Sources in this management category that are not technically feasible to control may be placed in Management Category II upon approval by the Department.

Management Category II: Remaining streambank sites are placed in this category.

As discussed elsewhere in this plan, the removal of dams along the Milwaukee River and its tributaries may result in exposed lakebeds that are highly suspectable to the erosive action of rainfall, runoff, and streamflow. Where habitat rehabilitation efforts involving dam removal occur, the need for streambank protection measures and critical area seeding will be assessed. Where warranted, stabilization of the lakebed and streambanks will be considered eligible for technical and financial assistance through the nonpoint source program.

Rural Pollution Source Control Summary

A regional and watershed summary of the agricultural nonpoint sources targeted for control under this strategy is presented in Table 61. Sources targeted for control include the following:

1. 63 barnyards delivering an estimated 1,116 pounds of phosphorus under the 10-year, 24 hour rain event.

2. 14,609 acres of eroding uplands delivering an estimated 3,155 tons of sediment annually to surface waters.

3. 23,405 feet of streambank degradation spread out over 76 sites, that deliver an estimated 421 tons of sediment annually to surface waters.

4. 1,237 critical acres estimated to be winterspread with manure each year by an estimated 101 livestock operations.

5. In addition, 20 barnyards that may be impacting pocket wetlands or groundwater have been targeted for further investigation.

The greatest pollution control activity will occur in the Lower Mainstem Region, followed closely by activity in the West and Upper Mainstem Region. Control activity will be relatively light in the East Region.

Tables 62, 63, and 64 show the distribution by subwatershed of targeted sources within each of these regions. Efforts to control sediment from uplands will dominate activity in the East Region, with most of the reduction targeted for the WaterCress Creek and Parnell Creek subwatersheds.

Control efforts will be broadened in the West and Upper Mainstem Region, to include more barnyard runoff controls and some streambank protection work in addition to the upland controls. Wayne Marsh Subwatershed will be a focal point for the control of barnyard runoff, sediment delivered from uplands, and for the repair of degraded streambanks. Other subwatersheds will have an important, but less intensive, level of effort.

Control efforts will be relatively intense in several subwatersheds within the Lower Mainstem Region. Kewaskum Subwatershed will have a high level of effort for the control of barnyards and upland erosion. West Bend and Quaas Creek subwatersheds will have a high level of effort for the control of sediment delivered from upland erosion and for the control of streambank degradation.

This agricultural strategy targets an estimated 50 percent of the watershed's total sediment load. Approximately five percent of this control will come from streambank protection, and 45 percent will come from control of sediment delivered from uplands.

This agricultural strategy also targets an estimated 45 percent of the watershed's total phosphorus load. Approximately 25 percent of this control will come from upland practices, five percent will come from manure management, and 15 percent will come from barnyard runoff controls.

These levels of control are consistent with those recommended for lands upstream of the Milwaukee Harbour Estuary in A Management Plan For The Milwaukee Harbour Estuary (SEWRPC, 1987). That plan recommends a rural control strategy that will result in a 25 percent reduction in phosphorus and sediment loading, even with a moderate level (50 percent) of landowner participation.

RURAL POLLUTION CONTROL PRACTICES

The types and estimated quantities of management practices that will be needed to control the critical nonpoint sources identified in this plan are presented in Table 65. The control efforts for major rural sources are summarized below.

UPLAND EROSION CONTROL PRACTICES

A combination of contour cropping, contour strip cropping, reduced tillage, critical area stabilization, and rotation changes can be used to reduce sediment delivery to surface waters from the 14,609 critical cropland acres. In addition, there is anticipated to be a considerable need for grass waterways, and some limited need for terraces, field diversions, and grade stabilization structures. The practice needs presented in Table 65 for these practices represent an average of two management scenarios. One scenario assumes that changes in cropping rotation will be an accepted management

practice. The second scenario assumes that changes in rotation will not be readily accepted. Under either scenario, many cropland acres must be treated with more than one practice. Consequently, about 20,000 acres of these practices will be needed.

Changes in crop rotation are a low-cost to no-cost alternative that can play a major role in meeting reduction targets on these fields. In fact this practice, by itself, could meet the management need on 43 percent of all critical fields. When used in combination with other practices, it could meet the need on 66 percent of all critical fields.

Many of the critical acres in the watershed are characterized by having low soil loss, but are adjacent to conveyance channels. Although soil loss is low on these fields, the soil that is eroded is readily delivered to the surface water system. These types of fields are in fact responsible for a large part of the delivered sediment to surface waters. Even with the Information and Education Program planned for this watershed, landowners may perceive little need to control these fields since these fields are not a serious threat from a soil conservation standpoint.

Additional management practices that could be effective in reducing delivered sediment from these areas were identified by Land Conservation Department staff. These include agriculture sedimentation basins and vegetative filter strips. Vegetative filter strips are considered part of both critical area stabilization and streambank (shoreline) protection. Agriculture sedimentation basins are considered a separate practice.

The use of vegetative filter strips and agricultural sedimentation basins as primary control practice should only be considered after all options for on-site erosion control have been explored. This is because these are off-site controls that attempt to control soil particles after they are already in transport. Control of such particles is often difficult.

The quantities of agriculture sedimentation basins and vegetative filter strips that will be needed are hard to estimate at this time. Consequently, no estimates have been made.

Animal Waste Management

Barnyard runoff control systems and animal waste utilization plans will be principal management components. Where necessary to implement animal waste utilization plans that protect water quality, manure storage will be used as an additional management practice.

Barnyard runoff management will include traditional barnyard runoff control systems that incorporate clear water diversions, sediment basins, filter walls, filter strips, and waste utilization planning. In addition, there may be a need to control runoff by using roofs for barnyard runoff management and manure storage facilities to prevent rain and snow from contacting manure.

Land Conservation Department staff have also identified a potential need for relocating high priority barnyards from sensitive floodplain areas, since a significant portion of critical barnyards are located in floodplain areas. All of these systems will be options for controlling the critical barnyards identified in this plan, although the extent to which each will be used has not been estimated.

A variety of manure storage structures may be used. A waste utilization plan will be prepared to assure that waste emptied from each storage structure is safely spread.

Streambank Protection

The goal of streambank protection is to decrease sedimentation of surface waters and to improve habitat destruction caused by cattle access and loss of adequate vegetative cover along streambanks.

Streambank fencing, shaping and seeding, and rip-rap will be some of the traditional practices needed. In addition, cattle and machinery crossings will be needed. Other more innovative practices that will help achieve better fish habitat while decreasing streambank erosion and cattle access include livestock watering pumps, that allow the livestock operator to provide a watering area for livestock that does not require livestock access to the surface water from which the water is being drawn, streambank erosion control measures that incorporate fish habitat structures, and vegetative filter strips.

All of these practices will be options for controlling the critical streambank degradation sites identified in this plan. The extent to which livestock watering pumps and fish habitat structures will be used has not been estimated.

Pesticide and Fertilizer Management

As discussed earlier in this plan, application rates of agricultural chemicals such as nitrogen fertilizer, atrazine, and alachlor are higher than the state average in those counties within which the East-West Watershed is located. Improved pesticide and fertilizer management will probably be needed in the watershed. Although NR 120 has identified Best Management Practices, the required practice standards and specifications have not yet been developed. The Department of Agriculture, Trade, and Consumer Protection is responsible for developing these standards and specifications. As these become available, their application in this watershed project will be evaluated jointly by Department, the DATCP, the county LCDs and the University of Wisconsin Center for Nutrient and Pesticide Management. Until that time, appropriate aspects of pesticide and fertilizer management will be demonstrated as part of the Information & Education Program presented in Chapter VI.

URBAN POLLUTION CONTROL GOALS AND DECISION CRITERIA

This section presents the umbrella urban stormwater management program for the East-West Watershed, followed by an analysis of management alternatives and recommended control plans for each of the major urban areas in the watershed. Details needed to begin implementation of these urban programs are presented in Chapter V.

UMBRELLA URBAN PROGRAM

INTRODUCTION

The urban control strategies for the city of West Bend and the villages of Campbellsport, Kewaskum, and Newburg consider controlling three sources of pollutants in order to achieve the in-stream pollutant reduction goals identified in the first part of this chapter. These sources include:

1. Construction site erosion.
2. Post-development runoff from new development.
3. Runoff from existing development (retrofitting).

CONSTRUCTION SITE EROSION

Project Goal: Due to the potentially catastrophic impacts of inadequately regulated construction activity on water resources, it is the goal of this priority watershed project to achieve the control of construction erosion throughout the incorporated and unincorporated portions of the watershed area. A high level of control is required, consistent with goals established for the Milwaukee Harbour Estuary, statewide recommended standards, and the protection and improvement goals established for water bodies in this watershed plan.

Mechanism: Locally adopted erosion control ordinances and adequate administrative and enforcement capability of the local administering authorities is considered the primary mechanism for achieving this control.

Decision Criteria: The adequacy of existing control mechanisms will be evaluated for the appropriate municipality using the Model Ordinance For the Control of Construction Site Erosion (WDNR, 1987) and the Practice Standards and Specifications Handbook for Construction Erosion Controls (WDNR, 1988).

The strategy for urbanizing lands in unincorporated areas of Washington, Ozaukee, Sheboygan, Fond du Lac and Dodge counties includes achieving better control of construction site erosion.

The Nonpoint Source Control Program will make technical and financial support available to local units of government for carrying out construction erosion control program activities. Chapter V contains additional information on items eligible for this support.

Post-Development Runoff From New Development

Program Goal: It is the goal of the priority watershed project to minimize the hydraulic and pollutant loading impacts of new development on water resources through the use of structural and non-structural controls. Specifically, the goals of the program are to reduce or maintain pollutant loads, to prevent increases in peak discharges so that streambed and streambank erosion will not be increased, and to maintain stream base flows and stream temperatures. Control of urban runoff from new development will be used in conjunction with control of runoff from existing areas to achieve pollutant loads and flows consistent with the protection and improvement goals established in this plan.

Mechanism: This will be achieved through the implementation of a detailed stormwater control plan that builds on the information contained in this priority watershed plan. More detailed plans, that include an identification of practice types, practice locations, and institutional means for plan implementation, will be needed for the study areas for the city of West Bend and the villages of Kewaskum, Campbellsport, and Newburg.

Decision Criteria: This watershed plan identifies the cost and effectiveness of alternative management programs for controlling urban stormwater runoff on lands planned for development in the four municipal study areas. This information is also combined with information in this plan on alternatives for controlling runoff from existing areas in order to identify the water quality benefits of a combined program for existing and new development.

This information will be valuable to the communities in understanding the effects of various management options on achieving the water resources goals for the project. It is also used by the Department to determine what type of retrofitting program will be cost shared for existing areas, as explained in the discussion on the program for control of runoff from existing areas.

It is expected that subsequent, more detailed studies may be needed for each community to develop the information in this watershed plan into an implementation plan for new development. Technical as well as institutional questions may need to be resolved and provisions detailed for assuring the plan is carried out. Stormwater studies will also afford an opportunity to investigate how controls on new development can be geared to meet hydraulic objectives for protection of the streambed and streambank.

Where more detailed studies can be completed, information from them may be used to modify retrofitting plans for existing development.

The Nonpoint Source Control Program will make technical and financial support available to local units of government for carrying out stormwater management activities for developing areas. Chapter V contains additional information on items eligible for this support.

Runoff From Existing Development

Project Goal: It is the goal of the priority watershed project to focus controls on areas producing pollutants at the highest rates, in order to most cost-effectively meet the improvement and protection (non-degradation) goals for urban streams. In addition, it is the goal of the project to foster the use of non-structural management practices such as good housekeeping measures designed to keep harmful materials out of the storm sewer system.

Mechanism: This will be achieved through installing stormwater control practices on critical areas identified in this plan, and by fostering good housekeeping practices. A follow-up study may be needed if there are outstanding technical or institutional questions that need to be resolved prior to practice design and installation.

Decision Criteria: This watershed plan identifies the cost and effectiveness of alternative management programs for controlling stormwater runoff from existing urban lands in the four municipal study areas. This information is also combined with information in this plan on alternatives for controlling runoff from future planned urban areas in order to identify the water quality benefits of a combined program for existing and new development.

This information will be valuable to the communities in understanding the effects of various management options on achieving the water resources goals for the project. It is also used by the Department to determine what type of retrofitting program will be cost shared for existing areas.

The Nonpoint Source Control Program will make technical and financial support available to local units of government for carrying out stormwater management activities for existing urban areas. Chapter V contains additional information on items eligible for this support.

City of West Bend

Recommended control programs are presented for each of the three subwatersheds that occur in the study area for the city of West Bend. These include Silver Creek, Quaas Creek, and the West Bend subwatersheds. These recommendations are meant to be a starting point in developing a more refined urban control program, and are intended as guidance in making these refinements. Recommendations for these subwatersheds are followed by recommendations that apply city wide.

Information concerning the costs of these recommended programs is presented in the Staffing and Budget section of Chapter V.

SILVER CREEK

Urban Pollutant Reduction Goals: Chapter III of this plan summarizes the existing and anticipated pollution potential of existing and planned urban development in the Silver Creek Subwatershed. In summary, the urban acreage is anticipated to double between 1985 and the year 2000. The volume of urban runoff and its estimated loads of total lead and suspended solids are also anticipated to double between 1985 and the year 2000 if urban stormwater controls are not used.

Chapter III of this plan states that the preliminary water resources objective for the urban stream reaches in the Silver Creek Subwatershed was "enhancement," reflecting the fact that Silver Creek, Engmann Creek, and Washington Creek are not meeting their full use potential due to urban runoff. Chapter IV established that a reduction of 50 percent for urban stormwater pollutants such as lead and suspended sediment is needed in order to enhance these streams. In other words the 1985 urban pollutant loads should be decreased by 50 percent by the year 2000.

A secondary objective of "protection" was established for these streams in the event the "enhancement" objective could not be achieved. Chapter IV established that in order to meet the "protection" objective, it is necessary to prevent significant increases in the existing urban pollutant load. In other words, the urban pollutant load in the year 2000 should not be significantly greater than in 1985.

This plan also recognizes the need to prevent destabilizing increases in annual flood peak flow discharges, and to maintain base flows by encouraging infiltration in urbanizing areas.

The minimum level of urban pollutant load reduction that must occur in order to meet either the "enhancement" or "protection" objectives was calculated for the Silver Creek Subwatershed. These required reductions were in turn used to evaluate the effectiveness of different urban stormwater control measures. "Existing" urban lands refer to urban areas in existence as of 1985. "Planned" urban lands refer to the lands projected for development between 1985 and the year 2000. "Future" urban lands incorporate both "existing" and "planned" urban areas.

In summary, to "enhance" these streams:

a. Control measures must annually remove at least 660 pounds of total lead from future urban areas. This is equal to reducing the lead load from existing urban areas by 50 percent and allowing no lead load from the planned urban area.

b. Control measures must annually remove 235,750 pounds of suspended sediment from future urban areas. This is equal to removing 50 percent of the sediment load from existing urban lands, and removing enough sediment from urbanizing agricultural land to account for 50 percent of the agricultural loading plus 100 percent of the amount by which urban loadings will exceed the loading from the land in its agricultural use.

c. No quantitative control goals have yet been set for flow, although this needs to be done.

In summary, to "protect" these streams:

a. Control measures must annually remove at least 450 pounds of total lead from future urban areas. This is equal to complete restriction of lead loads from planned urban areas.

b. Control measures must annually remove 68,000 pounds of suspended sediment from future urban areas. This is equal to complete restriction of lead loads from planned urban areas.

Urban Practices: Principal urban management practices considered for controlling stormwater pollutants include wet detention basins, infiltration devices, and accelerated street sweeping. These practices vary in effectiveness for controlling urban pollutants, reducing peak runoff discharges, and maintaining the infiltration of rainfall needed to support stream baseflows.

Infiltration devices are constructed to allow stormwater runoff that is directed towards them to soak into the ground. They may take the form of constructed devices, such as trenches filled with gravel, larger infiltration basins, or grassed swale drainage along roadsides. Simply by redirecting downspouts from rain gutters onto lawn areas, infiltration can be accomplished without constructing devices. Overall, infiltration devices are the most effective practice for controlling pollutants and peak discharges from impervious urban surfaces such as rooftops, parking lots, and road surfaces. Infiltration has the added benefit of contributing towards maintenance of stream baseflows.

There are some limitations of infiltration devices. Heavy or poorly drained soils may either limit the use of infiltration devices or require them to be so large as to be impractical. In addition, infiltration devices can pose a threat to groundwater if installed to control heavily polluted runoff.

In order to minimize the risk of groundwater contamination, infiltration devices should not be used to treat heavily polluted runoff. In general, runoff from residential home rooftops and driveways, and from rooftops in institutional, commercial, and non-manufacturing industrial areas can be infiltrated with little risk of groundwater contamination. Runoff from parking lots in institutional, commercial, and from separate employe or visitor parking lots in non-manufacturing industrial areas can be infiltrated

provided some form of pre-treatment is provided. Highly contaminated runoff, such as that from storage and loading areas in commercial and industrial areas, should generally not be infiltrated. All infiltration devices should have a minimum separation distance of three feet to the top of the water table or bedrock in order to reduce the risk of groundwater contamination. In addition, all infiltration should take place through a surface layer of sod wherever possible.

Finally, it is probably wise to evaluate the need to restrict infiltration within certain distances of municipal wells to reduce the risk of contaminating the municipal water supply with infiltrated stormwater.

Appendix B contains general guidelines for the use of infiltration devices in urban areas that will minimize the risk of groundwater contamination. In addition, monitoring of selected infiltration devices is recommended. Selection of monitoring sites should be made jointly by the Department and the municipality. The Department will provide funding to establish monitoring sites, and to collect and analyze monitoring results.

In the analysis presented in this watershed plan, infiltration is applied to parking lots only. This is because parking lots yield a high concentration of most urban pollutants yet can be infiltrated with pretreatment precautions. Infiltration of rooftop areas contributes significantly to cost while providing little additional control of most urban stormwater pollutants. It should be recognized, however, that rooftops are significant contributors of runoff volume. Consequently, further study of the use of infiltration devices for rooftops is needed for areas where baseflow maintenance and maintenance of peak streamflows is critical.

Although grassed swales are not formally evaluated as an infiltration device, it is well known that they are among the most effective devices for controlling urban stormwater runoff pollutants and flows. The cost and effectiveness of urban control programs that incorporated the use of grassed swales should also be considered further for this area.

Wet detention basins are also highly effective in reducing pollutant loads, although they are less effective than infiltration devices. Wet basins also are effective in reducing peak discharges. Basins do not provide for maintenance of baseflow, and temperatures of water discharged from basins may be elevated to the point where the receiving stream is adversely affected.

Street sweeping beyond normal spring clean-up is relatively ineffective in controlling pollutants, but may provide an important increment of control when used as part of a more diversified stormwater management program. Street sweeping will not, of course, have any effect on stormwater flows.

Effectiveness of Control: The effectiveness of different practices in reducing pollutant loads from existing, planned, and future urban areas was calculated for the Silver Creek Subwatershed. Anticipated limitations on the extent to which detention and infiltration can be used in this area have been incorporated into the analysis. For example, use of infiltration was limited

to well drained soils. Detention basins were limited to areas where space is potentially available, based on information from the regional planning commission.

A diversified program involving a mix of different control practices on both existing and planned urban areas will be needed to meet either the "enhancement" or "protection" goals for these streams. This can be shown in Tables 66, 67, and 68.

The effectiveness of different practices in reducing pollutant loads from existing urban areas in the Silver Creek Subwatershed is shown in Table 66. This table shows that even if further urbanization stops in the Silver Creek Subwatershed, none of these practices, when used alone, can be expected to provide the level of lead or suspended sediment reduction needed to meet the "enhancement" objective.

Similarly, Table 67 shows that none of these practices, when used alone, is capable of completely curbing the pollutant loads from planned urban development. Such control would be needed as part of either an enhancement or protection plan for these streams. Note that none of the practices will provide the control of lead required, while only detention can come close to providing the control of suspended sediment required. However, detention as a sole practice will work only if it controls 100 percent of the planned urban area.

Table 68 presents six alternative stormwater management programs for evaluation that reflect mixtures of these various practices on both existing and planned urban areas. These alternatives are meant to span a range of approaches, although information in Tables 66 and 67 can be used to develop other alternatives. In developing these alternatives, detention does not serve those areas treated with either infiltration or street sweeping. Street sweeping and infiltration can be used in the same area without affecting the results presented in this table because street sweeping is used on arterial road surfaces whereas infiltration is limited to parking lot surfaces.

Alternative program #5 is the most effective. This program represents maximum infiltration and detention in existing and planned urban areas. It meets the suspended sediment reductions needed for stream "enhancement," and comes close to the lead reduction required. It represents a well-mixed program of controls.

Alternative programs #4, #3, #2, and #1 are next in effectiveness. Program #4 represents maximum infiltration on existing and planned urban areas, maximum detention on planned areas, a small amount of detention on existing urban areas, and accelerated street sweeping. Program #3 represents a mix of practices on existing areas and extensive detention for planned areas. Program #2 represents maximum infiltration on existing and planned urban areas, no use of detention, and accelerated street sweeping. Program #1 represents maximum detention on existing and planned areas.

Program #1 meets the "enhancement" objective for suspended sediment, and is very close to the "protection" level for lead. Programs #4 or #2 provide the pollutant load reductions needed to support the "protection" objective, and Program #4 would come close to providing the sediment reduction needed to support the "enhancement" objective. Program #3 is similar to Program #1 in its effect. Alternative program #6 would perform relatively poorly.

The Southeastern Wisconsin Regional Planning Commission is concurrently preparing a more detailed stormwater management plan for the Silver Creek Subwatershed (SEWRPC, 1988). The study indicates that it is impractical to achieve a level of pollutant control consistent with "enhancing" Silver Creek. The study indicates that a level of control consistent with Alternative Program #3 (Table 68) is achievable. This level of pollutant control, which would at a minimum protect Silver Creek, can be considered a worthwhile investment of Nonpoint Source Control Program funds. It must be made clear, however, that only those elements of the Commission's recommended plan that are consistent with funding policies of the Nonpoint Source Control Program will be eligible for program support. Also, use of surface water resources for stormwater management facilities is not generally considered acceptable. Although these features may be conveniently located, they should be protected. Examples include valuable and sensitive wetlands, or impoundments such as the Bicentennial Park Pond.

Further investigation is still needed to determine the effectiveness of the Commission's recommended program in meeting the peak flow reduction and baseflow maintenance objectives for surface waters in the subwatershed. Generally, infiltration alternatives should be encouraged where feasible in all sub-basins which are coincidental with the headwaters of streams in the planning area, particularly planned land use areas associated with Silver Creek, and Engmann Creek. Besides abating pollutant loads, this infiltration has the greatest effect on attenuating high flows and preserving base flows in the streams, and in maintaining cool water temperatures through groundwater recharge to the stream.

Consistent with this concern, the role of grassed swales in meeting the pollutant load and flow related objectives of this plan should be incorporated into these studies. Obvious limitations include soil type, slope, and development density. However, it is worth further investigation as to where swales might work. This is particularly important in the headwaters of Silverbrook Creek, where curb and gutter facilities and detention basins may lead to elevated water temperatures. This could in turn result in the stream's inability to support the unique coldwater forage fishery which currently exists or the trout fishery that might be established, if only seasonally, at the Bicentennial Park Pond and the unnamed pond directly downstream of Highway 45. Infiltration, which swales or other devices could provide, could address both the hydrologic and pollution control problems facing this stream.

The support offered through the Nonpoint Source Control Program to the city for carrying out these activities is presented in Chapter V.

QUAAS CREEK

Urban Pollutant Reduction Goals: Chapter III of this plan summarizes the pollution potential of existing and planned urban development in the Quaas Creek Subwatershed. In summary, the urban acreage is anticipated to nearly triple between 1985 and the year 2000. The volume of urban runoff and its estimated loads of total lead and suspended solids are anticipated to increase 400 percent in this same time period if urban stormwater controls are not used.

Chapter III of this plan states that the water resources objective of this project is to "enhance" the quality of existing recreation, fish and aquatic life uses within the Quaas Creek Subwatershed. Since existing urban lands in the subwatershed contribute a small pollutant load that is not degrading the stream, the "enhancement" objective can be met by keeping urban pollutant loads at existing levels into the future. (Controls for existing rural sources will be the primary means of achieving the "enhancement" objective.)

This plan also recognizes the need to prevent destabilizing increases in annual flood peak flow discharges, and to maintain base flows by encouraging infiltration in urbanizing areas. Prevention of destabilizing flows is critical for Quaas Creek, given the large increase in development that is projected to occur. Maintenance of stream baseflows and protection of low stream temperatures are also critical, especially for the segments of the creek that support trout.

The minimum level of urban pollutant load reduction that control measures must achieve in the future urban area was calculated for the Quaas Creek Subwatershed in order to evaluate the effectiveness of different control measures.

1. Control measures must annually remove at least 743 pounds of total lead from future urban areas to meet the urban pollutant reduction goal. This is equal to allowing no lead load from planned urban areas.

2. Control measures must annually remove 22,000 pounds of suspended sediment from future urban areas. This is equal to removing enough of the sediment load from urbanizing agricultural land to account for 100 percent of the amount that loads from urban lands exceed loads from agricultural lands.

3. No quantitative control goals have yet been set for peak flows or baseflow maintenance, although this needs to be done for reasons stated above.

Urban Practices: Principal urban management practices considered for controlling stormwater pollutants include wet detention basins, infiltration devices, and accelerated street sweeping. These practices vary in

effectiveness for controlling urban pollutants, reducing peak runoff discharges, and maintaining the infiltration of rainfall needed to support stream baseflows. These practices are discussed in the section addressing the Silver Creek Subwatershed. The effectiveness of grassed swales was not quantified for this analysis, nor were the effects of these alternatives on stream peak flows and baseflows. These analyses are needed.

Effectiveness of Controls: The effectiveness of different practices in reducing pollutant loads from existing, planned, and future urban areas was calculated for the Quaas Creek Subwatershed. Anticipated limitations on the extent to which detention and infiltration can be used in this area have been incorporated into the analysis. For example, use of infiltration was limited to well drained soils. Detention basins were not used for either the existing urban areas in sub-basin QC003 or for the planned urban areas in sub-basins QC001, QC002, and QC003. This limitation on detention is to protect the trout portions of Quaas Creek from the impact of temperature increases associated with detention basins, and to encourage the maximum use of infiltration to maintain stream baseflows so critical to cold water sport fish communities.

The effectiveness of different practices in reducing pollutant loads from existing urban areas in the Quaas Creek Subwatershed is shown in Table 69. Table 70 shows the same information for planned areas. These tables show that practices in existing areas cannot, by themselves, compensate for the large loadings projected to come from new development. None of the practices, when used alone in planned urban areas, can provide the level of reduction needed (743 pounds for lead; 22,000 pounds for suspended solids) for these pollutants.

Table 71 presents six alternative stormwater management programs that reflect mixtures of these various practices. These alternatives are meant to span a range of approaches using practices in varying degrees on existing and planned urban areas. Detention does not serve those areas treated with either infiltration or street sweeping. Street sweeping and infiltration can be used in the same area without affecting the results presented in this table because street sweeping is used on arterial road surfaces whereas infiltration is limited to parking lot surfaces.

Alternative programs #5 and #4 are the most effective. Program #5 represents maximum infiltration and detention in existing and planned urban areas; Program #4 represents a similar approach except that less detention is used on existing urban areas. Although neither meet the primary goal of "no-change" with respect to total lead, both meet the goal with respect to suspended solids. Both programs are comprised of a mix of controls, and either is recommended for the control of total lead and suspended solids. Grassed swale drainage, particularly in developing areas, should be evaluated further as a pollution control practice as part of any recommended program.

Alternative programs #2 and #6 are next in effectiveness. Program #2 represents maximum infiltration on existing and planned areas, whereas program #6 represents maximum detention on planned areas only and maximum infiltration on planned areas only. Although these programs fall further from the goal of

"no-change" with respect to total lead, they can be considered acceptable. Their effectiveness with respect to flow related goals have not been determined. Grassed swale drainage needs to be further considered for these programs.

Alternative programs #1 and #3 perform poorly, and neither is recommended.

Additional control programs can be created using the data presented in Tables 69 and 70, and evaluated using the pollution reduction goals presented.

Prior to choosing a program for implementation, further investigation is needed to determine the effectiveness of the program in meeting the peak flow reduction and baseflow maintenance objectives for Quaas Creek. In addition, the technical feasibility of siting and constructing the recommended practices may need to be further investigated, and stormwater management plans or ordinances that meet the objectives stated in this for plan developed for Quaas Creek. As mentioned above, the role of grassed swales in meeting the pollutant load and flow related objectives of this plan should be incorporated into these studies. The support offered through the Nonpoint Source Control Program to the city for carrying out these activities is presented in Chapter V.

West Bend

Urban Pollutant Reduction Goals: Chapter III of this plan summarizes the pollution potential of existing and planned urban development in that portion of the West Bend Subwatershed contained in the city of West Bend Study Area. In summary, the urban acreage is anticipated to increase about 80 percent between 1985 and the year 2000. The volume of urban runoff and its estimated loads of total lead and suspended solids are anticipated to increase 75 percent in this same time period if urban stormwater controls are not used.

Chapter III of this plan includes water resources objectives applicable to those portions of the Milwaukee River within the city of West Bend Study Area. These objectives are to "enhance" the quality of existing recreation, fish and aquatic life uses within the free-flowing sections of the river below the West Bend Pond, particularly in the segment of the former Woolen Mills Impoundment, and to protect other stream reaches within the study area. Since existing urban lands in the subwatershed contribute a significant portion of the pollutant load, a large reduction of urban stormwater pollutants is needed along with the recommended rural nonpoint source controls to meet the "enhancement" objective.

The first part of Chapter IV establishes a high level (50 percent) of reduction for urban stormwater pollutants such as total lead or suspended solids as a primary goal in order to meet this objective of water resource "enhancement." The plan establishes "no change" in the load of these pollutants as a secondary goal to prevent further degradation in the event the primary goal cannot be met. In both instances, the reduction goals are set

for the year 2000 using the 1985 pollutant loads as a base. In other words, the 50 percent reduction goal will be met if the urban pollutant load in the year 2000 is 50 percent less than the 1985 urban load; the "no change" goal will be met if the year 2000 load is no higher than the year 1985 load.

This plan also recognizes the need to prevent destabilizing increases in annual flood peak flow discharges, and to maintain base flows by encouraging infiltration in urbanizing areas.

The minimum level of urban pollutant load reduction that control measures must achieve was calculated for the West Bend Subwatershed in order to evaluate the effectiveness of different control measures. "Existing" urban lands refer to urban areas in existence as of 1985. "Planned" urban lands refer to the lands projected for development between 1985 and the year 2000. "Future" urban lands incorporate both "existing" and "planned" urban areas.

1. Control measures must annually remove at least 1,994 pounds of total lead from future urban areas to meet the urban pollutant reduction goal. This is equal to reducing the lead load from existing urban lands by 50 percent and allowing no lead load from planned urban areas.

2. Control measures must annually remove 772,690 pounds of suspended sediment from future urban areas. This is equal to removing 50 percent of the sediment load from existing urban lands, and removing enough of the sediment load from urbanizing agricultural land to account for 50 percent of the existing agricultural loading plus 100 percent of the amount that loads from urban lands exceed loads from agricultural lands.

3. No quantitative control goals have yet been set for flow, although flow related impacts from development in this subwatershed are unlikely to be significant.

Urban Practices: Principal urban management practices considered for controlling stormwater pollutants include wet detention basins, infiltration devices, and accelerated street sweeping. These practices vary in effectiveness for controlling urban pollutants, reducing peak runoff discharges, and maintaining the infiltration of rainfall needed to support stream baseflows. These practices are discussed in the section addressing the Silver Creek Subwatershed. The effectiveness of grassed swales was not quantified for this analysis, nor were the effects of these alternatives on stream peak flows and baseflows. The evaluation of the role that grassed swales can play as a control measure is needed.

Effectiveness of Controls: The effectiveness of different practices in reducing pollutant loads from existing, planned, and future urban areas was calculated for the West Bend Subwatershed. Anticipated limitations on the extent to which detention and infiltration can be used in this area have been incorporated into the analysis. For example, use of infiltration was limited to well drained soils.

The effectiveness of different practices in reducing pollutant loads from existing urban areas in the West Bend Subwatershed is shown in Table 72. Only wet detention, when used on 57 percent of the drainage area, approaches the reduction needed from existing areas. Table 73 shows that none of these practices, when used alone, can provide the level of reduction needed (1,194 pounds for lead; 575,000 pounds for suspended solids) for pollutants projected to be produced by planned urban development. Consequently, a mix of these practices is needed to achieve the urban pollutant load reduction goals for this subwatershed.

Table 74 presents six alternative stormwater management programs for evaluation that reflect mixtures of these various practices. These alternatives are meant to span a range of approaches using practices in varying degrees on existing and planned urban areas. Detention does not serve those areas treated with either infiltration or street sweeping. Street sweeping and infiltration can be used in the same area without affecting the results presented in this table because street sweeping is used on arterial road surfaces whereas infiltration is limited to parking lot surfaces.

Alternative programs #4 and #1 are the most effective. Program #4 represents maximum use of detention and infiltration on existing and planned areas; program #1 represents maximum detention on existing and planned areas. Although these programs do not meet the lead load reductions consistent with achieving enhancement of the river, the lead load reductions are close to those needed. Either of these programs are recommended for achieving the "enhancement" objective.

Alternative programs #5 and #2 are next in effectiveness. Program #5 represents maximum detention and infiltration on existing areas, and maximum infiltration and moderate detention on planned areas. Program #2 represents maximum infiltration on existing and planned areas. Both programs will meet the "no-change" pollutant loading criteria that is consistent with the secondary objective for the Woolen Mills section of the river and consistent with the primary objective of "protection" for other portions of the river. Either of these programs is recommended to achieve the protection objective.

Alternative programs #3 and #6 will perform poorly. These programs meet neither the "enhancement" nor "protection" goals with respect to total lead. These two programs are not recommended.

In general, information collected for this subwatershed indicates that neither treating additional sub-basins nor targeting critical land uses that occur outside of the critical sub-basins will significantly add to reductions in the pollutant loads that are affecting sections of the Milwaukee River targeted for enhancement. The exception is the medium industrial land uses that occur within urban sub-basins WB003 and WB005. Although these lands were not targeted for this analysis, their control may provide incremental pollutant load reductions important in achieving the water resources objectives for the receiving stream segments as well as for the section of the river flowing through the former Woolen Mills Impoundment.

Additional control programs can be created using the data presented in Tables 72 and 73, and evaluated using the pollution reduction goals presented.

Prior to choosing a program for implementation, further investigation is needed to determine the effectiveness of the program in meeting the peak flow reduction and baseflow maintenance objectives for this area. In addition, the technical feasibility of siting and constructing the recommended practices may need to be further investigated, and stormwater management plans or ordinances that meet the objectives stated in this for plan need to be developed. As mentioned above, the role of grassed swales in meeting the pollutant load and flow related objectives of this plan should be incorporated into these studies. The support offered through the Nonpoint Source Control Program to the city for carrying out these activities is presented in Chapter V.

Summary of Recommendations: The following is a summary of recommendations for the city of West Bend. Support available through the Nonpoint Source Control Program for carrying out these activities is presented in Chapter V.

1. The city should carry out further studies as described in each of the preceding subwatershed discussions for the Silver Creek, Quaas Creek, and West Bend subwatersheds, and should implement stormwater management programs to reduce pollutant loads from existing and developing areas.

2. The city should review and modify, as needed, its construction erosion control program consistent with the guidance contained in this plan. This review should consider changes needed in the city's ordinance and supporting documents, and changes needed in ordinance administration and enforcement.

3. The city should conduct an adequate base level of spring street sweeping and fall leaf pick up, except where accelerated sweeping is identified as a component of a program recommended by this plan.

4. The city should promote the general concepts and use of infiltration as much as possible.

5. The city, with assistance from the UW-Extension, should conduct an Information and Education Program, consistent with that presented in this plan, to:

    a. Increase public awareness and understanding of nonpoint source pollution problems and causes.

    b. Decrease the amount and improve the quality of stormwater runoff from commercial, industrial, institutional, and residential property.

    c. Improve the effectiveness of construction erosion control and stormwater management by local developers, engineers, contractors, and builders.

d. Reduce the pollution potential posed by improper application of lawn and garden chemicals.

e. Reduce the potential of improper use and disposal of household and automotive maintenance chemicals and waste products.

f. Reduce the potential of improper use and disposal of hazardous chemicals by small quantity generators such as institutions and businesses.

g. Reduce the amount of pet feces that are washed off of urban areas into storm sewers.

h. Improve the effectiveness of fall leaf pick-up and spring street sweeping as water quality protection measures.

Recommended Program for the Village of Kewaskum

Urban Pollutant Reduction Goals: Chapter III of this plan summarizes the pollution potential of existing and planned urban development in the village of Kewaskum Study Area. In summary, the urban acreage is anticipated to increase by 127 percent between 1985 and the year 2000. The volume of urban runoff and its estimated loads of total lead and suspended solids are anticipated to increase 150 percent in this same time period if urban stormwater controls are not used.

Chapter III of this plan states that the primary water resources objectives of this project are to:

1. "Enhance" the quality of existing recreation, fish and aquatic life uses in Kewaskum Creek, the un-named perennial tributary in Section 9, and portions of the Milwaukee River below the Kewaskum Millpond.

2. "Protect" similar uses in other portions of the Milwaukee River. Where the "enhancement" objective cannot be achieved, "protection" is adopted as a secondary objective.

This plan also recognizes the need to prevent destabilizing increases in annual flood peak flow discharges, and to maintain base flows by encouraging infiltration in urbanizing areas. Water resources in the Kewaskum Study Area most likely to experience flow related impacts from urban development include the lower urbanized or urbanizing portions of Kewaskum Creek and the un-named tributary.

The minimum level of urban pollutant load reduction that control measures must achieve in the future urban area was calculated for the Kewaskum Study Area in order to evaluate the effectiveness of different control measures. Because the Kewaskum Study Area was not divided into separate sub-basins, effectiveness of programs could not be evaluated separately with respect to water resources having different objectives. The effectiveness of alternative control programs were thus evaluated based on achieving adequate pollutant load reductions for the study area as a whole.

1. Control measures must annually remove at least 450 pounds of total lead from future urban areas to meet the urban pollutant reduction goal for stream "protection." This is equal to allowing no additional load from planned urban areas.

   To meet the pollutant load reduction goal for stream "enhancement," control measures must remove at least 600 pounds of total lead. This is equivalent to a 50 percent reduction in lead loading from existing areas and no allowable increase in loading from planned urban areas.

2. Control measures must annually remove at least 41,800 pounds of suspended sediment from future urban areas to meet the urban pollutant reduction goal for stream "protection." This is equal to 100 percent of the amount that loads from urban lands exceed loads from agricultural lands.

   To meet the pollutant load reduction goal for stream enhancement, control measures must remove at least 195,400 pounds. This is equal to removing 50 percent of the sediment load from existing urban lands, and removing enough of the sediment load from urbanizing agricultural land to account for 50 percent of the existing agricultural loading plus 100 percent of the amount that loads from urban lands exceed loads from agricultural lands.

3. No quantitative control goals have yet been set for flow. Potential flow related impacts will probably be confined to Kewaskum Creek and the un-named tributary.

Urban Practices: Principal urban management practices considered for controlling stormwater pollutants include wet detention basins, infiltration devices, and street sweeping. These practices vary in effectiveness for controlling urban pollutants, reducing peak runoff discharges, and maintaining the infiltration of rainfall needed to support stream baseflows.

These practices are discussed in the section addressing the Silver Creek Subwatershed. The effectiveness of grassed swales was not quantified for this analysis, nor were the effects of these alternatives on stream peak flows and baseflows. These analyses are needed.

Effectiveness of Controls: The effectiveness of different practices in reducing pollutant loads from existing, planned, and future urban areas was calculated for the Kewaskum Study Area. Infiltration was limited to well drained soils.

Table 75 presents five alternative stormwater management programs. These alternatives are meant to span a range of approaches using practices in varying degrees on existing and planned urban areas. Detention does not serve those areas treated with infiltration or street sweeping. Street sweeping programs will not affect the results presented in this table for infiltration because street sweeping is used on arterial road surfaces whereas infiltration is limited to parking lot surfaces.

Evaluation of these programs is based on meeting the "protection" objectives. Further analysis of effectiveness in meeting "enhancement" objectives will be conducted during implementation if warranted.

Alternative programs #4, #3, and #2 are the most effective. Program #4 represents low levels of detention and infiltration in existing areas and high levels in planned areas. Program #3 represents a moderate level of detention and a high level of infiltration in existing areas and moderate levels of detention and high levels of infiltration in planned areas. Although not shown here, street sweeping could be accelerated in place of some of the infiltration in order to reach the pollutant reduction objective. Program #2 represents high levels of infiltration in existing and planned areas only. Any of these three programs can be recommended for the control of total lead and suspended solids. Grassed swale drainage, particularly in developing areas, should be evaluated further as a pollution control practice as part of any recommended program.

Alternative programs #1 and #5 are next in effectiveness. Program #1 represents maximum detention in existing and planned areas, while Program #5 represents maximum detention and infiltration on planned areas with a moderate program of accelerated street sweeping. Although these programs fall further from the goal of "no-change" with respect to total lead, they can be considered acceptable. Their effectiveness with respect to flow related goals have not been determined. Grassed swale drainage needs to be further considered for these programs.

Prior to choosing a program for implementation, further investigation is needed to determine the effectiveness of the program in meeting the peak flow reduction and baseflow maintenance objectives for Kewaskum Creek and the unnamed tributary. In addition, the technical feasibility of siting and constructing the recommended practices may need to be further investigated, and stormwater management plans or ordinances that meet the objectives stated in this for plan developed for the study area. As mentioned above, the role of grassed swales in meeting the pollutant load and flow related objectives of this plan should be incorporated into these studies.

Summary of Recommendations: The following is a summary of recommendations for the village of Kewaskum. Support available through the Nonpoint Source Control Program for carrying out these activities is presented in Chapter V.

1. The village should carry out further studies as described in the preceding subwatershed discussion, and should implement stormwater management programs to reduce pollutant loads from existing and developing areas.

2. The village should review and modify, as needed, its construction erosion control program consistent with the guidance contained in this plan. This review should consider changes needed in the village's ordinance and supporting documents, and changes needed in ordinance administration and enforcement.

3. The village should conduct an adequate base level of spring street sweeping and fall leaf management, except in areas where accelerated sweeping is an important program component.

4. The village should promote the general concepts and use of infiltration as much as possible.

5. The village, with assistance from the UW-Extension, should conduct an Information and Education Program, consistent with that presented in this plan, to:

   a. Increase public awareness and understanding of nonpoint source pollution problems and causes.

   b. Decrease the amount and improve the quality of stormwater runoff from commercial, industrial, institutional, and residential property.

   c. Improve the effectiveness of construction erosion control and stormwater management by local developers, engineers, contractors, and builders.

   d. Reduce the pollution potential posed by improper application of lawn and garden chemicals.

   e. Reduce the potential of improper use and disposal of household and automotive maintenance chemicals and waste products.

   f. Reduce the potential of improper use and disposal of hazardous chemicals by small quantity generators such as institutions and businesses.

   g. Reduce the amount of pet feces that are washed off of urban areas into storm sewers.

   h. Improve the effectiveness of fall leaf pick-up and spring street sweeping as water quality protection measures.

RECOMMENDED PROGRAM FOR THE VILLAGE OF CAMPBELLSPORT

Urban Pollutant Reduction Goals: Chapter III of this plan summarizes the pollution potential of existing and planned urban development in the village of Campbellsport Study Area. In summary, the urban acreage is anticipated to increase by 60 percent between 1985 and the year 2000. The volume of urban runoff is estimated to increase by 50 percent and its estimated loads of total lead and suspended solids are anticipated to increase 30 percent in this same time period if urban stormwater controls are not used.

Chapter III of this plan states that the primary water resources objectives of this project are to "protect" existing recreational, fish, and aquatic life uses in the Milwaukee River.

This plan also recognizes the need to prevent destabilizing increases in annual flood peak flow discharges, and to maintain base flows by encouraging infiltration in urbanizing areas. Water resources in the Campbellsport Study Area most likely to experience flow related impacts from urban development include the un-named tributary that drains westward into the West Branch of the Milwaukee River in Section 23 of Ashford Township.

The minimum level of urban pollutant load reduction that control measures must achieve in the future urban area was calculated for the Campbellsport Study Area in order to evaluate the effectiveness of different control measures. The effectiveness of alternative control programs were evaluated based on achieving adequate pollutant load reductions for the study area as a whole.

1. Control measures must annually remove at least 66 pounds of total lead from future urban areas to meet the urban pollutant reduction goal for stream "protection." This is equal to allowing no additional load from planned urban areas.

2. Control measures will not be needed to remove suspended sediment from future urban areas to meet the urban pollutant reduction goal for stream "protection." This is because agricultural land uses will be replaced mainly by low intensity urban land uses which produce less suspended sediment. As a result, no additional controls will be needed for sediment. This is a unique occurrence amongst communities in the East-West Watershed.

3. No quantitative control goals have yet been set for flow. Potential flow related impacts will probably be confined to the un-named tributary referenced above.

Urban Practices: Principal urban management practices considered for controlling stormwater pollutants include wet detention basins and

infiltration devices.sweeping. These practices vary in effectiveness for controlling urban pollutants, reducing peak runoff discharges, and maintaining the infiltration of rainfall needed to support stream baseflows.

These practices are discussed in the section addressing the Silver Creek Subwatershed. The effectiveness of grassed swales was not quantified for this analysis, nor were the effects of these alternatives on stream peak flows and baseflows. These analyses are needed.

Effectiveness of Controls: The effectiveness of different practices in reducing pollutant loads from existing, planned, and future urban areas was calculated for the Campbellsport Study Area. Infiltration was limited to well drained soils.

Table 76 presents five alternative programs for stormwater management. These alternatives are meant to span a range of approaches using practices in varying degrees on existing and planned urban areas. Detention does not serve those areas treated with infiltration. Street sweeping programs will not affect the results presented in this table for infiltration because street sweeping is used on arterial road surfaces whereas infiltration is limited to parking lot surfaces.

Alternative programs #1-4 will all provide the level of control needed for lead and suspended solids. Any of these programs can be recommended for the control of total lead and suspended solids. Grassed swale drainage, particularly in developing areas, should be evaluated further as a pollution control practice as part of any recommended program.

Alternative program #5 performs poorly, and is not recommended.

Prior to choosing a program for implementation, further investigation is needed to determine the effectiveness of the program in meeting the peak flow reduction and baseflow maintenance objectives for the un-named tributary. In addition, the technical feasibility of siting and constructing the recommended practices may need to be further investigated, and stormwater management plans or ordinances that meet the objectives stated in this for plan developed for the study area. As mentioned above, the role of grassed swales in meeting the pollutant load and flow related objectives of this plan should be incorporated into these studies.

Summary of Recommendations: The following is a summary of recommendations for the village of Campbellsport. Support available through the Nonpoint Source Control Program for carrying out these activities is presented in Chapter V.

1. The village should carry out further studies as described in the preceding subwatershed discussion, and should implement stormwater management programs to reduce pollutant loads from existing and developing areas.

2. The village should review and modify, as needed, its construction erosion control program consistent with the guidance contained in this plan. This review should consider changes needed in the village's ordinance and supporting

documents, and changes needed in ordinance administration and enforcement.

3. The village should conduct an adequate base level of spring street sweeping and fall leaf pick up.

4. The village should promote the general concepts and use of infiltration as much as possible.

5. The village, with assistance from the UW-Extension, should conduct an Information and Education Program, consistent with that presented in this plan, to:

   a. Increase public awareness and understanding of nonpoint source pollution problems and causes.

   b. Decrease the amount and improve the quality of stormwater runoff from commercial, industrial, institutional, and residential property.

   c. Improve the effectiveness of construction erosion control and stormwater management by local developers, engineers, contractors, and builders.

   d. Reduce the pollution potential posed by improper application of lawn and garden chemicals.

   e. Reduce the potential of improper use and disposal of household and automotive maintenance chemicals and waste products.

   f. Reduce the potential of improper use and disposal of hazardous chemicals by small quantity generators such as institutions and businesses.

   g. Reduce the amount of pet feces that are washed off of urban areas into storm sewers.

   h. Improve the effectiveness of fall leaf pick-up and spring street sweeping as water quality protection measures.

Recommended Program For the Village of Newburg

Urban Pollutant Reduction Goals: Chapter III of this plan summarizes the pollution potential of existing and planned urban development in the village of Newburg Study Area. In summary, the urban acreage is anticipated to increase by 135 percent between 1985 and the year 2000. The estimated loads

of total lead and suspended solids are anticipated to increase nearly ten-fold in this same time period if urban stormwater controls are not used.

Chapter III of this plan states that the primary water resources objectives of this project are to "protect" existing recreational, fish, and aquatic life uses in the Milwaukee River.

This plan also recognizes the need to prevent destabilizing increases in annual flood peak flow discharges, and to maintain base flows by encouraging infiltration in urbanizing areas. These are not likely to be important considerations for Newburg, however, since flow related impacts on the Milwaukee River from development in Newburg are likely to be small.

The minimum level of urban pollutant load reduction that control measures must achieve in the future urban area was calculated for the Newburg Study Area in order to evaluate the effectiveness of different control measures. The effectiveness of alternative control programs were evaluated based on achieving adequate pollutant load reductions for the study area as a whole.

1. Control measures must annually remove at least 928 pounds of total lead from future urban areas to meet the urban pollutant reduction goal for stream "protection." This is equal to allowing no additional load from planned urban areas.

2. Control measures must annually remove at least 273,000 pounds of suspended sediment from future urban areas to meet the urban pollutant reduction goal for stream "protection." This is equal to 100 percent of the amount that loads from urban lands exceed loads from agricultural lands.

3. No quantitative control goals have yet been set for flow.

Urban Practices: Principal urban management practices considered for controlling stormwater pollutants include wet detention basins and infiltration devices. These practices vary in effectiveness for controlling urban pollutants, reducing peak runoff discharges, and maintaining the infiltration of rainfall needed to support stream baseflows.

These practices are discussed in the section addressing the Silver Creek Subwatershed. The effectiveness of grassed swales was not quantified for this analysis, nor were the effects of these alternatives on stream peak flows and baseflows. These analyses are needed.

Effectiveness of Controls: The effectiveness of different practices in reducing pollutant loads from existing, planned, and future urban areas was calculated for the Newburg Study Area. Infiltration was limited to well drained soils.

Table 77 presents five alternative stormwater management programs that reflect mixtures of these various practices. These alternatives are meant to span a

range of approaches using practices in varying degrees on existing and planned urban areas. Detention does not serve those areas treated with infiltration. Street sweeping programs will not affect results presented in this table for infiltration because street sweeping is used on arterial road surfaces whereas infiltration is limited to parking lot surfaces.

Alternative programs #2, #3, and #4 are the most effective. Although none of these programs can meet the pollutant load reduction for total lead needed to meet the water resource protection objective, they come within 20 percent. Programs #1 and #5 perform poorly. Grassed swale drainage, particularly in developing areas, should be evaluated further as a pollution control practice.

Prior to choosing a program for implementation, the technical feasibility of siting and constructing the stormwater practices may need to be further investigated, and stormwater management plans or ordinances that meet the objectives stated in this for plan developed for the study area. As mentioned above, the role of grassed swales in meeting the pollutant load and flow related objectives of this plan should be incorporated into these studies.

Summary of Recommendations: The following is a summary of recommendations for the village of Newburg. Support available through the Nonpoint Source Control Program for carrying out these activities is presented in Chapter V.

1. The village should carry out further studies as described in the preceding subwatershed discussion, and should implement stormwater management programs to reduce pollutant loads from existing and developing areas.

2. The village should review and modify, as needed, its construction erosion control program consistent with the guidance contained in this plan. This review should consider changes needed in the village's ordinance and supporting documents, and changes needed in ordinance administration and enforcement.

3. The village should conduct adequate base levels of spring street sweeping and fall leaf pick up.

4. The village should promote the general concepts and use of infiltration as much as possible.

5. The village, with assistance from the UW-Extension, should conduct an Information and Education Program, consistent with that presented in this plan, to:

    a. Increase public awareness and understanding of nonpoint source pollution problems and causes.

    b. Decrease the amount and improve the quality of stormwater runoff from commercial, industrial, institutional, and residential property.

c. Improve the effectiveness of construction erosion control and stormwater management by local developers, engineers, contractors, and builders.

d. Reduce the pollution potential posed by improper application of lawn and garden chemicals.

e. Reduce the potential of improper use and disposal of household and automotive maintenance chemicals and waste products.

f. Reduce the potential of improper use and disposal of hazardous chemicals by small quantity generators such as institutions and businesses.

g. Reduce the amount of pet feces that are washed off of urban areas into storm sewers.

h. Improve the effectiveness of fall leaf pick-up and spring street sweeping as water quality protection measures.

PART TWO
DETAILED PROGRAM FOR IMPLEMENTATION

CHAPTER V - DETAILED PROGRAM FOR IMPLEMENTATION

CHAPTER VI - INFORMATION AND EDUCATION PROGRAM

CHAPTER V
DETAILED PROGRAM FOR IMPLEMENTATION

INTRODUCTION

The purpose of this chapter is to document how the level of rural and urban nonpoint source pollution control identified in Chapter IV will be carried out. It includes important information and guidelines both for local units of government responsible for implementing the project, and for the state and federal agencies that will provide them with technical, financial, and administrative support.

This chapter includes information and guidelines concerning:

1. Project participants and their responsibilities.
2. Cost share assistance funds and their administration.
3. Local assistance funds and their administration.
4. The Information and Education Program that will support implementation of the watershed project.
5. Estimated cost sharing and local staffing needs for implementing the watershed project.

PARTICIPANTS AND THEIR ROLES

LANDOWNERS AND LAND OPERATORS

Owners and operators of public or private lands are key participants since they will implement the control program through voluntary installation of Best Management Practices. These participants, such as individuals, partnerships, corporations, or municipalities, will be eligible for technical and cost share assistance if determined to have critical nonpoint sources. State agencies are also eligible for assistance to control critical sources on lands they own or operate.

Rural landowners determined to have critical nonpoint sources will work with their local Land Conservation Departments to develop conservation plans, enter into cost share agreements, and install practices. Cost share recipients agree to maintain sound land management practices on lands that are well

managed at the start of the project, as well as to maintain all cost shared practices.

The approach is more complicated in urban areas. On one level, the general public will be encouraged by local municipal officials through Information and Education Programs to practice good urban housekeeping practices that result in the proper use and disposal of materials harmful to water quality.

On a second level, owners and operators of established urban lands, such as existing parking lots, street surfaces, and large rooftops, will work with their respective municipalities to identify feasible controls, enter into cost share agreements, and install practices in areas determined by this plan to be critical. Where the municipality owns or operates the land, it will work in a parallel fashion directly with the Department.

On a third level, land developers and builders will work directly with the appropriate municipal authorities to comply with local construction erosion control ordinances and stormwater management plans for new development. Best Management Practices to control construction site erosion and manage runoff from new development is not cost shared through this watershed project.

Local Units of Government

Primary responsibility for implementing this watershed project rests with the cities, counties, and villages within the East-West Watershed. Most of the activities referenced below are supported by funds made available by the Nonpoint Source Control Program through the Department.

Washington, Fond du Lac, Ozaukee, Sheboygan, and Dodge counties, working through their respective Land Conservation Departments, are the major management agencies for rural portions of this project. These counties will contact high priority landowners, develop conservation plans, enter in cost share agreements with landowners, design practices and certify practice installation, and reimburse landowners for construction costs at the approved rate. Each county is responsible for tracking changes in the land management inventory, pollutant load reductions resulting from landowner involvement in the watershed project, and progress in completing its technical workload.

These counties will enter into agreements with the Department to make cost share funds available to landowners and to make funds available to each county to support the staff needed to carry out their responsibilities. County staff will work with the Department and towns within the watershed to identify construction erosion control program needs for unincorporated areas. Where appropriate, county staff will administer and enforce construction erosion control ordinances in unincorporated areas. Finally, county Land Conservation Department staff will cooperate with the UW-Extension in conducting the Information and Education Program identified in this plan.

The city of West Bend and the villages of Kewaskum, Campbellsport, and Newburg are the principal management agencies for urban nonpoint source controls. These municipalities have several responsibilities.

First, each municipality will be responsible for cooperating with the UW-Extension in the conduct of the urban information program identified in this plan.

Second, each municipality is responsible for contacting owners or operators of critical urban lands where retrofitted practices are eligible for cost sharing, for developing cost share agreements with these landowners, for providing them with practice designs, and for making cost share funds available to eligible landowners for installing practices. Where necessary, the municipality should conduct further studies to determine which practices identified in this plan are feasible to retrofit at specific locations.

Third, these municipalities are responsible for modifying or adopting and administering construction erosion control ordinances consistent with the guidelines in this plan.

Fourth, the municipalities are responsible for developing and implementing stormwater management plans or ordinances as needed to protect water resources from the impacts of increasing development, consistent with the pollution reduction goals and objectives presented in this plan.

COOPERATING AGENCIES

The primary cooperating agencies that will assist in implementing this plan include the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), the USDA-Soil Conservation Service, and the UW-Extension.

The DATCP has the general role of assisting counties during project implementation. Specifically, the DATCP will:

a. Manage a training program for Land Conservation Department staff involved with project implementation.

b. In cooperation with the UW-Extension, act as a clearinghouse for information related to agricultural Best Management Practices, sustainable agriculture, and nutrient and pest management.

c. Carry out Information and Education Program activities or tasks for which it has responsibility, as specified in Chapter VI of this plan.

d. Assist Land Conservation Department staff in identifying watershed project participants who are subject to federal or state conservation compliance programs.

e. Assist Land Conservation Department staff, if requested, in developing manure storage ordinances.

f. Assist Land Conservation Department staff in completing annual workload analyses and grant applications for work to be conducted under this plan.

g. Participate in the annual project review meetings.

The Soil Conservation Service will provide technical support to county Land Conservation Department staff. The UW-Extension is responsible for coordinating the Information and Education Program identified in Chapter VI of this plan, and will play a major role in carrying out many of the information & education activities in rural and urban areas.

DEPARTMENT OF NATURAL RESOURCES

GENERAL ROLE

Financial Support: The Department will provide funding support for cost share agreements that counties and municipalities develop with landowners under their jurisdictions. The Department will also enter into cost sharing agreements directly with these units of government for control of pollution sources on lands the governments own or operate.

The Department will provide technical assistance funding to local units of government to support a wide range of activities that they have responsibility for carrying out. Funding will be provided to support staff or professional services contracts needed to carry out most of the rural and urban responsibilities identified above for local units of government. In addition, the Department will support staff and other expenses needed to carry out the Information and Education Program strategy identified in this plan.

Project Evaluation: The Department has responsibility for water resource monitoring and evaluation activities that will be used to determine if expected changes in water resources occur as management practices are installed and as ordinances and stormwater management plans are developed and implemented. The Department has responsibility for documenting the results of evaluation monitoring activities.

The Department has also has responsibility for coordinating annual project evaluation meetings with local units of government involved in the project, and for producing annual project evaluation reports.

Administrative Support: The Department initiates annual workplanning with local units of government that receive grants under the program, and coordinates development and revisions of local assistance funding agreements

based on these workplans. The Department provides guidance to local units of government where questions arise concerning the conformance of proposed activities with this watershed plan. In some situations, prior review and approval by the Department of Best Management Practices, cost share agreements, or local assistance activities is required as a condition of funding. Situations where these requirements apply are clearly specified in Chapter NR 120, Wisconsin Administrative Code.

Special Activities

This plan identifies additional responsibilities of the Department in this watershed project. These include: assisting county staff with site reviews where wetland or groundwater impacts are suspected; assisting county staff with integrating wildlife and fish management concerns into selection and design of certain management practices; providing counties with technical guidance on the application of the special practices contained in Appendix C of this watershed plan; assisting counties, cities, and villages in identifying changes needed in their construction erosion control programs; assisting communities in identifying additional actions needed in order to implement recommendations made in this plan for control of urban runoff from existing and developing areas.

PROJECT SCHEDULE

There will be a three-year period for entering into cost share agreements. Practices on any one cost share agreement must be installed within a five year period. Consequently, the project period will last for eight years.

Under extenuating circumstances, the period for entering into cost share agreements can be extended for a limited period of time by the Department provided the extension will result in a significant increase in pollution control. In addition, extenuating circumstances may warrant a limited extension of the installation period on selected cost share agreements. Any such extensions must receive prior approval from the Department and be warranted according to the criteria specified in Chapter NR 120, Wisconsin Administrative Code.

COST SHARE ASSISTANCE ADMINISTRATION

Eligible Pollution Sources

Rural nonpoint sources that are eligible for cost share assistance under the East-West Watershed Project are defined in Chapter IV of this plan. Urban practices retrofitted to control pollution from established urban areas are eligible for cost share assistance.

It is important to note that Nonpoint Source Control Program cost share funds cannot be used to control pollution sources, land management activities, and management practices specifically excluded by Chapter NR 120, Wisconsin Administrative Code. Some important items include: practices already installed prior to this project; lands already controlled prior to this project; activities covered under the Wisconsin Pollutant Discharge Elimination System Permit Program or otherwise covered under Chapter 147, Wisconsin Statutes; septic system controls; dredging activities; silvicultural activities; wetland drainage; practices normally and routinely used in the growing of crops or the feeding of livestock. In urban areas, important additional practices that are not eligible for funding include construction erosion control practices and practices designed to control pollutants from areas of new development.

ELIGIBLE BEST MANAGEMENT PRACTICES

Best Management Practices are practices, techniques, or measures determined to be the most effective, practicable means of controlling urban and rural nonpoint sources in a way that is compatible with meeting the water resource goals of the project. Eligible Best Management Practices are those for which technical and financial assistance is available through the Nonpoint Source Control Program to land owners and land operators who have a pollution source meeting the requirements specified in Chapter IV of this plan.

Eligible Best Management Practices identified for this plan include practices listed in Chapter NR 120, Wisconsin Administrative Code, as well as additional alternative Best Management Practices and design criteria identified during the planning process as needed to meet the management goals of this project. Changes to Chapter NR 120 that occur during implementation may make additional practices eligible for cost sharing in this watershed project.

Table 78 lists the Best Management Practices eligible at this time for cost sharing, and their respective cost share rates. The special practices adopted for the East-West Watershed that appear in Table 78 include three alternative management practices, and three modifications to management practices already included in Chapter NR 120. These practices are presented in detail in Appendix C to this plan. Summary information on these practices is presented below.

Using Easements to Support Pollution Control Practices

Nonpoint Source Program funds may be used to purchase land easements in order to support specified Best Management Practices. These practices, all of which involve the establishment of permanent vegetative cover, include:

1. Shoreline buffers.
2. Critical area stabilization.
3. 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.

Easements may be contracts between the land owner and the Department, or between the land owner and the local unit of government. In either case, prior approval is needed from the Department before the easement is signed in order for Nonpoint Source Program funds to be used. If the easement is between the landowner and the local unit of government, the local unit of government shall forward the easement proposal to the Department prior to entering into a formal easement agreement with the landowner. If the easement is between the landowner and the Department, the local unit of government will retain responsibility for identifying how the easement will be used in controlling targeted pollution sources. After the landowner and the local unit of government negotiate the role of the easement, the information will be forwarded to the Department for completion of the easement process.

The following guidelines and criteria define where easements may be purchased using program funds to support shoreline buffers and critical area stabilization. Guidelines for using easements to support wetland restoration are set forth in a separate section. It is assumed that all easements are used to control a targeted pollution source identified in this plan, and that the easement is used to support one of the three practices for which it may be used.

1. <u>Easements used on riparian lands along high priority water resources are eligible for funding.</u>

   Generally, these are the highest priority areas for obtaining easements to secure permanent vegetative cover. These water resources are those streams that are most sensitive to nonpoint pollution. Also, these water resources will experience added benefits of permanent vegetative cover. These benefits include enhancements to aquatic habitat and, if agreed to by the landowner, improved public access to surface waters.

   In the East-West and North Branch watersheds of the Milwaukee River South, waters designated as "high priority" for this purpose include:

   <u>East-West</u>:
   Main Stem Milwaukee R.
   East Branch Milwaukee R.
   Water Cress Cr.
   Quaas Cr.
   Auburn Cr.
   Kewaskum Cr.
   Un-Named Cr.(Riveredge)

Virgin Cr. Headwaters
West Branch Milwaukee R.

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

2 Easements may be used for targeted sources in other areas of the watershed provided the easement, in combination with the permanent vegetative cover, offers protection at a cost that is competitive with that of other controls.

Easements may be lower or similar in cost to expensive practices such as terraces or agricultural sediment basins on continuous row crops where no other alternative is available except retiring the land. As such, they may be used to get cost-effective pollution control consistent with cost containment provisions in NR 120.

Easements may not be purchased with program funds to control targeted pollution sources outside areas riparian to high priority water resources if significantly lower cost practices such as changes in crop rotation, reduced tillage, contour plowing, or contour strips provide an adequate level of control."

Neither NR 120 nor this plan specifically exclude the use of program funds for easements in urban areas, but criteria have not yet been developed for identifying eligible sites. When criteria for purchasing easements in urban areas become available, they will be applied to this watershed project and funding for eligible sites can be made available.

WETLAND RESTORATION ELIGIBILITY

Wetland restoration is an eligible Best Management Practice for the purpose of controlling nonpoint sources of pollution. Secondary benefits of a wetland restoration may be for wildlife or fish habitat; however the primary justification of the restoration must be for water quality improvement.

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

Three situations have been identified where wetland restoration is eligible:

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

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

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

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

3. Prior converted wetlands down slope or up slope from fields identified as critical upland sediment sources through the WIN model.

   Restoration of wetlands in these situations will do one of two things: 1) create a wetland filter which reduces the pollutants from an up slope field to a water resource; or 2) reduce the volume and\or velocity of water flowing from an up slope wetland to a downslope critical field. Two eligibility conditions must be met to use wetland restoration in this situation:

   a. All upland fields draining to the wetland or below the wetland must be controlled to a soil loss of "T".

   b. One of more of these same fields must still have a sediment loss rate (after the application any erosion control measures) greater than the "sediment delivery rate" listed in Table 59 for the appropriate subwatershed.

Easements may be used for the wetland for any one of these situations.

Any costs involved with the restoration of the water level or livestock exclusion will be handled through a Cost Share Agreement at a 70% state cost share rate. If an easement is to be pursued, the LCD must first contact the DNR District nonpoint source coordinator to initiate the process. The nonpoint source coordinator will be responsible for obtaining review comments from the local Wildlife, Fishery, Water Regulation and Zoning, and other appropriate staff. The Nonpoint Source Coordinator will then forward the proposal to Central Office Water Resources Management and Property Management, and other appropriate staff. Final approval of the easement will rest with the Bureau of Water Resources Management.

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.

Alternative Best Management Practices

Street Sweeping: The urban analysis in Chapter IV shows that intensified street sweeping has a place as part of a broader urban stormwater quality control program. This practice, when used in conjunction with other urban practices, can contribute towards the achievement of the pollutant load reductions needed to meet urban water quality goals.

Agricultural Sedimentation Basin: The analysis of eroding uplands delivering sediment to surface waters presented in Chapter IV shows that many of the parcels needing control have low soil loss yet high delivery. In some of these areas, traditional management practices identified in Chapter NR 120, Wisconsin Administrative Code may not be accepted by landowners. As a result, this practice is added to give Land Conservation Department district staff a broader range of alternatives to offer to landowners.

Once soil particles are in transport, it is very difficult to achieve good control. For this reason, the use of agricultural sediment basins should only be considered after all options for on-site erosion control have been explored.

Animal Lot Relocation: High priority animal lots located in floodplain areas pose a particular problem for control. For some of these lots, application of traditional barnyard runoff control systems may not be possible, either because of floodplain or shoreland zoning restrictions or because the practice will not operate as intended under high water conditions. This practice is adopted as an extra option in reducing pollutant loads from these animal lots.

Livestock Water Pumps: This is adopted as an eligible practice component under the Shoreline Protection (Streambank Stabilization) practice contained in Chapter NR 120, Wisconsin Administrative Code. This component will allow the livestock operator to provide a watering area for livestock that does not require livestock access to the surface water from which the water is being drawn.

Fish Habitat Structures: This is adopted as an eligible practice component under the Shoreline Protection (Streambank Stabilization) practice contained in Chapter NR 120, Wisconsin Administrative Code. SCS Standard 395 will constitute the practice component. This component will allow the use of streambank stabilization practices that incorporate fish habitat structures. This will enhance integration of nonpoint source controls and fishery improvement.

Vegetative Filter Strips: This is adopted as a refinement of SCS Standard 393 (Filter Strip) to increase the minimum requirements for design of filter

strips for sediment and related pollutants in the East-West Watershed. This refined standard will be considered as an additional practice component under the Critical Area Stabilization and the Shoreline Protection (Streambank Stabilization) practices contained in Chapter NR 120, Wisconsin Administrative Code.

The analysis of eroding uplands delivering sediment to surface waters presented in Chapter IV shows that many of the parcels needing control have low soil loss yet high delivery. In some of these areas, traditional management practices identified in Chapter NR 120 may not be accepted by landowners. As a result, this practice is added to give Land Conservation Department district staff a broader range of alternatives to offer to landowners.

Once soil particles are in transport, it is very difficult to achieve good control. For this reason, the use of vegetative filter strips as a primary control practice should only be considered after all options for on-site erosion control have been explored.

Chapter NR 120, Wisconsin Administrative Code, and Appendix C to this watershed plan contain additional information about cost share conditions and practice standards and specifications for the management practices in the East-West Watershed.

It is important to note that not all Best Management Practices will be cost shared, regardless of the eligibility of the source being controlled. Cost sharing is not provided where there is no financial burden placed on the landowner to implement the practice. Examples include changes in crop rotation, manure spreading management, or minimum levels of street sweeping or leaf collection for urban areas. Chapter NR 120, Wisconsin Administrative Code contains a complete list of ineligible Best Management Practices.

It is the policy of the Department and the local implementing agencies involved in this project that sound construction erosion control practices be used during the construction of agricultural Best Management Practices installed through the Nonpoint Source Control Program.

Cost Share Agreements

Purpose of Cost Share Agreements

The cost share agreement is a legally binding contract between the grant recipient and the appropriate authority as specified below. The purpose of this contract is to set forth the obligations of both parties to the agreement.

Generally, each agreement specifies the quantity and location of each Best Management Practice the grant recipient agrees to install, the estimated total cost and cost share amount for each practice, and a schedule for installing

the practices. In addition, the grant recipient agrees to install all practices on the agreement within a five year period, to maintain all practices on the agreement for a specified period of time, and to refrain from changes in land management that will either lessen the effectiveness of the practices or otherwise degrade water quality.

The cost share agreement binds the granting authority to provide for 100 percent of the technical assistance needed for planning, design, and certification of the practices on the agreement, and to provide the cost share portion of the practice cost. These cost sharing and technical assistance obligations are in turn supported by the state of Wisconsin through the Nonpoint Source Control Program. Information concerning fiscal management of cost share funds is presented later in this section. Information concerning management of technical assistance aids is presented in the section titled Local Assistance Funds Administration.

Finally, local units of government are responsible for enforcing compliance of contracts to which they are party. Where the Department serves as a party to an agreement with a unit of government, the Department will take responsibility for monitoring compliance.

Parties to Cost Share Agreements

In order to receive cost share assistance for the installation of approved Best Management Practices, an eligible landowner or land operator (grant recipient) must first enter into a cost share agreement with the appropriate authority. Parties to cost share agreements in the East-West Watershed will be as follows:

1. A landowner or operator can receive cost share assistance for practices installed in unincorporated areas of Washington, Ozaukee, Fond du Lac, Dodge, or Sheboygan counties by entering into an agreement with his respective county Land Conservation Committee.

2. A unit of government (other than a county or state agency) can receive cost share assistance for practices installed in unincorporated areas of these counties by entering into an agreement with its respective county Land Conservation Committee.

3. Washington, Ozaukee, Fond du Lac, Dodge, or Sheboygan county, or state agencies can receive cost share assistance for practices installed in unincorporated areas by entering into an agreement directly with the Department.

4. A landowner or operator can receive cost share assistance for practices installed in incorporated areas of the city of West Bend or the villages of Kewaskum, Newburg, or Campbellsport by entering into an agreement with his respective village or city.

5. The city of West Bend and the villages of Kewaskum, Newburg, and Campbellsport can receive cost share assistance for practices installed in incorporated areas by entering into an agreement directly with the Department.

Developing Cost Share Agreements

Cost share agreements must be developed within three years of the approval of this watershed plan, unless a request for extension is granted by the Department.

Rural Areas: Landowners or operators having critical rural nonpoint sources such as barnyards or eroding uplands will be contacted by staff of the appropriate Land Conservation Department early during the three-year period for entering into cost share agreements. The original inventory data base will be verified and changed as needed. Based on updated inventory data and the criteria presented in Chapter IV, management categories will be finalized for each nonpoint source. Barnyards draining to pocket wetlands or internally-drained on shallow soils will be reviewed jointly with the Department prior to assigning a management category.

A conservation plan will then be developed with the landowner. Based on the conservation plan, a cost share agreement will be developed jointly by the landowner or operator and the Land Conservation Department district staff. During development of the conservation plan and the cost share agreement, the Land Conservation Department district staff may consult with the Department's Southeast District Wildlife Management and Fish Management staff for the Milwaukee River Basin to optimize the wildlife and fish management benefits of nonpoint source control practices.

Specifically, the county staff should contact these Department staff if: streambank protection practices, agricultural sediment basins, or critical area stabilization practices are being considered; if fence rows, rock piles, or other wildlife habitat components will be affected by installation of agricultural practices; or if there are questions concerning wetland impacts of proposed practices.

The Department will assist county staff by:

a. Identifying streambank protection practices that also benefit fish and wildlife.

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

c. Reviewing placement of proposed agricultural sediment basins to assure that negative impacts on stream fish and aquatic life

will not occur and to provide comments on incorporating wildlife habitat components into the design.

d. Consulting on proposed obstruction removals to identify potential wildlife impacts and to propose mitigative measures that could be taken.

e. Consulting to resolve questions concerning the effects of agricultural practices on wetlands.

The cost share agreement must include Best Management Practices needed to control all sources in Management Category I. The agreement may, at the landowner's option, include practices to control sources in Management Category II. Inclusion of controls for sources in Category II will be strongly encouraged. The agreement will also specify through additional information on the agreement itself or through reference to the farm plan the existing levels of control that must be maintained. Sources in Management Category III may be included on the agreement, but only as non-cost shared items or as items supported through other programs.

Urban Areas: Developing cost share agreements for retrofitting urban practices is a process that parallels that in rural areas, although it is more complicated. This plan identifies levels of pollutant control needed from each community, similar to the identification made of the controls needed for each farmstead. Refining a feasible approach to retrofitting that is consistent with the goals and objectives of this watershed plan must be determined for each urban area, similar to the way a conservation plan is developed for a farmstead. Finally, the urban community is asked to look towards the future and make provisions to properly manage its developing lands, through good stormwater management plans and construction site erosion control programs, so that water quality is not degraded further and so that the benefits of practices installed in existing urban areas are not lost. This is similar to the approach taken in rural areas, where landowners are asked to look ahead and continue good management on lands already protected.

Ideally, developing a cost share agreement for retrofitting would be the last of a three-step process involving developing or modifying a construction erosion control program and developing a stormwater management plan. Practically, these activities may occur simultaneously. Ultimately, all are needed.

Practices to control pollutants from existing urban lands may be cost shared through agreements between the individual landowners and the municipality, or between the municipality and the Department where the municipality assumes the role of the land operator for purposes of practice installation and maintenance. In either case, it is the municipality's responsibility to contact landowners of critical urban land uses and encourage their participation.

Where needed, the Milwaukee River Program Fish and Wildlife Management staff will be available to provide comment on the selection and design of practices in urban areas. This assistance will be coordinated through the Milwaukee River Program Coordinator in Milwaukee or the Nonpoint Source Control Program Planner in Madison.

Cost Share Agreement Approvals

Cost share agreements will be developed in conformance with this plan, and consequently the approval by the Department of cost share agreements between local units of government and landowners will not typically be required. Nonetheless, Chapter NR 120, Wisconsin Administrative Code, and Appendix C do specify exceptions to this rule. These are as follows:

1. Where nonpoint source grant funds are used to cost share practices on land owned or operated by a granting authority.

2. For agreements exceeding $50,000 in state share.

3. For large grade stabilization structures.

4. For streambanks over six feet in height.

5. For agricultural sediment basins.

6. For structural urban Best Management Practices.

7. For animal lot relocation.

In addition, local and state permit requirements must be complied with for Best Management Practices.

Fiscal Management Procedures

The purpose of this section is to identify the responsibilities and procedures for handling cost share funds used to fund Best Management Practices. Basic fiscal management requirements for local units of government are specified in Chapter NR 120, Wisconsin Administrative Code. This discussion is meant to provide clarifying information.

Funding Agreements

The Nonpoint Source Grant Agreement is the mechanism that will be used to transmit Nonpoint Source Control Program funds from the Department to local management agencies for use in supporting cost share agreements with landowners. The cost share agreement is the mechanism that will be used to transmit these program funds from the local management agency to the individual landowner. Where the Department makes a cost share agreement with a county, city, or village to support practices on land owned or operated by the local agency, the Nonpoint Source Grant Agreement can be used as a cost share agreement.

Some important restrictions on the use of Nonpoint Source Control Program funds are as follows:

1. Program funds may only be used to support cost share agreements signed within the eligible period specified on the Nonpoint Source Grant Agreement.

2. Practices initiated prior to the signing of a cost share agreement are not eligible for program support.

3. Only those practices specified in the Nonpoint Source Grant Agreement will be eligible for program support.

Washington, Fond du Lac, Ozaukee, and Sheboygan counties will each have their own Nonpoint Source Grant Agreements with the Department, and each will handle cost share agreements with their own landowners. These four counties are fiscally responsible for the use of cost share funds provided to cost share recipients with which they have agreements. These counties are also responsible for adequately preparing and maintaining their own fiscal management files as specified in Chapter NR 120, Wisconsin Administrative Code.

Dodge County, under the provisions of Chapter NR 120, will delegate to Fond du Lac County its responsibility to develop a Nonpoint Source Grant Agreement. Fond du Lac County will therefore establish and maintain a project account that covers both counties. Dodge County will retain its responsibility to develop cost share agreements with its own landowners and will remain fiscally responsible for the use of cost share funds provided to landowners with which it has agreements. Dodge County and Fond du Lac County will enter into a joint agreement whereby Dodge County will agree to abide by all provisions of the Nonpoint Source Grant Agreement between Fond du Lac County and the Department.

Fiscal Management Responsibilities and Procedures

The following fiscal management procedures will be used by the five counties in the East-West Watershed to handle cost share funds:

Step 1. Sheboygan, Washington, Ozaukee, and Fond du Lac counties enter into Nonpoint Source Grant Agreements with the Department.

Step 2. Land Conservation Committees from Sheboygan, Washington, Ozaukee, Fond du Lac, and Dodge counties develop cost share agreements with respective landowners, obtaining the Department's review or approval if required.

Step 3. Respective Land Conservation Department staff design Best Management Practices. Where necessary, the appropriate bidding process is used.

Step 4. Respective Land Conservation Department staff oversee practice installation.

Step 5. Landowners submit itemized bills to respective Land Conservation Committees.

Step 6. Respective Land Conservation Department staff certify that the practice meets applicable standards and that cost containment requirements have been met.

Step 7. Respective Land Conservation Committees, and if required, the respective county board, approve the cost share payment to the landowner. Dodge County sends payment vouchers as well as supporting practice certification forms to Fond du Lac County.

Each Land Conservation Committee is responsible for obtaining proof that the applicable local share of the practice cost has been paid.

Step 8. Checks are issued by Sheboygan, Washington, Ozaukee, and Fond du Lac counties to their respective landowners. Checks are issued to Dodge County landowners through Fond du Lac County. Counties with project accounts update project ledgers.

In Sheboygan County, payments will be made using a two party check that lists as payees the grant recipient and the contractor.

COST CONTAINMENT PROVISIONS

RURAL BEST MANAGEMENT PRACTICES

The Land Conservation Committees for Washington, Ozaukee, Fond du Lac, Sheboygan, and Dodge counties will use a combination of bidding and average cost techniques in order to contain the cost of Best Management Practices for unincorporated areas of the East-West Watershed.

1. Best Management Practices having a total estimated cost for installation of $5,000 or more must be bid through the county bidding procedure.

2. For Washington, Ozaukee, Fond du Lac, and Dodge counties, Best Management Practices having a total estimated cost for installation of less than $5,000 may be bid by the landowner or grant recipient at his own discretion. Contractors are required to obtain bids from subcontractors for those items the contractor will not complete.
   If the bidding process is not used, then the cost share payment will be based on the average cost method. Each county will develop an average cost per unit of materials and labor for use in determining the average cost for practices and practice components. This list of average costs will be reviewed periodically and updated as needed. Average cost figures, and the time periods for which they apply, will be kept on file by the county until the final project audit has been completed.

The cost share payments made to grant recipients will be based on actual installation costs, and may not exceed the estimated cost share amounts based on the bidding and average cost methods described above without approval of the appropriate Land Conservation Committee. Where approval is requested by the landowner and granted by the Land Conservation Committee, the appropriate documentation will be submitted to the Department pursuant to Chapter NR 120, Wisconsin Administrative Code.

Urban Best Management Practices

Wisconsin Statutes generally require bids as a cost containment procedure for public works improvements. Chapter NR 120, Wisconsin Administrative Code, specifies conditions under which a city or village can use the force account method for professional services or construction activities supported by Nonpoint Source Control Program funds.

LOCAL ASSISTANCE FUNDS ADMINISTRATION

Purpose of Local Assistance Aids

Local assistance funds are provided by the Department to local units of government and state agencies, or their agents, to support employees hired or contracted to conduct activities necessary to implement the watershed project.

Funds are also provided to cover direct costs associated with these implementation activities. Although these funds will not cover 100 percent of the cost to a local management agency of implementing a watershed project, the funds are intended to support a substantial portion of the cost.

Eligible Rural Implementation Activities: Activities eligible for support with local assistance funds are specified in Chapter NR 120, Wisconsin

Administrative Code as refined by specific language in the Local Assistance Grant Agreements. Some of the most important eligible activities that must be conducted to implement this project in rural areas are:

a. Contacting landowners of critical nonpoint sources identified in this watershed plan.

b. Developing conservation plans that address the critical rural sources.

c. Developing and entering into cost share agreements with critical landowners or operators.

d. Identifying and designing site-specific Best Management Practices identified in this watershed plan.

e. Installing and verifying Best Management Practices included on cost share agreements.

f. Reviewing Best Management Practice operation and maintenance.

g. Planning, preparing, and conducting Information and Education Program activities consistent with the education component of this plan.

Eligible Urban Implementation Activities: The seven activities listed above are also applicable for urban areas.

The Nonpoint Source Control Program will provide support for the following activities aimed at construction erosion control in both incorporated and unincorporated areas:

1. Assistance in evaluating existing construction erosion control ordinances to determine where modifications are needed.

2. Distribution of available technical materials, including the model ordinance and the practice standards handbook.

3. Training workshops for appropriate target groups such as municipal staff, elected officials, developers, and consulting engineers.

4. Where needed, support of "additional staff" for a specified start-up period (up to five years) to assist a city, county, village, or town in the development and implementation of an ordinance.

The Nonpoint Source Control Program will provide support for the following activities aimed at controlling stormwater pollution from areas of new urban development:

1. Assist identified communities with developing water quality related objectives of more detailed stormwater studies.

2. Share with identified municipalities the cost of developing the water quality components of a detailed stormwater management plan for future development.

3. Distribute available technical materials to those responsible for developing and implementing the stormwater plan.

4. Support training sessions for those involved in developing, administering, and implementing the stormwater management plan.

5. Support "additional staff" for a specified start-up period to assist a municipality in implementing the stormwater plan. This could include assistance needed to develop and administer a stormwater control ordinance that includes provisions for protecting water quality and water resources habitat.

The Nonpoint Source Control Program will provide support for the following activities aimed at controlling stormwater pollution from currently established urban lands identified by this plan as having a high priority for control:

1. Assist identified communities with developing water quality related objectives of more detailed stormwater studies for existing urban areas if needed.

2. Share with identified municipalities the cost of developing the water quality components of more detailed retrofitting studies for selected existing areas.

3. Distribute available technical materials to those responsible for developing and implementing the retrofitting recommendations.

4. Support training sessions for those involved in developing, administering, and implementing the retrofitting recommendations.

5. Support "additional staff" needed to design and install retrofitted practices.

6. Support Information and Education Program activities designed to improve urban housekeeping.

7. Support eligible components of an accelerated street-sweeping program for a start-up period of up to five years.

Parties to Local Assistance Grant Agreements

The Department will have separate Local Assistance Grant Agreements with Washington, Ozaukee, Fond du Lac, Sheboygan, and Dodge counties to conduct basic rural implementation and construction erosion control activities. The Department will have an agreement with the UW-Extension to plan and conduct Information and Education Program activities. The Department will also develop separate agreements with the city of West Bend and the villages of Newburg, Kewaskum, and Campbellsport to support construction erosion control activities, stormwater management planning for new development, and activities needed to retrofit critical existing urban land uses.

Procedures for Developing Agreements

Local Assistance Grant Agreements will be developed jointly by the Department and each grant recipient upon approval of this watershed plan. Thereafter each of the governments and agencies with which the Department has an agreement will prepare and submit, under guidance from the Department, an annual or periodic workplan that reflects activities that must be completed to successfully implement the watershed project. The basis for these workplans will be the staffing and budget needs identified in this watershed plan and additional needs that become apparent during implementation. Following approval of these workplans by the Department, it will amend each Local Assistance Grant as needed and submit the revised grant to the grant recipient for signature.

Fiscal Management Procedures

Fiscal management procedures and record keeping requirements are specified in Chapter NR 120, Wisconsin Administrative Code.

BUDGET AND STAFFING NEEDS

Rural Implementation

Rural Budget Needs

Watershed Needs: Cost estimates for constructing rural Best Management Practices in the East-West Watershed are presented in Table 79. The total installation cost of meeting the pollution reduction objectives identified in this plan are approximately $3.67 million. State funds necessary to cost

share this level of control would be about $2.37 million; the local share provided by landowners would total $1.3 million. If the voluntary level of participation is 50 percent, then the state funds needed for cost sharing would be about $1.18 million.

In addition, $250,000 of state funds will be needed to purchase easements. These easements will be used to support wetland restoration, shoreline buffers, and critical area stabilization in accordance with guidelines set forth in this watershed plan.

Individual County Budget Needs: The total watershed budget is divided up according to individual county needs as a basis for developing Nonpoint Source Grant Agreements. Four budget projections are presented for the five counties; the budgets for Fond du Lac and Dodge counties are combined since both counties will be served by the Nonpoint Source Grant Agreement between Fond du Lac County and the Department.

Washington County: The estimated budget is presented in Table 80. The total construction cost of meeting the pollution reduction objectives identified in this plan are approximately $2.13 million. State funds necessary to cost share this level of control would be about $1.4 million; the local share provided by landowners would total $0.73 million. If the voluntary level of participation is 50 percent, then the state funds needed for cost sharing would be about $0.7 million.

Fond du Lac and Dodge counties: The estimated budget is presented in Table 81. The total construction cost of meeting the pollution reduction objectives identified in this plan are approximately $1.08 million. State funds necessary to cost share this level of control would be about $0.69 million; the local share provided by landowners would total $0.39 million. If the voluntary level of participation is 50 percent, then the state funds needed for cost sharing would be about $0.35 million.

Ozaukee County: The estimated budget is presented in Table 82. The total construction cost of meeting the pollution reduction objectives identified in this plan are approximately $0.22 million. State funds necessary to cost share this level of control would be about $0.15 million; the local share provided by landowners would total $.07 million. If the voluntary level of participation is 50 percent, then the state funds needed for cost sharing would be about $.09 million.

Sheboygan County: The estimated budget is presented in Table 83. The total construction cost of meeting the pollution reduction objectives identified in this plan are approximately $0.23 million. State funds necessary to cost share this level of control would be about $0.15 million; the local share provided by landowners would total $.08 million. If the voluntary level of participation is 50 percent, then the state funds needed for cost sharing would be about $.08 million.

RURAL STAFFING NEEDS

Watershed Needs: The total technical assistance workloads that develop for county Land Conservation Department district staffs over the eight year project period will vary depending on the level of landowner cooperation. The total estimated technical assistance workload for the rural portion of the East-West Watershed Project is anticipated to be between 33,000 and 54,000 hours, based on participation levels of 50 and 100 percent respectively. This is equivalent to a full-time staff equivalent of between 18 and 30 staff years of effort. This will require salary and fringe of between $460,000 and $756,000 to support staff over the eight year project period.

Individual County Staffing Needs: Estimated staffing needs for each county over the eight year project period are presented in Table 84. Staffing needs are estimated for the 50 percent and 100 percent participation levels. Information and Education Program workloads for each county represent the combined staff needs for Land Conservation Department and UW-Extension staff. The Information and Education Program is detailed in Chapter VI.

Washington County: There is an estimated need of 9 to 15.5 full-time staff equivalents over the eight year period. For each of the first three project years, the anticipated need is between two and three full-time staff equivalents. For each of the last five project years, the anticipated need is for about one full-time staff equivalent.

In addition, the estimated Information and Education Program workload will be about 400 hours during the first year. The workload during the remaining years is estimated to range from 200 to 400 hours per year.

Fond du Lac County: There is an estimated need of 5.5 to 9 full-time staff equivalents over the eight year period. For each of the first three project years, the anticipated need is between one and two full-time staff equivalents. For each of the last five project years, the anticipated need is between .5 and one full-time staff equivalents.

In addition, the estimated Information and Education Program workload will be about 400 hours during the first year. The workload during the remaining years is estimated to range from 200 to 400 hours per year.

Ozaukee County: There is an estimated need of 1.5 to two full-time staff equivalents over the eight year period. For each of the first three project years, the anticipated need is between .25 and .5 full-time staff equivalents. For each of the last five project years, the anticipated need is between .1 and .25 full-time staff equivalents.

Sheboygan County: There is an estimated need of 1.5 to three full-time staff equivalents over the eight year period. For each of the first three project years, the anticipated need is between .25 and .5 full-time staff

equivalents. For each of the last five project years, the anticipated need is between .2 and .3 full-time staff equivalents.

Dodge County: There is an estimated need of less than .5 staff equivalents over the eight year project period.

URBAN IMPLEMENTATION

URBAN BUDGET NEEDS

City of West Bend: The cost of implementing the urban stormwater management programs recommended in Chapter IV were estimated for portions of the West Bend Study Area contained in the Silver Creek, Quaas Creek, and West Bend subwatersheds. The estimated costs that are discussed include the construction and maintenance costs for detention and infiltration devices, and the cost of accelerated street sweeping.

Cost estimates for feasibility studies, stormwater management planning, or practice design and certification have not been made at this time, although they are important components of implementing the stormwater management program. Costs associated with making and implementing any needed changes in the city's construction erosion control program are also not included. The Nonpoint Source Control Program will cover a portion of the cost associated with these activities, as discussed elsewhere in this chapter.

Cost information for the alternative urban pollution control programs evaluated for the Silver Creek Subwatershed is presented in Table 85. Cost information for the Quaas Creek Subwatershed is presented in Table 86, and information for the West Bend Subwatershed is presented in Table 87. These tables present the capitol cost and equivalent annual cost, including maintenance, of the alternative programs. For each program, these costs are presented for controls on the existing urban area, on the planned urban area, and on the future (existing plus planned) urban area. A cost-effectiveness indicator is also presented for each program.

Based on the information in these tables, preliminary estimates can be made of the state and local funds that would be needed to implement the recommended programs in the Silver Creek, Quaas Creek, and West Bend subwatersheds. All costs associated with practices for planned urban development must be borne locally, since these costs are not eligible through the Nonpoint Source Control Program. Therefore, the estimated local share of implementing practices in planned areas can be taken directly from these tables. State and local costs associated with implementing these programs in existing urban areas are not readily apparent from these tables, however, since the Nonpoint Source Control Program covers 70 percent of the capitol cost of infiltration and detention and 50 percent of the cost of accelerated street sweeping, while 30 to 50 percent of these capitol costs plus all maintenance costs must be borne locally.

Table 88 is presented to show the state and local cost of implementing alternative programs in the existing urban area.

Table 88 presents the estimates of the state and local costs for installing and maintaining practices in the existing urban areas. In this table the total capitol costs cover detention and infiltration, the state cost shares represent 70 percent of the capitol costs of detention and infiltration, and the local shares are presented both as 30 percent of the capitol cost of detention and infiltration and as the equivalent annual cost of amortizing this local capitol cost plus all anticipated maintenance costs.

A summary of costs based on Table 88 are presented below for each subwatershed. Costs that are associated with programs aimed at achieving the primary water resources objectives are presented first, followed by costs associated with alternative programs that would achieve less reduction in pollutant loading and only secondary water resources objectives.

In the Silver Creek Subwatershed, Alternative Program #3 appears to be the most feasible based on more detailed studies by the Regional Planning Commission (SEWRPC, 1988).

1. The state share of the total capitol cost would be $250,000.

2. The local share of the total capitol cost would be $108,000; the equivalent annual cost of capitol expenses and maintenance would be $25,000.

In the Quaas Creek Subwatershed, controls implemented in the existing area as part of Programs #5 or #4 would have the following costs:

1. The state share of the total capitol cost would range from $168,000 to $189,000.

2. The local share of the total capitol cost would range from $72,000 to $81,000; the equivalent annual cost of capitol expenses and maintenance would range from $17,000 to $19,000.

Controls implemented as part of Program #2 or #6 in the existing urban areas of Quaas Creek would have the following costs:

1. The state share of the total capitol cost would range from $0 to $187,000.

2. The local share of the total capitol cost would range from $0 to $80,000; the equivalent annual cost of capitol expenses and maintenance would range from $0 to $18,000.

In the West Bend Subwatershed, controls implemented in the existing area as part of Programs #4 or #1 would have the following costs:

1. The state share of the total capitol cost would range from $0.91 million to $1.19 million.

2. The local share of the total capitol cost would range from $390,000 to $510,000; the equivalent annual cost of capitol expenses and maintenance would range from $90,000 to $117,000.

Controls implemented as part of Program #2 or #5 in the existing urban areas of the West Bend Subwatershed would have the following costs:

1. The state share of the total capitol cost would range from $1.19 million to $1.46 million.

2. The local share of the total capitol cost would range from $510,000 to $624,000; the equivalent annual cost of capitol expenses and maintenance would range from $117,000 to $144,000.

A program that addresses all of the existing urban areas in the city of West Bend Study Area would cost the state about $1.75 Million plus additional funds for more detailed planning and design work. The equivalent annual local cost, which includes operation and maintenance of practices and the local share of practice construction, would be about $170,000. The cost of controls for planned urban development through the year 2000, which must be borne locally unless other grant programs become available, would be about $4 Million.

VILLAGES OF KEWASKUM, CAMPBELLSPORT, AND NEWBURG

The cost of implementing the urban stormwater management programs recommended in Chapter IV were estimated for these three study areas. The estimated costs that are discussed include primarily construction and maintenance costs for detention and infiltration devices, since accelerated street sweeping is generally not cost-effective for these communities.

Cost estimates for feasibility studies, stormwater management planning, or practice design and certification have not been made at this time, although they are important components of implementing the stormwater management program. Costs associated with making and implementing any needed changes in the villages' construction erosion control programs are also not included. The Nonpoint Source Control Program will cover a portion of the cost associated with these activities, as discussed in this plan.

Cost information for the alternative urban pollution control programs evaluated for the Kewaskum Study Area is presented in Table 89. Cost information for the Campbellsport Study Area is presented in Table 90, and information for the Newburg Study Area is presented in Table 91. These tables

present the capitol cost and equivalent annual cost, including maintenance, of the alternative programs. For each program, these costs are presented for controls on the existing urban area, on the planned urban area, and on the future (existing plus planned) urban area. A cost-effectiveness indicator is also presented for each program.

Based on the information in these tables, preliminary estimates can be made of the state and local funds that would be needed to implement the recommended programs in these study areas. All costs associated with practices for planned urban development must be borne locally, since these costs are not eligible through the Nonpoint Source Control Program. Therefore, the estimated local share of implementing practices in planned areas can be taken directly from these tables. State and local costs associated with implementing these programs in existing urban areas are not readily apparent from these tables, however, since the Nonpoint Source Control Program covers 70 percent of the capitol cost of infiltration and detention and 50 percent of the cost of accelerated street sweeping, while 30 to 50 percent of these capitol costs plus all maintenance costs must be borne locally.

Table 92 presents the estimates of the state and local costs for installing and maintaining practices in the existing urban areas for these three study areas. In this table the total capitol costs cover detention and infiltration, the state cost shares represent 70 percent of the capitol costs of detention and infiltration, and the local shares are presented both as 30 percent of the capitol cost of detention and infiltration and as the equivalent annual cost of amortizing this local capitol cost plus all anticipated maintenance costs.

A summary of costs based on Table 92 are presented below for each study area.

In the Kewaskum Study Area, controls implemented in the existing area would have the following costs:

1. The state shares of the total capitol cost for programs that will meet the pollution reduction goals range from $288,000 to $527,000.

2. The local shares of the total capitol cost for these programs range from $102,000 to $226,000; the equivalent annual cost of capitol expenses and maintenance would range from $23,000 to $52,000.

The cost of controls for planned urban development through the year 2000, which must be borne locally unless other grant programs become available, would be about $1 Million.

In the Campbellsport Study Area, controls implemented in the existing area would have the following costs:

1. The state shares of the total capitol cost for programs that will meet the pollution reduction goals range from $63,000 to $354,000.

2. The local shares of the total capitol cost for these programs range from $27,000 to $152,000; the equivalent annual cost of capitol expenses and maintenance would range from $6,000 to $35,000.

The cost of controls for planned urban development through the year 2000, which must be borne locally unless other grant programs become available, would be about $180,000.

In the Newburg Study Area, controls implemented in the existing area would have the following costs:

1. The state shares of the total capitol cost range from $133,000 to $347,000.

2. The local shares of the total capitol cost for these programs range from $57,000 to $118,000; the equivalent annual cost of capitol expenses and maintenance would range from $13,000 to $27,000.

The cost of controls for planned urban development through the year 2000, which must be borne locally unless other grant programs become available, would be about $1.4 Million.

Urban Staffing Needs

Urban staffing needs have not been quantified at this time.

CHAPTER VI
INFORMATION AND EDUCATION PROGRAM

PURPOSE AND PERSPECTIVES

The primary purpose of this Information and Education Program for the East-West Watershed is to enhance implementation of watershed plan objectives. It was prepared as part of an ongoing and dynamic planning process. Incorporated in its preparation were both rural and urban basinwide educational strategies. These, in turn, were based upon survey data from rural and urban landowners and users, public meeting results committee and ad hoc group suggestions, staff interviewed, and other participatory processes.

In order to help ensure judicious use of funds for maximum impact, the educational program planning was viewed from a number of different perspectives. These included:

1. Key audiences capable of registering the greatest impacts on the resource base.

2. Key messages from the watershed project needing to be relayed.

3. Potential uses and outcomes of specific activities.

4. Levels of effort from different sources meshing for collective impact in improving water quality.

5. Critical timelines which might necessitate shifts in strategy.

6. Educational approaches prospectively to be employed.

The resulting educational plan for the East-West Watershed includes recommendations for both general and specifically targeted activities. It recognizes that carefully and specifically targeted audience groups hold the key to actions that can result in fairly immediate, substantial, and known improvements to water resource features. At the same time, the educational plan acknowledges that educational activities designed for general or broad audiences are important. They can help influence both short-term and long-term management decisions. In part, this is a recognition that numerous "encounters" with information are often required to motivate positive action. The general activities also address certain public "right-to-know" and

"building project momentum" objectives. Even so, however, the targeting of audiences and refinement of messages will occur to the greatest degree possible to benefit from advantages in cost-efficiencies and potentials for program impact.

KEY AUDIENCE GROUPS

Ideally, the watershed project would be able to uniformly reach all key audiences effectively throughout the entire implementation period. The realities of limited staff and resources, however, will likely requires reprioritizing and shifts between areas as important stages of the project unfold. The key audience groups -- as identified in the ural and urban educational strategies, and as contained in the East-West Watershed Educational Plan -- include:

1. Rural Landowners and Operators
2. Agricultural Organizations
3. Elected and Appointed Officials
4. Conservation and ENvironmental Groups
5. Civic and Service Groups
6. Urban Homeowners/Residents
7. Lake Residents/Organizations
8. Developers and Builders
9. Business and Industry Associations
10. Local Media Representatives
11. The General Public

Some of the above are uniquely rural or urban; others show considerable overlap. Priority can be ascertained by the extent to which respective listing occurs in the accompanying table found in Appendix F. For the project "sign-up period," these audiences will be addressed according to the following desired outcomes, tentatively given in decreasing order of priority:

1. Watershed project participation, largely through establishment of a cost-sharing contract -- either by units or government or rural landowners.

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

3. Widespread individual action on a voluntary basis -- no cost-sharing contract -- including urban homeowners/residents using better "housekeeping" practices.

4. Complementary programs utilized to achieve water quality objectives through means, and perhaps in areas, slightly different than the watershed project will address.

5. Support of the watershed project through newly discovered or reawakened convictions regarding Milwaukee River Program goals (persons may be motivated to voice this).

6. Increased awareness that the project exists and of what is being accomplished (the public's "right-to-know" without any action necessarily).

More than one of these outcomes could apply in any given instance, and there would likely be some interchangeability both within the respective groups and over time.

Types of Activities

There are different types of Information and Education Program activities including in the educational plan, as distinguished below by the outcome(s) sought:

1. Activities that motivate individuals and/or groups to action through participation in the watershed project.

2. Activities that provide instruction on how to take appropriate action.

3. Activities that develop an understanding of how the priority watershed project works (describing steps involved in planning, timeline, etc.).

4. Activities that share project progress, to reinforce awareness and perhaps motivate by peer pressure.

5. Activities that promote complementary programs which may address project objectives, but in a different fashion.

These may be regarded as activity outcomes or objectives which serve to complement the broad educational goals. established for the Milwaukee River Priority Watersheds Program (attached).

Levels of Activities

Educational planning for the East-West Watershed Project was complicated by the broader framework of the Milwaukee River Basin, within which it lies. The plan presented in this chapter addresses activities designed specifically for the East-West Watershed. A separate Basinwide Information and Education Plan addresses activities recommended for completion at the area or state level. The following levels of activities are thus distinguished for educational planning and implementation purposes:

Watershed-Specific: Activities specifically designed and intended for use in the East-West Watershed. Other watershed projects may have comparable educational activities recommended which can "draw from" those undertaken here, however, some restructuring or adaptation would be needed.

Basinwide: Activities, including educational materials, that have a potential for immediate use in the East-West Watershed, and which would make the project more effective. These activities, however, are undertaken for a broader, multi-watershed purpose under the Milwaukee River Program.

Statewide: Activities, particularly educational materials and training programs, undertaken to meet a widespread educational need (beyond the Milwaukee River Basin) but which may prove useful for successful East-West Watershed Project.

It should be noted that activities designed to reach smaller, targeted audiences with specific messages are best carried out in rural areas and smaller geographic units (individual watersheds, at largest). Activities designed to establish more general awareness among large groups representing a range of audience types are best carried out in a metropolitan media market at the basinwide level. The East-West Watershed Educational Plan guides the former, but will also benefit from the later.

Some activities, such as newsletters, are designed to communicate messages to several target audiences. Here, even though a specific subgroup may be the primary recipients of information provided in a given newsletter issue, there is recognized benefit in having all groups know what is occurring and why. Over time, project efforts will thus be seen as equitably balanced, for example, between urban and rural areas.

Educational Project Workload and Lead County Concept

During the sign-up period under the watershed project, there is a clear need to establish cost-sharing contracts with as many eligible individuals and communities as possible (ordinance development and housekeeping practices can be pursued after this period ends, as well as during it). In order to accomplish this, county staff must be available to make the necessary contacts and then commit to the necessary follow-through. These on-on-one contacts illustrate a most fundamental type of educational. However, they are considered a part of the technical implementation process and budgeted for elsewhere. Key educational materials, nevertheless, which will make this process more effective are covered here or in the Basinwide Information and Education Plan.

The educational plan table in Appendix F reflects a collective decision on the part of the counties to informally practice a "lead county concept" in sequentially implementing the five priority watershed plans under the Milwaukee River Program. Having Fond du Lac and Washington counties serve as

"co-leaders" for the multi-county educational activities in the East-West Watershed should result in greater efficiencies.[1] This is because Sheboygan, Ozaukee, and especially Dodge counties each contain a very small portion of the watershed -- and much of Sheboygan's slightly larger share is in state ownership. Examples of activities affected by this "deferral" to lead educational counties would be tours, publications, news releases, and public meetings. Because Washington County has substantial involvement in other watersheds as well, Fond du Lac County would be looked to as a lead contributor for activities such as the watershed newsletter.

Program Evolution and Educational Plan Updates

As noted previously, the East-West Watershed Educational Plan was prepared as a part of an ongoing process, and within the context of its position a some of the five priority watersheds in the Milwaukee River Basin. As such, its position as the first watershed project to be implemented is very important. The watershed-specific educational plan wa completed while in Urban Information and Education Strategy and a Basinwide Information and Education Plan were still under preparation. Thus, while drawing from important elements of these two documents to "fit" within a proper framework and establish a pattern of consistency, the East-West Watershed Educational Plan had to move forward on a base of "best assumptions to date." The most crucial of these assumptions have been noted in these background sections.

For these reasons, educational plan updates will occur. They have tentatively been scheduled on an annual basis; and it is likely that the first such update will rank among the most important. The first year of project implementation with its new insights will have been completed--as well as other watershed plans and the two major documents referenced above. These basinwide "umbrella" documents in particular contain much support information and policy positions that could not be included in this chapter. If changes in Milwaukee River Basin educational program direction were to occur, for example, it could affect East-West Watershed educational programming. No dramatic changes are foreseen at this time, however; and every attempt has been made to ensure that the East-West Watershed Educational Plan--including descriptive accounts of activities--"meshes" well with the basinwide effort. This approach will also help govern decision-making in the other adjoining watershed projects.

It is likely that the first years of educational activity within the East-West Watershed will be among the most ambitious. The groundwork for a successful and extensive program needs to be laid. However, the relative absence of

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[1]For the other Milwaukee River Watersheds, the roles would be reversed: Sheboygan County would assume an educational lead for the North Branch; Ozaukee County would assume the lead for at least the agricultural portion of the South Branch; and Washington County (perhaps assisted by Ozaukee County) could assume leadership for Cedar Creek. In all cases, landowners would still be referred to, and work with, their respective county LCD. It is simply the county portions of the basinwide educational workload that would be divided for efficiency; and primary identity for certain activities would thus reside in the counties that are most logical.

activities listed beyond the initial years should not be construed as a plan to do less educationally. Rather, any apparent disparity in activities for succeeding years reflects a presently unclear picture of needed commitments -- both staff and funding. It is also likely, therefore, that the educational plan table will be updated annually.

PART THREE
EVALUATION PLAN

CHAPTER VII - PROJECT EVALUATION AND MONITORING

CHAPTER VII
PROJECT EVALUATION AND MONITORING

PROJECT EVALUATION

The evaluation strategy for this project involves the collection, analysis, and reporting of information so that progress in three areas can be tracked:

1. First, progress in carrying out the education and technical assistance workloads identified in this plan will be tracked.

2. Second, changes in nonpoint source pollutant loading anticipated from cooperating landowners will be tracked.

3. Third, changes in the water resources themselves will be monitored.

EVALUATING LOCAL IMPLEMENTATION

PURPOSE

Information for this element will be used jointly by local project managers, state support staff from the Department, and staff from other supporting agencies to identify adjustments needed in project implementation.

METHODS

The information and technical assistance workload for each unit of government is identified in this watershed plan. Annual work plans consistent with this watershed plan will be prepared by local units of government and the UW-Extension, and approved by the Department as a requirement for receiving continued financial assistance under this watershed project. Progress towards the goals set forth in these materials will be the basis for this evaluation.

RESPONSIBILITY, SCHEDULE, AND REPORTING

Semi-annually each unit of government identified in this plan as having a significant role in the control of rural or urban nonpoint sources will summarize its progress towards meeting the annual work objectives of this plan, as modified by subsequent annual workplans. These reports will be

submitted to the Department, and used as a basis for discussing project progress and possible changes that may be needed.

Annually, the Department will coordinate project evaluation meetings with these units of government and will prepare an annual project summary report.

EVALUATING CHANGES IN LAND MANAGEMENT

PURPOSE

This information will be used to track progress being made towards pollutant reduction goals, and will serve in part as an indicator of project success.

METHODS

Rural Changes: The following indicators will be used to evaluate the change in pollutant loading from rural nonpoint sources:

1. The reduction in sediment delivered from upland erosion.
2. The reduction in sediment delivered from streambank erosion.
3. The improvement of degraded streambanks.
4. The reduction in the estimated phosphorus loading from barnyards.
5. The reduction in critical acres winterspread with manure.
6. Other indicators as needed.

For each of these source categories, three calculations will be made. These include:

1. The reduction in mass loading.
2. The percent reduction in mass loading from the source category.
3. The percent of the target reduction goal met for the source category.

The first calculation will be made for each stream segment and subwatershed. The other calculations will be made only by subwatershed. Separate calculations will be developed based on:

1. Practices included on cost share agreements.
2. Practices actually installed.

Urban Changes: The following indicators will be used to evaluate the change in pollutant loading from existing urban areas and from planned future urban areas:

1. The reduction in lead and suspended solids mass loading from practices retrofitted on existing areas.

2. The change in mass loading of lead and suspended solids and the change in stream hydrology from implementation of more detailed stormwater management plans or ordinances for future development. In addition, the adoption or modification, and enforcement of construction erosion control ordinances will be used as an indicator of accomplishment.

Separate calculations will be developed based on the following:

1. Practices included on cost share agreements or in stormwater management plans.

2. Practices actually installed.

Responsibilities, Schedules and Reporting

Counties will maintain and update their own inventory data base as needed to perform the required calculations. Inventory updates will include changes resulting from revised baseline data as well as changes resulting from practice installation.

Annually, each county will summarize and submit the required reports to the Department. In addition, each county will attach a landowner tracking sheet to each cost share agreement it sends to the Department. The tracking sheet will include summary information concerning the original inventory conditions and management category determinations, and changes in inventory conditions and management category determinations where applicable.

Where urban modeling tools are required and in the domain of the Department, the Department will either assist the community in developing the required information or will make the tools available for use.

Information submitted to the Department will be incorporated by it into the annual project summary report.

Evaluating Changes in Water Resources

Purpose

The purpose of water resource evaluations is to determine if the water resource objectives set forth in this watershed plan are being attained. This information, in conjunction with changes in pollutant loading, will serve as an indicator of project success.

Monitoring Methods

Water quality evaluations for streams and rivers will be based on changes in chemical and bacteriological parameters as well as on changes in several resource components including stream habitat, macroinvertebrate populations, fish communities, and aquatic plant populations. Water quality evaluations for lakes will be based on changes in trophic status as indicated by nutrient status, chlorophyll concentrations, and water clarity.

Site Selection

Evaluation monitoring sites will be selected in areas where the chance for water quality improvements is greatest, based on the severity of existing pollution sources and the potential of the stream for improvement. The monitoring effort will be structured to provide intensive monitoring at a limited number of sites.

The three site selection criteria include the severity of the nonpoint sources to be controlled, the expected response in the water resource, and site accessibility. Table 93 shows potential evaluation monitoring sites.

Lakes: Auburn and Lucas lakes will be used for reference monitoring because their pollutant loads are acceptable and their trophic status and drainage areas are relatively stable. Crooked and Green lakes are chosen because they can be expected to show improvement as nonpoint sources are controlled.

Streams: Eleven stream sites are chosen for monitoring.

Monitoring in Watercress Creek will be used to evaluate water quality and habitat improvement resulting from rural nonpoint source control measures in the headwaters area.

Two of the three sites on the East Branch of the Milwaukee River will be established near State Highway 28 and County Highway "H" to evaluate the effects of feedlot and streambank controls.

The Rustic Road station on the West Branch of the Milwaukee River is designed to evaluate nutrient reduction and status of aquatic plant communities. An additional station on the West Branch will be established to evaluate the effects of rural nonpoint source controls in the Wayne Marsh Subwatershed.

Stations along Kewaskum Creek will also be established to evaluate the water quality impacts of rural nonpoint source controls.

The stations on the Lower Mainstem of the Milwaukee River will be established at the site of the former Woolen Mills Impoundment in the city of West Bend, and at the village of Newburg. Monitoring at the Woolen

Mills site will be used to evaluate the effects of rural and urban nonpoint source controls as well as the effects of fish management activities. The monitoring at Newburg will be used to evaluate the effects of rural controls.

Stations on Silver Creek in the city of West Bend will be used to evaluate the effects of urban nonpoint source controls placed on existing and planned urban areas.

Sites on Quaas Creek will be established to evaluate the effect on water quality of rural nonpoint source controls, and of urban controls placed primarily on planned urban areas such as the industrial park.

Some flexibility may be required to adjust the evaluation monitoring plan so that monitoring evaluation stations are not located in areas where there is minimal landowner cooperation.

SCHEDULES, REPORTING, AND RESPONSIBILITIES

The schedule for pre-project monitoring is as follows:

Watercress Creek: fall 1989; spring, summer 1990.
East Branch Milwaukee River: fall 1989; spring, summer 1990.
West Branch Milwaukee River (Wayne Marsh): fall 1989; spring, summer 1990.
West Branch Milwaukee River (Rustic Road): summers of 1990, 1993, 1996.
Upper Mainstem Milwaukee River (Campbellsport): This station will be established if the impoundment is removed.
Kewaskum Creek: fall 1989; spring, summer 1990.
Milwaukee River (West Bend): fall 1989; spring, summer 1990.
Milwaukee River (Newburg): fall 1989; spring, summer 1990.
Silver Creek: fall 1989; spring, summer 1990.
Quaas Creek: fall 1989; spring, summer 1990.
Lakes (Auburn, Lucas, Crooked, Green): 1989, 1991, 1993, 1995 (once in the spring, once in the winter, and three times during the growing season.)

Post-project monitoring will be conducted at sites where pre-project monitoring has been conducted so that changes in water quality, habitat, or biota can be determined.

The Department is responsible for evaluation monitoring, data analysis, and interpretation. The Department is also responsible for documenting in evaluation monitoring reports the results of pre and post project evaluation monitoring. These reports will be used in preparing annual project evaluation reports and in preparing the final project report.

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

		Water Quality Parameter						
Stream Classification	Use	Maximum Temperature (°F)	pH Range (s.u.)	Minimum Dissolved Oxygen (mg/L)	Maximum Fecal Coliform (counts/100 ml)	Maximum Un-ionized Ammonia (mg N/L)	Maximum Total Ammonia (mg N/L)	Other
Full fish and aquatic life	Trout Balanced	-[1,2]	6.0-9.0[3]	6.0[4]	-	0.02	-	-[5,6,7]
	Warm water aquatic community	89[1]	6.0-9.0[3]	5.0	-	0.04	-	-[7]
Intermediate	Unbalanced aquatic community	-	6.0-9.0	3.0	-	-	3-6[8]	-[5,7]
Marginal	Effluent channel, wetland, diffuse surface water	-	6.0-9.0	1.0	-	-	-	-[5,7]
Recreational use	Full body contact	-	-	-	200-400[9]	-	-	-[7]

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

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

[3]The pH shall be within the rante of 6.0 to 9.0 standard units, with o change greater than 0.5 unit outside the estimated natural seasonal maximum and minimum.

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

[5]Unauthorized concentrations of substances are not permitted that alone or in combination with other materials present are toxic to fish and other aquatic life. The determination of the toxicity of a substance shall be based upon the available scientific data base. References to be used in determining the toxicy of a substance shall include, but not be limited to Quality Criteria for Water, EPA0440/9-76-003, U.S. Environmental Protection Agency, Washington, DC, 1976, and Quality Criteria 1973, EPA-R3-73-003, National Academy of Sciences, National Academy of Engineering, U.S. Government Printing Office, Washington, DC, 1974. Questions concerning the permissible levels, or changes in the same, of a substance or combination of substances or unedefined toxicity to fish and other biota, shall be resolved in accordance with the methods specified in Water Quality Criteria 1972 and Standard Methods for the Examination of Water and Wastewater, 14th Edition, American Public Health Association, New York, 1974, or other methods approved by the Department of Natural Resources.

[6]Streams classified as trout waters shall not be altered from natural background by effluent that influence the streat environment to such an extent that trout populations are adversely affected.

[7]Substances that will cause objectionable deposits on the shore or in the bed of a body of water shall not be present in such amounts as to interfere with public rights in waters of the State. Floating or submerged debris, oil, scum, or other materials shall be be present in such amounts as to interfere with public rights in waters of the State. Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the State. Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

[8]Total ammonia, expressed as N, shall not exceed 3 mg/L during the warm months (May-October) and 6 mg/L during the cold months (November-April).

[9]Fecal coliform shall not exceed a monthly geometric mean of 200 counts/100 ml based on not less than five samples per month, nor a monthly geometric mean of 400 counts/100 ml in more than 10% of all samples during any month.

APPENDIX B

NONPOINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES IN URBAN AREAS

Infiltration Device Type	Residential[1]	Institutional[3]		
		Rooftop	Parking Lot	
			0 - 5,000 sq. ft.	5,000 - 500,000 sq. ft.
Infiltration basin[3]	Pretreatment with grit chamber.[4] Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[4] Depth to GW > 3 ft.	Pretreatment with grit chamber.[4] Depth to GW > 3 ft. GW monitoring recommended.
Infiltration trench[3]	Pretreatment with grit chamber.[4] Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber. Depth to GW > 3 ft.	Pretreatment with grit chamber.[4] Depth to GW > 3 ft. GW monitoring recommended.
Grassed Swale[5]	Pretreatment with grit chamber.[4] Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber. Depth to GW > 3 ft.	Pretreatment with grit chamber.[4] Depth to GW > 3 ft. GW monitoring recommended.
Other infiltration practices	Redirect downspouts and slope driveways to lawn for infiltration. No pretreatment.	Redirect downspouts to lawn for infiltration. No pretreatment.	Slope lots to grass buffer strip.	

[1]Multi- and single-family dwellings.
[2]Churches, schools, and hospitals.
[3]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[4]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[5]Special construction techniques are required to maintain original soil permeability.

NONPOINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

	Commercial[4]					
Infiltration Device Type[2]	Rooftop Runoff		Parking Lot Runoff			Storage and Loading Acres Runoff[2]
	0-10,000 sq. ft.	> 10,000 sq. ft.	0-5,000 sq. ft.	5,000-500,000 sq. ft.	>500,000 sq. ft.	
Infiltration Basin[3]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[1] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Infiltration Trench[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Grassed Swale[2]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices	Redirect downspouts to lawn for infiltration. No pretreatment.		Slope lots to grass buffer strip.			

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. Grit chambers remove particles down to 100 u and wet sedimentation removes particles down to 40-100 u. All pretreatment devices should be equipped with oil and grease traps.
[4]Retail and service operations.
[5]The use of infiltration practices in storage areas must be reviewed on a case-by-case basis.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

Industrial (Non-Manufacturing)[4]

Infiltration Device Type[3]	Rooftop Runoff		Separate Employee & Visitor Parking Lot Runoff		Storage and Loading Area Runoff[5]
	0-10,000 sq. ft.	> 10,000 sq. ft.	5,000-500,000 sq. ft.	> 500,000 sq. ft.	
Infiltration Basin[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Infiltration prohibited.
Infiltration Trench[1]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Infiltration prohibited.
Grassed Swale[2]	No pretreatment. Depth to GW > 3 ft.	No pretreatment. Depth to GW > 3 ft.	Pretreatment with grit chamber.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment with wet sedimentation basin.[3] Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment required.[3] Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices	Redirect downspouts and driveways to lawn for infiltration. No pretreatment.				

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]Good materials management practices should be practiced to prevent the risk of generating contaminated runoff in the first place.

NON-POINT SOURCE POLLUTION CONTROL GUIDELINES
FOR INFILTRATION DEVICES

Industrial (Manufacturing)[4]				
Infiltration Device Type[3]	Rooftop Runoff		Separate Employee & Visitor Parking Lot Runoff	Storage and Loading Area Runoff[5]
	0-10,000 sq. ft.	> 10,000 sq. ft.		
Infiltration Basin[1]	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.
Infiltration Basin[1]	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.	Infiltration prohibited.
Grassed Swale[2]	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.	Pretreatment[3]. Depth to GW > 3 ft. GW monitoring recommended.
Other Control Practices				

[1]Infiltration should take place through a surface layer of soil where feasible, to minimize risk of groundwater contamination.
[2]Special construction techniques are required to maintain original soil permeability.
[3]Pretreatment is considered for infiltration devices to minimize maintenance. There may be incidental protection to groundwater from pretreatment devices. All pretreatment devices should be equipped with oil and grease traps.
[4]For the purpose of this table, industrial (manufacturing) consists of production industries. An example would be an industry with smokestacks that have the potential for emitting particulates that will settle on building rooftops and parking lots.
[5]Good materials management practices should be practiced to prevent the risk of generating contaminated runoff in the first place.

APPENDIX C

ALTERNATIVE BEST MANAGEMENT PRACTICES, DESIGN CRITERIA, STANDARD, AND SPECIFICATIONS FOR THE EAST-WEST BRANCH MILWAUKEE RIVER WATERSHED

1. STREET SWEEPING

Description: Mechanical street sweeping to remove vegetative matter, debris, and particulate from gutters.

Purpose: In some urban areas within the East-West Watershed, intensified urban street sweeping can provide an important water quality benefit when combined with other practices in a comprehensive urban stormwater quality control program. Intensified sweeping, meant to adequately clean streets from late winter, prior to spring rains, through late fall when pulverized leaf fragments are available for washoff to storm sewers.

Conditions: Cost sharing is authorized for the support of contract sweeping, or for the support of "additional municipal staff" needed to run equipment owned or rented by the municipality, in order to increase street sweeping in critical areas from minimum levels to accelerated levels.

Critical areas for each municipality are those defined in Chapters III and IV of this priority watershed plan. Minimum levels are defined as the municipality's existing level of street sweeping. Accelerated levels are defined as a frequency exceeding once every two weeks during the period of late winter through late fall, or as further refined in this watershed plan for the applicable municipality. This practice must be augmented by other urban stormwater control practices as specified by this watershed plan or as otherwise approved by the Department.

Cost sharing is limited to a five-year period for each eligible street surface in a municipality. Eligible surfaces will not be covered by cost-sharing more than once. The intensified street sweeping program for each critical area must be maintained by the municipality for a period of

ten years following the end of the two-year cost share period for that critical surface.

2. AGRICULTURAL SEDIMENTATION BASINS

Description: This is a basin designed and constructed to reduce the transport to surface waters and wetlands of sediment eroded from critical agricultural fields.

Purpose: The purpose of this practice in to detain sediment-laden runoff from critical agricultural fields for sufficient time to allow the majority of the sediment to settle out.

Cost Share Conditions:

1. Cost sharing is authorized for:

   a. Sediment basin including embankments; principal and emergency spillway structures, including anti-seep collars; dewatering outlet; outlet protection; vegetation and fencing.

   b. Sediment basins for structures with embankments of six to 25 feet in height or with impoundment capacities of 15 to 50 acre-feet only when approved in writing by the Department prior to construction.

   c. Sediment basins serving drainage areas of up to 150 acres.

2. Cost sharing is not authorized for:

   a. Basins having embankments exceeding 25 feet in height or with an impoundment capacity of more than 50 acre feet.

   b. Basins serving more than 150 acres.

   c. Basins located where failure may result in loss of life.

Planning Considerations:

Sediment basins may come under the definition of dams and be subject to the provisions of Chapter NR 333, Wisconsin Administrative Code, Dam Design and Construction Standards. As of August 1988, Chapter NR 333 did not apply to dams having a structural height of six feet or less, or a storage capacity of 15 acre-feet or less. Also, Chapter NR 333 did not apply to dams having a structural height of more than six feet but less than 25 feet and a maximum storage capacity of less than 50 acre-feet of water.

Sediment basins meeting these design requirements are at best only 70 to 80 percent effective in trapping sediment. Smaller sediment particles such as clay-sized particles will not be effectively controlled. Consequently, these basins should not be used to treat runoff from tributary lands unless those lands have a reasonable degree of soil loss protection. The sediment basin is meant only to provide for additional water quality protection in situations where use of upland practices to control lands below "T" is not practical.

Because soil particles already in transport are more difficult to control than soil particles at the erosion site, this practice should only be considered after on-site erosion control alternatives for meeting sediment delivery goals have been exhausted.

Design Standards and Specifications

1. The sediment basin shall be designed using SCS Standards 350 (Sediment Basin) and 378 (Pond). In addition, the following design specifications must be met:

   a. The basin shall include the following components, which are shown in Figure 1.

      These components include: a runoff storage volume; a sediment storage and permanent pool volume; a principal spillway; a dewatering outlet for the runoff water storage volume; and an emergency spillway.

   b. The minimum surface area of the runoff storage volume (A_s) shall be calculated as follows:

      A_s (ft^2) = 625 x A_{dr}, where A_{dr} is the drainage area to the basin in acres.

   c. The depth of the runoff storage volume from the top of the sediment storage and permanent pool volume to the crest of the principle spillway shall be at least two feet to prevent resuspension of sediments.

   d. The sediment storage volume shall be based on a design period of 10 years.

   e. The length to width ratio of the runoff storage volume shall be at least 2:1, and preferably 5:1. Baffles shall be used when necessary to prevent short-circuiting in basins. The shortest flow path shall be used to determine the width to length ratio.

   f. The principal spillway shall include one or more outlets for dewatering the runoff storage volume. The size of the

outlet(s) shall be calculated so that dewatering takes <u>at least</u> three days. The bottom hole or slot shall be at the elevation of the sediment storage and permanent pool. No hole shall be greater than four inches in diameter.

The following equation may be used:

$$A = \frac{A_s(2h)^{.5}}{20{,}428 * T * C_d}$$

where A = surface area of the outlet (ft^2)
A_s = surface area of basin (ft^2)
h = head of water above the outlet
T = dewatering time (hr)
C_d = coefficient of contraction for the outlet, about 0.6 for sharp edged orifices.

g. The sediment basin shall discharge to a stabilized drainageway protected from erosion. The principal spillway outlet pipe shall discharge at the bottom of the embankment.

h. The following maintenance provisions apply:

1. The embankment and emergency spillway shall be inspected regularly to insure that it is structurally sound and has not been damaged by erosion. Repairs shall be made promptly.

2. If the sediment reaches the elevation of the sediment storage and permanent pool elevation, the basin shall be cleaned out.

3. ANIMAL LOT RELOCATION

<u>Description and Purpose</u>: 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.

<u>Cost Share Conditions</u>:

1. Cost sharing shall be authorized for:

a. Construction of fences and other items necessary to confine the livestock on the new site.

b. Removal of fences and other obstructions, and the establishment of permanent vegetation on the existing site necessary to stabilize the site to be abandoned.

c. Reconstruction or replacement of buildings and other structures necessary for the relocation of the animal lot. The maximum cost share amount for relocation of buildings, structures, and lots shall be 70 percent of the replacement cost up to the appraised value of the buildings, structures, and lots to be replaced. Any salvage value or resale value realized during the maintenance period of the cost share agreement shall be deducted from the appraised value.

d. Proper abandonment of wells abandoned as a result of yard relocation.

2. A plan for relocation shall be approved by the Department, in writing, prior to signing of the cost share agreement.

Design Standards & Specifications:

1. Wells shall be properly abandoned in accordance with the requirements of Chapter NR 112, Wisconsin Administrative Code.

2. SCS field office guide standards and specifications as of December, 1988:

a. 393 - filter strip
b. 363 - diversion
c. 558 - roof runoff management
d. 342 - critical area planting
e. 561 - heavy use area protection
f. 382 - fencing
g. 412 - grassed waterway
h. 468 - lined waterway or outlet
i. 484 - mulching
j. 620 - underground outlet
k. 350 - settling basin.

4. LIVESTOCK WATER PUMPS

Description: This is adopted as an eligible practice component under the Shoreline Protection (Streambank Stabilization) Best Management Practice contained in Chapter NR 120, Wisconsin Administrative Code.

Purpose: This component will allow the livestock operator to provide a watering area for livestock that does not require livestock access to the surface water from which the water is being drawn.

Cost Share Conditions: Watering areas created through installation of livestock water pumps must be stabilized against erosion and must provide for the diversion of overland runoff tributary to the site. A suitable vegetative buffer must be maintained between the watering area and the stream to prevent water pollution from accumulated manure. Where necessary, accumulated manure must be removed from the site as part of a manure management plan.

Design Standards: Water pumps must be installed, used, and maintained consistent with manufacturer's specifications.

5. FISH HABITAT STRUCTURE

Description: This is adopted as an eligible practice component under the Shoreline Protection (Streambank Stabilization) Best Management Practice contained in Chapter NR 120, Wisconsin Administrative Code.

Purpose: This component will allow the use of streambank stabilization practices that incorporate fish habitat structures. This will enhance integration of nonpoint source controls and fishery improvement.

Cost Share Conditions: The cost share rate is 70% for this component, subject to an increase to 80% under the provisions of Chapter NR 120.18(1)(c), Wisconsin Administrative Code. The maximum cost share amount for stream bank stabilization practices involving fish habitat structures shall be the cost share amount of the stream bank stabilization without using the fish structure as part of the practice.

Design Standards: SCS Standard 395 will constitute the practice component. Part of this standard requires that installation be in accordance with designs approved by the Department's fish manager and the SCS biologist.

6. VEGETATIVE FILTER STRIP

Description: This practice is based on the guide standard for cropland filter strips contained on pages 74-83 of the publication Effects of Conservation Practices on Water Quantity and Quality (USDA-Soil Conservation Service, October 1, 1988; 98 pages).

This practice is meant to refine SCS Standard 393 (Filter Strip). In turn, this refined standard will be considered as an additional practice component under the Critical Area Stabilization and the Shoreline Protection Best Management Practices contained in Chapter NR 120, Wisconsin Administrative Code.

Purpose: Vegetated buffers have been identified as a Best Management Practice for stabilizing stream banks; enhancing fish and wildlife habitat; and removing critical croplands from production. They may also provide "filtering" of sediment, nutrients, pesticides and other pollutants from upslope croplands.

Cost Share Conditions: Cost sharing may be provided for the following:

1. Establishment of vegetative cover.

2. Construction of level spreading structures and associated grading necessary for the buffer to properly filter pollutants.

3. Obstruction removal.

Planning Considerations: Filter strip effectiveness is dependent upon overland flow. Once soil particles are in transport it becomes increasingly difficult and expensive to achieve adequate control, particularly where flow becomes channelized prior to entering the designed filter strip area.

For this reason the use of vegetative filter strips as a primary control practice for controlling sediment delivery from larger tributary areas should only be considered after all options for on-site erosion control have been exhausted.

SCS provides the following items to consider when designing or using vegetated buffer strips:

1. Vegetated buffer strips are effective for removing sediment and other suspended solids if flow is shallow and uniform.

2. Total phosphorus is not as effectively removed as sediment.

3. Buffers with concentrated or deeper channel-type flow are much less effective than buffers with shallow uniform flow.

4. Research in Virginia indicates vegetated buffers on cropland are only moderately effective for sediment and nutrient removal since the majority of the flow entering the buffer was judged to be concentrated. This problem is greater in hilly areas.

5. Effective cropland buffers have a limited expected life due to sediment buildup. For areas with significant soil loss, the expected life may be three to five years. Leveling and revegetating may be necessary to reestablish the buffer.

6. Vegetation must be vigorous, dense sod forming, stiff upright type, capable of remaining upright in heavy flows and during dormancy. The vegetation should be tolerant of wet and dry conditions and capable of recovering from inundation with water and sediment.

The Milwaukee River Wildlife Management staff specialist should be contacted to discuss wildlife aspects of proposed filter strips. However, vegetative requirements must be based primarily on filtering effectiveness, and secondarily on value as wildlife habitat.

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

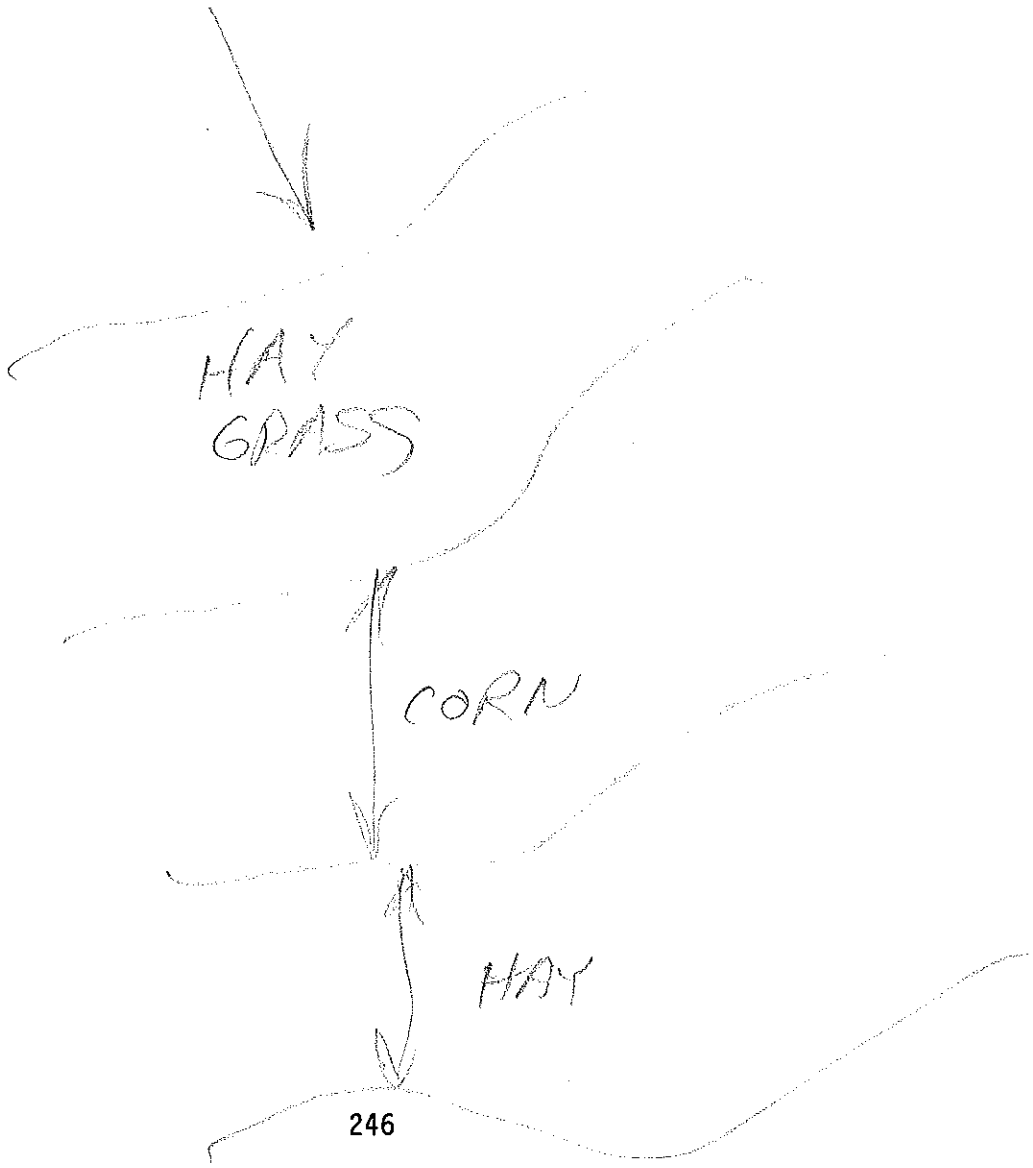

Table A-1
Buffer Area to Source Area Ratio

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

Table A-2
Flow Length of Buffer to Source Area

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

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

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Buffer Area to Source Area Ratio

Soil Type	% Reduction	Ratio
loam,	100%	0.7
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	200	165	35 (2 rods)
	100	85	15 (1 rod)
0.4	400 feet	290 feet	110 feet
	300	215	85
	200	145	55
	100	70	30 (2 rods)
0.7	400 feet	240 feet	160 feet
	300	180	120
	200	120	80
	100	60	40

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

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Flow Length of Buffer to Source Area

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	200	180	20
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0.4	400 feet	290 feet	110 feet
	300	215	85
	200	145	55
	100	70	30 (2 rods)
0.7	400 feet	240 feet	160 feet
	300	180	120
	200	120	80
	100	60	40

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

APPENDIX D
MILWAUKEE RIVER PROGRAM
BASINWIDE EDUCATIONAL GOALS

BASINWIDE GOAL PERTAINING TO EDUCATION

Educate key audiences regarding nonpoint source pollution and related resource management problems and solutions, thereby helping to facilitate public involvement, informed decision making, and plan implementation.

INFORMATION AND EDUCATION SUBCOMMITTEE-ADOPTED GOALS

The best available techniques, including research and survey results, will be utilized in education strategy development, implementation, and evaluation. The Milwaukee River Priority Watersheds Information and Education Program will strive to:

a. Improve the awareness/understanding of the watershed as a system, water quality problems, and the benefits available through integrated resource management, including particularly nonpoint source pollution control.

b. Inform people about the potentials of and instill a sense of responsibility or ethic for, the natural resources within the Milwaukee River Basin.

c. Achieve widespread participation in, and support for, the Priority Watershed and Integrated Resource Management programs through the involvement of broadly-based and diverse groups.

d. Develop and maintain a clear understanding of the seps the Program will be taking among rural an urban landowners and users, watershed committees, community leaders, and other groups.

e. Optimize both the use of rural and urban nonpoint source pollution control measure through voluntary cooperation, and the integrated use of complementary resource management techniques.

f. Coordinate and cooperate with other federal, state, and local programs and promote all appropriate implementation strategies (including mandatory controls, where warranted) as mechanisms to achieve water quality improvements.

APPENDIX E
PLANNING METHODS

This chapter describes the methods used to collect and analyze the information needed to develop this nonpoint source control plan. Key areas of inventory and analysis that are covered here include:

a. The water resources assessment.

b. The nonpoint source assessment.

c. The process for setting water resources objectives and nonpoint source reduction goals.

d. The development of the nonpoint source control strategy.

SURFACE WATER RESOURCE ASSESSMENT

Detailed assessments were conducted during 1985-86 by the Department's Southeast District staff on most of the perennial and intermittent surface waters in the watershed. These assessments were done to identify the conditions of each surface water resource, the pollutants or other factors that are limiting or threatening resource use, the potential that the resource might achieve with better land and water resource management, and the general level of management needed to achieve the maximum potential of the surface water. The assessment procedures are summarized below.

STREAM SEGMENTATION

Prior to collecting field data, streams were segmented using aerial photographs and topographic maps. The purpose of stream segmentation is reflect the hydrologic, morphological, and biological similarities and differences along a stream that can be expected to affect how a stream will respond to nonpoint source pollution. Data from several segments were often subsequently combined during the data analysis.

Stream Habitat

Data concerning stream habitat features including flow rate and depth, substrate quality, channel configuration, streambank stability, and water temperature, were collected using a technique developed by the Department's Southeast District (Bozek, 1986). The data were evaluated using the Wisconsin Department of Natural Resources Stream Classification Guidelines (Ball, 1982).

Water Quality

Water quality was assessed using a combination of historical water chemistry data and the collection and analysis of benthic macroinvertebrates for use in determining the Hilsenhoff Biotic Index(Hilsenhoff, 1982).

Extensive bacteria surveys were conducted to assess compliance of surface waters with standards for recreational use. The results were interpreted using the 1986 revisions to Chapter NR 120, Wisconsin Administrative Code.

Fish Resources

Fish communities were assessed qualitatively using a combination of historical data (Fago, 1978), and new inventories of millponds, lakes, and streams using various types of electrical shocking equipment.

Navigability

Determinations were made based on depths, high water marks, and lower bank heights.

Physical Characteristics

Physical stream characteristics were also obtained during the above referenced biological stream use investigations. Data characterizing stream width, depth, flow, streambank height and stability, and accessibility were used in the determination of recreational classification.

Determining Existing and Potential Uses

Procedures have been developed by the Department's Bureau of Water Resources Management for classifying the state's streams. These procedures provide scientific methods for designating uses according to a stream's natural ability to support a certain biological community and level of recreational use.

The existing use classifications reflect present biological and recreational conditions while the potential use classification is a determination of the conditions which could be achieved for surface waters under prescribed types and levels of environmental protection and resource management. In many instances, the existing and potential beneficial uses for which a water resource is suited will be the same, even though the resource is significantly degraded. Although water quality improvements may not be capable of resulting in a change in use class, such as would occur if an intermediate aquatic life stream (INT-D) were to become a balanced forage fish stream (FAL-C), significant enhancement of the resource may well occur. In this instance, the use class may not change, although the quality of the use class might noticeably improve.

Most surface waters in this watershed area should be enhanced through the reduction of nonpoint sources. Although the potential uses for which these resources are suited will not change, pollution reduction can be expected to result in a higher quality environment for recreational and aquatic life uses.

Biological Stream Use Classification

Biological stream use classes referenced in this plan describe the fish species or other aquatic organisms capable of being supported by a stream system. Designation of a particular use class is based on the ability of a stream to provide habitat and water quality conditions suitable for appropriate aquatic organisms.

Stream Uses

The following is a description of the biological use classes used to classify streams in Wisconsin as they were applied to surface waters in the East-West Watershed.

FAL A Cold Water Sport Fish: Streams categorized under this use classification are capable of supporting a cold water sport fishery, or as serving as a spawning area for salmonid (trout, salmon) species. The presence of an occasional trout or salmon in a stream does not justify it being classified as capable of supporting a cold water sport fishery.

FAL B Warm Water Sport Fish: Streams categorized under this use classification are capable of supporting a warm water sport fishery or serving as a spawning area for warm water sport fish (walleye, bluegill, smallmouth bass). Although warm water fish are occasionally found in many small streams, fish must commonly be found in a water body for it to be classified under this use designation.

FAL C Cold/Warm Water Forage Fish: Streams categorized under this use classification are capable of supporting an abundant, usually diverse, population of forage fish (shiners, minnows) and/or aquatic macroinvertebrates (insects, clams, crayfish) which are intolerant of pollution. These streams

are generally too small to support cold or warm water sport fish, but have natural water quality and habitat sufficient to support forage fish and/or aquatic macroinvertebrates. Streams capable of supporting valuable populations of tolerant forage fish are also included in this classification.

Intermediate D: Streams categorized under this use classification are capable of supporting small populations of forage fish tolerant of pollution, or fish and aquatic macroinvertebrates which are tolerant of pollution. The aquatic community in these streams is usually limited by naturally poor water quality or habitat deficiencies.

Marginal E: Streams categorized under this use classification are capable at best, of supporting aquatic macroinvertebrates or occasionally very tolerant fish species. These streams are usually small--intermittent streams and ditches--and the capacity to support aquatic life is extremely limited, usually because of naturally poor water quality and habitat.

WATER QUALITY STANDARDS

Water quality necessary to support the above biological uses has been quantified by certain measurable standards. These standards are statements of the characteristics of surface waters which must be maintained to enable the stream to continually meet its designated use. These standards are set by Chapters NR 102 and NR 104, Wisconsin Administrative Code.

Appendix A to this watershed plan contains a summary of the water quality standards currently contained in the Wisconsin Administrative Code. These standards are undergoing revision at this time, and updated versions of applicable administrative rules can be requested from any office of the Department.

RECREATIONAL STREAM USE CLASSIFICATION

RECREATIONAL USES

Recreational stream use classifications are described by the level of human body contact which has been determined to be appropriate and safe. The classification system applies to all surface waters including those which have been categorized as intermediate or marginal under the above referenced biological use classification system. There are three designations for surface waters under the recreational stream classification system--full body contact, partial body contact, and noncontact. A description of these categories and the criteria used to designate surface waters under the recreational stream use classification system is presented below.

Full Body Contact: Full body contact waters include those used for human recreation where immersion of the head is expected and occurs often.

Recreation activities classified as full body contact include swimming, waterskiing, sailboarding and other similar activities where frequent and significant contact with the water occurs. Water quality standards for full body contact use are applicable from May through September.

Partial Body Contact: Partial body contact waters include those 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.Water quality standards for partial body contact use are applicable year round.

Noncontact: Noncontact waters include those which 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.Typically, surface waters which are included in this classification would ordinarily be considered to be capable of supporting partial body contact use.

Recreational Use Classification Criteria

A determination of the types of recreation that surface water in the watershed presently support and where it occurs, was obtained from use information for the park and open space sites in the watershed. Additionally, recreational uses information was obtained through direct observation during the extensive field inventories, and through discussions with local citizens and officials. Criteria used to classify the recreational use of surface waters include the level of measured bacterial contamination, the stream's inherent physical characteristics and ability to support recreational use, and present use. Each of these criteria are discussed below.

Data characterizing stream width, depth, flow, streambank height and stability, and accessibility were used in the determination of recreational classification.

Water Quality Standards

Chapter NR 102, Wisconsin Administrative Code sets guidelines for use in determining the suitability of surface water for recreational use. The level of fecal coliform bacteria (membrane filter fecal coliform count) present in the water cannot exceed 200 colonies per 100 milliliters of water on not less than five occasions per month, nor 400 colonies per 100 milliliters in more than 10 percent of the samples taken in any month.

GROUNDWATER RESOURCE ASSESSMENT

Generally, groundwater quality in the watershed is of high quality and suitable for most purposes. Groundwater problems are frequently caused by activities that are local rather than regional in nature, and contamination often remains a local problem.

The purpose of this element is to gain an understanding of the threats to continued use of groundwater for potable uses. The evaluation used existing land use data, soil characteristics, geologic information, nonpoint source inventories, and the previously discussed investigations of cultural features to assess the susceptibility of groundwater to contamination. It also relied on a recently completed statewide investigation of groundwater contamination susceptibility.

THE NONPOINT SOURCE ASSESSMENT

Steps in the nonpoint source assessment include defining hydrologic subareas for data collection and analysis, conducting the pollution site inventory, and performing the data analysis.

DEFINING SUBWATERSHEDS AND SUB-BASINS

In most instances, a single source of agricultural or urban runoff cannot be identified as the primary cause of water quality degradation. More often, the water quality degradation typically associated with nonpoint source pollution is the result of contributions from many sources over a long period of time. Consequently, nonpoint sources of pollution in the East-West Watershed were grouped by hydrologic subwatersheds for analysis. The nonpoint sources within a hydrologic unit could then be ranked in importance based their severity, and a pollution control strategy developed to control those sources causing the majority of the pollutant loading.

The East-West Watershed was divided into 25 subwatersheds for data collection and analysis. These subwatershed divisions are shown on Map 2. The West Bend urban area was further subdivided into urban sub-basins to allow further refinement in associating water resources improvement and protection needs with the existing and planned future urban areas generating the pollutant loads. These urban sub-basins are presented in Chapter III of this plan.

RURAL NONPOINT SOURCE INVENTORY AND ANALYSIS

Sediment, nutrients, oxygen demand, bacteria, and pathogens are all significant pollutants that come from agricultural land use. These pollutants have a significant adverse impact on stream biota and the physical and

chemical habitat in which they live throughout the East-West Watershed. Recreational uses are also significantly impaired.

Principal sources of these pollutants include barnyard runoff, runoff of winterspread manure, upland sheet and rill erosion, and streambank degradation. Detailed surveys of these rural sources in the East-West Watershed were inventoried during 1986 and 1987 by staffs of the Washington, Ozaukee, Fond du Lac, and Sheboygan county Land Conservation Departments using Wisconsin Department guidelines (WDNR, 1985). These detailed surveys resulted in information on each barnyard, streambank, and land parcel in the entire watershed. Information from the upland erosion and barnyard surveys were combined to develop a more generalized assessment of the pollution potential associated with winterspreading of manure by each of the livestock operations inventoried.

Barnyard Runoff

Barnyard runoff was evaluated using a modification to the barnyard runoff model developed by the Agriculture Research Service (Young, et al., 1982; Baun, 1987). This model estimates the load of phosphorus and oxygen demand to receiving waters for any chosen rainfall event. The model results were used in this project to identify the relative pollution potential of barnyards in the watershed during a 10 year-24 hour rainfall. This information was used in turn to identify the most critical barnyards needing control.

In conducting the analysis of barnyard runoff, the barnyards were first divided into two major groupings. The first grouping includes all barnyards that are hydraulically connected to the surface water channel system of wetlands, lakes, and streams. These are evaluated amongst themselves to determine their relative importance as pollution sources.

The second group includes all internally-drained barnyards, the runoff from which does not course through the channel network of connecting lakes and streams. This internally-drained group was subsequently subdivided into three groups. One group, comprised of barnyards draining to deep mineral soils, is of little management concern. Barnyards in the second group, which includes those draining to pocket wetlands, were evaluated as potential sources of wetland degradation. Barnyards in the third group, which includes those draining to shallow soils that overlay bedrock or groundwater, were identified as potential concerns based on their potential to cause localized groundwater degradation.

Upland Erosion

Upland sheet and rill erosion was evaluated using the Wisconsin Nonpoint Source Model(WIN), developed through the Wisconsin Nonpoint Source Control Program to better assess the actual pollution potential from eroding uplands (Baun and Snowden, 1987). The WIN model starts with information about soil

loss on each land parcel, but incorporates further field information about the buffering capability of downgradient lands. The model estimates for each land parcel the sediment that is delivered to the stream channel network. The results of the WIN model were used to identify parcels delivering sediment to waterways, quantify the delivered sediment from each parcel, and identify the most critical parcels to control.

As part of the upland sediment delivery analysis, the extent of sediment delivery to riparian (connected to a stream or lake) and non-riparian wetlands was recorded. This information was not used to develop a detailed wetland protection strategy, however, because the individual wetlands receiving sediment vary tremendously in value and sensitivity, and much more site-specific information is needed before the management need can be identified.

Control of sediment will also reduce other pollutants such as nutrients and agricultural pesticides. It has been estimated that approximately two-thirds of the phosphorus loading that comes from agricultural fields is carried by soil particles; the remainder is soluble phosphorus that is dissolved in the runoff water (Miller, 1979). Consequently, control of sediment delivered to surface waters will also reduce the phosphorus loading. Likewise, some agricultural pesticides attach readily to soil particles and are transported with them.

Control of sediment delivered from uplands will serve to reduce the loading of these pesticides as well. These relationships were not quantified in developing this watershed plan, although a trend of decreasing nutrient and pesticide loads to surface waters will be expected to occur as sediment delivered from upland erosion is reduced.

Streambank Degradation

Streambank degradation was evaluated based on the estimated annual loading of sediment calculated for the eroding site, as well as on the general sensitivity of the water resource to trampling of the streambank and the streambed by cattle. The results were used to identify the highest priority sites for control.

Winterspread Manure

Winterspread manure as a pollution source was evaluated using the results of the upland erosion survey and the barnyard survey. For each person owning livestock, an estimate was made of the acres needed to winterspread six months of manure based on the composition and size of the herd and an assumed spreading rate of 25 T/A/Y. The upland erosion survey was used to identify the amount of cropland upon which manure could be spread, and the environmental suitability of the land for winterspreading. Based on the number of acres available for spreading, and the sensitivity of those lands to runoff, an estimate was made of the critical acres spread during each winter

for each livestock owner in the watershed. These critical acres, defined as being over six percent in slope or within the floodplain (based on soil type), have a high potential to deliver landspread manure to lakes and streams during periods of spring thaw. Based on the estimated number of critical acres spread, and other factors such as known spreading in floodplains, wetlands, or on very shallow (less than 12 inches) soils, the relative importance of each livestock operator as a potential pollution source was assessed.

Urban Nonpoint Source Inventory and Analysis

A wide range of pollutants are generated by urban land uses and activities. Some of these pollutants, such as sediment, nutrients, pesticides, oxygen demand, and bacteria are also produced by rural nonpoint sources. However, a wide range of other pollutants, many of which are potentially toxic, are primarily associated with urban runoff. These include metals (such as lead, zinc, chromium, copper, cadmium, and arsenic), and a wide range of hazardous organic compounds.

Case histories from urban areas across the country include evidence that urban runoff can have a significant impact on receiving waters. Although the cause and effect relationships are often difficult to establish, these studies indicate that urban areas and activities can upset several important components of the receiving water systems including stream hydrology, habitat, water quality, bottom sediment quality, and stream biology (Pitt, 1987). These impacts can be acute and catastrophic or more long-term and chronic. Acute impacts are associated primarily with such events as sediment loading from construction sites, which blanket a stream bed, or precipitous changes in urban runoff flow, which causes erosion and scour of the streambank and streambed. Long-term, chronic impacts are associated primarily with the repeated exposure of aquatic life to the pollutants present in urban runoff. In addition, steadily declining rates of groundwater recharge, which accompanies the creation of impervious areas characteristic of urban development, can result in a significant loss of base flow needed to sustain aquatic life in these streams.

Stormwater pollutant concentrations, runoff volumes, and pollutant yields vary by land uses (such as residential, commercial, industrial) and development characteristics within the land use (such as intensity of the development, and the stormwater conveyance system used to transport polluted runoff to receiving streams). Generation of many pollutants is correlated with the intensity of automobile traffic, which is the source of many pollutants in urban areas. Runoff volumes, which carry these pollutants, are highly correlated with the amount of impervious urban area that is directly connected to the receiving water system.

These direct connections for street and parking lot runoff are afforded by curb and gutter systems that feed into storm sewer pipes; for rooftops, the direct connections result when downspouts are run over sidewalks and driveways

draining into the street, or when the downspouts run directly into the storm sewer system.

The urban area inventory and analysis procedures used in the East-West Watershed are designed to assess the pollution potential of historic land development, existing urban areas, and planned future urban areas taking into account the many factors that determine the pollution potential of urban areas.

Data collection and analysis is restricted to four urban study areas including the city of West Bend, and the villages of Kewaskum, Campbellsport, and Newburg. For the villages of Kewaskum, Newburg, and Campbellsport, study areas including the municipality and immediately adjacent townships were jointly identified by SEWRPC and the Department prior to starting inventory work. The city of West Bend was sub-divided more finely prior to data collection, both because of its size and because of the larger number of surface waters receiving the urban runoff. Primary hydrologic divisions for the city were based on major subwatersheds, including Quaas Creek, Silver Creek, and West Bend. Twenty-nine secondary divisions, or urban sub-basins, were then delineated by the Department based on stream segments identified during the water resources assessment process. This allowed a more refined identification of urban pollution sources affecting each stream segment present in the city.

Historic Urban Development

Historic changes in urban development were evaluated primarily to identify the past pollution potential associated with construction activities near the four urban centers. This pollution potential was determined by taking into account the acres converted to urban land use and a unit area load for construction site erosion.

The Southeastern Wisconsin Regional Planning Commission developed tabular data setting forth changes in urban land uses for Kewaskum, Newburg, Campbellsport, and West Bend. The data for each of these urban areas was aggregated by both incorporated municipality and study area and reported to the Department.

The source material utilized by the Commission to provide historic changes in urban land uses within the West Bend, Kewaskum, and Newburg urban areas were the SEWRPC land use inventories for the years 1963, 1970, 1975, 1980, and 1985. The source material utilized to provide tabular data setting forth changes in urban land uses in the Campbellsport urban area were SEWRPC land use inventories for the years 1967 and 1985.

The source material utilized by the Commission to provide the map indicating historic urban development in the West Bend Study Area were one inch equals 660 feet for U. S. Department of Agriculture, Soil Conservation Service aerial photographs in the year 1950 and one inch equals 400 feet scale SEWRPC aerial photographs for the years 1963, 1970, 1975, 1980, and 1985. Source material

also included a one inch equals 2,000 feet scale map identifying hydrologic subbasins as determined by SEWRPC, in the Milwaukee River Watershed study and a one inch equals 1,000 feet scale map showing 1987 corporate limits for the city of West Bend from the Wisconsin Department of Transportation.

Existing Urban Areas

The inventory of established urban areas is designed to quantify the land use and development characteristics of the principal urban municipalities in the watershed so that their pollution potential and potential for control could be evaluated.

The Southeast Wisconsin Regional Planning Commission conducted the inventory of existing urban land uses in the East-West Watershed, and forwarded the data to the Department for analysis.

The Department, using the land use data developed by the Commission, estimated the pollution potential for these four urban areas using the Source Loading and Management Model, or SLAMM (Pitt and Voorhees, 1988). Average annual pollutant loadings were developed using SLAMM for phosphorus, lead, and suspended solids. For Newburg, Kewaskum, and Campbellsport, annual pollutant loads were estimated for each major land use type in the study area. For the city of West Bend, pollutant loads were estimated not only for each land use, but for each of the urban sub-basins.

SLAMM was also used to evaluate the effect on pollutant loadings of basic stormwater management alternatives for each of the four municipalities.

New Urban Development

New urban development was identified as an important consideration not only because of the attendant potential for construction site erosion, but because of the potential for increasing the urban runoff from the newly created impervious areas.

The Regional Planning Commission provided information to the Department on planned future urban development for the Kewaskum, Newburg, Campbellsport, and West Bend Study Areas for the year 2000. Although the Commission is currently preparing the year 2010 land use plan for southeastern Wisconsin, that information was not available for making estimates of future urban growth.

Source materials used in this element include the SEWRPC inventories of environmental corridors and isolated natural areas as delineated on 1985 one inch equals 400 feet aerial photographs, the historic urban land use analysis described above, and SEWRPC sanitary sewer service area plans. Meetings were also held with local officials to obtain information on committed or planned future development projects in the aforementioned study areas. In the absence of detailed long range land use plans specifying the amounts of incremental

new urban land uses within each study area, tabular data setting forth incremental new urban land uses within the delineated future urban service area of each study area was based upon types and ratios of each urban land use in that study area in 1985.

Estimates of potential past and future construction erosion were made by the Department using the planned changes in urban land use and as estimated unit area loading for construction sites.

Estimates of potential increases in urban runoff and associated pollutants from planned urban growth were made using the projected change in specific land uses and SLAMM. SLAMM was also used to incorporate the effects of stormwater management alternatives on future urban areas.

SETTING WATER RESOURCES OBJECTIVES

Water resources objectives are statements of those benefits that the East-West Branch Priority Watershed Project will attempt to provide through the control of nonpoint source pollution.

Water resources objectives for the Nonpoint Source Control Program in this watershed were developed by Department staff representing the Nonpoint Source Control Program, and Department district Water Resources and Fish Management Programs. The objectives were developed using results of the water resources and nonpoint source assessments.

Several factors considered in setting these objectives include the existing resource uses, problems or threats experienced by the resource, pollutants or other factors known or suspected of causing these problems, and the general degree to which these problems can be ameliorated by reducing nonpoint source pollution.

In most instances throughout the East-West Watershed, other resource management actions outside the scope of the Nonpoint Source Control Program will need to be coordinated with nonpoint source program activities in order to meet the full potential of these resources. For example, some water resources will need habitat rehabilitation, fish stocking, and further point source controls in conjunction with nonpoint source controls. These integrated resource management needs for the East-West Watershed are documented in the integrated resource management plan for the watershed (WDNR, 1988b).

SETTING POLLUTION REDUCTION GOALS

Nonpoint source pollution reduction goals are estimates of the general level of pollution control needed to meet the water resources objectives for the

priority watershed project. Reduction goals were set for individual water bodies where possible, and then generalized and applied on a subwatershed basis.

More generalized pollution reduction goals for the watershed as a whole were also developed based on a desire to reduce pollutant loads from this area to the Milwaukee Harbour Estuary. The level of nonpoint source pollution control in the East-West Watershed needed to help improve the estuary has been identified in a recently completed management plan (SEWRPC, 1987). The level of control recommended in that plan was used to check the overall adequacy of the pollution control program being proposed in this priority watershed project.

DEVELOPING NONPOINT SOURCE CONTROL STRATEGIES

The nonpoint source control strategy specifies decision criteria that will be used to identify critical nonpoint sources needing control, applies the criteria to sources identified in the watershed, and summarizes the sources that will be eligible for cost share and technical assistance through this watershed project.

Rural Source Decision Criteria

Decision criteria for barnyard runoff, manure spreading, and upland erosion sources connected hydraulically to the surface channel system were developed by ranking in decreasing order of severity the specific sites identified during the inventory. Barnyards were ranked by subwatershed and by watershed to determine relative severity, livestock operations winterspreading manure were ranked only by watershed, and upland erosion sites were ranked only by subwatershed. The decision criterion for determining control needs in each source category was developed by identifying the minimum acceptable pollutant loading on the ranked list and targeting all sources of equal or greater pollutant loading as needing controls.

Streambank degradation, internally-drained barnyard runoff, and sources of upland erosion to riparian and non-riparian wetlands were not ranked prior to developing decision criteria.

For these sources, the impacts are more site-specific and more generic decision criteria were developed.

Urban Decision Criteria

Decision criteria are developed for construction erosion, stormwater runoff from existing urban areas, and stormwater runoff from areas planned for future development.

Construction Erosion

Potential water quality impacts from construction erosion are so serious that erosion control is an assumed need for all incorporated and unincorporated areas of the watershed in order to meet the water quality objectives of the project.

This source is considered to be in Management Category I. Information is developed in the plan which estimates the magnitude of future potential construction erosion in the watershed. This information, however, is for illustration purposes only, and is not evaluated using specific numerical criteria in determining the need for construction erosion controls.

Stormwater Runoff

Decisions were made concerning the level of urban pollution control needed from both the urban lands which already exist and from those that are planned for future urban development.

Good urban housekeeping practices are considered a basic necessity. These practices include proper use and disposal of materials such as home, lawn, and garden materials, automotive maintenance materials, and domestic pet wastes that can harm water quality. It also includes basic programs of street sweeping and leaf collection and disposal. Management categories are not assigned to these actions, although an Information and Education Program fostering good housekeeping practices will be eligible for support from the Department.

The need for more ambitious urban controls, including stormwater infiltration, detention, and accelerated street sweeping is evaluated based on several factors. These include: pollutant load reduction objectives, the pollutant loading from existing urban lands under different management alternatives, and the pollutant load reduction from new urban development under different management alternatives.

Total lead and, where applicable, suspended solids are used as indicator pollutants in performing the analyses. Where urban pollutants are not suspected of causing water quality degradation, a project objective of "resource protection" is adopted.

In order to achieve the "resource protection" objective, the strategy will be to prevent any increases in urban pollutant loads through the planning period. In other words, the strategy will be to maintain the loading of urban pollutants at 1985 levels through the year 2000. Where urban pollutants are suspected of causing degradation of the water resource, project objectives of "resource enhancement or improvement" is adopted. In order to achieve the "enhancement or improvement" objectives, a large reduction in the urban

pollutant load will be sought by the end of the planning period. In other words, the strategy will be to reduce the urban pollutant load to 50 percent of its 1985 level by the year 2000.

Bacteria and hydraulic overloading are also recognized problems, but are not quantitatively addressed in this plan. Further consideration is provided for through more detailed stormwater studies that will be partly supported by this program during implementation.

Critical land uses and sub-basins are identified for the city of West Bend to focus where the urban stormwater pollutants are concentrated. For Campbellsport, Kewaskum, and Newburg this focusing is based solely on land use since urban sub-basins are not delineated for these communities. The pollutant load reduction that can be achieved by alternative control packages for these critical areas is considered along with the projected pollutant loading from new planned urban areas under different control alternatives. The resulting set of pollutant loading scenarios is evaluated. The objective is to focus management practices into critical areas, both existing and future, to achieve in the year 2000 either a maintenance or reduction of existing urban pollutant loads in the most cost-effective way.

MANAGEMENT CATEGORIES

In the Nonpoint Source Control Program, all critical pollution sources must be controlled as part of any assistance package developed with program funds. Recognizing that not all pollution sources are equally important to control, management categories are specified as part of the decision criteria presented in this plan. The purpose of the management category designation is to identify the conditions under which technical and financial assistance for controlling the site will be made available through the Nonpoint Source Control Program.

Sources in Management Category I are eligible for assistance, and in fact must be included as part of any assistance package developed under this program. These sources are usually those which, when controlled, will cumulatively result in attaining the pollutant load reduction objectives.

Sources in Management Category II are eligible for assistance, but being less severe may be included or excluded as part of the assistance package at the landowner's option.

Sources in this category are identified to provide a safety factor, since the program is voluntary and not all of the critical sources will be controlled. Sources in Management Category III are relatively insignificant, and Nonpoint Source Control Program funds may not be used for their control.

Management categories are defined in this plan for the following sources:

1. Streambank degradation.
2. Upland erosion.
3. Winterspread manure.
4. Barnyard runoff.
5. Construction erosion.

For urban practices, management categories are not specified per se. However, the urban analysis will be used to develop a plan of further study where necessary, and to identify eligible stormwater management components for this project.

APPENDIX F
DESCRIPTION OF WATERSHED-SPECIFIC MATERIALS AND EVENTS

NEWSLETTERS

Newsletters will be used to convey information to targeted groups such as local government officials, landowners, civic and environmental groups, interested citizens and other likely participants in the Milwaukee River Program. The objectives of the newsletters will be to supply basic information on the Program; provide updates on important elements of the Program including dates of upcoming events; improve understanding of nonpoint source pollution problems and causes; increase appreciation of lakes, streams and related natural resources in the watershed; introduce landowners to recommended management practices; provide information on available assistance including cot-sharing; and build a sense of momentum by providing information on participation and implemented practices. Newsletters will be distributed to key audiences within the watershed and used as handouts at public meetings, tours exhibits.

Two watershed-specific newsletter are presently planned for each year of the watershed project. However, many issues in the milwaukee River Program transcend watershed boundaries and interest groups often have regional membership. Therefore, some newsletters may be most efficiently written and distributed at the basinwide, rather than watershed level.

Thus, once the implementation process has begun, the watershed could be featured once a year in basinwide newsletters; and perhaps five basinwide newsletters per year -- corresponding to the five Milwaukee River watersheds -- could be produced during the latter part of the Program. Newsletter featuring articles about watersheds with similar nonpoint source pollution problems would then be distributed to key audiences on the mailing lists for neighboring watersheds.

Watershed newsletters will include articles on urban as well as rural nonpoint source pollution problems and practices to provide a balanced picture of Milwaukee River Program activities. Watershed newsletters featuring articles on municipal, commercial, and industrial problems and practices will be distributed to the usual rural audience and to targeted urban audiences such

as local government officials, civic and environmental groups, business associations, and environmental contacts for industries.

The lead responsible party for watershed newsletters will be the area UW-Extension Water Quality Education Coordinator with state specialist assistance. The Urban Water Quality Educator will be responsible for drafting or arranging for an expert to draft articles on urban issues. Other UW-Extension, Department, and Land Conservation Department staff will also be involved in newsletter preparation and distribution.

WATERSHED FOLDER AND FACT SHEETS

A watershed folder will be produced to communicate basic information about the watershed project and to serve as the "cover piece" for an education packet that would be assembled to meet the needs of particularly rural landowners and operators, but also perhaps local officials. Thus, the folder would contain different sets of Information and Education Program materials, including fact sheets, depending upon the audience groups to which it would be given.

The folder may ultimately bear a basinwide rather than a watershed-specific identify; and most of the fact sheets contained within it would likely have basinwide or statewide applicability, and be produced at hose levels. An exception may be demonstration project fact sheets and especially writeups describing good management practices which are viewed as "informal demonstrations." These could be localized considerably to this watershed project. Likewise, the combination of materials inserted in the folder would tend to help "localize" it.

Area and county UW-Extension and county Land Conservation Department staff would jointly prepare the watershed colder and demonstration fact sheets.

WATERSHED SLIDE PROGRAM(S)

An adaptable slide program will be developed for use at public meetings, community group programs and volunteer training sessions. The program will have some modules which can be used throughout the basin such as those explaining the mIlwaukee River Program, nonpoint source pollution, and rural and urban practices for abating nonpoint source pollution. Other modules will be specific to the watershed such as those explaining local nonpoint source pollution problems and causes, local examples of nonpoint source pollution abatement practices, landowner survey(s), inventory data an plan recommendations.

County Land Conservation Department and UW-Extension staff will provide slides and information for the watershed-specific portions of the slide program, will adapt basinwide portions, and use the program for public meetings, community group programs and volunteer training sessions. Many slides, especially graphic summaries of landowners surveys, inventory data and plan

recommendations, will be prepared by state Department or state or area UW-Extension staff. Area UW-Extension Water Quality staff will be responsible for coordinating the production of the slide program.

Local Exhibits

Exhibits on the Milwaukee River Program, on urban and rural nonpoint source pollution, on specific watershed plans and on Best Management Practices will be used at county fairs and other special events in the watershed. The purpose of focus of these exhibits will change as the program progresses. Thus interchangeable groups of exhibit components must be developed and made available to cover a variety of themes. The first exhibit used in a watershed will be designed to raise public awareness of the Milwaukee River Program, nonpoint sources of pollution and typical solutions. The second exhibit will be designed to inform people about inventory and/or survey results and plan recommendations for their watershed. The third (and fourth, if appropriate) exhibit will inform people about specific Best Management Practices.

Arrangements for use of exhibits in local areas will be the responsibility of county UW-Extension and Land Conservation Department staff with assistance from area UW-Extension and district Department staff. Most materials for the exhibits will be developed by area UW-Extension and district Department staff. Exhibits will be staffed by Watershed Advisory Committee members and other volunteers whenever possible to augment staff resources.

Media Contacts

An active program to involve the media in covering watershed events will begin with a conference with each local newspaper in the watershed to acquaint editors and reporters with the Milwaukee River Program. The lead responsible person for this activity is the Public Information Officer for the Department's Southeast District. The Milwaukee River Program Coordinator and the UW-Extension staff will also be involved.

News releases will be distributed to all local newspapers and radio stations (and regional newspapers and television stations where appropriate) to announce watershed events such as tours, public information meetings, plan completion, demonstration project installations and grant awards. The lead responsible agency for the news releases will vary depending on which agency or private group is responsible for the particular event.

Newspaper feature articles and appearances on local radio talk shows and interview programs will be sought to provide more in-depth coverage of the program. County UW-Extension staff will be primarily responsible for covering water quality issues in their regular radio talk shows and newspaper columns. Background material for radio programs and newspaper columns will often be prepared at the basin or state level. County staff will also participate in the preparation of background materials on subjects in their field of

expertise. Special feature articles or interview shows may involve direct participation by state or district Department or UW-Extension staff.

Series of Newspaper Columns and Radio Pubic Service Announcements

A coordinated series of newspaper columns and radio public service announcements will be used to inform people about particularly urban Best Management Practices. The primary focus of the series will be homeowner practices such as yard care, household hazardous waste, stream corridor and lakeshore management, automobile maintenance, and pet waste disposal. General information on the Milwaukee River Program, nonpoint source pollution and Best Management Practices for municipalities will also be included.

Development of the series of newspaper columns and radio public service announcements will be coordinated at the basinwide level, but publication or distribution will be made part of watershed implementation program. County UW-Extension agents will adapt newspaper column and radio pubic service announcements for local use and will arrange for distribution to local newspapers and radio stations. Newspaper column will also be distributed for publication in local civic and environmental group newsletters.

County UW-Extension agents may be involved in the development of newspaper column or public service announcements related to their areas of expertise. Supportive educational materials such as fact sheets will be available, upon request, through county UW-Extension offices. Such fact sheets and other written materials will be prepared at the basinwide or statewide level.

Demonstration Site and Key Rural Practices Tours

A meeting and tour will be conducted for the existing barnyard runoff management demonstration--and for all future demonstration sites. Priority landowners needing specific information and first-hand exposure to the demonstrated practices will be invited to the events(s). Transportation to and from the sites and organization around a social event such as a meal will be utilized as advisable and approved.

In addition, tours related to Best Management Practices will be pursued as appropriate for specific audiences, making use of both formal and informal "demonstrations." Presently, such a tour is planned for livestock operators and others are envisioned as likely for future years.

County Land Conservation Department and UW-Extension staff are identified as having the major responsibility for these tours.

Municipal Critical Areas and Urban Demonstration Sites Tours

Local staff and elected officials will be offered the opportunity to tour--often by automobile--critical areas identified by the future inventory of

their city or village. The tour will be also include urban demonstration projects or other examples of practices which could be used to reduce nonpoint source pollution in their community. The purpose of the tour will be to discuss specific streams or lakes, major sources of pollution and recommended practices in more detail on site. The tour may be followed by working meetings(s) to develop specific plans, programs or ordinances for that community.

The need, timing, and people involved in this tour and any subsequent meeting(s) will be worked out with the contact for each city and village by the Milwaukee River Program Coordinator.

Implementation Meeting/Tour

During the implementation phase in the watershed, a meeting and/or tour will be scheduled. The purposes of the meeting/tour will be to update local officials on program progress, to encourage more participation, and to inform the media and the public about implemented practices and water quality improvements. Rural and urban demonstration projects and other implemented practices will be featured in the meeting/tour. The meeting/tour should be scheduled before the end of the sign-up period for state cost-sharing. Implementation meetings and tours may be combined for adjacent watersheds where sign-up periods overlap.

The lead responsible party for arranging implementation meetings/tours will be the Milwaukee River Program Coordinator.

Assistance will also be provided by other Department staff, county and area UW-Extension, and Land Conservation Department staff.

Demonstration Projects

The need for demonstrations of nonpoint source pollution control practices will be evaluated in the watershed. Where appropriate, demonstrations will be designed to enhance related natural resources such as fish and wildlife habitat as well a improve water quality. Watershed demonstrations will be evaluated according to the following criteria:

1. Does the practice address an identified, major source of water pollution in the Milwaukee River Basin?

2. Is the practice needed in a variety of areas in the watershed (or other parts of the Milwaukee River Basin) to achieve water quality goals?

3. Is the practice unfamiliar and/or untested in the vicinity or in southeastern Wisconsin?

4. Does the practice require further research and refinement before widespread application? Would a demonstration aid this process?

5. Is the site proposed for the demonstration highly visible, easily accessible, or located where there would be credibility ascribed to the practice?

Milwaukee River Program staff, with the advice of watershed advisory committees and local governments, will identify and actively pursue implementation of needed demonstrations. An ad hoc group composed of the Milwaukee River Program Coordinator, area UW-Extension Water quality staff, the state UW-Extension Water Quality Education Coordinator, the Department's Nonpoint Section Chief or designed, and local government staff--including county UW-Extension and Land Conservation Departments--will be responsible for further identifying needed demonstrations and for drafting the necessary detailed proposals which elaborate upon the new demonstrations suggested in this plan. Implementation of specific demonstrations will be pursued by appropriate Department, Land Conservation Department, local government, and UW-Extension staff.

Part of the plan for each demonstration will be an Information and Education Program element including at a minimum signs, slides, fact sheets and tours. Area UW-Extension Water Quality staff will play a major role in coordinating and/or conducting the Information and Education Program component of each demonstration project.

Stream Corridor Management Demonstrations

Stream corridor management demonstrations may be used in both rural and urban areas to get citizens involved in local stream corridor management--fencing or stabilizing streambanks, planting vegetative buffer strips, re-establishing wetlands, improving fish and wildlife habitat, providing seasonal litter removal, etc. The program will recruit and train volunteers to implement the demonstrations. This type of volunteer program will expand staff resources and foster effective community involvement in stream corridor management, many principles of which are also proposed around lakeshores.

County UW-Extension agents will work with local civic and environmental groups, Land Conservation Department and Department staff, and others appropriate in developing stream corridor demonstrations. Area UW-Extension Water Quality staff will assist county UW-Extension offices as needed, particularly those which may lack staff in the appropriate program area.

Signs

Signs with the Milwaukee River Program logo will be used at selected locations to increase public awareness of the Milwaukee River Program and possibly the

extent of the Milwaukee River Basin and stream locations. Potential sites for signs identifying the Milwaukee River Basin, the five priority watersheds and individual streams will be selected and prioritized by the Information and Education Program Subcommittee. Signs will be produced by contract with a private firm. Primary responsibility for coordinating this sign project will be assigned to a staff member at the Department's Southeast District.

Signs identifying demonstration projects and other Milwaukee River Program cooperators will also be sued. Wherever possible, more detailed signs explaining demonstration projects and other cost shared practices will be put up in prominent public locations such as parks, waysides, boats and fishing accesses, and river walkways.

Lake Organization Meetings and Programs

Meetings will be scheduled with every lake district or organization. Specially targeted Information and Education Programs, including model yards where appropriate, will be developed for these areas because lakeshore developments are a special problem in the Milwaukee River Basin. Most of the lakes in the basin are surrounded by dense residential development served by septic or holding tanks.

Information and Education Programs will focus on land use planning, stormwater management, yard care practices, erosion control, and septic or holding rank maintenance because these practices are especially critical for maintaining water quality and property values for lake developments. Three different approaches have been identified for potential use in Information and Education Programs for lake organizations.

The first approach identified for use in these arc is a model yard contest or demonstration. The contest or demonstration and related training may be sponsored by the lake organization with assistance from county UW-Extension staff. The primary focus of model yard programs would be landscaping, stormwater infiltration, lakeshore stabilization, erosion control, and septic and holding tank maintenance practices that will protect lake water quality.

A second approach which may be used with interested lake organizations is a lakeshore management demonstration. Under this program, volunteers would participate in demonstrations of stormwater management, erosion control, shoreline stabilization, landscaping, or wetland restoration practices that protect lake water quality and enhance fish and wildlife habitat.

A third approach which may be used is the UW-Extension drinking water education program. Under this program, lakeshore residents would be provided with bottles to collect representative drinking water samples. After analysis, a public meeting would be conducted to collectively explain results, sources and patterns of movement for problem pollutants and the effect of land uses upon water quality.

Lake districts may also choose to participate in the nonpoint source pollution control program as units of local government, making them potentially eligible for cost-sharing to implement approved practices. Like cities and villages, lake districts or organizations may also develop and implement Information and Education Programs for their residents with assistance from UW-Extension staff.

The lead responsible party for scheduling the initial meeting with each lake organization will be the Milwaukee River Program Coordinator. Responsibility for follow-up activities such as information on yard care practices and training for model yard contests will lie with county and area UW-Extension staff.

Town Meetings

During the planning phase of the watershed project, staff from the lead educational counties met with their respective town boards and/or planning commissions. These meetings were used to accomplish one or more of the following: establish a courtesy contact; explain the deteriorated nature of the water resources base and, thus, the reason for the priority watershed project; indicate the steps which would be followed in the project; illustrate ways in which the project might affect the respective town and its residents; and provide a status update regarding the project.

During the implementation phase, two meetings are planned for each of the watershed townships lying in the lead educational counties. Officials and residents from adjoining towns in different counties or different watersheds may be invited to participate as advisable. The primary purpose of these meetings--tentatively scheduled for year-1 and year-3 of the project--will be to respectively indicate that implementation is underway and encourage participation, and to later advise that this phase will end shortly, offering suggestions for future involvement.

These meetings will be the responsibility of the county UW-Extension and Land Conservation Department staff. Area UW-Extension and Department staff assistance could be made available as needed for specific topics or the production of handout materials.

City and Village Meetings

As part of a process involved with more detailed local planning, the Milwaukee River Program staff will schedule a meeting with the governing body of each city and village. The purposes of the meeting will be to:

a. Present inventory results, urban residents survey results (if any) and general plan recommendations.

b. Get feedback from local officials regarding the plan as it affects their community.

c. Identify the next steps regarding specific actions to be taken, ultimately leading to approval of the plan for the community by the City Council/Village Board.

In larger cities and villages, Milwaukee River Program staff may present the same information to municipal staff before meeting with the Village Board or City Council. The purposes of the staff meeting will be to inform them of inventory results and to get feedback on plan recommendations before presentation to elected officials. Separate meetings may also be scheduled with committees, commissions or boards of the village or city upon request. And similar meetings may be scheduled at various junctures during project implementation.

The lead responsible party for scheduling meetings with municipal staff and elected officials will be the Milwaukee River Program Coordinator. Other Department and county or area UW-Extension staff responsible for that watershed will provide assistance at these meetings. For the meetings, the Milwaukee River Program staff will prepare (or arrange for the preparation of) a written summary of inventory an survey results and plan recommendations for each city and village and related audio-visual materials such as slides, overheads, maps and graphs.

Local Government Information and Education Activities

The Milwaukee River Program Coordinator will contact each city and village once a year during implementation to assess progress, update the community on the Milwaukee River Program and determine what types of information or other assistance they need. To facilitate this process, each city and village will be asked to designate a contact person for the Milwaukee River Program. Timing of the annual follow-up is important due to the local government budget cycle. Contacts should be made during the spring or early summer so that plans for new programs and capital expenditures can be included in the normal local government budget process.

Appropriate county or area UW-Extension and Department staff will assist local governments in the development and implementation of Information and Education Programs for their residents, businesses and industries. Department and UW-Extension staff will a provide information on urban Best Management Practices to city and village officials through telephone contacts, attending local government meetings, providing workshops, or other educational means.

County UW-Extension agents will have primary responsibility for urban Information and Education Program activities wherever they have appropriate skills and time. Area UW-Extension Water Quality staff will be responsible for urban Information and Education Program activities when needed by county UW-Extension staff.

Construction Erosion Control and Stormwater Management Workshops

One specific type of technical education and training assistance which will be offered to cities and villages will be construction erosion control and stormwater management workshops. The purpose of the workshops will be to assist municipal staff with the implementation of new or revised ordinances or plans for construction erosion control or stormwater management. The workshops will be designed to provide technical information on these practices to municipal staff, local developers, builders, contractors and consultants. The most effective time to schedule them will be winter or early spring, before the busiest construction season.

The county UW-Extension Community Resource Development Agent or area Urban Water Quality Educator will be responsible for organizing these workshops. Materials for use in the workshops will be developed on a basin or state level.

Programs for Local Groups

Videotape and slide programs with supportive educational materials will be presented to or made available to civic and environmental organizations, agricultural groups, Chambers of Commerce, local business and industry associations, youth groups, schools, churches and other local organizations. To provide an organized approach for soliciting and meeting program requests from local groups, the Milwaukee River Program Coordinator will develop a speakers bureau. Members of the speakers bureau will include state and local government staff surveyed concerning topics, frequency and types of groups they are willing to address.

The primary responsibility for maintaining the speakers bureau database will belong to the Milwaukee River Program Coordinator at the Department's Southeast District. The Urban Water Quality Educator will publicize the speakers bureau to solicit program requests from urban groups. Videotapes, slide programs and supportive educational materials will be developed on a statewide or basinwide level by state or area staffs through contracts with private or public agencies. Area UW-Extension staff will play a lead role in developing or coordinating the development of needed materials. County UW-Extension agents involved in the Milwaukee River Program will participate in the speakers bureau and the development of Information and Education Program materials according to their area of interest and available time.

Ultimately, it is hoped that the Milwaukee River Program staff can meet with leaders of these groups to provide information on the Milwaukee River Program, define how they would like to be involved in the Program, train volunteers from their groups, and (where appropriate) assist them in the implementation of educational programs, demonstration projects, and other activities.

MAJOR PROPOSALS

Major proposals include those collections of educational activities that could likely be performed well only under the umbrella of a substantial educational effort complementing the other activities undertaken for the watershed project. As such, major proposals must be prepared to document need and establish a proposed work plan. Additionally, the major proposal for conservation tillage specialist an agrichemical management specialist would show the watershed project as but one benefactor of a larger, perhaps basinwide or areawide, educational program. Even the outcome of an investigation with municipalities is likely to benefit from, or point to the need for, training programs and/or materials that are produced for a broader purpose.

At present, the watershed project educational program for municipalities will appear to require the use of -- at minimum -- a series of fact sheets on urban "housekeeping" practices for water quality protection on the following general subjects:

1. Reduction in pet feces runoff.
2. Improved efficiency of leaf collection and street sweeping.
3. Proper use and disposal of car products and lawn-garden chemicals.
4. General encouragement of precipitation infiltration rather than runoff.

A combination of county UW-Extension and Land Conservation Department staff contributions with area and/or state UW-Extension coordination would be required for preparing the major rural proposals; and area UW-Extension, Department, and respective municipal staff would be required for preparing the major urban proposals.

ANNUAL EDUCATIONAL PLAN UPDATE

The East-West Watershed Educational Plan will be reviewed and updated annually. This is needed particularly so that educational materials and events, costs and timing can be intelligently specified for the period beyond year-1. The anticipated completion of a Basinwide Information and Education Plan and major proposals will mark important milestones in projecting future educational commitments needed for the project--as will the completion of the first year of implementation.

Area UW-Extension staff will provide the leadership role in this annual plan updating process, and will be assisted especially in the identification or needed directions by county UW-Extension and Land Conservation Department staff. Department staff may also play an important role in the needs identification process.

TABLE A-3 EAST-WEST BRANCH WATERSHED EDUCATIONAL PLAN

Watershed-Specific Educational Material/ Event	Responsibility (Hours/Activity Group)[1] Fond du Lac	Washington	Notes	Cost/ Unit[2]	Project Year (Annual Cost)[2] 1	2	3	4	5	6	7	8	Total Number (Cost)[2]
Printed Materials													
Watershed Newsletter[3]													
Lead County Articles	UWEX/LCD (40)		Coordination, supplemental writing, editing printing, and distribution by Area & State UWEX (Co./hrs per yr.)	DNR-UWEX Contracts	2	2	2	2	2	2	2	2	16
Contributing Articles		LCD (20)											
Watershed Folder													
Assembly Leadership		LCD (20)	Area UWEX Staff Assistance	$500	1 ($500)								1 ($500)
Contributions/County Adaptation	LCD/UWEX (20)			($500)	(1)								
Demonstration Project Fact Sheet(s)[4]	LCD/UWEX (10)		Area UWEX budgetary & staff assistance		1								1
Demonstrating Good Practices Fact Sheet(s)[4]		LCD (10)	Informal demonstrations			1	1	1					3
Audio-Visual Materials													
Slide Program: Watershed Project Orientation	LCD/UWEX (8)	LCD/UWEX (8)	Most of effort and budget through Area UWEX		1								1
Slides of Urban Inventory Results & Plan Recommendations	UWEX (4)	UWEX (4)	"	$100/ County		1 ($200)							1 ($200)
Subtotal Hours/Cost	78	48		---	$500	$200							$700

Table A-3. East - West Branch Watershed Educational Plan

Watershed-Specific Educational Material/ Event	Responsibility (Hours/Activity Group)[1] Fond du Lac	Washington	Notes	Cost/ Unit[2]	Project Year (Annual Cost)[2] 1	2	3	4	5	6	7	8	Total Number (Cost)[2]
Exhibits (Usage)													
Campbellsport and Fond du Lac Libraries	UWEX (10)		Pre-existing exhibit boards and components via DNR grant to Area UWEX		2		2						4
Fond du Lac County Fair	UWEX/LCD (10)				1	1	1		1				4
Fond du Lac County Home Show	UWEX (20)			$200	1 ($200)								1 ($200)
Washington County Fair		LCD/UWEX (10)	"			1							1
Other, including Urban-Focused	UWEX (10)	(LCD/UWEX)	May need new components	( )	1	1							2
Media Releases/Participation													
Newspaper Columns	UWEX (20)		State and Area UWEX suggestions/ samples		4	4	4	2	1	1	1	1	18
Newspaper Column Adaptation		UWEX (4)			4	4	4	2	1	1	1	1	18
News Releases-w/Important Events Only	UWEX (10)	UWEX (10)	"		2	1	2	1	1	1	1	1	10
Radio Talk Shows	UWEX (5)	(UWEX)[5]			1	1	1		1				4
Tours													
Demonstration Site Mtg. & Tour for Animal Waste Operators	LCD/UWEX (26)		Established site	$370	1 ($370)		1 ($400)						2 ($770)
Livestock Operators		LCD (30)		$500	1 ($500)							1	($500)
Municipal Critical Areas & Demo. Sites		UWEX (10)	Area UWEX assistance		1	1	1	1	1	1	1	1	8
Bus Tour of Key Practices for Local Officials	UWEX/LCD (20)	UWEX/LCD (20)		$300		1 ($300)	1 ($300)						2 ($600)
Subtotal Hours/Cost	111	54		---	$1,070	$300	$700						$2,070

Table A-3. East - West Branch Watershed Educational Plan

Watershed-Specific Educational Material/ Event	Responsibility (Hours/Activity Group)[1] Fond du Lac	Washington	Notes	Cost/ Unit[2]	Project Year (Annual Cost)[2] 1	2	3	4	5	6	7	8	Total Number (Cost)[2]
New Demonstrations													
Stream Corridor Management	UWEX (40)	UWEX (20)	Separate proposals required for all suggestions. Hours & costs shown reflect scoping process only. Proposal writing would be largely by UWEX as Area assistance is available. LCD's play the major role in identifying landowners. DNR and UWEX Special assistance are included in each.	$75 (Group meetings needed)	1 ($75)	1 ($75)							2 ($150)
Stream/Lakeshore Management	UWEX (20)				1 ($75)								1 ($75)
Fishery, Stream Bank and Barnyard Integrated Resource Man.	LCD/UWEX (20)	LCD (20)			1								1
Roadside Ditch Stabilization	LCD/UWEX (30)					1							1
Conservation Tillage	UWEX (35)	UWEX (35)			2								2
DHI Testing Program Data-Linking Milk Production & Water Quality[6]		UWEX (30)			1								1
Long-term Alfalfa Rotations (1-2 yr Corn)/ Alfalfa Stand Renovation[7]		UWEX (35)			1								1
Residual Nitrogen Management			Area or basinwide demo. possibly in watershed.										(1)
Demonstration Site Signage	LCD (10)	LCD (10)	Cost incorporated in proposals	($300)	7	2							9
(Complete/Make Use of Animal Waste Management Demonstration in Adjacent North Branch Watershed)		(LCD) (20)			(1)								(1)
Model Yards-Lake Area[8] (Perhaps City Sites) (Use of Woolen Mills Dam Removal Site and West Bend Industrial Park Demonstrations Under Tours-Municipal..)	UWEX	UWEX	See above				1	1					2
Subtotal Hours/Cost	125	170		---	$150	$75							$225

Table A-3. East - West Branch Watershed Educational Plan

Watershed-Specific Educational Material/ Event	Responsibility (Hours/Activity Group)[1] Fond du Lac	Washington	Notes	Cost/ Unit[2]	Project Year (Annual Cost)[2] 1	2	3	4	5	6	7	8	Total Number (Cost)[2]
Meetings													
Towns - Regarding Implementation Process: Eden, Osceola Ashford, Auburn, Kewaskum, Barton, West Bend, Trenton, & Farmington (w/N. Branch)	UWEX/LCD (32)	UWEX/LCD (40)		$25	9 ($225)		9 ($225)						18 ($450)
Municipal Officials: Campbellsport, Kewaskum, Newburg, and West Bend	UWEX/DNR (4)	UWEX/DNR (12)	Cost and assistance through Area UWEX		4			4			4		12
Municipal Staff: Kewaskum, Newburg and West Bend		UWEX/DNR (12)	"		4								4
Conservation Groups	UWEX (10)	UWEX (10)			2	2	2	1	1	1	1	1	11
Wisconsin Woodland Owners Conference	UWEX (10)				1								1
Lake Organizations: Long, Kettle Moraine, Fifteen, Crooked, Forest, Silver-Lucas, Smith, and Green	UWEX[9] (20)	UWEX (12)	Area UWEX assistance	$25 (handouts)		3 ($75)	3 ($75)	3 ($75)		3 ($75)	3 ($75)	3 ($75)	18 ($450)
Technical Information Municipal Staff	LCD (4)	LCD (12)	1/Municipality/year		4	4	4	4	4	4	4	4	32
Developers, Builders, Individually	LCD (8)	LCD (8)	2/County/year		4	4	4	4	4	4	4	4	32
Developers, Builders Community Workshop on Construction Erosion/ Stormwater Management	UWEX/LCD (10)	UWEX/LCD (10)	1/Municipality Area UWEX assistance	$50		2 ($100)	2 ($100)						4 ($200)
Community Group Programs upon Request	UWEX (4)	UWEX (4)	1/County/year-first 5 years		2	2	2	2	2	1	1	1	13
Business Associations	UWEX (4)	UWEX (4)	"		2	2	2	2	2	1	1	1	13
Agricultural Groups	UWEX (4)	UWEX (4)	"		2	2	2	2	2	1	1	1	13
Subtotal Hours/Cost	80	106		---	$225	$175	$400	$75		$75	$75	$75	$1,100

Table A-3. East - West Branch Watershed Educational Plan

Watershed-Specific Educational Material/ Event	Responsibility (Hours/Activity Group)[1] Fond du Lac	Washington	Notes	Cost/ Unit[2]	Project Year (Annual Cost)[2] 1	2	3	4	5	6	7	8	Total Number (Cost)[2]
Major Proposals[10]													
Conservations Tillage Specialist	UWEX/LCD (10)	UWEX/LCD (10)	Likely basinwide proposal		1								1
Agrichemical Management Specialist	UWEX/LCD (5)	UWEX/LCD (5)	Possible area facet of Statewide program		(1)								(1)
Investigation with Municipalities of of the Need for, and Their Interest in, Educational Program Packages Addressing at Minimum:	UWEX/DNR & Respective Municipality (2)	UWEX/DNR & Respective Municipality (6)	Area UWEX co-leadership 1/Municipality		4								4
Reduction in Pet Feces Runoff													
Improved Efficiency of Leaf Collection & Street Sweeping													
Proper Use and Disposal of Car Care Products & Lawn-Garden Chemicals													
General Encouragement of Precipitation Infiltration Rather than Runoff.													
Annual Educational Plan Update[11]	UWEX/LCD (8)	UWEX/LCD (8)	Contributions only--Area UWEX leadership		1	1	1	1	1	1	1	1	7
Subtotal Hours/Cost	25	29		---									---
Total Hours [12]/Cost	419	407		---	$1,945	$750	$1,100	$75		$75	$75	$75	$4,095

Table A-3. East - West
Branch Watershed
Educational Plan
Additional Notes:

1 Hours and activities beyond year 1 become increasingly speculative. For this reason, subtotaling occurs only for anticipated Year 1 activities in the respective counties. Annual educational plan refinements will occur.

2 Costs reflected are only those reimbursed to the counties for "out-of-pocket" expenses specifically for East-West Branch Watershed educational activities. Most actual costs are covered under other plans and grants.

3 The Watershed Newsletter is currently being investigated for possible inclusion in a Basinwide Newsletter publication.

4 Currently, there is only one funded demonstration site in the watershed for which a fact sheet needs to be prepared -- an animal waste management site in Fond du Lac County. Stream corridor demonstration facts sheets may also be needed, however, as well as fact sheets describing good management practices at informal "demonstration sites".

5 Washington County UWEX Radio Talk Shows will pertain substantially to other watersheds as well, and are thus incorporated in the basinwide information and education plan.

6 Hours in Dairy Herd Improvement (DHI) Demonstration are needed to document past milk quality on the farm selected, and to develop a demonstration plan which provides a quality environment for livestock as well as improves water quality. UWEX State Specialist assistance would be sought.

7 UW-Madison Agronomy Department assistance is needed for the alfalfa demonstrations. See also "Major Proposals" in this table.

8 Possibly one model yard demonstration per lake will be established if feasible and desirable. No hourly estimates are given because of the extremely indefinite nature of scope (0-9 lake sites).

9 Crooked Lake lies in Sheboygan County. Because it is adjacent to the County Line and similar to the Fond du Lac County grouping of lakes, it is included here.

10 County time contributions under "Major Proposals" pertain only to the investigation of need and feasibility, not to implementation.

11 The annual update will provide a detailed breakdown of future hourly commitments needed and the disclosure of proposal costs following their determination.

12 Hourly totals given pertain to Year 1 only, for which a reasonable picture of need and commitment presently exists.

APPENDIX G
TABLES

Table 1. The relative importance of the East and West Branches Milwaukee River Watershed as a source of pollutants to the Milwaukee River System (1.)

Watershed	Water Load	% Water Load	Estimated Sus. Sol. Load	Estimated Tot. Phos. Load
North Branch	100 cfs	23%	7,340,000 lbs/y	42,100 lbs/y
East-West Branch	200 cfs	48%	15,310,000 lbs/y	87,800 lbs/y
Cedar Creek	70 cfs	17%	5,420,000 lbs/y	31,100 lbs/y
Milwaukee South (2.)	50 cfs	12%	3,830,000 lbs/y	22,000 lbs/y
TOTAL (2.)	420 cfs		31,900,000 lbs/y	183,000 lbs/y

1. Does not include part of the drainage from the City of Milwaukee within the Milwaukee River South Watershed, and does not include pollutant loads from the Menomonee River Watershed.

2. Based on measurements made at Estabrook Park Road, located on north side of the City of Milwaukee.

Table 2. Relative significance of major nonpoint source types in the East and West Branches Milwaukee River Watershed.

Source Type	Portion of Suspended Sediment Load	Portion of Total Phosphorus Load
Point Sources	< 1%	13%
Nonpoint Sources		
Agricultural	91%	85%
Uplands	(85%)	
Streambanks	(6%)	
Urban(1.)	9%	2%
Campbellsport	(<1%)	
Kewaskum	(1%)	
West Bend	(7%)	
Newburg	(<1%)	

1. This includes runoff from established urban areas only. Sediment delivered from construction sites is not included, but is potentially significant. The average annual pollution potential for construction sites over the last five years has four times that of established urban areas for sediment and phosphorus.

Table 3. Agricultural land use distribution, in acres, for three regions in the East and West Branches Milwaukee River Watershed(1.)

Region	farm-stead	wet-land	grass-land	pasture	woodlot	grazed woodlot	rotated crops	continuous crops	ALL LAND
East	183	5958	4215	622	8302	9	7361	686	27336
West and Upper Mainstem	1068	14625	4230	519	6782		43456	924	71604
Lower Mainstem	769	4014	7290	928	8962	58	21925	1568	45514
WATERSHED TOTAL	2020	24597	15735	2069	24046	67	72742	3178	144454

Table 4. Soil loss and sediment delivery from upland sheet and rill erosion in three major regions of the East and West Branches Milwaukee River Watershed

Parameter	East Branch	West & Upper Mainstem	Lower Mainstem	Watershed
Total Acres(1.)	21195	55911	40731	117837
Acres Delivering Sediment to Streams	6638 31%	26775 48%	24713 61%	58126 49%
Total Annual Delivered Sediment	463	2390	3409	6262
Average Delivery Ratio (2.)	5%	3%	5%	4%

1. Includes the following land uses: grasslands, pasture, woodlots, cropland.

2. Delivery ratio = tons sediment eroded/tons sediment delivered. The actual delivery for eroding uplands varies. Actual delivery from individual fields was used to develop the management strategy presented in this plan.

Table 5. Extent of internal drainage in the three main regions of the East and West Branches Milwaukee River Watershed

Region	Total Acres	Acres Draining to Surface Waters		Internally Drained Acres	
		Number	%	Number	%
East	28142	8847	31%	19295	69%
West	72981	28228	39%	44753	61%
Main	51253	29934	58%	21319	42%
Watershed	152376	67009	44%	85367	56%

Table 6. Streambank degradation in the East and West Milwaukee River Watershed

Sub-watershed(1.)	Region	Water Resource	Number of Degraded Sites	Feet Affected	Sediment Produced (tons/year)	% Degraded Feet Associated with Cattle Access	% Sediment Yield Associated with Cattle Access
ED	East	Milwaukee River	1	1,000	2.5	100%	100%
UT	West	tributary stream	2	1,800	5.0	100%	100%
WM	West	W. Br. Milwaukee R.	4	2,345	8.5	72%	0%
WM	West	tributary streams	5	1,900	24.0	100%	100%
SL	Main	Milwaukee River	3	1,300	14	77%	0%
SL	Main	tributary stream	1	1,200	0	100%	
KW	Main	Milwaukee River	1	75	22.5	0%	0%
KW	Main	Kewaskum Ck.	2	1,600	0	100%	
KW	Main	tributary stream	1	300	0	100%	
WB	Main	Milwaukee River	8	1,165	211	0%	0%
WB	Main	tributary stream	2	1,800	18	83%	0%
QC	Main	Quas Creek	31	8,070	95.7	12%	10%
DL	Main	Milwaukee River	15	840	17.5	6%	1%
		TOTAL	76	24,000	419		

1. Subwatershed names and locations that correspond to these are shown on map 2.

Table 7. Destination of barnyard runoff in three major regions of the East and West Branches Milwaukee River Watershed

Runoff Destination	Parameter(1.)	REGION: East Branch	West Branch & Upper Mainstem	Lower Mainstem	Watershed Total
Streams/Lakes	Number	17	77	64	158
	Pollutant Load	41 lbs.	488 lbs.	690 lbs.	1219 lbs.
Non-Riparian Wetlands	Number	10	8	7	25
	Pollutant Load	73 lbs.	72 lbs.	67 lbs.	212 lbs.
Deep Soils	Number	9	34	27	70
	Pollutant Load	472 lbs.	128 lbs.	192 lbs.	792 lbs.
Shallow Soils	Number	0	2	12	14
	Pollutant Load		2 lbs.	88 lbs.	90 lbs.
Regional Total	Number	36	121	110	267
	Pollutant Load	586 lbs.	690 lbs.	1037 lbs.	2313 lbs.

1. The pollutant load is based on the mass of phosphorus delivered from a 10 year-24 hour rainfall event. It is meant as a relative indicator only.

Table 8. Potential for pollution from winterspreading animal waste in the East-West Priority Watershed

Parameter	Dodge County	Fond Du Lac County	Ozaukee County	Sheboygan County	Washington County	Watershed Total
Livestock Operations(no.)	4	91	12	18	108	233
Manure produced (tons per 6 months)	2,200	67,000	5,400	9,000	78,000	161,600
Acres Needed For Spreading	90	2,680	220	360	3120	6,470
Acres Available For Spreading:						
Suitable Acres	250	4,740	290	680	4470	10,430
Critical Acres	20	1,560	100	440	1,640	3,760
Estimated Critical Acres Spread/winter	10	600	50	150	720	1,530

Table 9. Agricultural land use distribution, in acres, for subwatersheds of the East Region, East and West Branches Milwaukee River Watershed

Sub-water-shed(1.)	farm-stead	wet-land	grass-land	pasture	woodland	grazed woodland	rotated cropland	continuous cropland	ALL
CL	74	1686	708	268	1911	9	2366	100	7122
LL	13	415	654	75	583		1108	19	2867
ML	15	1271	836		1810		628		4560
PC	18	1505	827	150	2220		1005	153	5878
WC	37	587	1022	91	1472		1434	414	5057
FL					58				58
LD	26	494	168	38	248		820		1794
TOTALS	183	5958	4215	622	8302	9	7361	686	27336

1. Subwatershed names and locations that correspond to these codes are shown on Map 2.

Table 10. Rural nonpoint source summary for the Watercress Creek Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	2	barnyards	13 lbs. phosphorus
	pocket wetlands	1	barnyards	8 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	4	barnyards	36 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	1304	acres	144 tons sediment
	riparian wetland	1297	acres	54 tons sediment
	pocket wetland			487 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded 0 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 11. Rural nonpoint source summary for the Low Delivery Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	7	barnyards	10 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	1	barnyards	412 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	(6.)	acres	(6.) tons sediment
	riparian wetland			tons sediment
	pocket wetland			tons sediment
Streambank erosion	streams	0	sites	0 feet degraded
				0 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.
6. No calculations were made.

Table 12. Rural nonpoint source summary for the Long Lake Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	1	barnyards	3 lbs. phosphorus
	pocket wetlands	2	barnyards	26 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	179	acres	<1 tons sediment
	riparian wetland	1618	acres	1 tons sediment
	pocket wetland			412 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded 0 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 13. Rural nonpoint source summary for the Parnell Creek Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	2	barnyards	1 lbs. phosphorus
	pocket wetlands	2	barnyards	8 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	2	barnyards	11 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	959	acres	192 tons sediment
	riparian wetland	1561	acres	50 tons sediment
	pocket wetland			131 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 14. Rural nonpoint source summary for the Mauthe Lake Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	3	barnyards	2 lbs. phosphorus
	pocket wetlands	1	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	1752	acres	32 tons sediment
	riparian wetland	525	acres	13 tons sediment
	pocket wetland			7 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 15. Rural nonpoint source summary for the Crooked Lake Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	2	barnyards	12 lbs. phosphorus
	pocket wetlands	4	barnyards	31 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	2	barnyards	13 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	2444	acres	94 tons sediment
	riparian wetland	3470	acres	13 tons sediment
	pocket wetland			661 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 16. Agricultural land use distribution, in acres, for subwatersheds of the West and Upper Mainstem Region, East and West Branches Milwaukee River Watershed

Sub-water-shed(1.)	farm-stead	wet-land	grass-land	pasture	woodland	rotated cropland	continuous cropland	ALL
AC	49	2345	882	23	1617	1944	0	6860
CP	30	378	161	9	367	2544	0	3489
ED	214	2621	466	39	491	6661	312	10804
GW	39	634	84	8	11	1814	202	2792
HW	108	597	444	31	254	4890	333	6657
IA	22	550	84	3	401	1526	9	2595
KM	145	3441	534	111	628	5001	29	9889
LB	139	2144	477	35	746	8234	39	11814
MM	43	430	227	11	92	1943		2746
UT	23	311	184	19	189	548		1274
WM	256	1174	687	230	1986	8351		12684
TOTALS	1068	14625	4230	519	6782	43456	924	71604

1. Subwatershed names and locations that correspond to these codes are shown on Map 2.

Table 17. Rural nonpoint source summary for the Headwaters Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	6	barnyards	25 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	1	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	3391	acres	291 tons sediment
	riparian wetland	2140	acres	172 tons sediment
	pocket wetland			24 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded 0 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 18. Rural nonpoint source summary for the Lake Bernice Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	6	barnyards	11 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	2	barnyards	1 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	5112	acres	376 tons sediment
	riparian wetland	5035	acres	202 tons sediment
	pocket wetland			414 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded 0 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 19. Rural nonpoint source summary for the Wayne Marsh Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	30	barnyards	314 lbs. phosphorus
	pocket wetlands	2	barnyards	0 lbs. phosphorus
	shallow soils (3.)	2	barnyards	2 lbs. phosphorus
	deep soils (4.)	6	barnyards	53 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	4989	acres	821 tons sediment
	riparian wetland	2808	acres	142 tons sediment
	pocket wetland			339 tons sediment
Streambank erosion	streams	9	sites	3245.0 feet degraded 32.5 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 20. Rural nonpoint source summary for the Greenway Road Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	0	barnyards	0 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	647	acres	51 tons sediment
	riparian wetland	1062	acres	23 tons sediment
	pocket wetland			72 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded 0 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 21. Rural nonpoint source summary for the Ice Age Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	1	barnyards	1 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	1246	acres	128 tons sediment
	riparian wetland	1229	acres	64 tons sediment
	pocket wetland			60 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 22. Rural nonpoint source summary for the Eden Township Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	12	barnyards	27 lbs. phosphorus
	pocket wetlands	1	barnyards	3 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	5	barnyards	5 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	3800	acres	218 tons sediment
	riparian wetland	4670	acres	100 tons sediment
	pocket wetland			476 tons sediment
Streambank erosion	streams(Milwaukee R.)	1	sites	1000.0 feet degraded 2.5 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 23. Rural nonpoint source summary for the Kettle Moraine Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	5	barnyards	41 lbs. phosphorus
	pocket wetlands	5	barnyards	69 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	16	barnyards	61 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	1218	acres	136 tons sediment
	riparian wetland	2857	acres	60 tons sediment
	pocket wetland			672 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 24. Rural nonpoint source summary for the McCullough Marsh Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	4	barnyards	7 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	954	acres	67 tons sediment
	riparian wetland	918	acres	18 tons sediment
	pocket wetland			73 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 25. Rural nonpoint source summary for the Auburn Creek Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	2	barnyards	18 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	2	barnyards	5 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	2768	acres	101 tons sediment
	riparian wetland	1775	acres	70 tons sediment
	pocket wetland			126 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 26. Rural nonpoint source summary for the Campbellsport Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	5	barnyards	7 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	1	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	2151	acres	159 tons sediment
	riparian wetland	1251	acres	99 tons sediment
	pocket wetland			26 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 27. Estimated year 1985 urban nonpoint pollutant loadings by land use for the Campbellsport Study Area(1.)

	Area		Pollutant Loading, %(2.)		
Land Use	Acres	%	Suspended Solids	Total Phosphorus	Total Lead
Residential	245	54%	24%	29%	16%
Commercial	27	6%	22%	14%	30%
Industrial	14	3%	12%	8%	14%
Transportation	50	11%	1%	2%	2%
Institutional	73	16%	40%	42%	37%
Recreational	46	10%	1%	5%	1%
Total	455				

1. Existing land use in the Campbellsport Study Area is shown in Map 3.

2. Total 1985 urban pollutant loadings for the Campbellsport Study Area were 93,000 pounds for suspended solids, 240 pounds for total phosphorus, and 190 pounds for total lead.

Table 28. Estimated year 2000 urban nonpoint pollutant loadings by land use for the Campbellsport Study Area(1.)

	Area		Pollutant Loading, %(2.)		
Land Use	Acres	%	Suspended Solids	Total Phosphorus	Total Lead
Residential	505	69%	34%	42%	25%
Commercial	26	4%	16%	10%	22%
Industrial	34	5%	20%	12%	24%
Transportation	49	7%	1%	2%	1%
Institutional	73	10%	29%	30%	27%
Recreational	44	6%	1%	4%	1%
Total	731				

1. Existing and planned land use in the Campbellsport Study Area is shown in Map 4.

2. Total year 2000 urban pollutant loadings for the Campbellsport Study Area were 130,000 pounds for suspended solids, 330 pounds for total phosphorus, and 250 pounds for total lead.

Table 29. Rural nonpoint source summary for the Un-Named Tributary Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	6	barnyards	37 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	1	barnyards	3 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	499	acres	42 tons sediment
	riparian wetland	382	acres	7 tons sediment
	pocket wetland			22 tons sediment
Streambank erosion	streams	2	sites	1800 feet degraded 5 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 30. Agricultural land use distribution, in acres, for subwatersheds of the Lower Mainstem Region, East-West Watershed

Sub-water-shed(1.)	farm-stead	wet-land	grass-land	pasture	woodland	grazed woodland	rotated cropland	continuous cropland	ALL
DL	111	756	698	155	891	4	3935	46	6596
GL	10	121	146		231		254		762
KW	215	135	1744	355	2165	54	6377	480	11525
QC	101	689	520	96	484		2782	343	5015
SW	22	598	931	34	592		528	357	3062
SL	65		1413	43	3069		2059	7	6656
WB	245	1715	1838	245	1530		5990	335	11898
TOTALS	769	4014	7290	928	8962	58	21925	1568	45514

1. Subwatershed names and locations that correspond to these codes are shown on Map 2.

Table 31. Rural nonpoint source summary for the Kewaskum Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	28	barnyards	327 lbs. phosphorus
	pocket wetlands	2	barnyards	14 lbs. phosphorus
	shallow soils (3.)	8	barnyards	62 lbs. phosphorus
	deep soils (4.)	9	barnyards	27 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	5783	acres	1110 tons sediment
	riparian wetland	552	acres	44 tons sediment
	pocket wetland			124 tons sediment
Streambank erosion	streams	4	sites	1975.0 feet degraded 22.5 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 32. Estimated year 1985 urban nonpoint pollutant loadings by land use for the Kewaskum Study Area (1.)

	Area		Pollutant Loading, % (2.)		
Land Use	Acres	%	Suspended Solids	Total Phosphorus	Total Lead
Residential	381	48%	21%	27%	14%
Commercial	40	5%	22%	14%	29%
Industrial	72	9%	25%	15%	29%
Transportation	56	7%	0%	2%	1%
Institutional	80	10%	29%	30%	25%
Recreational	166	21%	3%	12%	2%
Total	795				

1. The Kewaskum Study Area is shown in Map 5.

2. Total 1985 urban pollutant loadings for the Kewaskum Study Area were 140,000 pounds for suspended solids, 380 pounds for total phosphorus, and 300 pounds for total lead.

Table 33. Estimated year 2000 urban nonpoint pollutant loadings by land use for the Kewaskum Study Area (1.)

	Area		Pollutant Loading, % (2.)		
Land Use	Acres	%	Suspended Solids	Total Phosphorus	Total Lead
Residential	989	55%	22%	31%	15%
Commercial	102	6%	22%	15%	30%
Industrial	163	9%	30%	19%	32%
Transportation	127	7%	0%	2%	0%
Institutional	163	9%	24%	25%	21%
Recreational	267	15%	2%	8%	2%
Total	1811				

(1.) Existing and planned land use in the Kewaskum Study Area is shown in Map 6.

(2.) Total year 2000 urban pollutant loadings for the Kewaskum Study Area were 350,000 pounds for suspended solids, 870 pounds for total phosphorus, and 750 pounds for total lead.

Table 34. Rural nonpoint source summary for the Smith Lake Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	4	barnyards	54 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	2	barnyards	54 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	2871	acres	269 tons sediment
Streambank erosion	streams	4	sites	2500 feet degraded 14 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 35. Rural nonpoint source summary for the West Bend Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	17	barnyards	92 lbs. phosphorus
	pocket wetlands	2	barnyards	4 lbs. phosphorus
	shallow soils (3.)	3	barnyards	13 lbs. phosphorus
	deep soils (4.)	6	barnyards	13 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	6757	acres	719 tons sediment
	riparian wetland	3402	acres	270 tons sediment
	pocket wetland			248 tons sediment
Streambank erosion	streams	10	sites	2965 feet degraded 229 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 36. Annual urban nonpoint pollutant loadings from the City of West Bend

Subwatershed	Area, acs.	Water Load (1,000 gal.)	Sus. Sols.		Total Phos.		Total Lead	
			lbs	%	lbs	%	lbs	%
Silver Creek	1384	250000	205500	20%	560	22%	430	19%
Quaas Creek	1017	130000	86000	8%	310	12%	180	8%
West Bend	2981	726000	739000	72%	1700	66%	1600	72%
TOTAL	5382	1106000	1030500		2570		2210	

Table 37. Relative importance of urban sub-basins in the City of West Bend, West Bend Subwatershed, based on water and pollutant loadings.

Urban Sub-basin (1.)	Area, % (2.)	Water loading, % (3.)	Pollutant Loading, % (4.)		
			Sus. Sols.	Tot. Phos.	Tot. Lead
WB003	12	8	7	7	6
WB004	1	1	1	1	1
WB005	9	8	8	7	7
WB006	1	1	1	1	1
WB007	11	11	12	11	14
WB008	22	27	27	28	26
WB010	24	29	31	30	32
WB011	8	8	8	8	8
WB013	1	1	1	1	2
WB014	11	6	4	6	3

1. The locations of these sub-basins are shown on Map 7.
2. The total subwatershed area is 2,981 acres, based on 1985 data.
3. The total annual subwatershed water loading was 726M gallons.
4. The total annual subwatershed pollutant loadings are 739,000 lbs. for suspended solids, 1,680 lbs. for total phosphorus, and 1,600 lbs. for total lead.

Table 38. Relative importance of different land uses in the City of West Bend, West Bend Subwatershed, based on water and pollutant loadings(1.)

Land Use Type (1.)	Land Use Area		Lead Load	
	Acres	%	lbs.	%
commercial strip	241	8%	499	31%
medium industrial	196	7%	351	22%
light industrial	66	2%	121	8%
miscellaneous(2.)	147	5%	141	9%
schools	116	4%	81	5%
hospitals	13	0%	20	1%
multi-family residential	155	5%	94	6%
high density residential, alleys	117	4%	71	4%
high density residential, no alleys	114	4%	53	3%
med. density residential, no alleys	927	31%	112	7%
low density residential	221	7%	38	2%
open space	588	20%	15	1%
parkland	57	2%	3	0%
cemetery	23	1%	1	0%
TOTAL	2981		1600	

1. Existing land use in the West Bend Study Area is shown on Map 8.
2. Miscellaneous land uses include institutional lands other than schools or hospitals.

Table 39. The percent of critical land uses contained within high priority urban sub-basins for the City of West Bend: West Bend Subwatershed (1.)

Land Use Type	Percent of the Land Use Contained In the Sub-Watershed			TOTAL
	WB007	WB008	WB010	
Commercial Strip	14%	23%	36%	73%
Light Industrial	2%	19%	53%	74%
Medium Industrial	31%	12%	21%	64%
Miscellaneous(2.)	0%	25%	48%	73%

1. Critical land uses in this subwatershed are defined as those which combine to contribute 70% of the total subwatershed lead loading. High priority sub-basins were identified based on the pollution potential of the sub-basin and the quality of the adjacent receiving water.
2. Miscellaneous land uses include institutional lands other than schools and hospitals.

Table 40. Amount of lead loading from critical land uses in three critical urban sub-basins located in the City of West Bend: West Bend Subwatershed.

Land Use	Land Use Areas As Percent of Subwatershed	Percent Lead Loading by Sub-Basin			
		WB007	WB008	WB010	TOTAL
commercial strip	6	5	8	12	25
light industrial	1	0	1	4	5
medium industrial	2	7	3	4	14
miscellaneous(1.)	3	0	2	4	6
TOTAL	12	12	14	24	50

1. Miscellaneous land uses include institutionial land uses other than schools and hospitals.

Table 41. Estimated annual urban lead loading by land use for the year 2000 for the City of West Bend: West Bend Subwatershed.

Land Use Type (1.)	Land Use Area		Lead Load	
	Acres	%	lbs.	%
commercial strip	323	6%	705	25%
medium industrial	464	9%	825	30%
light industrial	155	3%	285	10%
miscellaneous(2.)	170	3%	161	6%
schools	135	3%	91	3%
hospitals	14	0%	22	1%
multi-family residential	310	6%	185	7%
high density residential, alleys	248	5%	148	5%
high density residential, no alleys	248	5%	112	4%
med. density residential, no alleys	1860	37%	227	8%
low density residential	434	9%	16	1%
open space	520	10%	9	0%
parkland	161	3%	7	0%
cemetery	27	1%	1	0%
TOTAL	5069		2794	

1. Existing and planned land use in the West Bend Study Area is shown on Map 10.
2. Miscellaneous land uses include institutional lands other than schools or hospitals.

Table 42. Estimated year 1985 urban nonpoint pollutant loadings by land use for the Newburg Study Area(1.)

	Area		Pollutant Loading, %(2.)		
Land Use	Acres	%	Suspended Solids	Total Phosphorus	Total Lead
Residential	422	80%	38%	62%	32%
Commercial	11	2%	20%	10%	26%
Industrial(3.)	14	3%	22%	10%	23%
Industrial(4.)	28	5%			
Transportation	5	1%	0%	0%	1%
Institutional	17	3%	19%	14%	17%
Recreational	31	6%	1%	5%	1%
Total	528				

1. Existing land use in the Newburg Study Area is shown in Map 11.

2. Total 1985 urban pollutant loadings for the Newburg Study Area were 47,000 pounds for suspended solids, 168 pounds for total phosphorus, and 103 pounds for total lead.

3. Industrial, non-quarry lands.

4. Industrial, quarry lands.

Table 43. Estimated year 2000 urban nonpoint pollutant loadings by land use for the Newburg Study Area(1.)

	Area		Pollutant Loading, %(2.)		
Land Use	Acres	%	Suspended Solids	Total Phosphorus	Total Lead
Residential	626	50%	6%	18%	4%
Commercial	40	3%	7%	6%	8%
Industrial	520	42%	85%	72%	86%
Transportation	5	0%	0%	0%	0%
Institutional	17	1%	2%	3%	2%
Recreational	33	3%	0%	1%	0%
Total	1241				

1. Existing and planned land use in the Newburg Study Area is shown on Map 12.

2. Projected urban pollutant loadings for the year 2000 in the Newburg Study Area are 460,000 pounds for suspended solids, 850 pounds for total phosphorus, and 1,100 pounds for total lead.

Table 44. Rural nonpoint source summary for the Silver Creek Subwatershed

Source Type	Receiving Area	Contributing Sources number	units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	0	barnyards	0 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	1229	acres	95 tons sediment
	riparian wetland	917	acres	35 tons sediment
	pocket wetland			207 tons sediment
Streambank erosion	streams	1	sites	30 feet degraded
				<1 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 45. Relative importance of urban sub-basins in the City of West Bend, Silver Creek Subwatershed, based on water and pollutant loadings.

Urban Sub-basin (1.)	Area, % (2.)	Water loading, % (3.)	Pollutant Loading, % (4.)		
			Sus. Sols.	Tot. Phos.	Tot. Lead
SW007	1%	0%	0%	0%	0%
SW008	9%	3%	1%	4%	1%
SW009	15%	16%	18%	15%	22%
SW010	4%	2%	1%	3%	1%
SW011	1%	2%	2%	1%	2%
SW012	11%	21%	25%	20%	29%
SW013A	14%	11%	10%	13%	9%
SW013B	8%	8%	8%	8%	6%
SW013C	2%	3%	3%	3%	2%
SW013D	7%	10%	11%	10%	10%
SW014	11%	10%	9%	10%	8%
SW015	17%	14%	12%	13%	9%

1. The locations of these sub-basins are shown on Map 7.
2. The total urban area in the subwatershed is 1,384 acres, based on 1985 data..
3. The total annual subwatershed water loading from urban areas was 250M gallons.
4. The total annual urban pollutant loadings are 205,500 lbs.
for suspended solids, 558 lbs. for total phosphorus, and 426 lbs.
for total lead.

Table 46. Relative importance of different land uses in the City of West Bend, Silver Creek Subwatershed, based on water and pollutant loadings(1.).

Land Use Type (1.)	Land Use Area		Lead Load	
	Acres	%	lbs.	%
commercial strip	93	7%	205	48%
light industrial	2	0%	4	1%
miscellaneous(2.)	32	2%	31	6%
schools	37	3%	27	5%
hospitals	5	0%	8	2%
multi-family residential	99	7%	62	12%
high density residential, alleys	7	0%	3	1%
high density residential, no alleys	15	1%	9	2%
med. density residential, no alleys	464	32%	57	11%
low density residential	67	5%	3	1%
open space	437	31%	10	2%
parkland	101	7%	6	1%
cemetery	25	2%	1	0%
TOTAL	1384		426	

1. The existing land use within this subwatershed is shown on Map 8.
2. Miscellaneous land uses include institutional lands other than schools or hospitals.

Table 47. The percent of critical land uses contained within high priority urban sub-basins for the City of West Bend: Silver Creek Subwatershed (1.)

Land Use Type	Percent of the Subwatershed Land Use In Sub-basin					TOTAL
	SW009	SW012	SW013A	SW013B	SW013D	
Commercial Strip	42%	43%	2%	2%	2%	91%
Multi-Family Residential	3%	25%	25%	9%	4%	66%
Schools, hospitals, miscellaneous institutional	0%	15%	25%	5%	34%	79%

1. Critical land uses in this subwatershed are defined as those which combine to contribute 70% of the total subwatershed lead loading. High priority sub-basins were identified based on the pollution potential of the sub-basin and the quality of the adjacent receiving water.

Table 48. Amount of lead loading from critical land uses in five critical urban sub-basins located in the City of West Bend: Silver Creek Subwatershed

Land Use	Land Use Areas As Percent of Subwatershed	Percent Lead Loading by Sub-Basin					
		SW009	SW012	SW013A	SW013B	SW013D	TOTAL
commercial strip	6%	20%	21%	1%	1%	1%	44%
multi-family residential	5%	0%	4%	3%	1%	1%	9%
schools, hospitals, miscellaneous institutional	4%	0%	2%	3%	1%	6%	12%
TOTAL	15%	20%	27%	7%	3%	8%	65%

Table 49. Estimated annual urban lead loading by land use for the year 2000 for the City of West Bend: Silver Creek Subwatershed.

Land Use Type (1.)	Land Use Area		Lead Load	
	Acres	%	lbs.	%
commercial strip	238	11%	520	61%
light industrial	2	0%	4	0%
miscellaneous(2.)	37	2%	35	4%
schools	44	2%	30	3%
hospitals	6	0%	9	1%
multi-family residential	187	9%	112	13%
high density residential, alleys	12	1%	5	1%
high density residential, no alleys	25	1%	15	2%
med. density residential, no alleys	900	42%	110	13%
low density residential	125	6%	5	1%
open space	418	19%	8	1%
parkland	128	6%	6	1%
cemetery	29	1%	1	0%
TOTAL	2151		860	

1. The existing and planned land use within this subwatershed is shown on Map 10.
2. Miscellaneous land uses include institutional lands other than schools or hospitals.

Table 50. Rural nonpoint source summary for the Quaas Creek Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	5	barnyards	57 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	3	barnyards	12 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	3592	acres	648 tons sediment
	riparian wetland	3001	acres	268 tons sediment
	pocket wetland			399 tons sediment
Streambank erosion	streams	31	sites	8070 feet degraded 96 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 51. Relative importance of urban sub-basins in the City of West Bend, Quaas Creek Subwatershed, based on water and pollutant loadings.

Urban Subbasin (1)	Area, % (2)	Water Loading, % (3)	Pollutant Loading, % (4)		
			Suspended Solids	Total Phosphorus	Total Lead
QC001	28	18	10	18	11
QC002	16	7	3	8	2
QC003	11	14	14	13	16
QC004	21	36	46	33	47
QC005	10	6	2	6	2
QC006	3	2	1	2	1
QC007	11	17	24	20	21

1. Location of these subbasins are shown on Map 7.
2. Total urban area in the subwatershed is 1020 acres, based on 1985 data.
3. Total annual subwatershed water loading from urban areas was 126,700,000 gallons
4. Total annual nonpoint pollutant loadinsg area 85950 pounds for suspended solids, 308 pounds for total phosphorus, and 178 pounds for total lead.

Table 52. Relative importance of different land uses in the City of West Bend, Quaas Creek Subwatershed, based on lead loadings(1.)

	Land Use Area		Lead Load	
Land Use Type(2.)	acres	%	lbs.	%
commercial strip	21.5	2	47	27
medium industrial	4.6	0	8	4
low industrial	16.1	2	29	16
miscellaneous institutional	11.7	1	11	6
schools	40.5	4	28	16
hospitals	0	0	0	0
multiple family residential	29.9	3	19	11
high density residential, alleys	0	0	0	0
high density residential, no alleys	0	0	0	0
medium density residential, no alleys	71.9	7	9	5
low density residential	248.3	25	11	6
open space, undeveloped	573.5	56	16	9
parks	1.5	0	0	0
cemetery	0	0	0	0
total	1020	100	178	100

1. The existing land use within this subwatershed is shown on Map 8.
2. Miscellaneous institutional land use includes all institutional land uses other than schools and hospitals (e.g. court house).

Table 53. The percent of critical land uses contained within high priority urban sub-basins for the City of West Bend: Quaas Creek Subwatershed(1.)

Land Use Type	Percent of the Subwatershed Land Use in Subbasin			
	QC003	QC004	QC007	Total
Commercial Strip	20	57	0	77
Low Industrial	28	72	0	100
Medium Industrial	70	30	0	100
Schools, hospitals, miscellaneous institutional	0	8	92	100

1. Critical land uses in this subwatershed are defined as those which combine to contribute 70% of the total subwatershed lead loading. High priority subbasins were identified based on the pollution potential of the subbasin and the quality of the adjacent receiving water.

Table 54. Amount of lead loading from critical land uses in three critical urban sub-basins located in the City of West Bend: Quaas Creek Subwatershed

Land Use	Land Use Areas as Percent of Subwatershed	Percent Lead Loading by Sub-basin			
		QC003	QC004	QC007	Total
Commercial Strip	2	5	15	0	20
Low industrial	2	5	12	0	17
Medium Industrial	0	3	1	0	4
Schools, hospitals, miscellaneous institutional	5	0	2	20	22
Total	9	13	30	20	63

Table 55. Estimated annual urban lead loading by land use for the year 2000 for the City of West Bend: Quaas Creek Subwatershed.

Land Use Type (1)	Land Use Area		Lead Load	
	acres	%	lbs.	%
commercial strip	149	5	325	33
medium industrial	48	2	85	9
low industrial	172	6	316	33
miscellaneous institutional.	11	0	10	1
schools	41	1	28	3
hospitals	0	0	0	0
multiple family residential	167	6	100	10
high density residential, alleys	0	0	0	0
high density residential, no alleys	0	0	0	0
medium density residential, no alleys	370	13	45	5
low density residential	1316	46	50	5
open space, undeveloped	550	19	10	1
parks	55	2	3	0
cemetery	0	0	0	0
total	2879	100	972	100

1. The existing and planned land use within this subwatershed is shown on Map 10.

Table 56. Rural nonpoint source summary for the Daly Lake Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	10	barnyards	160 lbs. phosphorus
	pocket wetlands	3	barnyards	49 lbs. phosphorus
	shallow soils (3.)	1	barnyards	12 lbs. phosphorus
	deep soils (4.)	7	barnyards	86 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	4002	acres	518 tons sediment
	riparian wetland	1730	acres	71 tons sediment
	pocket wetland			203 tons sediment
Streambank erosion	streams	15	sites	840.0 feet degraded 17.5 tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 57. Rural nonpoint source summary for the Green Lake Subwatershed

Source Type	Receiving Area	Contributing Sources number	Contributing Sources units	Pollution Load (1.)
Barnyard runoff	streams/lakes (2.)	0	barnyards	0 lbs. phosphorus
	pocket wetlands	0	barnyards	0 lbs. phosphorus
	shallow soils (3.)	0	barnyards	0 lbs. phosphorus
	deep soils (4.)	0	barnyards	0 lbs. phosphorus
Winterspread manure (5.)				
Upland erosion	streams/lakes	479	acres	50 tons sediment
	riparian wetland	153	acres	13 tons sediment
	pocket wetland			7 tons sediment
Streambank erosion	streams	0	sites	0 feet degraded tons sediment

1. Phosphorus loads for barnyards are based on the 10 year-24 hour rain event. Sediment loads for upland erosion and streambank erosion are average annual values.
2. Riparian wetlands are included.
3. Defined as soils less than 60 inches deep over shallow bedrock or the water table.
4. Defined as soils at least 60 inches deep over bedrock or the water table.
5. This source was not calculated for individual subwatersheds. See Table 8 for a watershed summary.

Table 58. Sediment and phosphorus reduction goals for the East-West Watershed

Sub-Watershed(1.)	Sediment: Reduction Goal(2.)	Sediment: Notes	Phosphorus: Reduction Goal(2.)	Phosphorus: Notes
WC	50%	control will also affect Long L.	25%	Control will also affect Long L.
LL	-	most pollution sources are in WC	4%	Most pollution sources are in WC
PC	45%	10% for PC sediment; additional for PC & ML nutrient control	30%	
ML	10%		30%	
CL	15%		25%	
LD				
FL				
HW	50%	25% for HW sediment; additional control for LB sediment	30%	will also benefit LB
LB	50%		30%	
WM	50%	25% for WM sediment; additional control for Mil.River Sediment	50%	30% for WM nutrients; additional control for Mil. River
GW	25%		50%	
IA	10%		30%	
ED	50%		50%	
KM	50%	35% for KM sediment; additional control for CP sediment	50%	
MM	10%		50%	
AC	50%	25% for AC sediment; additional control for CP & Mil. River Sediment	50%	
CP	50%		50%	
UT	25%		50%	
KW	50%		50%	
SL	50%		50%	
SW	50%		50%	
QC	50%		50%	25% for QC nutrients; additional control for Mil. River
WB	50%		50%	
DL	50%		50%	
GL	25%		50%	

1. Subwatershed names and locations that correspond to these codes are shown on Map 2.

2. Based on judgements of district water resources management staff. These reductions represent those desired to achieve the potential beneficial uses of the waterbodies contained within the subwatersheds. In general, the Milwaukee River has pollution reduction goals of 50% for sediment and phosphorus, and major contributing subwatersheds are consistent with this goal.

Table 59. Management decision criteria for pollution sources in the East and West Branches Milwaukee River Watershed

UPLAND EROSION

Sub-watershed (1.)	Delivered Sed. Target (T/A/Y) (2.)
WC	0.180
LD	
LL	
PC	0.800
CL	1.000
FL	
ML	0.086
GW	0.140
IA	0.420
ED	0.050
KM	0.100
MM	0.200
CP	0.042
AC	0.050
UT	0.300
HW	0.080
LB	0.080
WM	0.200
SL	0.150
KW	0.200
SW	0.025
QC	0.130
WB	0.080
DL	0.130
GL	0.210

BARNYARDS to SURFACE WATERS

Management Category	Limits (lbs. TP) Lower	Upper
I(3.)	16.9	--
II(4.)	7.7	16.8
II(5.)	5.0	7.6
III	0.0	4.9

BARNYARDS to POCKET WETLANDS

Contact Category (6.)	Limits (lbs. TP) Lower	Upper
Yes	10.0	--
No	0.0	9.9

BARNYARDS to SHALLOW SOILS

Contact Category (6.)	Limits (lbs. TP) Lower	Upper
Yes	0.0	--

BARNYARDS to DEEP SOILS

Management Category	Limits (lbs. TP) Lower	Upper
III	0.0	--

WINTERSPREAD MANURE

Management Category	Limits (no. critical acres spread) Lower	Upper
I(7.)	15.0	--
II	7.0	14.9
III	0.0	6.9

STREAMBANK DEGRADATION

Management Category	Limits (Tons/site) Lower	Upper
I(8.)	1.0	--
II	0.0	1.0

1. Subwatershed names and locations that correspond to these codes are shown on Map 2.
2. All parcels delivering soil above this rate are management category I.
3. Exceptions to lower limits: ED is 13.9; WC is 11.3.
4. Exceptions to lower limits: UT is 5.8; WB is 5.0; MM is 6.5; CP is 5.6.
5. This represents class where eligibility is limited to $3,500.
6. Final management categories will be determined on a case-by-case basis.
7. Also includes livestock operaters spreading in floodplains, wetlands, or shallow soils.
8. Also includes inventoried sites with excessive degraded habitat, regardless of erosion.

Table 60. Preliminary site characteristics used to indicate low groundwater contamination potential from concentrated animal waste sources (1.)

Characteristic	Animal Lot	Temp. Manure Stack	Solid Manure Storage Structure	Runoff from lot, Stack, or Structure
Feet to ground-water or bedrock	>3	>5	>3-5	>2(2.)
%Soil passing #200 sieve	>50% for at least 1 foot, or >25% for at least 3 feet	>50% for at least 3 feet, or >25% for at least 5 feet	>3 feet having >50%, or >5 feet having >25%	>50% for at least 1 foot, or >25% for at least 2 feet(3.)
Animal Herd Size	Animal herd size should be considered as a factor, although criteria need to be developed.			
Management	The frequency of lot scraping should also be considered as it will affect the availability of total nitrogen and the form of nitrogen found under the barnyard			
Location	Sources located in groundwater discharge areas are generally less of a concern for water supply wells than sources located in groundwater discharge areas.			

1.The separation distance and soil mechanical analysis criteia were considered together in determining site vulnerability.
2.As determined in the first 100 feet of vegetated buffer for overland flow or 300 feet of vegetated buffer for channel flow.
3.If runoff ponds for extended periods in an unvegetated area, a goundwater hazard may exist even if the separation distances and soil characteristics are met.

Table 61. Agricultural nonpoint pollution sources planned for control in the East and West Branches Milwaukee River Watershed, by Region(1.)

		BARNYARD RUNOFF						MANURE RUNOFF		UPLAND EROSION		STREAMBANK EROSION		
	destination:	surf. water		pocket wetland		shallow soil								
REGION	controls:	no. of yards	lbs. TP (2.)	no. of yards	lbs. TP (2.)	no. of yards	lbs. TP (2.)	no. of livestock operations	no. of critical acres	no. of acres	tons delivered sediment	no. of sites	no. of feet	no. of tons
East		3	29	2	38					458	182			
West & Upper Mainstem		27	446	2	60	2	2			6857	1114	12	7045	41
Lower Mainstem		33	641	2	63	12	87			7294	1859	64	16360	380
WATERSHED TOTAL		63	1116	6	161	14	89	101	1237	14609	3155	76	23405	421

1. Controls for these sources will be based on further evaluation: barnyard runoff to pocket wetlands, barnyard runoff to shallow soils and control of winterspread manure.

2. Total phosphorus as estimated for the 10-year 24 hour storm.

Table 62. Agricultural nonpoint pollution sources planned for control in the East Region, East and West Branches Milwaukee River Watershed(1.)

		BARNYARD		RUNOFF		UPLAND	EROSION
	destination:	surf. water		pocket wetland			
SUBWATER-SHED (2.)	controls:	no. of yards	lbs. TP (2.)	no. of yards	lbs. TP (2.)	no. of acres	tons delivered sediment
WC		1	11			255	74
LD		1	9				
LL				1	21		
PC						67	91
CL		1	9	1	17	13	14
FL							
ML						123	3
REGIONAL TOTAL		3	29	2	38	458	182

1. Controls for these sources will be based on further evaluation: barnyard runoff to pocket w barnyard runoff to shallow soils, and control of winterspread manure.
2. Subwatershed names and locations that correspond to these codes are shown on Map 2.
3. Total phosphorus as estimated for the 10-year 24 hour storm.

Table 63. Agricultural nonpoint pollution sources planned for control in the West and Upper Mainstem Region, East and West Branches Milwaukee River Watershed(1.)

		BARNYARD RUNOFF						UPLAND EROSION		STREAMBANK EROSION		
	destination:	surf. water		pocket wetland		shallow soil						
SUBWATER-SHED (2.)	controls:	no. of yards	lbs. TP (3.)	no. of yards	lbs. TP (3.)	no. of yards	lbs. TP (3.)	no. of acres	tons delivered sediment	no. of sites	no. of feet	no. of tons
GW								97	12			
IA								62	12			
ED		2	23					1138	109	1	1000	3
KM		2	36	2	60			265	95			
MM		1	7					67	7			
CP		1	6					1129	88			
AC		1	18					544	57			
UT		3	32					59	11	2	1800	5
HW		1	24					1086	146			
LB		1	9					1454	180			
WM		15	291			2	2	956	397	9	4245	33
REGIONAL TOTAL		27	446	2	60	2	2	6857	1114	12	7045	41

1. Controls for these sources will be based on further evaluation: barnyard runoff to pocket wetlands, barnyard runoff to shallow soils, and control of winterspread manure.
2. Subwatershed names and locations that correspond to these codes are shown on Map 2.
3. Total phosphorus as estimated for the 10-year 24 hour storm.

Table 64. Agricultural nonpoint pollution sources planned for control in the Lower Mainstem Region, East and West Branches Milwaukee River Watershed(1.)

		BARNYARD RUNOFF						UPLAND EROSION		STREAMBANK EROSION		
	destination:	surf. water		pocket wetland		shallow soil						
SUBWATER-SHED (2.)	controls:	no. of yards	lbs. TP (3.)	no. of yards	lbs. TP (3.)	no. of yards	lbs. TP (3.)	no. of acres	tons delivered sediment	no. of sites	no. of feet	no. of tons
SL		3	53					447	162	4	2500	14
KW		19	312	1	15	8	62	1657	562	4	1975	23
SW								331	80			
QC		3	53					1289	376	31	8080	96
WB		5	68			3	13	2243	418	10	2965	229
DL		3	155	1	48	1	12	1266	242	15	840	18
GL								61	19			
REGIONAL TOTAL		33	641	2	63	12	87	7294	1859	64	16360	380

1. Controls for these sources will be based on further evaluation: barnyard runoff to pocket wetlands, barnyard runoff to shallow soils, and control of winterspread manure.
2. Subwatershed names and locations that correspond to these codes are shown on Map 2.
3. Total phosphorus as estimated for the 10-year 24 hour storm.

Table 65. Estimated best management practice needs for controlling rural nonpoint pollution sources in the East and West Branches Milwaukee River Watershed

Best Management Practice	Units	Need By County: Washington	Fond Du Lac	Sheboygan	Ozaukee	Dodge	Watershed Need
UPLAND EROSION(1.)							
Contour Cropping	acres	4780	20	250	200	0	5250
Contour Strip Cropping	acres	500	780	10	40	30	1360
Reduced Tillage	acres	2680	2580	110	210	150	5730
Critical Area Stabilization	acres	420	450	30	10	0	910
Change In Rotation	acres	3220	2820	120	230	130	6520
Grass Waterways	acres	56	80	13	6	2	157
Terraces	feet	10000	5000	1200	0		16200
Field Diversions	feet	10000	6000	250	0		16250
Grade Stabilization	number	8	15	5	3		31
Agriculture Sediment Basins	number	10					10
ANIMAL WASTE(2.)							
Barnyard Runoff Management	number	46 to 61	14 to 16	1 to 3	3 to 4		64 to 84
Manure Management	acres	633	452	138	24		1240
(Long Term Storage)	(number)	19	8	1			28
(Short Term Storage)	(number)	18	8	6	1		33
(Waste Utilization Plans)	(number)	106	47	13	4		41
STREAMBANK EROSION(3.)							
Streambank Stabilization							
(Shape & Seed)	feet	2000	700		200		2900
(Fencing)	feet	30000	2000		2000		34000
(Rip-Rap)	feet	500			600		1100
(Crossings)	number	20	1	2	1		24

1. Vegetative filter strips are included under Critical Area Stabilization.
2. Roofs over barnyards and manure management facilities and barnyard relocation are included under Barnyard Runoff Management. Waste utilization planning needs include plans for landowners having barnyard runoff control systems, long term storage, short term storage, or merely a waste utilization plan not associated with any of these structural practices.
3. Includes vegetative filter strips, livestock watering pumps, and fish habitat structures.

TABLE 66. Effectiveness of Urban Nonpoint Source Controls for Reducing Pollutant Loadings in Existing Urban Areas in the City of West Bend: Silver Creek Subwatershed. (1)

Type of Control	Description of Control(2)			Pollutant Reduction, lbs (3)		Do Controls Meet or Exceed Reduction Goals for Enhancing Water Quality (4)	
	Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Lead	Susp Sols.	Lead	Susp Sols.
Detention	45	None	None	134	86000	No	No
Detention	13	None	None	59	36500	No	No
Infiltration	None	16	None	25	10000	No	No
Infiltration	None	33	None	51	20500	No	No
Infiltration	None	65	None	106	39000	No	No
St. Sweeping	None	None	18	37	13400	No	No
St. Sweeping	None	None	34	52	18800	No	No
St. Sweeping	None	None	11	7	4200	No	No

1. The controls were only used in critical urban subbasin for existing urban areas.

2. The drainage area for the existing urban area was 1384 acres; drainage area for critical subbasins was 762 acres; the acres of parking lot in critical subbasins was 53 acres; the 18 and 34 passes each year were a schedule for commercial streets only and the 11 passes schedule was for residential streets only.

3. The annual NP pollutant loading without controls was 205500 pounds for suspended solids and 425 pounds for lead in existing urban areas.

4. The improvement goal was "yes" for existing urban areas if its lead reduction was 212 pounds or more (50% reduction) and the suspended solids reduction was 102750 lbs or more (50% reduction).

TABLE 67. Effectiveness of Urban Nonpoint Source Controls for Reducing Pollutant Loadings Planned Urban Areas in the City of West Bend: Silver Creek Subwatershed. (1)

Type of Control	Description of Control(2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3) Lead	Susp. Sols.
Detention	55	None	None	128	81600
Detention	85	None	None	250	136000
Detention	91	None	None	197	127500
Detention	100	None	None	305	179000
Infiltration	None	50	None	105	38000
Infiltration	None	100	None	210	76000
St. Sweeping	None	None	18	63	22800
St. Sweeping	None	None	34	89	31900
St. Sweeping	None	None	11	10	6890

1. The controls were used for all the planned urban areas.

2. The drainage area for planned urban area was 767 acres; the acres of parking lot was 62 acres; the 18 and 34 passes each year were a schedule for commercial streets only and the 11 passes schedule was for residential streets only.

3. The annual NP pollutant without controls was 198000 pounds for suspended solids and 448 pounds for lead.

TABLE 68. Effectiveness of Alternative Urban Nonpoint Source Control Programs in Achieving Pollutant Reduction Goals for Future Land Uses in the City of West Bend: Silver Creek Subwatershed(1).

Program Alt. Number	Type of Urban Land Use	Description of Control(2): Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3): Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals for Enhancing Water Quality (4): Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals of No Change In Loading (5): Lead	Susp. Sols
1	Existing	45	None	None	134	86000				
	Planned	100	None	None	305	179000				
	Future	65	None	None	439	265000	No	Yes	No	Yes
2	Existing	None	65	34	158	58000				
	Planned	None	100	34	299	108000				
	Future	None	84	34	457	166000	No	No	Yes	Yes
3	Existing	13	33	18	150	70400				
	Planned	85	None	None	250	136000				
	Future	39	33	18	400	206400	No	No	No	Yes
4	Existing	13	16	18	86	40000				
	Planned	91	50	18	365	187900				
	Future	41	34	18	451	227900	No	No	Yes	Yes
5	Existing	45	16	18	196	109000				
	Planned	91	50	18	365	189000				
	Future	62	34	18	561	298000	No	Yes	Yes	Yes
6	Existing	None	None	None	0	0				
	Planned	91	50	18	365	189000				
	Future	33	27	18	365	189000	No	No	No	Yes

1. The controls were only used in critical subbasin for existing urban areas and controls were used for all the planned urban areas. Future land use was existing plus planned land uses.

2. The drainage area for the existing urban area was 1384 acres; the planned urban area was 767 acres and the future urban area was 2151 acres. The acres of parking lots for critical subbasins in existing urban areas were 53 acres and the acres of parking lot in planned urban areas were 62 acres. Eighteen and 34 passes each year were for commercial streets only.

3. Future land use annual nonpoint pollutant loadings without controls were 403500 pounds (205500 lbs. existing + 198000 lbs. planned) for suspended solids and 873 pounds (425 lbs. existing + 448 lbs. planned) for lead.

4. Enhancement was "yes" if the lead loading reduction was 660 pounds (a 75% reduction in future loading) and the suspended solids loading reduction was 235750 (a 58% reduction in future loading).

5. The No Change was "yes" if its lead loading reduction was 448 pounds (a 51% reduction in future loading) and the suspended solids loading reduction was 68000 lbs. (17% reduction in future loading.)

TABLE 69. Effectiveness of Urban Nonpoint Source Controls for Reducing Pollutant Loadings in Existing Urban Areas in the City of West Bend: Quaas Creek Subwatershed. (1)

Type of Control	Description of Control(2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3) Lead	Susp Sols.
Detention	8	None	None	20	13537
Detention	16	None	None	41	27076
Detention	32	None	None	82	54151
Detention	24(4)	None	None	11	8870
Detention	8(5)	None	None	31	18393
Infiltration	None	22	None	15	6484
Infiltration	None	44	None	30	12880
Infiltration	None	89	None	60	25745
St. Sweeping	None	None	18	7	2599
St. Sweeping	None	None	34	10	3640

1. The controls were only used in critical urban subbasin for existing urban areas, except detention was not used in QC003 because it discharges to trout water.

2. The drainage area for the existing urban area was 1020 acres; drainage area critical subbasins was 438 acres with 326 available for detention; the acres of parking lot in critical subbasins was 20 acres; the 18 and 34 passes each year were a schedule for commercial streets only.

3. The annual NP pollutant loading without controls was 86000 pounds for suspended solids and 180 pounds for lead in existing urban areas.

4. Detention serves only non-critical land uses.

5. Detention serves only critical land uses such as commercial, light industrial, medium industrial, and institutional.

TABLE 70 Effectiveness of Urban Nonpoint Source Controls for Reducing Pollutant Loadings Planned Urban Areas in the City of West Bend: Quaas Creek Subwatershed. (1)

Type of Control	Description of Control(2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3) Lead	Susp. Sols.
Detention	25	None	None	126	73708
Detention	50	None	None	253	147416
Detention	25(4)	None	None	27	21512
Detention	25(5)	None	None	99	52195
Infiltration	None	25	None	103	41408
Infiltration	None	50	None	204	81866
Infiltration	None	100	None	409	163615
St. Sweeping	None	None	18	44	15663
St. Sweeping	None	None	34	61	21927

1. The controls were used for all the planned urban areas, except detention was not used in subbasins discharging to trout waters of Quaas Creek.

2. The drainage area for planned urban area was 1859 acres; the acres of parking lot was 96 acres; the 18 and 34 passes each year were a schedule for commercial streets.

3. The annual NP pollutant without controls was 327600 pounds for suspended solids and 743 pounds for lead.

4. Detention serves only non-critical land uses.

5. Detention serves only critical land uses: commercial, light industrial, medium industrial, and institutional.

TABLE 71. Effectiveness of Alternative Urban Nonpoint Source Control Programs in Achieving Pollutant Reduction Goals for Future Land Uses in the City of West Bend: Quaas Creek Subwatershed(1).

Program Alt. Number	Type of Urban Land Use	Description of Control(2): Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3): Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals of No Change In Loading (4): Lead	Susp. Sols
1	Existing	32	None	None	82	54151		
	Planned	50	None	None	253	147416		
	Future	44	None	None	335	201567	No	Yes
2	Existing	None	89	18	67	28344		
	Planned	None	100	18	453	179278		
	Future	None	98	18	520	207622	No	Yes
3	Existing	8	22	18	42	22620		
	Planned	25	25	18	273	130779		
	Future	19	24	18	315	153399	No	Yes
4	Existing	8	44	18	57	29016		
	Planned	50	50	18	501	244945		
	Future	35	49	18	558	273961	No	Yes
5	Existing	16	44	18	78	42555		
	Planned	50	50	18	501	244945		
	Future	38	49	18	579	287500	No	Yes
6	Existing	None	None	None	0	0		
	Planned	50	50	18	501	244945		
	Future	32	41	18	501	244945	No	Yes

1. The controls were only used in critical subbasin for existing urban areas and controls were used for all the planned urban areas. Future land use was existing plus planned land uses. Detention was not used for subbasins discharging to trout waters.

2. The drainage area for the existing urban area was 1020 acres; the planned urban area was 1859 acres and the future urban area was 2879 acres. The acres of parking lots for critical subbasins in existing urban areas were 20 acres and the acres of parking lot in planned urban areas were 96 acres. Eighteen and 34 passes each year were for commercial streets only.

3. Future land use annual nonpoint pollutant loadings without controls were 413600 pounds (86000 lbs. existing + 327600 lbs. planned) for suspended solids and 923 pounds (180 lbs. existing + 743 lbs. planned) for lead.

4. The No Change was "yes" if its lead loading reduction was 743 pounds (a 80% reduction in future loading) and the suspended solids loading reduction was 22000 lbs. (5% reduction in future loading.)

TABLE 72. Effectiveness of Urban Nonpoint Source Controls for Reducing Pollutant Loadings in Existing Urban Areas in the City of West Bend: West Bend Subwatershed. (1)

Type of Control	Description of Control(2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3) Lead	Susp Sols.	Do Controls Meet or Exceed Reduction Goals for Enhancing Water Quality (4) Lead	Susp Sols.
Detention	14	None	None	194	117425	No	No
Detention	28	None	None	389	234850	No	No
Detention	57	None	None	778	469700	No	Yes
Detention	50 (5)	None	None	109	85287	No	No
Detention	50 (6)	None	None	281	151469	No	No
Infiltration	None	16	None	129	53164	No	No
Infiltration	None	37	None	251	103934	No	No
Infiltration	None	73	None	502	207779	No	No
St. Sweeping	None	None	18	77	27786	No	No
St. Sweeping	None	None	34	108	39900	No	No

1. The controls were only used in critical urban subbasin for existing urban areas.

2. The drainage area for the existing urban area was 2981 acres; drainage area for critical subbasins was 1699 acres; the acres of parking lot in critical subbasins was 189 acres; the 18 and 34 passes each year were a schedule for commercial streets only.

3. The annual NP pollutant loading without controls was 739000 pounds for suspended solids and 1600 pounds for lead in existing urban areas.

4. The improvement goal was "yes" for existing urban areas if its lead reduction was 800 pounds or more (50% reduction) and the suspended solids reduction was 369500 lbs or more (50% reduction).

5. Detention serves only noncritical land uses.

6. Detention serves only critical land uses: commercial, light and medium industrial, and miscellaneous institutional.

TABLE 73. Effectiveness of Urban Nonpoint Source Controls for Reducing Pollutant Loadings Planned in Urban Areas in the City of West Bend: West Bend Subwatershed. (1)

Type of Control	Description of Control(2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3) Lead	Susp. Sols.
Detention	88	None	None	536	361632
Detention	25	None	None	208	129393
Detention	50	None	None	416	258786
Detention	100	None	None	831	517573
Detention	50(4)	None	None	125	102845
Detention	50(5)	None	None	286	155942
Infiltration	None	25	None	164	67872
Infiltration	None	50	None	313	129566
Infiltration	None	100	None	625	259036
St. Sweeping	None	None	18	36	12893
St. Sweeping	None	None	34	50	17980

1. The controls were used for all the planned urban areas.
2. The drainage area for planned urban area was 2088 acres; the acres of parking lot was 130 acres; the 18 and 34 passes each year were a schedule for commercial streets only.
3. The annual NP pollutant without controls was 575000 pounds for suspended solids and 1194 pounds for lead.
4. Detention serves only non-critical land uses.
5. Detention serves only critical land uses such as commercial, light industrial, medium industrial, and miscellaneous institutional.

TABLE 74. Effectiveness of Alternative Urban Nonpoint Source Control Programs in Achieving Pollutant Reduction Goals for Future Land Uses in the City of West Bend: West Bend Subwatershed(1).

Program Alt. Number	Type of Urban Land Use	Description of Control(2): Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (3): Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals for Enhancing Water Quality (4): Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals of No Change In Loading (5): Lead	Susp. Sols
1	Existing	57	None	None	778	469700				
	Planned	100	None	None	831	517573				
	Future	75	None	None	1609	987273	No	Yes	Yes	Yes
2	Existing	None	73	18	579	235565				
	Planned	None	100	18	867	530466				
	Future	None	84	18	1446	766031	No	No	Yes	Yes
3	Existing	14	18	18	400	198375				
	Planned	25	25	18	408	210108				
	Future	18	21	18	808	408483	No	No	No	Yes
4	Existing	28	37	18	717	366570				
	Planned	88	50	18	885	504041				
	Future	54	42	18	1602	870611	No	Yes	Yes	Yes
5	Existing	28	37	18	717	366570				
	Planned	50	50	18	765	401195				
	Future	37	42	18	1482	767765	No	No	Yes	Yes
6	Existing	None	None	None	0	0				
	Planned	50	50	18	765	401195				
	Future	20	20	18	765	401195	No	No	No	Yes

1. The controls were only used in critical subbasin for existing urban areas and controls were used for all the planned urban areas. Future land use was existing plus planned land uses.

2. The drainage area for the existing urban area was acres; the planned urban area was 2088 acres and the future urban area was 5069 acres. The acres of parking lots for critical subbasins in existing urban areas were 189 acres and the acres of parking lot in planned urban areas were 130 acres. Eighteen and 34 passes each year were for commercial streets only.

3. Future land use annual nonpoint pollutant loadings without controls were 1314082 pounds (739000 lbs. existing + 575082 lbs. planned) for suspended solids and 2794 pounds (1600 lbs. existing + 1194 lbs. planned) for lead.

4. Enhancement was "yes" if the lead loading reduction was 1994 pounds (a 71% reduction in future loading) and the suspended solids loading reduction was 772686 (a 59% reduction in future loading).

5. The No Change was "yes" if its lead loading reduction was 1194 pounds (a 43% reduction in future loading) and the suspended solids loading reduction was 231292 lbs. (19% reduction in future loading.)

TABLE 75. Effectiveness of Alternative Urban Nonpoint Source Control Programs in Achieving Pollutant Reduction Goals for Future Land Uses in the Village of Kewaskum Study Area

Program Alt. Number	Type of Urban Land Use	Description of Control(1) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Pollutant Reduction, lbs (2) Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals of No Change In Loading (3) Lead	Susp. Sols.
1	Existing	89	None	None	122	81000		
	Planned	100	None	None	303	188200		
	Future	95	None	None	425	269200	No	Yes
2	Existing	None	100	None	173	75200		
	Planned	None	100	None	259	109629		
	Future	None	100	None	432	184829	No	Yes
3	Existing	50	50	None	191	103080		
	Planned	50	50	None	282	148846		
	Future	50	50	None	473	251926	Yes	Yes
4	Existing	25	25	None	97	52080		
	Planned	88	50	None	365	172054		
	Future	61	39	None	462	224134	Yes	Yes
5	Existing	None	None	None	0	0		
	Planned	88	50	18	380	181608		
	Future	50	29	18	380	181608	No	Yes

1. The drainage area for the existing urban area was 772 acres; the planned urban area was 1016 acres and the future urban area was 1788 acres. The acres of parking lots in the existing urban area were 50 acres and in the planned area were 68 acres. Eighteen passes were for commercial streets only.
2. Future land use annual nonpoint pollutant loadings without controls were 354600 pounds (145500 lbs. existing + 209100 lbs. planned) for suspended solids and 752 pounds (306 lbs. existing and 446 lbs. planned) for lead.
3. The No Change was "yes" if its lead loading reduction was 446 lbs and the suspended solids loading reduction was 41800 lbs.

TABLE 76. Effectiveness of Alternative Urban Nonpoint Source Control Programs in Achieving Pollutant Reduction Goals for Future Land Uses in the Village of Campbellsport Study Area

Program Alt. Number	Type of Urban Land Use	Description of Control(1) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Pollutant Reduction, lbs (2) Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals of No Change In Loading (3) Lead	Susp. Sols.
1	Existing	87	None	75	69220		
	Planned	100	None	45	33563		
	Future	92	None	120	102783	Yes	Yes
2	Existing	None	100	100	44777		
	Planned	None	100	26	11170		
	Future	None	100	126	55847	Yes	Yes
3	Existing	25	25	57	32245		
	Planned	50	50	35	22366		
	Future	34	30	92	54611	Yes	Yes
4	Existing	25	None	32	20869		
	Planned	97	50	46	32719		
	Future	52	9	78	53588	Yes	Yes
5	Existing	None	None	0	0		
	Planned	97	50	46	32719		
	Future	37	9	46	32719	No	Yes

1. The drainage area for the existing urban area was 455 acres; the planned urban area was 276 acres and the future urban area was 731 acres. The acres of parking lots in the existing urban area were 34 acres and in the planned area were 8 acres.
2. Future land use annual nonpoint pollutant loadings without controls were 130043 pounds (92751 lbs. existing + 37292 lbs. planned) for suspended solids and 253 pounds (187 lbs. existing and 66 lbs. planned) for lead.
3. The No Change was "yes" if its lead loading reduction was 66 lbs.

TABLE 77. Effectiveness of Alternative Urban Nonpoint Source Control Programs in Achieving Pollutant Reduction Goals for Future Land Uses in the Village of Newburg Study Area

Program Alt. Number	Type of Urban Land Use	Description of Control(1) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Pollutant Reduction, lbs (2) Lead	Susp. Sols.	Does Program Meet or Exceed Reduction Goals of No Change In Loading (3) Lead	Susp. Sols.
1	Existing	96	None	46	29821		
	Planned	100	None	631	351361		
	Future	98	None	677	381182	No	Yes
2	Existing	None	100	46	19607		
	Planned	None	100	704	295116		
	Future	None	100	750	314723	No	Yes
3	Existing	50	50	57	31159		
	Planned	50	50	667	323254		
	Future	50	50	724	354413	No	Yes
4	Existing	96	50	69	39631		
	Planned	64	50	673	326835		
	Future	77	50	742	366466	No	Yes
5	Existing	None	None	0	0		
	Planned	64	50	673	326835		
	Future	38	45	673	326835	No	Yes

1. The drainage area for the existing urban area was 500 acres; the planned urban area was 713 acres and the future urban area was 1213 acres. The acres of parking lots in the existing urban area were 13 acres and in the planned area were 121 acres.
2. Future land use annual nonpoint pollutant loadings without controls were 437845 pounds (47443 lbs. existing + 390402 lbs. planned) for suspended solids and 1029 pounds (101 lbs. existing and 928 lbs. planned) for lead.
3. The No Change was "yes" if its lead loading reduction was 928 lbs and the suspended solids loading reduction was 273000 lbs.

Table 78. Eligible Best Management Practices And Cost Share Rates For The East-West Watershed

Best Management Practice(1.)	State Cost Share Rate
Contour Cropping	50% or $6/ac.
Contour Strip Cropping	50% or $12/ac.
Field Strip Cropping	50% or $10/ac.
Field Diversions	70%
Terraces	70%
Grassed Waterways	70%
Reduced Tillage	50% or $45/ac.(2.); 50% or $15/ac.(3.)
Critical Area Stabilization (4.)	* 70% (9.)
Grade Stabilization Structures	* 70%
Agricultural Sediment Basins (5.)	70%
Stream Bank Protection (4.)	* 70% (6.)
Barnyard Runoff Management	70%
Animal Lot Relocation (5.)	* 70% (7.)
Long Term Manure Storage Facilities	70% up to $10,000
Short Term Manure Storage Facilities	70% up to $6,000
Roofs for Barnyard/ Manure Storage Facilities	* 70%
Livestock Exclusion From Woodlots	50%
Structural Urban Practices(8.)	70%
Street Sweeping (5.)	50%
Wetland Restoration	* 70% (9.)
Shoreline Buffers	* 70% (9.)
Nutrient and Pesticide Management	50% (10.)

1. See Chapter NR 120, Wisconsin Administrative Code for a full description of Best Management Practices and cost share conditions.

2. For continuous row crop land.

3. For cropland in rotation.

4. This practice is included in Chapter NR 120, Wisconsin Administrative Code, but special modifications have been made for some pollution sources in the East-West Watershed. See Appendix C for modifications.

5. This is an alternative Best Management Practice not contained in Chapter NR 120, Wisconsin Administrative Code. See Appendix C for more information.

6. The maximum cost share amount for stream bank stabilization practices involving fish habitat structures shall be the cost share amount of the stream bank stabilization without using the fish structure as part of the practice.

7. The maximum cost share amount for relocation of buildings, structures, and lots shall be 70 percent of the replacement cost up to the appraised value of the buildings, structures, and lots to be replaced. Any salvage value or resale value realized during the maintenance period of the cost share agreement shall be deducted from the appraised value.

8. Only practices for established urban areas may be cost shared. Construction erosion control practices and practices for managing stormwater from new development are not eligible.

9. Easements may be entered into with landowners in conjunction with these BMPs. See Chapter IV for where easements may apply.

10. Spill control basins have a state cost share rate of 70%.

* May be increased to 80 percent with matching county funds.

Table 79. Cost share budget needs for rural management practices in the East and West Branches Milwaukee River Watershed

Best Management Practice	TOTAL WATERSHED		
	Total Cost(1.)	Cost Share Needs 100% Part.	Cost Share Needs 50% Part.
Contour Cropping		$31,500	$15,750
Contour Strip Cropping	$32,640	$16,320	$8,160
Reduced Tillage	$229,200	$114,600	$57,300
Critical Area Stabilization	$91,000	$63,700	$31,850
Change in Rotation	$0	$0	$0
Grass Waterways	$392,500	$274,750	$137,375
Terraces	$91,700	$64,190	$32,095
Field Diversions	$91,875	$64,313	$32,156
Grade Stabilization	$93,000	$65,100	$32,550
Agriculture Sediment Basins	$540,000	$378,000	$189,000
Barnyard Runoff Controls	$1,110,000	$777,000	$388,500
Long Term Manure Storage	$560,000	$280,000	$140,000
Short Term Manure Storage	$330,000	$198,000	$99,000
Streambank Shape & Seed	$11,600	$8,120	$4,060
Streambank Fencing	$34,000	$23,800	$11,900
Streambank Rip-Rap	$22,000	$15,400	$7,700
Stream Crossings	$37,500	$26,250	$13,125
All Practices	$3,667,015	$2,369,543	$1,184,771

1. Total cost to control critical pollution sources. In addition, $250,000 of state funds will be needed to purchase easements. These easements will be used to support wetland restoration, shoreline buffers, and critical area stabilization in accordance with guidelines set forth in this watershed plan.

Table 80. Cost share budget for rural best management practices in the Washington County portion of the East and West Branches Milwaukee River Watershed

	WASHINGTON COUNTY		
		Cost Share Needs	
Best Management Practice	Total Cost(1.)	100% Part.	50% Part.
Contour Cropping		$28,680	$14,340
Contour Strip Cropping	$12,000	$6,000	$3,000
Reduced Tillage	$107,200	$53,600	$26,800
Critical Area Stabilization	$42,000	$29,400	$14,700
Change in Rotation	$0	$0	$0
Grass Waterways	$140,000	$98,000	$49,000
Terraces	$35,000	$24,500	$12,250
Field Diversions	$35,000	$24,500	$12,250
Grade Stabilization	$24,000	$16,800	$8,400
Agriculture Sediment Basins	$300,000	$210,000	$105,000
Barnyard Runoff Controls	$795,000	$556,500	$278,250
Long Term Manure Storage	$380,000	$190,000	$95,000
Short Term Manure Storage	$180,000	$108,000	$54,000
Streambank Shape & Seed	$8,000	$5,600	$2,800
Streambank Fencing	$30,000	$21,000	$10,500
Streambank Rip-Rap	$10,000	$7,000	$3,500
Stream Crossings	$30,000	$21,000	$10,500
All Practices	$2,128,200	$1,400,580	$700,290

1. Total cost for practices needed to control critical sources.

Table 81. Cost share budget for rural best management practices in the Fond du Lac and Dodge County portions of the East and West Branches Milwaukee River Watershed

	FOND DU LAC & DODGE COUNTIES		
		Cost Share Needs	
Best Management Practice	Total Cost(1.)	100% Part.	50% Part.
Contour Cropping		$120	$60
Contour Strip Cropping	$19,440	$9,720	$4,860
Reduced Tillage	$109,200	$54,600	$27,300
Critical Area Stabilization	$45,000	$31,500	$15,750
Change in Rotation	$0	$0	$0
Grass Waterways	$205,000	$143,500	$71,750
Terraces	$17,500	$12,250	$6,125
Field Diversions	$21,000	$14,700	$7,350
Grade Stabilization	$45,000	$31,500	$15,750
Agriculture Sediment Basins	$150,000	$105,000	$52,500
Barnyard Runoff Controls	$225,000	$157,500	$78,750
Long Term Manure Storage	$160,000	$80,000	$40,000
Short Term Manure Storage	$80,000	$48,000	$24,000
Streambank Shape & Seed	$2,800	$1,960	$980
Streambank Fencing	$2,000	$1,400	$700
Streambank Rip-Rap	$0	$0	$0
Stream Crossings	$3,000	$2,100	$1,050
All Practices	$1,084,940	$693,850	$346,925

1. Total cost of control practices for critical pollution sources.

Table 82. Cost share budget for rural best management practices in the Ozaukee County portion of the East and West Branches Milwaukee River Watershed

	OZAUKEE COUNTY		
		Cost Share Needs	
Best Management Practice	Total Cost(1.)	100% Part.	50% Part.
Contour Cropping		$1,200	$600
Contour Strip Cropping	$960	$480	$240
Reduced Tillage	$8,400	$4,200	$2,100
Critical Area Stabilization	$1,000	$700	$350
Change in Rotation	$0	$0	$0
Grass Waterways	$15,000	$10,500	$5,250
Terraces	$35,000	$24,500	$12,250
Field Diversions	$35,000	$24,500	$12,250
Grade Stabilization	$9,000	$6,300	$3,150
Agriculture Sediment Basins	$30,000	$21,000	$21,000
Barnyard Runoff Controls	$60,000	$42,000	$21,000
Long Term Manure Storage	$0	$0	$0
Short Term Manure Storage	$10,000	$6,000	$3,000
Streambank Shape & Seed	$800	$560	$280
Streambank Fencing	$2,000	$1,400	$700
Streambank Rip-Rap	$12,000	$8,400	$4,200
Stream Crossings	$1,500	$1,050	$525
All Practices	$220,660	$152,790	$86,895

1. Total cost of practices needed to control critical pollution sources.

Table 83. Cost share budget for rural best management practices in the Sheboygan County portion of the East and West Branches Milwaukee River Watershed

	SHEBOYGAN COUNTY		
		Cost Share Needs	
Best Management Practice	Total Cost(1.)	100% Part.	50% Part.
Contour Cropping		$1,500	$750
Contour Strip Cropping	$240	$120	$60
Reduced Tillage	$4,400	$2,200	$1,100
Critical Area Stabilization	$3,000	$2,100	$1,050
Change in Rotation	$0	$0	$0
Grass Waterways	$32,500	$22,750	$11,375
Terraces	$4,200	$2,940	$1,470
Field Diversions	$875	$613	$306
Grade Stabilization	$15,000	$10,500	$5,250
Agriculture Sediment Basins	$60,000	$42,000	$21,000
Barnyard Runoff Controls	$30,000	$21,000	$10,500
Long Term Manure Storage	$20,000	$10,000	$5,000
Short Term Manure Storage	$60,000	$36,000	$18,000
Streambank Shape & Seed			
Streambank Fencing			
Streambank Rip-Rap			
Stream Crossings	$3,000	$2,100	$1,050
All Practices	$233,215	$153,823	$76,911

1. Total cost of practices needed to control critical sources.

Table 84. Estimated technical assistance needs for rural implementation in the East and West Branches Milwaukee River Watershed

Activity	Project Years When Work Will Be Done	Washington County 100% Part. (Hrs.)	Washington County 50% Part. (Hrs.)	Fond Du Lac County 100% Part. (Hrs.)	Fond Du Lac County 50% Part. (Hrs.)	Ozaukee County 100% Part. (Hrs.)	Ozaukee County 50% Part. (Hrs.)	Sheboygan County 100% Part. (Hrs.)	Sheboygan County 50% Part. (Hrs.)	Dodge County 100% Part. (Hrs.)	Dodge County 50% Part. (Hrs.)
Project and Financial Mgt.	Years 1-8	2800	2800	2000	2000	1200	1200	640	640	320	320
Information/Education	Years 1-8	(2.)	(2.)	(2.)	(2.)						
Pre-Contact Office Inventory, Landowner Tracking Sheets	Years 1-3	320	320	220	220	30	30	30	30	10	10
Landowner Contacts (1.)	Years 1-3	1930	1930	1300	1300	200	200	150	150	40	40
Conservation Planning, Cost Share Agreement Development	Years 1-3	7700	3850	5180	2590	820	410	600	300	170	80
Practice Design & Installation											
Upland Erosion Control	Years 1-8	4830	2410	4810	2410	400	200	1470	730	200	100
Barnyard Runoff Control	Years 1-8	5300	2650	1500	750	400	200	200	100		
Manure Spreading Control	Years 1-8	2960	1480	1280	640	80	80	560	280		
Streambank Erosion Control	Years 1-8	2260	1130	220	110	230	130	1820	910		
Construction Erosion Control											
Review & Modify Ordinance(s)	Year 1										
Administer Ordinance	Years 2-3	(3.)		(3.)		(3.)		(3.)		(3.)	
TOTAL COUNTY WORKLOAD	Years 1-8	28100	16570	0 16510	10020	3360	2450	5470	3140	740	550

1. The numbers of landowners having critical pollution sources by county are: Washington(321); Fond Du Lac(216); Ozaukee(34); Sheboygan(25); Dodge(7).
2. During the first year, the estimated workload is 400 hours for this county. Workloads for later years are uncertain. See I&E section for more information.
3. Estimates are not available at this time.

TABLE 85. Cost of Alternative Urban Nonpoint Source Control Program for Existing, Planned and Future Land Uses in the City of West Bend: Silver Creek Subwatershed.(1)

Program Alt. Number	Type of Urban Land Use	Descriptions of Control (2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Capitol Cost, $ x 1000 (3	Equivalent Annual Cost, $ (4)	Cost Effectiveness, $ /lb (5) Lead	Susp. Sols.
1.	Existing	45	None	None	400	62000	466	0.7
	Planned	100	None	None	530	81000	266	0.4
	Future	65	None	None	930	143000	326	0.5
2.	Existing	None	65	34	520	94000	596	1.6
	Planned	None	100	34	930	141000	470	1.3
	Future	None	84	34	1450	235000	513	1.4
3.	Existing	13	33	18	360	64000	571	1.3
	Planned	85	None	None	800	123000	415	0.9
	Future	39	33	18	1160	187000	450	1.0
4.	Existing	13	16	18	230	49000	570	1.2
	Planned	91	50	18	918	141000	386	0.7
	Future	41	34	18	1148	190000	421	0.8
5.	Existing	45	16	18	540	96000	490	0.9
	Planned	91	50	18	918	141000	386	0.7
	Future	62	34	18	1458	237000	422	0.8
6.	Existing	None	None	None	0	0	0	0
	Planned	91	50	18	918	141000	386	0.7
	Future	33	27	18	918	141000	386	0.7

1. Future land use includes existing and planned land use. Controls were only used for critical subbasins in existing urban areas and controls were used in all the planned area.

2. The drainage area for the existing urban area was 1384 acres; the planned urban area was 767 acres and the future urban area was 2151 acres. The acres of parking lot for critical subbasins in existing urban areas was 53 acres and the acres of parking lot in planned urban areas was 62 acres. 18 and 34 passes were only for commercial streets.

3. Capitol cost for infiltartion was based on a cost of $15,000 per acre of area draining to the infilatration device, detention basin capitol cost ranged from $52,000 for a 0.5 acre pond to $104,000 for a 1.6 acre pond and a capitol cost was not included for street sweeping.

4. Equivalent annual cost was the capital cost and engineering design cost for detention (35%) amortized over 50 years with 6% interest and 5% annual maintenance cost (equivalent annual cost = (capital cost and engineering design cost for detention (35%)) x .0635 + (0.05 x (capital cost and engineering design cost for detention (35%)). Street sweeping annual costs were $13 per curb mile per pass plus $1000 per day mobilization cost.

5. Cost effectiveness was equivalent annual cost per pound reduction.

TABLE 86. Cost of Alternative Urban Nonpoint Source Control Program for Existing, Planned and Future Land Uses in the City of West Bend: Quaas Creek Subwatershed.(1)

Program Alt. Number	Type of Urban Land Use	Descriptions of Control (2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Capitol Cost, $ x 1000 (3	Equivalent Annual Cost, $ (4)	Cost Effectiveness, $ /lb (5) Lead	Susp. Sols.
1.	Existing	32	None	None	240	36000	439	0.7
	Planned	50	None	None	580	90000	356	0.6
	Future	40	None	None	820	126000	376	0.6
2.	Existing	None	89	18	267	30304	452	1.1
	Planned	None	100	18	1440	184010	406	1.0
	Future	None	98	18	1707	214314	412	1.0
3.	Existing	8	22	18	170	41800	995	1.8
	Planned	25	25	18	650	104070	381	0.8
	Future	19	24	18	820	145970	463	0.9
4.	Existing	8	44	18	240	49344	866	1.7
	Planned	50	50	18	1300	190870	380	0.8
	Future	35	49	18	1540	240214	430	0.9
5.	Existing	16	44	18	270	53300	683	1.2
	Planned	50	50	18	1300	190870	380	0.8
	Future	38	49	18	1510	244170	422	0.8
6.	Existing	None	None	None	0	0	0	0
	Planned	50	50	18	1300	190870	380	0.8
	Future	32	41	18	1300	190870	380	0.8

1. Future land use includes existing and planned land use. Controls were only used for critical subbasins in existing urban areas and controls were used in all the planned area.

2. The drainage area for the existing urban area was 1020 acres; the planned urban area was 1859 acres and the future urban area was 2879 acres. The acres of parking lot for critical subbasins in existing urban areas was 20 acres and the acres of parking lot in planned urban areas was 96 acres. 18 and 34 passes were only for commercial streets.

3. Capitol cost for infiltration was based on a cost of $15,000 per acre of area draining to the infiltration device, detention basin capitol cost ranged from $48,000 for a 0.3 acre pond to $96,000 for a 1.5 acre pond and a capitol cost was not included for street sweeping.

4. Equivalent annual cost was the capital cost and engineering design cost for detention (35%) amortized over 50 years with 6% interest and 5% annual maintenance cost (equivalent annual cost = ((capital cost + engineering design cost for detention (35%)) x .0635 + (0.05 x capital cost and . Street sweeping annual costs were $13 per curb mile per pass plus $1000 per day mobilization cost.

5. Cost effectiveness was equivalent annual cost per pound reduction.

TABLE 87. Cost of Alternative Urban Nonpoint Source Control Program for Existing, Planned and Future Land Uses in the City of West Bend: West Bend Subwatershed.(1)

Program Alt. Number	Type of Urban Land Use	Descriptions of Control (2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping: Passes Each Year	Capitol Cost, $ x 1000 (3	Equivalent Annual Cost, $ (4)	Cost Effectiveness, $ /lb (5) Lead	Susp. Sols.
1.	Existing	57	None	None	1300	200000	257	0.4
	Planned	100	None	None	1300	200000	240	0.4
	Future	75	None	None	2600	400000	248	0.4
2.	Existing	None	73	18	2080	258276	446	1.1
	Planned	None	100	18	1800	218059	251	0.4
	Future	None	84	18	3880	476335	329	0.6
3.	Existing	14	18	18	880	139000	347	0.7
	Planned	25	25	18	840	124100	304	0.6
	Future	18	21	18	1720	263100	325	0.6
4.	Existing	28	37	18	1700	238000	332	0.6
	Planned	88	50	18	2000	289200	327	0.6
	Future	54	42	18	3700	527200	329	0.6
5.	Existing	28	37	18	1700	238000	331	0.6
	Planned	50	50	18	1600	229260	300	0.6
	Future	37	42	18	3300	467260	315	0.6
6.	Existing	None	None	None	0	0	0	0
	Planned	50	50	18	1600	229260	300	0.6
	Future	20	20	18	1600	229260	300	0.6

1. Future land use includes existing and planned land use. Controls were only used for critical subbasins in existing urban areas and controls were used in all the planned area.

2. The drainage area for the existing urban area was 2981 acres; the planned urban area was 2088 acres and the future urban area was 5069 acres. The acres of parking lot for critical subbasins in existing urban areas was 189 acres and the acres of parking lot in planned urban areas was 130 acres. 18 and 34 passes were only for commercial streets.

3. Capitol cost for infiltration was based on a cost of $15,000 per acre of area draining to the infiltration device, detention basin capitol cost ranged from $67,000 for a 0.85 acre pond to $118,000 for a 2.0 acre pond and a capitol cost was not included for street sweeping.

4. Equivalent annual cost was the capital cost and engineering design cost for detention (35%) amortized over 50 years with 6% interest and 5% annual maintenance cost (equivalent annual cost = (capital cost and engineering design cost for detention (35%)) x .0635 + (0.05 x (capital cost and engineering design cost for detention (35%)). Street sweeping annual costs were $13 per curb mile per pass plus $1000 per day mobilization cost.

5. Cost effectiveness was equivalent annual cost per pound reduction.

TABLE 88. State and Local Costs Associated with Implementing Nonpoint Source Controls in Existing Urban Areas of West Bend Study Area.

Study Area	Alternative Program (1.)	Total Capitol Cost (2.)	State Cost Share (3.)	Local Share: Capital Cost Only (4.)	Local Share: Equivalent Annual Cost(5.)
Silver Creek	#3	$ 360,000	$ 252,000	$108,000	$ 25,000
	#5	$ 540,000	$ 378,000	$162,000	$ 37,000
	#4	$ 230,000	$ 161,100	$ 69,900	$ 15,900
	#2	$ 520,000	$ 364,000	$156,000	$ 35,900
Quaas Creek	#5	$ 270,000	$ 189,000	$ 81,000	$ 18,600
	#4	$ 240,000	$ 168,000	$ 72,100	$ 16,600
	#2	$ 267,000	$ 186,900	$ 80,100	$ 18,400
	#6	$0	$0	$0	$0
West Bend	#4	$1,700,000	$1,190,000	$510,000	$117,000
	#1	$1,300,000	$ 910,000	$390,000	$ 89,800
	#2	$2,080,000	$1,456,000	$624,000	$143,600
	#5	$1,700,000	$1,190,000	$510,000	$117,000

1. These prgrams are presented in Tables (FUTSW, FUTQC, and FUTWB) and discussed in Chapter 5.
2. Includes the capitol cost of infiltration and detention devices.
3. Based on a cost share rate of 70% times the total capitol cost.
4. Based on 30% of the total capitol cost.
5. Based on amortizing the local share of the total capitol cost and all estimated maintenance costs. Does not include street sweeping. Street sweeping wil increase the equivalent annual cost for each subwatershed by about $15,000. During the first two years of accelerated sweeping, the Nonpoint Source Program will provide funds to cover one-half this cost.

TABLE 89. Cost of Alternative Urban Nonpoint Source Control Program for Existing, Planned and Future Land Uses in the Village of Kewaskum Study Area(1)

Program Alt. Number	Type of Urban Land Use	Descriptions of Control (2): Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Sweeping Passes Per Year	Capitol Cost, $ x 1000 (3)	Equivalent Annual Cost, (4)	Cost Effectiveness, $ /lb (5): Lead	Susp. Sols.
1.	Existing	89	None	None	440	70000	573	0.9
	Planned	100	None	None	740	110000	363	0.6
	Future	95	None	None	1180	180000	423	0.7
2.	Existing	None	100	None	753	85521	494	1.1
	Planned	None	100	None	1020	115770	446	1.0
	Future	None	100	None	1773	201291	465	1.0
3.	Existing	50	50	None	640	82732	433	0.8
	Planned	50	50	None	880	117885	418	0.8
	Future	50	50	None	1520	200617	424	0.8
4.	Existing	25	25	None	304	541366	426	0.0
	Planned	88	50	None	1100	147885	405	0.9
	Future	61	39	None	1404	189251	410	0.9
5.	Existing	None	None	None	0	0	0	0
	Planned	88	50	18	1100	166587	438	0.5
	Future	50	29	18	1100	166587	438	0.5

1. Future land use includes existing and planned land use.
2. The drainage area for the existing urban area was 772 acres; the planned urban area was 1016 acres and the future urban area was 1788 acres. The acres of parking lots in the existing urban area were 50 acres and in the planned area were 68 acres.
3. Capitol cost for infiltartion was based on a cost of $15,000 per acre of area draining to the infilatration device, detention basin capitol cost was $89,000 per 1.2 acres of pond.
4. Equivalent annual cost was the capital cost and engineering design cost for detention (35%) amortized over 50 years with 6% interest and 5% annual maintenance cost (equivalent annual cost = (capital cost and engineering design cost for detention (35%)) x .0635 + (0.05 x (capital cost and engineering design cost for detention (35%)).
5. Cost effectiveness was equivalent annual cost per pound reduction.

TABLE 90. Cost of Alternative Urban Nonpoint Source Control Program for Existing, Planned and Future Land Uses in Village of Campbellsport Study Area(1)

Program Alt. Number	Type of Urban Land Use	Descriptions of Control (2): Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Capitol Cost, $ x 1000 (3)	Equivalent Annual Cost, (4)	Cost Effectiveness, $ /lb (5): Lead	Susp. Sols.
1.	Existing	87	None	270	40000	533	0.6
	Planned	100	None	180	270000	600	0.8
	Future	92	None	450	670000	558	0.6
2.	Existing	None	100	507	57544	575	1.3
	Planned	None	100	117	13279	510	1.2
	Future	None	100	624	70823	562	1.3
3.	Existing	25	25	200	27306	479	0.8
	Planned	50	50	150	19639	561	0.9
	Future	50	50	350	46495	510	0.8
4.	Existing	25	None	90	13000	406	0.6
	Planned	97	50	220	31639	687	1.0
	Future	52	9	310	44639	572	0.8
5.	Existing	None	None	0	0	0	0
	Planned	97	50	220	31639	687	1.0
	Future	37	9	220	31639	687	1.0

1. Future land use includes existing and planned land use.
2. The drainage area for the existing urban area was 455 acres; the planned area was 276 acres and the future urban area was 731 acres. The acres of parking lots in the existing urban area were 13 acres and in the planned area were 8 acres.
3. Capitol cost for infiltartion was based on a cost of $15,000 per acre of area draining to the infilatration device, detention basin capitol cost ranged from $89,000 per 1.2 acres of pond.
4. Equivalent annual cost was the capital cost and engineering design cost for detention (35%) amortized over 50 years with 6% interest and 5% annual maintenance cost (equivalent annual cost = (capital cost and engineering design cost for detention (35%)) x .0635 + (0.05 x (capital cost and engineering design cost for detention (35%)).
5. Cost effectiveness was equivalent annual cost per pound reduction.

TABLE 91. Cost of Alternative Urban Nonpoint Source Control Program for Existing, Planned and Future Land Uses in Village of Newberg Study Area(1)

Program Alt. Number	Type of Urban Land Use	Descriptions of Control (2) Detention: % Total Drainage Area Controlled	Infiltration: % Parking Lot Acres Controlled	Capitol Cost, $ x 1000 (3)	Equivalent Annual Cost, (4)	Cost Effectiveness, $ /lb (5) Lead	Susp. Sols.
1.	Existing	96	None	300	45000	978	1.5
	Planned	100	None	800	120000	190	0.3
	Future	98	None	1100	165000	243	0.4
2.	Existing	None	100	190	21600	469	1.1
	Planned	None	100	1821	206683	293	0.7
	Future	None	100	2011	228283	304	0.7
3.	Existing	50	50	260	35810	628	1.1
	Planned	50	50	1300	163341	245	0.5
	Future	50	50	1560	199151	275	0.6
4.	Existing	96	50	391	55810	808	1.4
	Planned	64	50	1400	173341	257	0.5
	Future	77	50	1791	229151	308	0.6
5.	Existing	None	None	0	0	0	0
	Planned	64	50	1400	173341	257	0.5
	Future	38	45	1400	173341	257	0.5

1. Future land use includes existing and planned land use.
2. The drainage area for the existing urban area was 500 acres; the planned area was 713 acres and the future urban area was 1213 acres. The acres of parking lots in the existing urban area were 13 acres and in the planned area were 121 acres.
3. Capitol cost for infiltartion was based on a cost of $15,000 per acre of area draining to the infilatration device, detention basin capitol cost ranged from $89,000 per 1.2 acres of pond.
4. Equivalent annual cost was the capital cost and engineering design cost for detention (35%) amortized over 50 years with 6% interest and 5% annual maintenance cost (equivalent annual cost = (capital cost and engineering design cost for detention (35%)) x .0635 + (0.05 x (capital cost and engineering design cost for detention (35%)).
5. Cost effectiveness was equivalent annual cost per pound reduction.

TABLE 92. State and Local Costs Associated with Implementing Nonpoint Source Controls in Existing Urban Areas of Kewaskum, Campbellsport, an Newburg Study Areas. (SACOST)

Study Area	Alternative Program (1.)	Total Capitol Cost (2.)	State Cost Share (3.)	Local Share: Capital Cost Only (4.)	Local Share: Equivalent Annual Cost(5.)
Kewaskum	#1	$440,000	$308.000	$132,000	$ 30,400
	#2	$753,000	$527,100	$225,900	$ 51,995
	#3	$640,000	$448,000	$192,000	$ 44,200
	#4	$340,000	$288,000	$102,000	$ 23,500
	#5	0	0	0	0
Campbellsport	#1	$270,000	$189,000	$ 81,000	$ 18,600
	#2	$507,000	$354,900	$152,100	$ 35,008
	#3	$200,000	$140,900	$ 60,000	$ 13,800
	#4	$ 90,000	$ 63,000	$ 27,000	$ 6,200
Newburg	#2	$190,000	$133,000	$ 57,000	$ 13,120
	#3	$260,000	$182,000	$ 78,000	$ 17,900
	#4	$391,000	$274,000	$117,000	$ 27,000

1. These programs are presented in Tables 89, 90 and 91, and discussed in Chapter 5.
2. Includes the capitol cost of infiltration and detention devices.
3. Based on a cost share rate of 70% times the total capitol cost.
4. Based on 30% of the total capitol cost.
5. Based on amortizing the local share of the total capitol cost and all estimated maintenance costs. Where used, street sweepting will increase equivalent annual costs by $18,000. During the first two years of accelerated sweeping, the Nonpoint Source Program will provide funds to cover 50% of the cost.

Table 93. Sites Selected For Evaluation Monitoring in the East-West Watershed

Surface Water	Subwatershed	Adjacent Sources Affecting Site[1]	Evaluation Method[2]
Streams			
Watercress Cr.	Watercress Cr.	UE	HAB,BIO
E. Branch	Mauthe Lake	BY	NUT,BACT
E. Branch	Smith Lake	BY	NUT,BACT
W. Branch	Campbellsport	Imp	HAB,NUT
W. Branch	Rustic Rd.	UE,BE	NUT,HAB
W. Branch	Wayne Marsh	UE,BY,BE	HAB,NUT
Kewaskum Cr.	Kewaskum	UE,BY,BE	HAB,BIO
Mainstem	West Bend	Imp	HAB
Quaas Creek	Quaas Creek	UNPS	NUT,BIO
Silver Creek	Silver Creek	UNPS	HAB,BIO
Mainstem	Daly Lake	UE	NUT,HAB
Lakes[3]			
Auburn	Auburn L.	None (4.)	
Lucas	Silver Cr.	None (4.)	
Green	Smith	UE	NUT
Crooked	Crooked	UE	NUT

Footnote:

1 UE = Upland Erosion,
BY = Barnyard
Imp = Impoundment
UNPS = Urban Nonpoint Sources
PA = Pasture
BE = Bank Erosion

2 HAB = Habitat Investigations
NUT = Chemical Monitoring
BIO = Biological Investigations
BACT = Bacteriological Investigations

3 Long Lake will be monitored as part of the Key Lakes Program

4 These are control sites for lake evaluations.

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