One possible approach is to use the continuous discharge record to assign probabilities to event mean concentrations for individual storms. A second possibility is to use the continuous discharge record, the event mean concentration, and the low flow concentration to construct a duration curve for concentrations, which could be used to estimate the percent of time a given concentration level is exceeded. A third possibility is to fit a probability distribution to the concentration date, or perhaps a joint distribution using discharge and concentrations" (USGS, 1990). Duration-curve analysis will be used to estimate the probability of dissolved oxygen and water temperature exceeding critical levels. Changes in annual suspended sediment will be estimated using measured transport curves and discharge data.

Tests can be run for bacteria counts and dissolved oxygen levels. The USGS will be evaluating statistical analysis for water chemical parameter data. The watershed analyses will be based on their findings.

COST OF MONITORING (using 1990 cost estimates)

LABORATORY COSTS

DNR:

Water Chemistries - $199.10/station/season

Bacteria - $10/station/season

Macroinvertebrate sorting & analysis - $69/sample/station/season.

GBMSD Costs (1):

Water chemistries	$38,000/year
Continuous dissolved oxygen/temperature monitoring (2)	5,000/year
Sediment analyses	9,000/year
Water column trace contamination analyses	14,000/year

(1) - Costs reflect a summary of individual sample costs. Actual costs realized by GBMSD would be much less, as all laboratory samples are analyzed in conjunction with in house (WPDES permit related) analysis.

(2) - Costs for equipment attrition.

Green Bay Health Department

Bacteria Sampling	23,000/year

CONTRACT COSTS

The USGS will be contracted to continue monitoring of the Bower Creek Station. Using 1990 cost estimates, the station will cost $64,900 per year. During Fiscal Year 1991, 40 percent of this cost will be borne by the USGS. The DNR or other interested parties will cost-share the remainder of the costs. It is anticipated that the station will be maintained through 1997. Cost-share rates will be negotiated each year of the project.

EQUIPMENT COSTS

Roughly $500.00 per year will be required for maintenance of equipment, replacement of dissolved oxygen chart paper, etc.

GBMSD monitoring program labor/equipment costs equal about $23,000/year.

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APPENDIX A
WATERSHED PLANNING METHODS

This appendix describes the steps and procedures used to prepare this plan. These are:

- Evaluating water quality and aquatic habitat.
- Assessing pollution sources.
- Establishing water resources objectives.
- Establishing pollution reduction goals.
- Developing a nonpoint source control strategy.
- Involving the public and local units of government.

EVALUATING WATER QUALITY AND AQUATIC HABITAT

The DNR is responsible for designating the biological and recreational uses that surface waters can support under proper management, prescribing the water quality required to sustain these designated uses, and indicating the methods to implement, achieve and maintain those conditions.

The DNR's Lake Michigan District water resources management staff conducted investigations of the existing quality and natural resource conditions for lakes and streams. Their purpose was to evaluate water quality problems and establish a basis for setting water resource management objectives. Detailed assessment results are documented in the "East River Priority Watershed Water Resources Appraisal Report".

DATA COLLECTION

The following is a summary of the five elements comprising the water quality and aquatic habitat investigation.

Subwatershed Delineation and Stream Segmentation: Prior to collecting field data, the watershed was divided into 16 hydrologic subwatersheds. This was accomplished using 1986, 1"=400' scale aerial photographs, and 1"=2,000'(7.5 minute) U.S. Geological Survey quadrangle maps. These maps were also used to divide the perennial and intermittent stream network into segments. Stream segments were used to separate portions of waterways where either natural conditions or human-induced changes resulted in pronounced differences in stream character and/or water quality.

Stream Habitat Evaluation: Existing information characterizing stream habitat including flow rate and depth, substrate quality, channel configuration, streambank stability, and water temperature were evaluated using the DNR's Stream Classification Guidelines (Ball, 1982).

Water Quality Assessment: Water quality was assessed through review of historical water chemistry data and an evaluation of bottom dwelling animals (macroinvertebrates) using the Hilsenhoff Biotic Index (Hilsenhoff, 1982). Extensive bacteria (fecal coliform) surveys were conducted to assess the suitability of surface waters for recreational use.

Fisheries Resource Assessment: Fish communities were assessed qualitatively using a combination of historical data (Fago, 1984) and information collected during this investigation. Resident fish populations in the streams, lakes, and impoundments were sampled using seines and electrical shocking equipment.

Navigability and Recreational Use Determinations: The extent and degree to which streams are navigable was determined based on evidence of canoeing or boating, field data including evidence of stream alteration or use and information provided by landowners or other local experts. Recreational uses were determined through field observations, file data and information from local users. Information from local users was collected, in part, through a survey of urban residents conducted during 1989.

DATA INTERPRETATION

This information was used to determine the existing and potential biological and recreational uses for surface waters. The existing uses reflect present biological and recreational conditions. Potential uses reflect biological and recreational conditions that could be achieved under prescribed types and levels of management. Even though existing and potential uses of a surface water are the same, management programs can result in significant and perceptible changes in the quality of the aquatic environment. Use classifications and supporting water quality standards used in evaluating water resource conditions are discussed below.

Biological Stream Use Classification: Biological stream use classes describe the fish species or other aquatic organisms supported by a stream system. Designation is based on the ability of a stream to provide suitable habitat and water quality conditions for fish and other aquatic life. The following biological stream use classification system is used statewide and was applied to surface waters in the East River Watershed.

FAL A Cold Water Communities: These streams are capable of supporting a community of cold water fish (trout, sculpin) and other aquatic life, or serve as spawning areas for cold water fish species.

FAL B Warm Water Sport Fish Communities: These streams are capable of supporting a community of warm water sport fish (bass, walleye, pike) or serve as spawning areas for warm water sport fish.

FAL C Warm Water Forage Fish Communities: These streams are capable of supporting an abundant, diverse community of forage fish (shiners, minnows) and other aquatic life (insects, clams, crayfish).

Limited Forage Fish Communities (Intermediate Surface Waters): These streams are capable of supporting small populations of forage fish tolerant of pollution, or fish and aquatic invertebrates tolerant of pollution. The aquatic community is usually limited by small physical stream size and reduced stream flow.

Limited Aquatic Life (Marginal Surface Waters): These streams are capable at best of supporting a limited community of aquatic life. These streams are usually small, such as intermittent streams and ditches, or have been extensively modified through channel straightening or concrete lining.

Recreational Stream Use Classification: Recreational stream use classifications are described by a level of human body contact determined to be safe and reasonable. The system applies to all surface waters including those categorized as intermediate or marginal under the above referenced biological use classification system. Three designations are used under the recreational stream classification system. These are full body contact, partial body contact and non-contact.

Full Body Contact: These waters are used for human recreation where immersion of the head is expected and occurs often. Recreation activities classified as full body contact include swimming, water skiing, sailboarding and other similar activities.

Partial Body Contact: These waters are used for human recreation where immersion of the head is not frequent and contact is most often incidental or

accidental. Recreational activities classified as partial body contact include boating, canoeing, fishing and wading.

Non-contact: These waters should not be used for human recreation. This category is used infrequently when extenuating circumstances such as high concentrations of in-place pollutants, an uncontrollable pollution source, or other conditions dictate that contact with the water would be an unnecessary health risk.

Water Quality Standards and Criteria: Water quality standards and criteria are expressions of the conditions considered necessary to support biological and recreational uses. Water quality standards for recreational and biological uses are contained in Chapters NR 102, NR 104, and NR 105 of the Wisconsin Administrative Code.

In addition to these standards, other criteria were used to assess the suitability of surface waters for recreational and biological uses. Data characterizing stream size and accessibility were used to help determine the suitability and types of recreation a stream is capable of supporting. Information on current recreational use of surface waters provided by users at public access points and discussions with local officials was also used to assess suitability of surface waters for recreation.

Additional information used to assess the suitability of surface waters for biological uses includes recommended maximum nutrient levels, suspended solids concentrations and the extent to which stream beds are clogged with sediment. Selected water quality standards and other evaluation criteria used in assessing surface waters are presented in this appendix.

ASSESSING POLLUTION SOURCES

The purpose of the pollution source assessment is to identify the rural and urban sources and quantities of pollutants impacting surface waters. Rural and urban pollutant sources assessed for this watershed are discussed below.

RURAL NONPOINT SOURCES

Excessive quantities of sediment, nutrients, oxygen-demanding substances, pesticides and bacteria are pollutants carried in runoff draining agricultural areas. These pollutants degrade surface water quality thereby restricting recreational and biological uses. The principal rural nonpoint sources evaluated in preparing this plan include:

- Barnyards and livestock area runoff.
- Eroding uplands delivering sediment to surface waters.
- Eroding, slumping, or trampled streambanks.
- Areas contributing runoff of winterspread livestock manure.

Inventories were conducted between 1988 and 1989 by the Brown and Calumet County Land Conservation Department (LCD) staffs. The DNR, in cooperation with the DATCP and the LCD staffs, completed the data analyses. The inventory and evaluation procedures are summarized below.

Barnyard and Livestock Area Runoff: The LCD staffs mapped locations of barnyards in the watershed on 1986, 1"=400' scale aerial photographs. A field survey of each barnyard was conducted to collect information needed to determine its pollution potential.

The barnyard data was used in the "BARNY" Model (Baun, 1987), a modification of the animal lot runoff model, developed by the U.S. Department of Agriculture, Agricultural Research Service (Young, 1982). Information about the mass loading of total phosphorus and chemical oxygen-demand generated during a 10-year, 24-hour rainfall event was used to evaluate the relative pollution potential of each barnyard. The livestock operations were ranked according to their potential to impact surface and/or groundwater quality.

Upland Erosion and Sediment Delivery: The LCD staffs conducted an inventory with in the watershed, using existing data and field investigations. Cropland, pastures, grasslands, woodlands and other open (non-urban) land uses were investigated. Existing data sources included site-specific farm conservation plans, aerial photographs, and U.S. Geological Survey 1"=2,000' scale quadrangle maps. The information obtained for each parcel included size, soil type and its potential for erosion, slope percent and length, land cover, crop rotation, present management, overland flow distance and destination, channel type and receiving water.

Upland erosion and sediment delivery was determined using the Wisconsin Nonpoint Source (WIN) Model (Baun & Snowden, 1987). The WIN model calculates the average annual quantity of eroded soil reaching surface waters from each farm field. The determination is made based on a "typical" year of precipitation. Estimated sediment delivery was used to assess the relative pollution potential of each farm field in the watershed.

Streambank Erosion: The survey method used is a modification of the streambank erosion analysis included in Phase II of the Land Inventory Monitoring process used by

the U.S. Department of Agriculture, Soil Conservation Service. At locations where erosion was occurring, the following information was recorded:

- Length of trampled or eroding bank.
- Vertical height.
- Estimated annual rate of recession.
- Adjacent land uses.
- Potential management measures.

The amount of sediment lost annually was calculated for each erosion site. In addition, areas adjacent to streams impacted by livestock, but which were not necessarily eroding at a high rate, were also noted.

Runoff from Areas Winterspread with Livestock Waste: This analysis estimated the pollution potential associated with winterspreading livestock waste in the watershed. The information collected for the barnyard and upland erosion surveys was used in this evaluation.

This analysis was completed using a three-step process. First, the number of acres which each livestock operation needs to landspread manure was calculated for a six-month period. This calculation included approximating when manure cannot be incorporated into the ground because of frozen or saturated conditions. The amount of manure generated by each operation was based on the number and type of livestock. The area required for spreading was based on an application rate of 25 tons per acre per year.

Second, the land available to each livestock operation for winterspreading was characterized according to its environmental sensitivity. Lands having slopes equal to or greater than six percent or located within the floodplain were considered to have a high potential to deliver landspread manure to lakes and streams during periods of spring thaw.

Third, the number of sensitive acres winterspread with manure was estimated for each livestock operation based on the number of acres needed for winterspreading and the proportion of lands available to the livestock operation that are considered environmentally sensitive. This number was used to indicate the relative pollution potential of each livestock operation due to runoff of winterspread manure.

URBAN NONPOINT SOURCES

Nationwide investigations confirm that urban runoff can have a significant adverse impact on receiving waters. The result is that urban areas and activities can upset several important components of a stream including stream flow, habitat, water quality, bottom sediment quality, and stream biology (Pitt, 1987).

Pollutants carried in urban stormwater runoff include some of the same pollutants associated with rural nonpoint source runoff such as sediment, nutrients, oxygen-demanding organic materials, bacteria and pesticides. Other pollutants, many of which are potentially toxic, are transmitted to surface and groundwater primarily by urban runoff. These include heavy metals (lead, zinc, chromium, copper, cadmium and arsenic) and a wide range of hazardous organic compounds. Urbanization reduces groundwater recharge and increases the volume and peak of stream flow during storms which causes devastating hydrologic changes in streams. This results in flashy streams which destroy stable habitat for aquatic life and often necessitates the conversion of natural streams into stormwater conveyance channels to reduce flood damage.

Principal urban nonpoint sources evaluated in preparing this plan include:

- Existing 1986 urban land uses,.
- New urban development, including the potential for construction site erosion as well as increased pollutant loading from the newly established urban surfaces.
- Eroding streambanks.

Stormwater pollutant concentrations, runoff volumes, and pollutant yields vary by urban land use (residential, commercial, industrial) and development characteristics (intensity of the development, stormwater conveyance system). The inventory of existing and planned urban areas was designed to quantify the urban land use and development characteristics for existing and planned urban development. This information was used to estimate the existing and future urban pollutant loads.

Existing 1986 Urban Areas: Three study areas were delineated in the watershed and included all incorporated municipalities and surrounding lands sufficient to accommodate planned future development.

Existing land use categories were delineated on 1"=400' scale aerial photos by the Brown County Planning Commission. This information was digitized, quantified, and mapped by the Bay Lake Regional Planning Commission (BLRPC).

New Urban Development: The Brown County Planning Commission delineated anticipated year 2010 planned urban land uses. This information was digitized, quantified and mapped by the BLRPC. This information was based on existing land use configuration, sanitary sewer service area plans, other land use plans where available and meetings with local officials to discuss information on committed or planned development projects. It was assumed that environmental corridors and isolated natural areas would not be urbanized.

The DNR used this information on existing and planned urban development in its Source Loading and Management Model (Pitt and Voorhees, 1989) to estimate urban nonpoint source loads for six pollutants--sediment, phosphorus, lead, copper, zinc and cadmium. Information on existing pollutant loads was used to identify the magnitude and distribution of the current urban nonpoint source loadings and to identify high priority land uses responsible for most of these loads. Information on planned urban development was used to estimate the future pollution potential associated with uncontrolled development. The effectiveness of applying urban management practices to existing and planned urban areas was also evaluated to determine what level of management is needed to reduce current urban pollutant loads to acceptable levels by the year 2010.

The potential for construction site impacts was assessed based on the number of acres planned for development and the adequacy of existing local construction erosion control programs. Acres planned for development were provided to the DNR by the Brown County Planning Commission. The adequacy of existing local construction erosion control programs was also evaluated by DNR.

Streambank Erosion: The Brown County LCD staff used rural streambank erosion survey techniques and applied to portions of urban streams where streambank erosion was suspected to be a problem.

OTHER POLLUTION SOURCES

Additional sources of surface water pollution, beyond those discussed in this plan, are degrading water quality in the watershed. These pollution sources have the potential to overshadow improvements in water quality that might otherwise occur as a result of the priority watershed program.

The DNR conducted an inventory and evaluation of these other pollution sources. Inventory results and recommendations for alleviating the water quality impacts of these other pollution sources are documented in the above referenced East River water quality appraisal report.

ESTABLISHING WATER RESOURCES OBJECTIVES

Recreational and biological water resources objectives were established for each of the streams and lakes in the watershed. These objectives identify how the project is anticipated to change the quality of the aquatic environment for recreational and biological uses. Factors considered in setting water resources objectives include existing water quality and aquatic habitat, factors or pollutants that may be keeping the surface water from meeting its full potential to support biological and recreational uses, and the practicality of reducing pollutants.

ESTABLISHING POLLUTION REDUCTION GOALS

Nonpoint pollution reduction goals are estimates of the level of nonpoint source control needed to meet the water quality and recreational use objectives identified in this plan. Pollution reduction goals and water resources objectives are set together since they are integrally related.

Nonpoint source pollution reduction goals contained in this plan are a refinement of recommendations contained in the Lower Green Bay Remedial Action Plan. Pollution reduction goals in this plan specifically target the control of sediment and phosphorus in rural areas and the control of sediment, phosphorus, urban toxic materials and stream flow changes in urban areas. Importantly, reducing the quantity of these substances reaching surface water decreases the amount of other substances such as pesticides and bacteria which degrade water quality.

Water resources objectives presented in this plan recognize that pollution control and resource management efforts beyond the scope of the Wisconsin Nonpoint Source Pollution Abatement Program (NPS Program) are needed to achieve the identified objectives. These will include implementation of other recommended management actions set forth primarily in the Lower Green Bay Remedial Action Plan.

DEVELOPING A NONPOINT SOURCE CONTROL STRATEGY

The final step in the planning process is the development of a strategy for achieving the nonpoint source pollution reduction goals identified in the plan. Several items are addressed in developing the control strategy including:

- Critical nonpoint pollution sources.
- Effective management practices and guidelines for use of state cost-share funds for practice installation.

- Responsibilities, estimated workloads and work schedules for local implementing agencies, and guidelines for use of state funds to support local implementation activities.

- Estimated cost of installing practices and supporting staff at the local level.

- Information and education needs.

- Project evaluation needs.

Identification of critical nonpoint sources eligible for cost-share and technical assistance under the NPS Program were determined by:

- Evaluating pollutant loading for each nonpoint source in each subwatershed.

- Determining the relative importance of controlling each source (barnyards, urban runoff, cropland erosion, etc.) to achieving the water resource objectives.

- Developing criteria to determine which sources need to be controlled.

- Applying the criteria to determine eligibility for participation in the priority watershed project.

This evaluation was carried out on a subwatershed and watershed basis for the rural and urban nonpoint sources. The result is a site-specific ranking of nonpoint sources and a determination of assistance to be made available through the NPS Program for their control.

INVOLVING THE PUBLIC AND LOCAL UNITS OF GOVERNMENT

The DNR convened an advisory subcommittee and several technical work groups to assist in preparing this watershed plan. The advisory subcommittee contains representatives from cities, counties, villages, and towns in the watershed, the Brown County Planning Commission, the BLRPC, Green Bay Metropolitan Sewerage District, UWEX, DATCP, environmental groups and interested citizens. This subcommittee primarily provided policy guidance during the planning process and reviewed plan chapters.

Three types of technical work groups were convened to help with developing technical aspects of the plan--a water resources appraisal work group, an agricultural work group and an urban work group. These groups reviewed land and water resources assessment

information, assisted in developing water resources objectives and pollution reduction goals and assisted in developing the pollution control strategy.

FUTURE HUMBOLDT		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: com, ind, med res.								
CRITICAL AREA TOTAL								
AREA	76.47	76.47						
LEAD	34.52	34.52	7.25	79.0%	20.88	39.5%	1.81	94.7%
COPPER	14.10	14.10	5.92	58.0%	10.01	29.0%	5.35	62.1%
ZINC	95.67	95.67	28.70	70.0%	62.19	35.0%	27.71	71.0%
CADMIUM	0.59	0.59	0.18	70.0%	0.38	35.0%	0.17	71.1%
PHSO	101.63	101.63	54.88	46.0%	78.26	23.0%	29.97	70.5%
SS	63155.48	63155.48	6315.55	90.0%	34735.51	45.0%	1514.27	97.6%
GRAND TOTAL								
AREA	84.64							
LEAD	34.57	34.57	7.30	78.9%	20.93	39.4%	1.86	94.6%
COPPER	14.11	14.11	5.93	58.0%	10.02	29.0%	5.36	62.0%
ZINC	95.68	95.68	28.71	70.0%	62.20	35.0%	27.72	71.0%
CADMIUM	0.59	0.59	0.18	70.0%	0.38	35.0%	0.17	71.1%
PHSO	101.87	101.87	55.12	45.9%	78.50	22.9%	30.21	70.3%
SS	63179.98	63179.98	6340.05	90.0%	34760.01	45.0%	1538.77	97.6%

FUTURE GREENLEAF		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: med res.								
CRITICAL AREA TOTAL								
AREA	89.52							
LEAD	3.49	3.49	0.73	79.0%	2.11	39.5%	0.56	84.0%
COPPER	1.70	1.70	0.71	58.0%	1.21	29.0%	0.60	65.0%
ZINC	12.53	12.53	3.76	70.0%	8.14	35.0%	3.38	73.0%
CADMIUM	0.22	0.22	0.07	70.0%	0.14	35.0%	0.06	73.0%
PHSO	51.92	51.92	28.04	46.0%	39.98	23.0%	27.52	47.0%
SS	19335.03	19335.03	1933.50	90.0%	10634.27	45.0%	1546.80	92.0%
GRAND TOTAL								
AREA	237.81							
LEAD	4.38	4.38	1.62	62.9%	3.00	31.5%	1.45	66.9%
COPPER	1.85	1.85	0.86	53.3%	1.36	26.6%	0.75	59.7%
ZINC	12.68	12.68	3.91	69.2%	8.29	34.6%	3.53	72.1%
CADMIUM	0.23	0.23	0.08	67.0%	0.15	33.5%	0.07	69.8%
PHSO	56.37	56.37	32.49	42.4%	44.43	21.2%	31.97	43.3%
SS	19779.86	19779.86	2378.33	88.0%	11079.10	44.0%	1991.63	89.9%

EXISTING SCOTT		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK	
land use: com, ind								
CRITICAL AREA TOTAL								
AREA	17.60							
LEAD	9.50	9.50	2.00	79.0%	5.75	39.5%	5.02	47.2%
COPPER	3.87	3.87	1.63	58.0%	2.75	29.0%	3.68	5.0%
ZINC	26.20	26.20	7.86	70.0%	17.03	35.0%	24.89	5.0%
CADMIUM	0.16	0.16	0.05	70.0%	0.10	35.0%	0.15	5.0%
PHSO	26.20	26.20	14.15	46.0%	20.17	23.0%	17.46	33.4%
SS	16831.94	16831.94	1683.19	90.0%	9257.57	45.0%	10085.43	40.1%
GRAND TOTAL								
AREA	1055.37							
LEAD	18.72	18.72	11.21	40.1%	14.97	20.0%	14.24	23.9%
COPPER	6.43	6.43	4.19	34.9%	5.31	17.5%	6.24	3.0%
ZINC	39.25	39.25	20.91	46.7%	30.08	23.4%	37.94	3.3%
CADMIUM	0.46	0.46	0.35	24.3%	0.40	12.2%	0.45	1.7%
PHSO	104.09	104.09	92.04	11.6%	98.06	5.8%	95.35	8.4%
SS	38288.53	38288.53	23139.78	39.6%	30714.16	19.8%	31542.02	17.6%

FUTURE SCOTT		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: com, ind								
CRITICAL AREA TOTAL								
AREA	7.10	7.10						
LEAD	3.84	3.84	0.81	79.0%	2.32	39.5%	0.18	95.2%
COPPER	1.56	1.56	0.66	58.0%	1.11	29.0%	0.59	62.0%
ZINC	10.58	10.58	3.17	70.0%	6.88	35.0%	3.07	71.0%
CADMIUM	0.07	0.07	0.02	70.0%	0.04	35.0%	0.02	71.0%
PHSO	10.58	10.58	5.71	46.0%	8.14	23.0%	2.85	73.1%
SS	6794.71	6794.71	679.47	90.0%	3737.09	45.0%	133.20	98.0%
GRAND TOTAL								
AREA	360.29							
LEAD	7.06	7.06	4.03	42.9%	5.54	21.5%	3.41	51.7%
COPPER	2.51	2.51	1.60	36.1%	2.06	18.0%	1.54	38.6%
ZINC	15.54	15.54	8.14	47.6%	11.84	23.8%	8.03	48.3%
CADMIUM	0.18	0.18	0.13	25.7%	0.16	12.8%	0.13	26.0%
PHSO	39.37	39.37	34.50	12.4%	36.94	6.2%	31.64	19.6%
SS	14916.18	14916.18	8800.94	41.0%	11858.56	20.5%	8254.67	44.7%

EXISTING GREEN BAY		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: high res, com, ind, freeway								
CRITICAL AREA TOTAL								
AREA	4042.36							
LEAD	1227.90	1227.90	257.86	79.0%	742.88	39.5%	236.99	80.7%
COPPER	511.28	511.28	214.74	58.0%	363.01	29.0%	211.68	58.6%
ZINC	3606.61	3606.61	1081.98	70.0%	2344.30	35.0%	1066.61	70.4%
CADMIUM	23.34	23.34	7.00	70.0%	15.17	35.0%	6.92	70.4%
PHSO	3929.27	3929.27	2121.81	46.0%	3025.54	23.0%	1987.19	49.4%
SS	2334002.80	2334002.80	233400.28	90.0%	1283701.54	45.0%	219122.79	90.6%
GRAND TOTAL								
AREA	18390.88							
LEAD	1464.44	1464.44	494.40	66.2%	979.42	33.1%	473.53	67.7%
COPPER	607.62	607.62	311.08	48.8%	459.35	24.4%	308.02	49.3%
ZINC	4298.49	4298.49	1773.86	58.7%	3036.18	29.4%	1758.49	59.1%
CADMIUM	34.54	34.54	18.20	47.3%	26.37	23.7%	18.12	47.5%
PHSO	7070.82	7070.82	5263.36	25.6%	6167.09	12.8%	5128.74	27.5%
SS	3440243.11	3440243.11	1339640.59	61.1%	2389941.85	30.5%	1325363.10	61.5%

FUTURE GREEN BAY		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: com, ind, med res., high res., inst, off. park								
CRITICAL AREA TOTAL								
AREA	2630.15							
LEAD	562.25	562.25	118.07	79.0%	340.16	39.5%	37.32	93.4%
COPPER	235.08	235.08	98.73	58.0%	166.91	29.0%	86.39	63.2%
ZINC	1601.90	1601.90	480.57	70.0%	1041.24	35.0%	456.69	71.5%
CADMIUM	12.45	12.45	3.73	70.0%	8.09	35.0%	3.51	71.8%
PHSO	2345.43	2345.43	1266.53	46.0%	1805.98	23.0%	891.67	62.0%
SS	1218430.36	1218430.36	121843.04	90.0%	670136.70	45.0%	43311.87	96.4%
GRAND TOTAL								
AREA	3675.09							
LEAD	568.52	568.52	124.34	78.1%	346.43	39.1%	43.59	92.3%
COPPER	236.13	236.13	99.78	57.7%	167.96	28.9%	87.44	63.0%
ZINC	1602.95	1602.95	481.62	70.0%	1042.29	35.0%	457.74	71.4%
CADMIUM	12.56	12.56	3.85	69.4%	8.20	34.7%	3.62	71.2%
PHSO	2376.77	2376.77	1297.87	45.4%	1837.32	22.7%	923.00	61.2%
SS	1221564.87	1221564.87	124977.54	89.8%	673271.21	44.9%	46446.38	96.2%

EXISTING DEPERE		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: high res, com, ind, freeway								
CRITICAL AREA TOTAL								
AREA	461.15							
LEAD	146.24	146.24	30.71	79.0%	88.48	39.5%	22.81	84.4%
COPPER	58.34	58.34	24.50	58.0%	41.42	29.0%	23.98	58.9%
ZINC	410.69	410.69	123.21	70.0%	266.95	35.0%	120.56	70.6%
CADMIUM	3.07	3.07	0.92	70.0%	2.00	35.0%	0.90	70.6%
PHSO	502.00	502.00	271.08	46.0%	386.54	23.0%	234.61	53.3%
SS	289608.45	289608.45	28960.84	90.0%	159284.64	45.0%	25061.61	91.3%
GRAND TOTAL								
AREA	4829.68							
LEAD	214.43	214.43	98.90	53.9%	156.67	26.9%	91.00	57.6%
COPPER	86.38	86.38	52.54	39.2%	69.46	19.6%	52.02	39.8%
ZINC	603.89	603.89	316.41	47.6%	460.15	23.8%	313.76	48.0%
CADMIUM	6.68	6.68	4.53	32.2%	5.61	16.1%	4.51	32.5%
PHSO	1415.88	1415.88	1184.96	16.3%	1300.42	8.2%	1148.49	18.9%
SS	604398.83	604398.83	343751.23	43.1%	474075.03	21.6%	339852.00	43.8%

FUTURE DEPERE		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: com, ind, high res, med res.								
CRITICAL AREA TOTAL								
AREA	1537.07							
LEAD	292.86	292.86	61.50	79.0%	177.18	39.5%	13.69	95.3%
COPPER	122.55	122.55	51.47	58.0%	87.01	29.0%	45.94	62.5%
ZINC	841.98	841.98	252.59	70.0%	547.29	35.0%	241.18	71.4%
CADMIUM	6.83	6.83	2.05	70.0%	4.44	35.0%	1.93	71.8%
PHSO	1306.57	1306.57	705.55	46.0%	1006.06	23.0%	481.90	63.1%
SS	673538.87	673538.87	67353.89	90.0%	370446.38	45.0%	21706.82	96.8%
GRAND TOTAL								
AREA	1757.55							
LEAD	294.18	294.18	62.82	78.6%	178.50	39.3%	15.01	94.9%
COPPER	122.78	122.78	51.70	57.9%	87.24	28.9%	46.16	62.4%
ZINC	842.2	842.2	252.81	70.0%	547.51	35.0%	241.40	71.3%
CADMIUM	6.85	6.85	2.07	69.8%	4.46	34.9%	1.95	71.6%
PHSO	1313.18	1313.18	712.16	45.8%	1012.67	22.9%	488.51	62.8%
SS	674200.22	674200.22	68015.23	89.9%	371107.73	45.0%	22368.16	96.7%

EXISTING BELLEVUE

land use: high res, com, ind, freeway, med. res

		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
CRITICAL AREA TOTAL								
AREA	685.52							
LEAD	176.01	176.01	36.96	79.0%	106.49	39.5%	22.06	87.5%
COPPER	72.86	72.86	30.60	58.0%	51.73	29.0%	28.74	60.6%
ZINC	497.01	497.01	149.10	70.0%	323.06	35.0%	142.31	71.4%
CADMIUM	3.49	3.49	1.05	70.0%	2.27	35.0%	1.00	71.4%
PHSO	613.63	613.63	331.36	46.0%	472.50	23.0%	259.08	57.8%
SS	357142.37	357142.37	35714.24	90.0%	196428.30	45.0%	24861.45	93.0%
GRAND TOTAL								
AREA	3440.7							
LEAD	198.61	198.61	59.56	70.0%	129.09	35.0%	44.66	77.5%
COPPER	78.53	78.53	36.27	53.8%	57.40	26.9%	34.41	56.2%
ZINC	519.96	519.96	172.05	66.9%	346.01	33.5%	165.26	68.2%
CADMIUM	4.03	4.03	1.59	60.6%	2.81	30.3%	1.54	61.9%
PHSO	751.78	751.78	469.51	37.5%	610.65	18.8%	397.23	47.2%
SS	388127.92	388127.92	66699.79	82.8%	227413.85	41.4%	55847.00	85.6%

FUTURE BELLEVUE
land use: com, ind, med res., high res.

		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
CRITICAL AREA TOTAL								
AREA	1565.83							
LEAD	411.08	411.08	86.33	79.0%	248.70	39.5%	31.74	92.3%
COPPER	170.63	170.63	71.67	58.0%	121.15	29.0%	62.97	63.1%
ZINC	1165.08	1165.08	349.52	70.0%	757.30	35.0%	333.87	71.3%
CADMIUM	8.39	8.39	2.52	70.0%	5.45	35.0%	2.38	71.6%
PHSO	1554.73	1554.73	839.56	46.0%	1197.14	23.0%	595.84	61.7%
SS	846785.17	846785.17	84678.52	90.0%	465731.85	45.0%	33408.09	96.1%
GRAND TOTAL								
AREA	1899.26							
LEAD	413.09	413.09	88.34	78.6%	250.71	39.3%	33.75	91.8%
COPPER	170.97	170.97	72.00	57.9%	121.49	28.9%	63.31	63.0%
ZINC	1165.43	1165.43	349.87	70.0%	757.65	35.0%	334.22	71.3%
CADMIUM	8.42	8.42	2.55	69.7%	5.48	34.9%	2.41	71.3%
PHSO	1564.77	1564.77	849.59	45.7%	1207.18	22.9%	605.87	61.3%
SS	847813.6	847813.6	85706.94	89.9%	466760.27	44.9%	34436.52	95.9%

EXISTING ASHWAUBENON		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
land use: high res, com, ind, freeway								
CRITICAL AREA TOTAL								
AREA	310.12							
LEAD	96.68	96.68	20.30	79.0%	58.49	39.5%	14.58	84.9%
COPPER	38.57	38.57	16.20	58.0%	27.39	29.0%	14.52	62.4%
ZINC	271.81	271.81	81.54	70.0%	176.68	35.0%	73.52	73.0%
CADMIUM	1.68	1.68	0.50	70.0%	1.09	35.0%	0.45	73.0%
PHSO	329.11	329.11	177.72	46.0%	253.41	23.0%	133.56	59.4%
SS	184237.77	184237.77	18423.78	90.0%	101330.77	45.0%	13339.69	92.8%
GRAND TOTAL								
AREA	762.54							
LEAD	103.42	103.42	27.04	73.8%	65.23	36.9%	21.32	79.4%
COPPER	41.55	41.55	19.18	53.8%	30.36	26.9%	17.49	57.9%
ZINC	293.12	293.12	102.85	64.9%	197.99	32.5%	94.83	67.6%
CADMIUM	2.09	2.09	0.92	56.1%	1.50	28.1%	0.87	58.5%
PHSO	433.91	433.91	282.52	34.9%	358.21	17.4%	238.36	45.1%
SS	221281.57	221281.57	55467.58	74.9%	138374.58	37.5%	50383.50	77.2%

FUTURE ASHWAUBENON

land use: com, ind, med res., office park

		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
CRITICAL AREA TOTAL								
AREA	170.85							
LEAD	88.85	88.85	18.66	79.0%	53.75	39.5%	6.23	93.0%
COPPER	36.24	36.24	15.22	58.0%	25.73	29.0%	13.75	62.0%
ZINC	245.03	245.03	73.51	70.0%	159.27	35.0%	70.99	71.0%
CADMIUM	1.50	1.50	0.45	70.0%	0.98	35.0%	0.43	71.1%
PHSO	247.18	247.18	133.48	46.0%	190.33	23.0%	74.19	70.0%
SS	157676.65	157676.65	15767.67	90.0%	86722.16	45.0%	3902.79	97.5%
GRAND TOTAL								
AREA	186.97							
LEAD	88.94	88.94	18.75	78.9%	53.84	39.5%	6.32	92.9%
COPPER	36.26	36.26	15.24	58.0%	25.75	29.0%	13.77	62.0%
ZINC	245.05	245.05	73.53	70.0%	159.29	35.0%	71.01	71.0%
CADMIUM	1.5	1.5	0.45	70.0%	0.98	35.0%	0.43	71.1%
PHSO	247.66	247.66	133.96	45.9%	190.81	23.0%	74.67	69.9%
SS	157725.02	157725.02	15816.03	90.0%	86770.53	45.0%	3951.16	97.5%

EXISTING ALLOUEZ

land use: med res, high res, com, ind, freeway

		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
CRITICAL AREA TOTAL								
AREA	1850.37							
LEAD	117.91	117.91	24.76	79.0%	71.33	39.5%	21.71	81.6%
COPPER	53.94	53.94	22.66	58.0%	38.30	29.0%	20.44	62.1%
ZINC	389.01	389.01	116.70	70.0%	252.86	35.0%	106.61	72.6%
CADMIUM	5.06	5.06	1.52	70.0%	3.29	35.0%	1.39	72.4%
PHSO	1147.31	1147.31	619.55	46.0%	883.43	23.0%	596.72	48.0%
SS	478375.21	478375.21	47837.52	90.0%	263106.36	45.0%	45063.76	90.6%
GRAND TOTAL								
AREA	2935.35							
LEAD	161.98	161.98	68.83	57.5%	115.41	28.8%	65.78	59.4%
COPPER	70.65	70.65	39.36	44.3%	55.01	22.1%	37.14	47.4%
ZINC	490.05	490.05	217.74	55.6%	353.90	27.8%	207.65	57.6%
CADMIUM	5.91	5.91	2.37	59.9%	4.14	29.9%	2.25	62.0%
PHSO	1256.06	1256.06	728.30	42.0%	992.18	21.0%	705.47	43.8%
SS	519959.72	519959.72	89422.04	82.8%	304690.88	41.4%	86648.28	83.3%

FUTURE ALLOUEZ

land use: com, high res, 1/2 med res., inst.

		DO NOTHING	FULL DET		1/2 DET		SWP 1X WEEK+ FULL DET	
CRITICAL AREA TOTAL								
AREA	213.06							
LEAD	33.24	33.24	6.98	79.0%	20.11	39.5%	4.55	86.3%
COPPER	14.19	14.19	5.96	58.0%	10.08	29.0%	4.89	65.5%
ZINC	94.77	94.77	28.43	70.0%	61.60	35.0%	26.28	72.3%
CADMIUM	0.84	0.84	0.25	70.0%	0.55	35.0%	0.23	72.5%
PHSO	161.59	161.59	87.26	46.0%	124.42	23.0%	76.58	52.6%
SS	74460.18	74460.18	7446.02	90.0%	40953.10	45.0%	4508.92	93.9%
GRAND TOTAL								
AREA	477.13							
LEAD	39.62	39.62	13.36	66.3%	26.49	33.1%	10.93	72.4%
COPPER	17.07	17.07	8.84	48.2%	12.95	24.1%	7.77	54.5%
ZINC	115.27	115.27	48.93	57.6%	82.10	28.8%	46.77	59.4%
CADMIUM	1.21	1.21	0.62	48.5%	0.92	24.3%	0.60	50.3%
PHSO	249.54	249.54	175.21	29.8%	212.37	14.9%	164.53	34.1%
SS	106250.02	106250.02	39235.86	63.1%	72742.94	31.5%	36298.76	65.8%

URBAN I & E MATERIALS AND EVENTS

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Printed Materials								
Newsletters	Area UWEX	$3,900	9,000	$3,900	9,000	$3,900	9,000	3 newsletters/year
Watershed folders	Area UWEX	750	1,000	---	---	---	---	Folders will be used for both urban and rural activities.
Fact Sheets	Area UWEX	NA	2,000	NA	2,000	NA	1,000	Fact Sheets from other watersheds will be used when available.
Existing printed materials[c] (reprinting and assembly)	Area UWEX District DNR	$3,000	2,000	$4,500	3,000	$6,000	4,000	Includes materials for workshops, exhibits and schools.
Marketing materials	Area UWEX	$2,200	1,000	$4,400	2,000	$4,400	2,000	Includes the design and printing of buttons, posters, bumper stickers, placemats, garbage bags, and condiment-rack displays for both urban and rural audiences.
Audio-visual Materials								
Watershed slide program	Area UWEX	---	---	$ 250	3	---	---	One slide program will be used for both urban and rural audiences.
Dial-A-Tip	Area UWEX County UWEX	---	4	---	4	---	4	
Media								
Radio PSA's	Area UWEX DNR			$ 100	2	$ 100	3	
Television PSA's	Area UWEX DNR			$ 500	1	$ 500	1	PSA's will be for both urban and rural audiences.

APPENDIX C

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Advisory Committee	Area UWEX LCD							See Urban I & E Matrix
Farmers	County UWEX LCD Area UWEX	---	---	$ 500	1	$ 500	1	
Demonstrations								
Conservation Tillage	County UWEX Area UWEX Local SCS LCD	---	---	$ 500	2	$ 500	2	Forage conservation tillage demonstrations will be maintained for three years.
Nutrient Management	County UWEX Area UWEX Local SCS	---	3	$ 300	3	$ 300	3	
Streambank protection	Area UWEX County UWEX DNR LCD	$ 500	2	$ 250	1	---	---	
Alternative cropping systems	Area UWEX County UWEX	---	---	$ 500	1	$ 500	1	
Signs								
Demonstration projects and road signs	Area UWEX LCD							See Urban I & E Matrix
Cooperator signs	LCD	NA	NA	NA	NA	NA	NA	
Workshops/Meetings								
Town Meetings	County UWEX LCD	---	10	---	---	---	---	Presentations will be part of the town board agenda.

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Annual Forage Profitability Seminar	County UWEX	---	1	---	1	---	1	
Forage Council Twilight Meeting	County UWEX	---	1	---	1	---	1	
UWEX Producer meetings	County UWEX	---	1	---	2	---	2	
Animal Housing Tour/ Workshop	County UWEX	---	---	---	1	---	1	
Quality Milk Workshop	County UWEX	---	---	---	1	---	1	
Youth								
Field Demonstrations/ Projects	Area UWEX County UWEX LCD	---	---	$ 500	1	$ 500	1	
Landowner access list	County UWEX LCD	---	1	---	1	---	1	List will be updated annually.
Streambank demonstration	Area UWEX County UWEX LCD DNR	NA	1	NA	1	NA	2	

[a] Years are based on the State Fiscal Year: July 1-June 30. Year 1 is the 1990-91 Fiscal Year.
[b] All cost estimates are in 1990 dollars.
[c] The identification and purchase of bulletins, fact sheets, brochures, booklets and magazine supplements produced by UW-Extension, DNR, EPA and other state and federal agencies will prevent unnecessary duplication of materials.

RURAL I & E MATERIALS AND EVENTS

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Printed Materials								
Watershed newsletters	Area UWEX	---	2,250	---	2,250	---	2,250	3 newsletters/year
Watershed folders	Area UWEX							See Urban I & E matrix.
Fact Sheets	Area UWEX County UWEX	NA	500	NA	500	NA	500	Fact sheets from other watersheds and state UWEX specialists will be used when available.
Existing Printed Materials[c] (reprinting and assembly)	Area UWEX County UWEX Local SCS LCD	$1,000	1,000	$2,000	2,000	$2,000	2,000	Includes materials for workshops and exhibits.
Marketing materials	Area UWEX							See Urban I & E Matrix.
Audio Visual								
Watershed slide program	Area UWEX							See Urban I & E Matrix.
Media								
Newsreleases	County UWEX	---	3	---	3	---	3	
Newspaper feature story	County UWEX Area UWEX LCD Local SCS	---	1	---	2	---	2	
Radio programs	County UWEX Local SCS	---	3	---	3	---	3	

Educational Material/ Event	Responsi- bility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Radio talk shows	Area UWEX LCD County UWEX	---	1	---	1	---	1	
Radio PSA's	Area UWEX DNR	---	---	$ 100	1	$ 100	1	
Television interviews	Area UWEX County UWEX LCD Local SCS	---	5	---	5	---	5	
Television news features	County UWEX LCD Local SCS Area UWEX	---	1	---	1	---	1	
Local Shows and Events								
WPS Materials Handling Exposition	Area UWEX County UWEX	---	1	---	1	---	1	
Farm Progress Days	Area UWEX DNR	$5,000	1	---	---	$ 200	1	Year 1 costs will be for NPS educational display/model.
Conservation Tillage Field Day	County UWEX Area UWEX Local SCS LCD	---	---	$1,000	2	$ 500	1	Most costs will be covered by in-kind contributions.
Tours								
Local Officials	Area UWEX County UWEX LCD							See Urban I & E Matrix.

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Television interviews	Area UWEX County UWEX LCD, DNR	---	2	---	3	---	3	
Television news features	Area UWEX DNR	---	2	---	2	---	2	
Information Meeting	Area UWEX DNR	$ 500	13	---	---	---	---	Individual breakfast or luncheon meetings will be held with the larger media contacts.
News releases	Area UWEX DNR	---	4	---	4	---	4	
Newspaper feature story	Area UWEX DNR Local Government	---	2	---	2	---	2	
Radio programs	County and Area UWEX	---	4	---	4	---	4	
Radio talk shows	Area UWEX LCD DNR	---	1	---	1	---	1	
Local Shows and Events								
County events (Home & Garden Show, Boat Show, Sports Fishing Show, Wildlife Days)	Area UWEX DNR LCD	$1,500	3	$1,500	3	$1,500	3	Displays will be a joint effort with the RAP.
River/Bay Clean-Up Day	Area UWEX DNR LCD	$1,250	1	$1,250	1	$1,250	1	Costs are covered by in-kind contributions from local businesses.

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Tours								
Local officials	Area UWEX Local Governments DNR	$ 350	1	---	---	$ 350	1	Both urban and rural sites will be included.
Advisory Committee	Area UWEX DNR LCD	$ 350	1	---	---	$ 350	1	Both urban and rural sites will be included.
Demonstrations								
Showcase of Homes/ residential construction site erosion control	Area UWEX Local Government Home Builders' Assoc. LCD	$3,000	2	$3,000	2	$ 3,000	2	
City of DePere Stormwater Mngt.	LCD DNR Local Government	$400,000	1	$4,000	1	---	---	A permanent sign will be placed in the picnic area during the second year.
Model Yards	County UWEX Area UWEX	---	---	$1,000	1	$2,000	2	Landscaping for stormwater management.
Streambank stabilization	LCD Local Government	---	---	$5,000	1	---	---	
Signs								
Demonstration Projects and road signs	Area UWEX LCD	$7,500	25	---	---	---	---	Includes rural demonstration project and road signs
Workshops								
Construction erosion control	Area UWEX Local Government DNR	$1,500	3	---	---	---	---	

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Storm-water Management	Area UWEX DNR Local Government	---	---	---	---	NA	NA	
Meetings Community groups	Area UWEX DNR	---	NA	---	NA	---	NA	Includes Speaker's Bureau work and speaking engagements for professional associations, businesses, organizations and other targeted groups.
Local Governments	Area UWEX Local Government DNR	---	10	---	NA	---	NA	
Schools and Youth Youth Group Programs	Area UWEX County UWEX DNR LCD	---	---	NA	NA	NA	NA	Assist youth organizations with environmental projects.
Community events	Area UWEX County UWEX DNR LCD	NA	1	NA	2	NA	2	Youth group participation in community events and projects.
In-Service training	DNR Curriculum Coordinators Area UWEX	---	2	---	2	---	2	
Curriculum infusion	DNR Curriculum Coordinators Area UWEX	NA	NA	NA	NA	NA	NA	

Educational Material/ Event	Responsibility	Year 1[a] Estimated[b] Costs	Year 1[a] Number	Year 2[a] Estimated[b] Costs	Year 2[a] Number	Year 3[a] Estimated[b] Costs	Year 3[a] Number	Comments
Learning activities	Area UWEX DNR	NA	1	NA	1	NA	1	Includes "Adopt-A-Stream" and other "hands-on" activities.
"Outdoor Classroom"	Area UWEX School administrators, LCD	---	---	NA	1	NA	1	

[a] Years are based on the State Fiscal Year: July 1-June 30. Year 1 is the 1990-91 Fiscal Year.
[b] All cost estimates are in 1990 dollars.
[c] The identification and purchase of bulletins, fact sheets, brochures, booklets and magazine supplements produced by UW-Extension, DNR, EPA and other state and federal agencies will prevent unnecessary duplication of materials.

APPENDIX D
GLOSSARY

ACUTE TOXICITY:
Any poisonous effect produced by a single short-term exposure to a chemical that results in a rapid onset of severe symptoms.

ADVANCED WASTEWATER TREATMENT:
The highest level of wastewater treatment for municipal treatment systems. It requires removal of all but 10 parts per million of suspended solids and biological oxygen and/or 50 percent of the total nitrogen. Advanced wastewater treatment is also known as " tertiary treatment."

AGRICULTURAL CONSERVATION PROGRAM (ACP):
A federal cost-sharing program to help landowners install measures to conserve soil and water resources. ACP is administered by the USDA ASCS through county ACP committees.

ALGAE:
A group of microscopic, photosynthetic water plants. Algae give off oxygen during the day as a product of photosynthesis and consume oxygen during the night as a result of respiration. Thus algae effect the oxygen content of water. Nutrient-enriched water increases algae growth.

AMMONIA:
A form of nitrogen (NH_3) found in human and animal wastes. Ammonia can be toxic to aquatic life.

ANAEROBIC:
Without oxygen.

AREA OF CONCERN:
Areas of the Great Lakes identified by the International Joint Commission (IJC) as having serious water pollution problems.

AREAWIDE WATER QUALITY MANAGEMENT PLANS (208 PLANS):
A plan to document water quality conditions in a drainage basin and make recommendations to protect and improve basin water quality. Each basin in Wisconsin must have a plan prepared for it, according to section 208 of the Clean Water Act.

ANTIDEGRADATION:

A policy which states that water quality will not be lowered below background levels unless justified by economic and social development considerations. Wisconsin's antidegradation policy is currently being revised to make it more specific and meet EPA guidelines.

AVAILABILITY:

The degree to which toxic substances or other pollutants that are present in sediments or elsewhere in the ecosystem are available to affect or be taken up by organisms. Some pollutants may be "bound up" or unavailable because they are attached to clay particles or are buried by sediment. The amount of oxygen, pH, temperature and other conditions in the water can affect availability.

BACTERIA:

Single-cell, microscopic organisms. Some can cause disease, and some are important in the stabilization of organic wastes.

BASIN PLAN:

See "Areawide Water Quality Management Plan".

BENTHIC ORGANISMS (BENTHOS):

The organisms living in or on the bottom of a lake or stream.

BEST MANAGEMENT PRACTICE (BMP):

The most effective, practical measures to control nonpoint sources of pollutants that runoff from land surfaces.

BIOACCUMULATION:

The uptake and retention of substances by an organism from its surrounding medium and from its food. Chemicals move through the food chain and tent to end up at higher concentrations in organisms at the upper end of the food chain such as predator fish, or in people or birds that eat these fish.

BIOASSAY STUDY:

A test for pollutant toxicity. Tanks of fish or other organisms are exposed to varying doses of treatment plant effluent; lethal doses of pollutants in the effluent are thus determined.

BIOCHEMICAL OXYGEN DEMAND (BOD):

A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. BOD_5 is the biochemical oxygen demand measured in a five day test. The greater the degree of pollution, the higher the BOD_5.

BIODEGRADABLE:

Waste which can be broken down by bacteria into basic elements. Most organic wastes such as food remains and paper are biodegradable.

BIOTA:

All living organisms that exist in an area.

BUFFER STRIPS:

Strips of grass or other erosion-resisting vegetation between disturbed areas and a stream or lake.

BULKHEAD LINES:

Legally established lines which indicate how far into a stream or lake an adjacent property owner has the right to fill. Many of these lines were established many years ago and allow substantial filling of the bed of the River and Bay. Other environmental laws may limit filling to some degree.

CARCINOGENIC:

A chemical capable of causing cancer.

CATEGORICAL LIMITS:

All point source discharges are required to provide a basic level of treatment. For municipal wastewater treatment plants this is secondary treatment (30 mg/1 effluent limits for SS and BOD). For industry the level is dependent on the type of industry and the level of production. More stringent effluent limits are required if necessary to meet water quality standards.

CHLORINATION:

The application of chlorine to wastewater to disinfect it and kill bacteria and other organisms.

CHLORORGANIC COMPOUNDS (CHLORORGANICS):

A class of chemicals which contain chlorine, carbon and hydrocarbon. Generally refers to pesticides and herbicides that can be toxic. Examples include PCB's and pesticides such as DDT and dieldrin.

CHRONIC TOXICITY:

The effects of long-term exposure of organisms to concentrations of a toxic chemical that are not lethal is injurious or debilitating to an organism in one or more ways. An example of the effect of chronic toxicity could be reduced reproductive success.

CLEAN WATER ACT:

See "Public Law 92-500."

COMBINED SEWERS:

A wastewater collection system that carries both sanitary sewage and stormwater runoff. During dry weather, combined sewers carry only wastewater to the treatment plant; during heavy rainfall, the sewer becomes swollen with stormwater. Because the treatment plant cannot process the excess flow, untreated sewage is discharged to the plant's receiving waters, i.e., combined sewer outflow.

CONFINED DISPOSAL FACILITY (CDF):

A structure built for the containment and disposal of dredged material.

CONGENERS:

Chemical compounds that have the same molecular composition, but have different molecular structures and formula. For example, the congeners of PCB have chlorine located at different spots on the molecule. These differences can cause differences in the properties and toxicity of the congeners.

CONSERVATION TILLAGE:

Planting row crops while disturbing the soil only slightly. In this way a protective layer of plant residue says in the surface; erosion is decreases.

CONSUMPTION ADVISORY:

A health warning issues by WDNR and WDHSS that recommends that people limit the fish they eat from some rivers and lakes based on the levels of toxic contaminants found in the fish.

CONTAMINANT:

Some material that has been added to water that is not normally present. This is different from a pollutant, as a pollutant suggests that there is too much of the material present.

CONVENTIONAL POLLUTANT:

Refers to suspended solids, fecal coliforms, biochemical oxygen demand, and pH, as opposed to toxic pollutants

COST-EFFECTIVE:

A level of treatment or management with the greatest incremental benefit for the money spent.

CRITERIA:

See water quality standard criteria.

DDT:

A chlorinated hydrocarbon insecticide that has been banned because of its persistence in the environment.

DIOXIN (2,3,7,8-tetrachlorodibenso-p-dioxin):
A chlorinated organic chemical which is highly toxic.

DISINFECTION:
A chemical or physical process that kills organism that cause disease. Chlorine is often used to disinfect wastewater.

DISSOLVED OXYGEN (DO):
Oxygen dissolved in water. Low levels of dissolved oxygen cause bad smelling water and threaten fish survival. Low levels of dissolved oxygen are often due to inadequate wastewater treatment. The Department of Natural Resources considers 5 ppm DO necessary for fish and aquatic life.

DREDGING:
Removal of sediment from the bottom of water bodies.

ECOSYSTEM:
The interacting system of biological community and its nonliving surrounding.

EFFLUENT:
Solid, liquid or gas wastes (byproducts) which are disposed on land, in water or in air. As used in the RAP generally means wastewater discharges.

EFFLUENT LIMITS:
The Department of Natural Resources issues WPDES permits that establish the maximum amount of pollutant that can be discharged to a receiving stream. Limits depend on the pollutant involved and the water quality standards that apply for the receiving waters.

EMISSION:
A direct (smokestack particles) or indirect (busy shopping center parking lot) release of any contaminant into the air.

ENVIRONMENTAL PROTECTION AGENCY (USEPA):
The federal agency responsible for enforcing federal environmental regulations. The Environmental Protection Agency delegates some of its responsibilities for water, air and solid waste pollution control to state agencies.

ENVIRONMENTAL REPAIR FUND:
A fund established by the Wisconsin Legislature to deal with abandoned landfills.

EPIDEMIOLOGY:
The study of diseases as they affect populations rather than individuals, including the distribution and incidence of a disease mortality and morbidity rated, and the

relationship of climate, age, sex, race and other factors. EPA uses such data to establish national air quality standards.

EROSION:
The wearing away of the land surface by wind or water.

EUTROPHIC:
Refers to a nutrient-rich lake. Large amounts of algae and weeds characterize a eutrophic lake (see also "Oligotrophic" and "Mesotrophic").

EUTROPHICATION:
The process of nutrient enrichment of a lake loading to increased production of aquatic organisms. Eutrophication can be accelerated by human activity such as agriculture and improper waste disposal.

FACILITY PLAN:
A preliminary planning and engineering document that identifies alternative solutions to a community's wastewater treatment problems.

FECAL COLIFORM:
A group of bacteria used to indicate the presence of other bacteria that cause disease. The number of coliform is particularly important when water is used for drinking and swimming.

FISHABLE AND SWIMMABLE:
Refers to the water quality goal set for the nation's surface waters by Congress in the Clean Water Act. All waters were to meet this goal by 1984.

FLOURANTHENE:
A polyaromatic hydrocarbon (PHA) with toxic properties.

FLY ASH:
Particulates emitted from coal burning and other combustion, such as wood burning, and exited into the air from stacks, or more likely, collected by electrostatic precipitators.

FOOD CHAIN:
A sequence of organisms in which each uses the next as a food source.

FURANS (2,3,7,8-tetra-chloro-dibenzpfurans):
A chlorinated organic compound which is highly toxic.

GREEN STRIPS:
See buffer strip.

GROUNDWATER:

Underground water-bearing areas generally within the boundaries of a watershed, which fill internal passageways of porous geologic formations (aquifers) with water which flows in response to gravity and pressure. Often used by the source of water for communities and industries.

HABITAT:

The place or type of site where a plant or animal naturally lives and grows.

HEAVY METALS:

Metals present in municipal and industrial wastes that pose long-tern environmental hazards if not properly disposed. Heavy metals can contaminate ground and surface waters, fish and other food stuffs. The metals of most concern are: Arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium and zinc (see also separate listings of these metals for their health effects).

HERBICIDE:

A type of pesticide that is specifically designed to kill plants and can also be toxic to other organisms.

HYDROCARBONS:

Any of a large family of chemicals containing carbon and hydrogen in various combinations.

INCINERATOR:

A furnace designed to burn wastes.

INFLUENT:

Influent for an industry would be the river water that the plant intakes for use in its processing. Influent to a municipal treatment plant is untreated wastewater.

IN-PLACE POLLUTION:

As used in the RAP refers to pollution from contaminated sediments. These sediments are polluted from post discharges from municipal and industrial sources.

INTERNATIONAL JOINT COMMISSION (IJC):

An agency formed by the United States and Canada to guide management of the Great Lakes and resolve border issues.

ISOROPYLBIPHENYL:

A chemical compound used as a substitute for PCB.

LANDFILL:

A conventional sanitary landfill is "a land disposal site employing an engineered method of disposing of solid wastes on land in a manner that minimizes environmental hazards by spreading solid wastes in thin layers, materials at the end of each operating day". Hazardous wastes frequently require various types of pretreatment before they are disposed of, i.e., neutralization chemical fixation encapsulation. Neutralizing and disposing of wastes should be considered a last resort. Repurifying and reusing waste materials or recycling them for another use may be less costly.

LC-1:

The concentration that results in 1 percent mortality of the test animal populations exposed to the contaminant.

LC_{50}:

Lethal concentration for 50 percent of the test population exposed to a toxicant substance.

LD_{50}:

Lethal dose for 50 percent of the test population exposed to a toxicant substance.

LEACHATE:

The contaminated liquid which seeps from a pile or cell of solid materials and which contains water, dissolved and decomposing solids. Leachate may enter the groundwater and contaminate or inking water supplies.

LOAD:

The total amount of materials or pollutants reaching a given local.

MACROPHYTE:

A rooted aquatic plant.

MASS:

The amount of material a substance contains after measured by its weight (in a gravitational field).

MASS BALANCE:

A study that examines all parts of the ecosystem to determine the amount of toxic or other pollutant present, its sources, and the processes by which the chemical moves through the ecosystem.

MESOTROPHIC:

Refers to a moderately fertile nutrient level of a lake between the oligotrophic and eutrophic levels. (See also "Eutrophic" and "Oligotrohpic.")

MILLIGRAMS PER LITER (mg/1):

A measure of the concentration of substance in water. For most pollution measurement this is the equivalent to "parts per million".

MITIGATION:

The effort to lessen the damages caused, by modifying a project, providing alternatives, compensating for losses. or replacing lost values.

MIXING ZONE:

The portion of a stream or lake in which effluent is allowed to mix with the receiving water. The size of the area depends on the volume and flow of the discharge and receiving water. For streams the mixing zone is one-third of the lowest flow that occurs once every 10 years for a seven day period.

NONPOINT SOURCE POLLUTION (NSP):

Pollution whose sources cannot be traced to a single point such as a municipal or industrial wastewater treatment plant discharge pipe. Nonpoint sources include eroding farmland and construction sites, urban streets, and barnyards. Pollutants from these sources reach water bodies in runoff, which can best be controlled by proper land management.

NPS:

See nonpoint source pollution.

OLIGOTROPHIC:

Refers to an unproductive and nutrient-poor lake. Such lakes typically have very clear water. (See also "Eutrophic" and "Mesotrophic.")

OUTFALL:

The mouth of a sewer, drain, or pipe where effluent from a wastewater treatment plant is discharged.

PATHOGEN:

Any infective agent capable of producing disease; may be a virus, bacterium, protozoan, etc.

PELAGIC:

Referring to open water portion of a lake.

PESTICIDE:

Any chemical agent used for control of specific organisms, such as insecticides, herbicides, fungicides, etc.

PH:

A measure of acidity or alkalinity, measured on a scale of 0 to 14 with 7 being neutral and 0 being most acid, and 14 being most alkaline.

PHENOLS:

Organic compounds that are byproducts of petroleum refining, textile, dye, and resin manufacture. High concentrations can cause taste and odor problems in fish. Higher concentration can be toxic to fish and aquatic life.

PHOSPHORUS:

A nutrient that when reaching lakes in excess amounts can lead to overfertile conditions and algae blooms.

PLANKTON:

Tiny plants and animals that live in water.

POINT SOURCES:

Sources of pollution that have discrete discharges, usually from a pipe or outfall.

POLLUTION:

The presence of materials or energy whose nature, location, or quantity produces undesired environmental effects.

POLYCHLORINATED BIPHENYLS(PCBs):

A group of 209 compounds, PCBs have been manufactured since 1929 for such common uses as electrical insulation and heating/cooling equipment, because they resist wear and chemical breakdown. Although banned in 1979 because of their toxicity, they have been detected on air, land and water, and recent surveys have found PCBs in every section for the country, even those remote from PCB manufacturers.

POLYCHLORINATED ORGANIC COMPOUNDS:

A group of toxic chemicals which contains several chlorine atoms.

PRETREATMENT:

A partial wastewater treatment required from some industries. Pretreatment removes some types of industrial pollutants before the wastewater is discharged to a municipal wastewater treatment plant.

PRIORITY POLLUTANT:

A list of toxic chemicals identified by the federal government because of their potential impact in the environment and human health. Major discharges are required to monitor for all or some of these chemicals when their WPDES permits are reissued.

PRIORITY WATERSHED:

A drainage area about 100,000 acres in size selected to receive Wisconsin Fund money to help pay the cost of controlling nonpoint source pollution. Because money is limited, only watersheds where problems are critical, control is practical, and cooperation is likely are selected for funding.

PRODUCTIVITY:

A measure of the amount of living matter which is supported by an environment over a specific period of time. Often described in terms of algae production for a lake.

PUBLIC LAW 92-500 (CLEAN WATER ACT):

The federal law that set national policy for improving and protecting the quality of the nation's waters. The law set a timetable for the cleanup of the nation's waters and stated that they are to be fishable and swimmable. This also required all discharges of pollutants to obtain a permit and meet the conditions of the permit. To accomplish this pollution cleanup billions of dollars have been made available to help communities pay the cost of building sewage treatment facilities. Amendments in the Clean Water Act were made in 1977 by passage of Public Law 95-217, and in 1987.

PUBLIC PARTICIPATION;

The active involvement of interested and affected citizens in governmental decision-making.

PUBLICLY OWNED TREATMENT WORKS (POTW):

A wastewater treatment plan owned by a city, village or other unit of government.

RAP:

See Remedial Action Plan.

RECYCLING:

The process by which waste materials are transformed into new products.

REMEDIAL ACTION PLAN:

A plan designed to restore beneficial uses to a Great Lakes Area of Concern.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RF/FS):

An investigation of problems and assessment of management options conducted as part of a superfund project.

RESOURCE CONSERVATION AND RECOVERY ACT OF 1976 (RCRA):

This federal law amends the Solid Waste Disposal Act of 1965 and expands on the Resource Recovery Act of 1970 to provide a program which regulates hazardous

wastes, to eliminate open dumping and to promote solid waste management programs.

RETRO-FIT:
The placement of an urban structural practice in an existing urban area, which may involve rerouting existing storm sewers and/or relocating existing buildings or other structures.

RIPARIAN:
Belonging or relating to the bank of a lake, river or stream.

RIPRAP:
Broken rock, cobbles, or boulders placed on the bank of a stream to protect it against erosion.

RULE:
Refers to Wisconsin administrative rules. See Wisconsin Administrative Code.

RUNOFF:
Water from rain, snow melt, or irrigation that flows over the ground surface and returns to streams. Runoff can collect pollutants from air or land and carry them to receiving waters.

SECONDARY IMPACTS:
The indirect effects that an action can have on the health of the ecosystem or the economy.

SECONDARY TREATMENT:
Two-stage wastewater treatment that allows the coarse particles to settle out, as in primary treatment, followed by biological breakdowns of the remaining impurities. Secondary treatment commonly removes 90 percent of the impurities. Sometimes "secondary treatment" refers simply to the biological part of the treatment process.

SEDIMENT:
Soil particles suspended in and carried by water as a result of erosion.

SEICHES:
Changes in water levels due to the tipping of water in an elongated lake basin whereby water is raised in one end of the basin and lowered in the other.

SEPTIC SYSTEM:
Sewage treatment and disposal for homes not connected to sewer lines. Usually the system includes a tank and drain field. Solids settle to the bottom of the tank; liquid percolates through the drain field.

SLUDGE:
A byproduct of wastewater treatment; waste solids suspended in water.

SOLID WASTE:
Unwanted or discharged material with insufficient liquid to be free flowing.

STANDARDS:
See water quality standards.

STORM SEWERS:
A system of sewers that collect and transport rain and snow runoff. In areas that have separated sewers, such stormwater is not mixed with sanitary sewage.

SUPERFUND:
A federal program which provides for cleanup of major hazardous landfills and land disposal areas.

SUSPENDED SOLIDS (SS):
Small particles of solid pollutants suspended in water.

SYNERGISM:
The characteristic property of a mixture of toxicants that exhibits a greater-that-additive cumulative toxic effect.

TACs:
Technical advisory committees that assisted in the development of the Remedial Action Plan.

TERTIARY TREATMENT:
See advanced wastewater treatment.

TOP-DOWN MANAGEMENT:
A management theory that uses biomanipulation, specifically the stocking of predator species of fish to improve water quality.

TOTAL MAXIMUM DAILY LOADS:
The maximum amount of a pollutant that can be discharged into a stream without causing a violation of water quality standards.

TOXIC:
An adjective that describes a substance which is poisonous, or can kill or injure a person or plants and animals upon direct contact or long-term exposure. (Also, see toxic substance.)

TOXIC SUBSTANCE:

A chemical or mixture of chemicals which through sufficient exposure, or ingestion, inhalation of assimilation by an organism, either directly from the environment or indirectly by ingestion through the food chain, will, on the basis of available information cause death, disease, behavioral or immunologic abnormalities, cancer, genetic mutations, or development of physiological malfunctions, including malfunctions in reproduction or physical deformations, in organisms or their offspring.

TOXICANT:

See toxic substance.

TOXICITY:

The degree of danger posed by a toxic substance to animal or plant life. Also see acute toxicity, chronic toxicity and additivity.

TOXICITY REDUCTION EVALUATION:

A requirement for a discharger that the causes of toxicity in an effluent be determined and measures taken to eliminate the toxicity. The measures may be treatment, product substitution, chemical use reduction or other actions that will achieve the desired result.

TREATMENT PLANT:

See wastewater treatment plant.

TROPHIC STATUS:

The level of growth or productivity of a lake as measured by phosphorus content, algae abundance, and depth of light penetration.

TURBIDITY:

Lack of water clarity. Turbidity is usually closely related to the amount of suspended solids in water.

UNIVERSITY OF WISCONSIN-EXTENSION (UWEX):

A special outreach, education branch of the state university system.

VARIANCE:

Government permission for a delay or exception in the application of a given law, ordinance or regulation. Also, see water quality standard variance.

VOLATILE:

Any substance that evaporates at a low temperature.

WASTELOAD ALLOCATION:

Division of the amount of waste a stream can assimilate among the various dischargers to the stream. Results in the limit on the amount (in pounds) of chemical or biological constituent discharged from a wastewater treatment plant to a water body.

WASTEWATER:
Water that has become contaminated as a byproduct of some human activity. Wastewater includes sewage, washwater and the water-borne wastes of industrial processes.

WASTE:
Unwanted materials left over from manufacturing processes, refuse from places of human habitation or animal habitation.

WASTEWATER TREATMENT PLANT:
A facility for purifying wastewater. Modern wastewater treatment plants are capable of removing 95 percent of organic pollutants.

WATER QUALITY AGREEMENT:
The Great Lakes Water Quality agreement was initially signed by Canada and the United States in 1972 and was subsequently revised in 1978 and 1987. It proves guidance for the management of water quality, specifically phosphorus and toxics, in the Great Lakes.

WATER QUALITY LIMITED SEGMENT:
A section of river where water quality standards will not be met if only categorical effluent standards are met.

WATER QUALITY CRITERIA:
A measure of the physical, chemical or biological characteristics of a water body necessary to protect and maintain different water uses (fish and aquatic life, swimming, etc.).

WATER QUALITY STANDARDS:
The legal basis and determination of the use of a water body and the water quality criteria, physical, chemical, or biological characteristics of a water body, that must be met to make it suitable for the specified use.

WATER QUALITY STANDARD VARIANCE:
When natural conditions of a water body preclude meeting all conditions necessary to maintain full fish and aquatic life and swimming a variance may be granted.

WATERSHED:
The land area that drains into a lake or river.

WETLANDS:

Those areas that are inundates or saturated by surface or groundwater at a frequency and duration sufficient to support a variety of vegetative or aquatic life. Wetland vegetation requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas.

WISCONSIN ADMINISTRATIVE CODE:

The set of rules written and used by state agencies to implement state statutes. Administrative codes are subject to public hearing and have the force of law.

WISCONSIN FUND:

A state program that helps pay the cost of reducing water pollution. Funding for the program comes from general revenues and bonds and is based on a percentage of the state;s taxable property value. The Wisconsin Fund includes these programs:

Point Source Water Pollution Abatement Grant Program - Provides grants for 60 percent of the cost of constructing wastewater treatment facilities. Most of this program's money goes for treatment plant construction, but three percent of this fund is available for repair or replacement of private , onsite sewer systems.

Nonpoint Source Water Pollution Abatement Grant Program - Funds to share the cost of reducing water pollution nonspecified sources are available in selected priority watersheds.

Solid Waste Grant Program - Communities planning for solid waste disposal sites are eligible for grant money. $500,000 will be available each year to help with planning costs.

WISCONSIN NONPOINT SOURCE WATER POLLUTION ABATEMENT GRANT PROGRAM:

A state cost-share program established by the State Legislature in 1978 to help pay the costs of controlling nonpoint source pollution. Also known as the nonpoint source element of the Wisconsin Fund or the Priority Watershed Program.

WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES):

A permit system to monitor and control the point source dischargers of wastewater in Wisconsin. Dischargers are required to have a discharge permit and meet the conditions it specifies.

PRIORITY WATERSHED PROJECTS IN WISCONSIN
1991

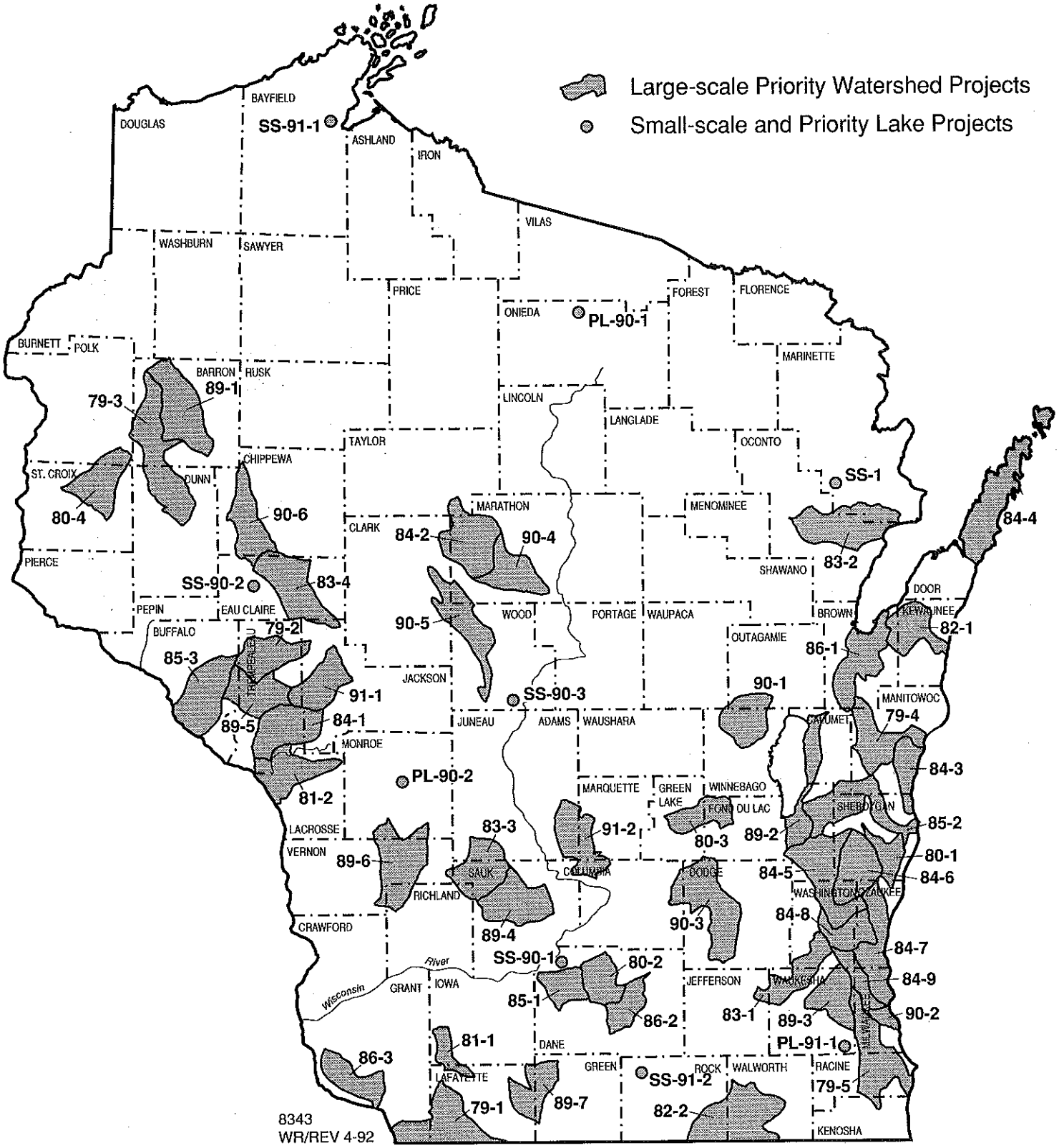
Map Number	Large-scale Priority Watershed Project	County(ies)	Year Project Selected
79-1	Galena River*	Grant, Lafayette	1979
79-2	Elk Creek*	Trempealeau	1979
79-3	Hay River*	Barron, Dunn	1979
79-4	Lower Manitowoc River*	Manitowoc, Brown	1979
79-5	Root River*	Racine, Milwaukee, Waukesha	1979
80-1	Onion River*	Sheboygan, Ozaukee	1980
80-2	Sixmile-Pheasant Branch Creek*	Dane	1980
80-3	Big Green Lake	Green Lake, Fond du Lac	1980
80-4	Upper Willow River*	Polk, St. Crox	1980
81-1	Upper West Branch Pecatonica River*	Iowa, Lafayette	1981
81-2	Lower Black River	La Crosse, Trempealeau	1981
82-1	Kewaunee River	Kewaunee, Brown	1982
82-2	Turtle Creek	Walworth, Rock	1982
83-1	Oconomowoc River	Waukesha, Washington, Jefferson	1983
83-2	Little River	Oconto, Marinette	1983
83-3	Crossman Creek/Little Baraboo River	Sauk, Juneau, Richland	1983
83-4	Lower Eau Claire River	Eau Claire	1983
84-1	Beaver Creek	Trempealeau, Jackson	1984
84-2	Upper Big Eau Pleine River	Marathon, Taylor, Clark	1984
84-3	Sevenmile-Silver Creeks	Manitowoc, Sheboygan	1984
84-4	Upper Door Peninsula	Door	1984
84-5	East & West Branch Milwaukee River	Fond du Lac, Washington, Sheboygan, Dodge, Ozaukee	1984
84-6	North Branch Milwaukee River	Sheboygan, Washington, Ozaukee, Fond du Lac	1984
84-7	Milwaukee River South	Ozaukee, Milwaukee	1984
84-8	Cedar Creek	Washington, Ozaukee	1984
84-9	Menomonee River	Milwaukee, Waukesha, Ozaukee, Washington	1984
85-1	Black Earth Creek	Dane	1985
85-2	Sheboygan River	Sheboygan, Fond du Lac, Manitowoc, Calumet	1985
85-3	Waumandee Creek	Buffalo	1985
86-1	East River	Brown, Calumet	1986
86-2	Yahara River —Lake Monona	Dane	1986
86-3	Lower Grant River	Grant	1986
89-1	Yellow River	Barron	1989
89-2	Lake Winnebago East	Calumet, Fond du Lac	1989
89-3	Upper Fox River (Ill.)	Waukesha	1989
89-4	Narrows Creek — Baraboo River	Sauk	1989
89-5	Middle Trempealeau River	Trempealeau, Buffalo	1989
89-6	Middle Kickapoo River	Vernon, Monroe, Richland	1989
89-7	Lower East Branch Pecatonica River	Green, Lafayette	1989
90-1	Arrowhead River & Daggetts Creek	Winnebago, Outagamie, Waupaca	1990
90-2	Kinnickinnic River	Milwaukee	1990
90-3	Beaverdam River	Dodge, Columbia, Green Lake	1990
90-4	Lower Big Eau Pleine River	Marathon	1990
90-5	Upper Yellow River	Wood, Marathon, Clark	1990
90-6	Duncan Creek	Chippewa, Eau Claire	1990
91-1	Upper Trempealeau River	Jackson, Trempealeau	1991
91-2	Neenah Creek	Adams, Marquette, Columbia	1991

Map Number	Small-scale Priority Watershed Project	County(ies)	Year Project Selected
SS-1	Bass Lake*	Marinette	1985
SS-90-1	Dunlap Creek	Dane	1990
SS-90-2	Lowes Creek	Eau Claire	1990
SS-90-3	Wood County Groundwater Prototype	Wood	1990
SS-91-1	Whittlesey Creek	Bayfield	1991
SS-91-2	Spring Creek	Rock	1991

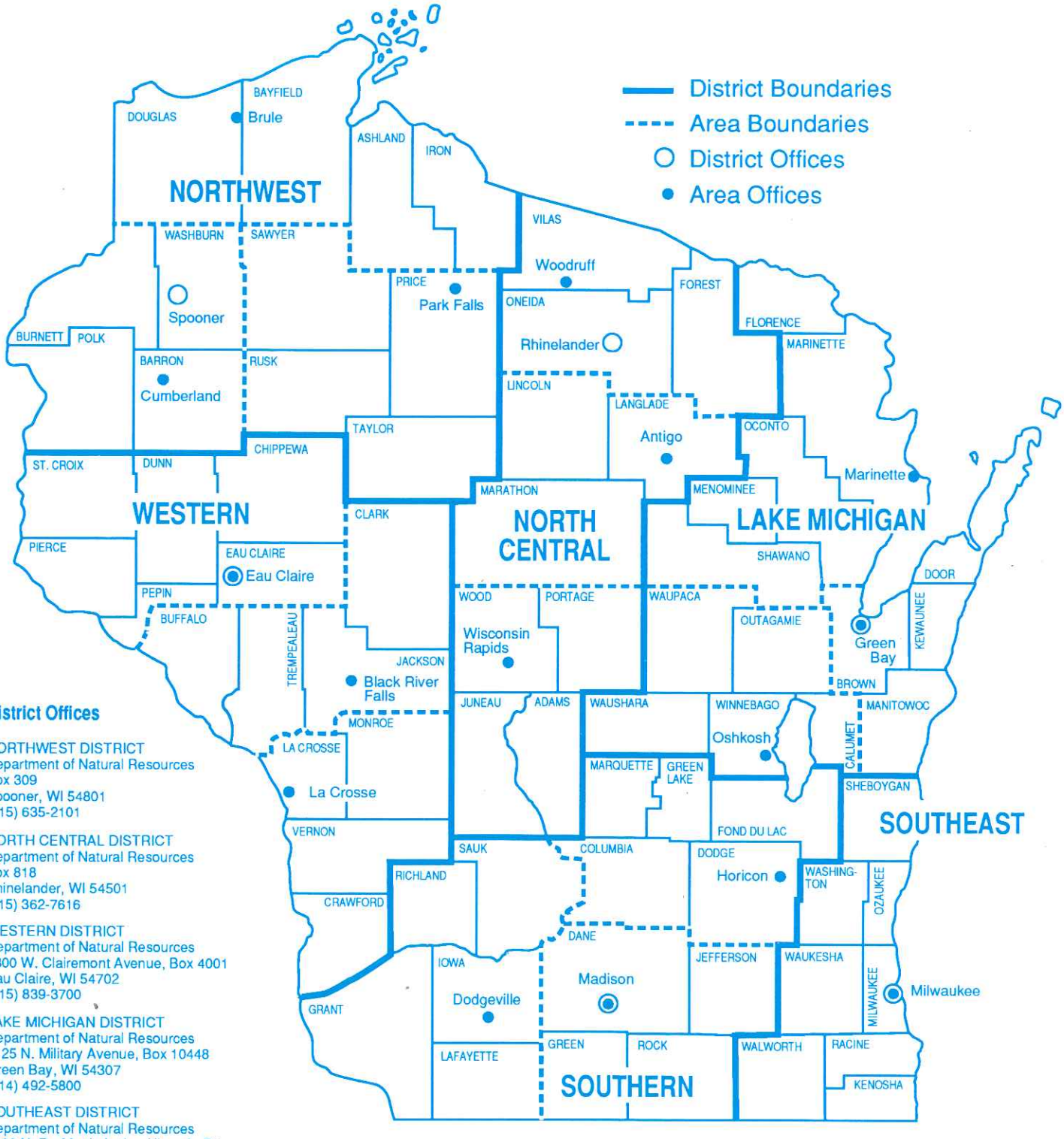
Map Number	Priority Lake Project	County(ies)	Year Project Selected
PL-90-1	Minocqua Lake	Oneida	1990
PL-90-2	Lake Tomah	Monroe	1990
PL-91-1	Little Muskego, Big Muskego and Wind Lakes	Waukesha, Racine, Milwaukee	1991

** Project completed*

Priority Watershed Projects in Wisconsin
1991



DNR Field Districts and Areas



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REV 8/91

OUR MISSION:

To protect and enhance our Natural Resources —
our air, land and water;
our wildlife, fish and forests.

To provide a clean environment
and a full range of outdoor opportunities.

To insure the right of all Wisconsin citizens
to use and enjoy these resources in
their work and leisure.

And in cooperation with all our citizens
to consider the future
and those who will follow us.

WISCONSIN
DEPT. OF NATURAL RESOURCES

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