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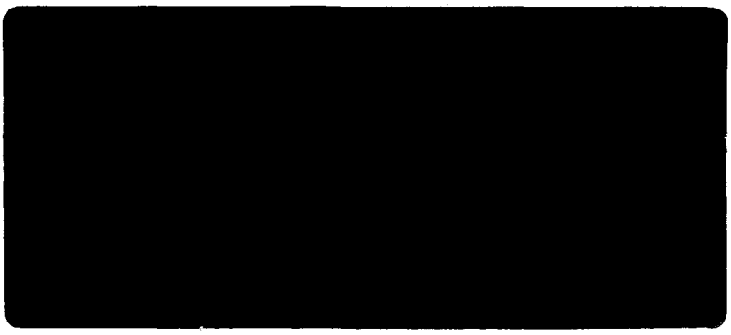

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Black River Watershed

Town of Wilson
Park and Forestry Commission
Sheboygan County, Wisconsin

Job No. 10531C2

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EXECUTIVE SUMMARY

The objective of the Black River Watershed assessment was to evaluate how past, current, and future land uses affect characteristics of the watershed that provide control of flooding and sedimentation; and to recommend means and methods to preserve and improve the quality of the watershed as pressures of urbanization increase.

The study divides the Black River Watershed into two key subwatersheds, each having unique characteristics. The subwatersheds were labeled as the **Southern Segment**, which is relatively undeveloped; and the **Northern Segment**, which is undergoing a phase of rapid urbanization. The Northern Segment includes the Fisherman's Creek Watershed, which is predominantly a developed area that was evaluated in a previous report. Each watershed was evaluated from the following perspectives:

- Each subwatershed was characterized with respect to land use, political boundaries, flooding potential, and erosion potential.
- The factual characterization of the watershed was combined with field observations to provide an assessment of critical areas which are most susceptible to flooding, erosion, and water quality degradation.
- Government regulations and programs regarding land use practices which affect the quality of the watershed were outlined.
- Local regulatory and nonregulatory options available to the Town are presented along with examples from area towns and villages.

Several recommendations are provided to assist the Town in developing a plan for the watershed, which may include preserving critical areas, enforcing existing regulations, initiating local regulatory or non-regulatory processes, monitoring water quality at key locations, and educating landowners and users of the importance of best management practices.

Forward

The Wisconsin Coastal Management Program was established in 1978 to direct comprehensive attention to the state's 820 miles of Lake Michigan and Lake Superior coastline. The WCMP analyzes and develops state policy on a wide range of Great Lakes' issues, coordinates the many governmental programs that effects the coast, and provides grants to stimulate better state and local coastal management. Its overall goal is to preserve, protect, and develop the resources of Wisconsin's coastal areas for this and succeeding generations.

1. INTRODUCTION

1.1 Black River Watershed General Information

A watershed is an area of land surface that contributes surface water runoff to a given point along a stream, river, or lake. The Black River Watershed is the area that contributes surface drainage to the mouth of the Black River at Lake Michigan (refer to Figure 1: *Black River Watershed*). The Black River is unusual for rivers in this region of Wisconsin because it primarily flows in a northerly direction and is parallel to Lake Michigan. The headlands of the Black River Watershed, including its tributaries, consist mainly of fine-textured soils, with the river and tributaries often cutting gullies into the soil. The velocity of the river in this headland region is much greater that the main portion of the river, which flows slowly north until discharging into Lake Michigan. The downstream part of the basin, parallel to Lake Michigan, can exhibit stream velocities that are less than the easterly ground water underflow and at times is stagnant.

The purpose of this study is to evaluate conditions of the Black River Watershed; past, present, and future, as they relate to water quantity and quality. This study also recommends means to preserve the integrity of the watershed as pressure to urbanize increases. To accomplish this objective, the watershed has been divided into two subwatersheds with differing developmental stages, namely, the Northern and Southern Segments, as described in Chapter 3. The Northern Segment includes Fisherman's Creek, the northermost tributary of the Black River. For specific information relating to condition of Fisherman's Creek, refer to the *Fisherman's Creek Watershed Study* by Miller Engineers September 9, 1991.

1.2 Black River Watershed Characteristics

The Black River Watershed encompasses an area of approximately 18 square miles in eastern Sheboygan County. It is roughly bordered by Humboldt Avenue in Sheboygan on the north, near Lake Michigan on the east, along C.T.H. KK up to and including parts of Oostburg on the south, along C.T.H. A and Wilson Lima Road on the southwest, and along Interstate Highway I-43 on the northwest. Approximately 75 percent of the total watershed is contained in the Town of

Wilson. Other areas containing much smaller proportions include the Town of Holland, the Town of Lima, the Village of Oostburg, and the City of Sheboygan (refer to Figure 2: *Political Boundaries*).

2. RECORD REVIEW AND BACKGROUND INFORMATION

Miller Engineers & Scientists conducted a review of existing information directly related to the Black River Watershed. This included the following:

- Historical information on the rate of commercial/industrial/residential development within the watershed
- Information on previous hydrologic studies of the watershed
- Regional watershed information
- City of Sheboygan and Town of Wilson zoning
- City of Sheboygan storm sewer plans
- Other information pertinent to water quality and flood management

A list of publications that are referenced in this watershed study are presented in the Appendix. Contacts for agencies and personnel which can provide further assistance regarding the watershed are also listed in the Appendix.

3. SUBWATERSHED CHARACTERISTICS

In order to evaluate the Black River Watershed, it was divided into two parts, the Northern and the Southern Segments (refer to Figure 3: *Black River Subwatersheds*). Each segment has similar geologic and hydrogeologic conditions. However, the political boundaries and rates of past, present, and anticipated development vary widely for the two subwatersheds. By design, the northern watershed is developed, or is developing quickly, and is greatly influenced by the City of Sheboygan (especially the far north end). The southern watershed is largely undeveloped and is mainly governed by the Town of Wilson.

3.1 Northern Segment

3.1.1 General Description

The Northern Segment is located at the downstream portion of the Black River Watershed. It is most closely bordered on the south by C.T.H. V. There are approximately 6,000 acres (9.4 square miles) in the Northern Segment. This area is defined mainly as an area of rapid development. The Fisherman's Creek, studied previously, is included in the Northern Segment.

3.1.2 Land Use and Political Boundaries

Current land use in the northern segment can be divided into three categories:

- Nearly 35% of the entire segment is residential/commercial. This area is predominately on the far north end of the segment and includes nearly all the land governed by the City of Sheboygan and that land in the Town of Wilson, which is adjacent to the City of Sheboygan.

- Along Lake Michigan there is a band of heavily forested land. This land makes up approximately 15% of the Northern Segment. Some residences are located within this area, but they are scattered.

- The remaining 50% of the land in this segment is agricultural land. The majority of the area has been cleared of all trees and natural vegetation, with the exception of a few narrow grass swales along streams.

Approximately 30% of the Northern Segment is within the limits of the City of Sheboygan. This area has largely been developed as residential and commercial/industrial. The remaining 70% of the northern segment is within the Town of Wilson. This area is largely agriculture, however, there is a strong trend toward residential development.

3.1.3 Hydrologic Information

The Black River has a distinct channel with numerous gentle meanders. It flows north and nearly parallels the shore of Lake Michigan. At times, this lower northern portion of the river has very slow stream velocities. These velocities can even be less than the easterly ground water flow which can cause the river to become stagnant. At times, the mouth of the river is temporarily closed by sand deposited from Lake Michigan wave action.

Distinct drainage corridors leading to the Black River are evident throughout most of the northern segment. There are slight exceptions to this near Fisherman's Creek and in the City of Sheboygan, where overland flow is controlled by storm sewers and roadside ditches. The Fisherman's Creek at one time exhibited a large degree of meandering. Much of this original meandering was lost when the stream was channelized during development. Stream meandering is vital to its integrity. Meanders in a stream reduce water velocities which in turn reduces erosion along stream banks and bottoms and improves the water quality. Stream and drainage corridors near the south end of the north watershed show less meander, therefore, water can move quicker and with more sediment to the Black River.

Several properties in this area have small man-made ponds. These ponds, if properly constructed and maintained, can improve water quality by retaining the water long enough for sediment to settle out. They also serve to retain water during heavy rains which reduces the severity of downstream flooding.

3.1.4 Erosion/Water Quality

Soils in the Black River Watershed can be broken down into various hydrologic soil groups which reflect the ability of soils to retain runoff from storms after the soils have been thoroughly wetted. The different soils groups are defined in Table 1: *Hydrologic Soil Groups*. The soil groups are based on information obtained in the *Sheboygan County Soil Survey*.

The majority of the soil on the west half of the Northern Segment is fine textured, with very slow infiltration rates (Soil Group C). These soils generally impede downward water movement and increase erosion during heavy storm events. Erosion is particularly a problem during spring rain when the frost may not be out of the ground and crops are not planted, leaving exposed soil. The quality of storm water runoff reaching the main branch of the Black River from these areas is greatly diminished due to the erosion. During periods of heavy precipitation, turbidity and sediment load in the creeks increases significantly. The sediment does more than cause the water to become cloudy. Turbidity and sediment also impairs feeding and breathing processes of aquatic organisms, eliminates or covers spawning beds, increases water temperature, and acts as a transport mechanism for unwanted nutrients and chemicals.

The second major soil grouping includes land that is well drained with high infiltration capacities (Soil Group A). In natural conditions, these soils allow for a major portion of precipitation to infiltrate the soil and not contribute to surface runoff. These soils are mainly located in a band approximately 1/2 mile wide along the main branch of the Black River. There is also a large deposit of type A soils located south of the confluence of Fisherman's Creek and the Black River.

The remaining soils are generally Soil Group B, moderately well-drained soils. These soils are generally spot located in the City of Sheboygan and along the border between the type A soil at the Black River and the type C soils to the west.

In the Northern Segment, much of the area is urbanized, especially that in the City of Sheboygan. These areas likely contribute many of the common urban runoff constituents such as pesticides and fertilizers from lawn application, salts and petroleum from streets, and organic (leaves and grass) and particulate matter from storm runoff.

3.2 Southern Segment

3.2.1 General Description

The Southern Segment is the upstream portion of the Black River Watershed. It is most closely bordered on the north by C.T.H. V and on the south by Oostburg. There are approximately 5,500 acres (8.6 square miles) in the Southern Segment. This area is mainly rural, with the majority of the land used for agriculture.

3.2.2 Land Use and Political Boundaries

Current land use in the Southern Segment consists mainly of agricultural land. Except for woodlots, most of this land has been cleared of all natural vegetation. Narrow grass swales are visible along some of the intermittent streams. There is also a naturally vegetated swale approximately 1/8 mile wide near highway I-43. This vegetation protects the Black River along an area with extremely steep banks. Along the Lake Michigan shoreline, there is a band approximately 1/4 to 1/2 mile wide that is heavily forested. A majority of this land comprises Kohler Andrae State Park. Some residences are located within this band, but they are very limited.

Development in the Southern Segment is primarily near Oostburg and around I-43 and C.T.H. V. Near Oostburg the development is mainly residential, with some commercial. Along I-43, the development is nearly all commercial.

Approximately 20% of the Southern Segment is outside the Town of Wilson. This land is governed by the Town of Lima, Town of Holland, and Village of Oostburg. The majority of this land is agricultural. However, the Village of Oostburg is a growing residential and commercial community. The remaining 80% of the Southern Segment is within the Town of Wilson. This area is largely agriculture, with some commercial development near I-43.

3.2.3 Hydrologic Information

Water flow within the Southern Segment of the Black River is very distinct, following the valleys of ravines of wide wetlands. An especially deep valley is located due north of Oostburg near C.T.H. OK and I-43. There are many areas along the river that accommodate floodwater. The ravines near C.T.H. OK and I-43, a large wetland near the crossing of Wilson-Lima Road, and much of Kohler Andrae State Park, serve as such buffers.

Drainage corridors, typically extending from I-43 to the Black River, are intermittent throughout most of the Southern Segment. For the most part, the drainage corridors have not been altered, and run along grassed channels through farm fields. The grassed channels, although narrow, do provide a buffer zone between the farm fields and the intermittent streams. This allows some sediment to settle out and limits other sediment from reaching the stream.

In other areas, particularly around Oostburg, the drainage corridors are being channelled into drainage ditches and culverts. There are also storm sewers in Oostburg which direct storm water runoff to the Black River Watershed.

Effluent from the Oostburg Wastewater treatment facility is discharged to the Black River Watershed and effects the hydraulic load to the Black River.

3.2.4 Erosion/Water Quality

Hydraulic soil groups and related infiltration rates in the Southern Segment are very similar to those in the Northern Segment. The majority of the west half of the segment is Soil Group C; fine textured soils with very slow infiltration rates. These soil characteristics contribute greatly to surface runoff. Along with fine-textured soils and sloping land, this soil type has a high potential for surface erosion, sedimentation, and the formation of rills and gullies.

The soil surrounding the main channel of the Black River is very similar in both the Southern and Northern Segments; mostly Soil Group A, which has high infiltration capacity. However, unlike the Northern Segment, the Southern Segment has a wide strip of variable soils located between the Black River and Lake Michigan. Generally, these soils are cut and fill or alluvial deposits (soils mainly deposited by meandering streams) and are too variable to be rated.

Soil Group B, moderately well-drained soils, are generally located along the western reach of the river. These soils make up only a small fraction of the total area.

Near Oostburg, a large amount of the area is Soil Group D. Type D soils are clayey and/or restrictive soil with very slow infiltration rates and a high water table. These soils impede the downward movement of water during the course of a precipitation event. This condition increases the degree and frequency of erosion, sedimentation, and increased hydraulic loading in the watershed.

4. WATERSHED ASSESSMENT

The Black River watershed is located predominately in the Town of Wilson and is rapidly being developed. This development often has significant impacts on the watershed. The northern most branch of the Black River, the Fisherman's Creek, provides an example of degradation from agricultural practices and development without consideration of the effect on the watershed.

Information from the *Fisherman's Creek Watershed Study*, along with the information gathered from this investigation, provide insight for improving development standards throughout the Black River watershed. The following sections discuss the key characteristics of both the Northern and Southern Segments of the watershed. *Site Photographs* in the Appendix emphasize some the key characteristics, both positive and negative with respect to water quality.

4.1 Northern Segment

As mentioned previously, many areas in the Northern Segment have already undergone significant development while other areas are still seeing rapid development. Man-made changes throughout the segment have had impacts on the watershed. If properly planned, future changes in these areas may provide opportunities to reduce sediment loads in the river, minimize flooding, and improve the overall water quality.

4.1.1 Water Retention

Many of the streams that lead to the Black River will naturally exhibit tendencies to flash flood due to their west-east orientation and the slow infiltration soil types in the west half of the watershed. In addition to this, man-made changes have also influenced the water retention rates.

The most significant change to the watershed is caused by the conversion of woodland to farmland and the farmland to urbanization. These conversions increase the hydrologic load and reduce the time it takes for the runoff to reach the river. Where water is no longer slowed down by vegetation, it can reach a stream faster and is less likely to infiltrate the soil. This results in increased peak flow rates during rain events.

Another factor affecting the peak flow rate is the reduction of meander in the streams that lead to the Black River. This effect is most noticeable near the Fisherman's Creek. Where meandering has been reduced in a stream, flood storage is decreased and water velocity increases.

Channelizing storm water runoff through storm sewers and roadside ditches has a similar effect as reducing meanders in the stream. It allows storm water to quickly reach the river without slowing the water to promote natural infiltration.

Wetlands and lowlands provide a natural flood buffer zone. Unfortunately, with increased urbanization, lowlands and small wetlands are often filled, eliminating this buffer. Fortunately, several flood buffers still exist. City, county, and state parks, as well as golf courses, often provide areas where streams can safely overflow their banks without damaging residential or commercial development. Some areas along the Black River have development set back from the waterway, avoiding damage when the river overflows its banks.

Several properties and business parks in the Northern Segment have small ponds. Whether designed as retention ponds or not, these ponds increase the retention time of storm water which decreases the peak flow in the main channel.

4.1.2 Water Quality

Water quality can be adversely affected by two primary sources sedimentation and chemicals. During periods of heavy precipitation, sedimentation due to erosion increases. Sediment can change the biological, aesthetic, and physical properties of the stream. This not only makes the water cloudy, it impairs feeding and breathing for aquatic organisms, eliminates or covers spawning beds, increases the water temperature, and carries unwanted nutrients and chemicals. In the Northern Segment, sedimentation is increased due to construction erosion and increased water flow rates with channelization. As flow rates increase, the water will scour the land increasing sediment loads. Wetlands and retention ponds can act as a buffer to slow the water and allow the sediment to settle out. Silt fences along construction sites can also prevent the sediment from reaching the streams. However, silt fences which are not properly maintained offer little help. Where water velocity cannot be slowed to reduce erosion and sedimentation, riprap and vegetative cover crops, such as grass, can reduce scouring.

Increased chemical loads not only have potential to create toxicity problems, they can also cause nutrient and chemical loading to a stream that results in secondary effects. Nutrient additions enhance biological growth of foreign organisms. This change in the population and character of microorganisms can shift the food chain, decrease the oxygen content, and eradicate many native species. Chemical loads for the Northern Segment are predominantly caused by urban storm water runoff. Urban property typically includes such chemicals as: fertilizers and pesticides from residential runoff; synthetic organics like gasoline, oil, and rubber from streets; road salts; and other miscellaneous pollutants.

4.1.3 Critical Areas

Critical areas have been identified throughout the watershed and are shown on Figure 4: *Critical Watershed Areas*. There areas generally include:

- Shoreland Districts
- Floodplain Districts
- Shoreland/Wetland Districts
- WDNR Wetland Designations (areas less than 2 acres are not shown for clarity)
- Areas with elevations less than 600 feet
- 75 foot wide vegetative corridors along tributaries
- Southern most tributary of the Black River

In the Northern Segment, as Sheboygan continues to develop, the northern most tributaries will need to be protected. Some negative effects of development are already visible along C.T.H. EE as small wetland areas are filled in for development and construction sites do not maintain erosion structures. Other critical areas include the Arthur Jerving Conservancy at C.T.H. EE and Lakeshore Drive. As mentioned previously, natural vegetation and wildlife can be very sensitive to increases in hydraulic or chemical loading (refer to Figure 4 for locations of other critical areas).

4.2 Southern Segment

The Southern Segment is still largely agricultural. Without careful planning, agricultural land often has two effects on local waterways; it increases the sediment in the water due to erosion, and increases the chemical loading due to pesticides and fertilizers. However, with careful planning and well managed stream corridors, the streams can be improved to promote a natural habitat for fish and wildlife.

4.2.1 Water Retention

Water retention in the Southern Segment is similar to the Northern Segment. Intermittent streams that lead to the Black River have a tendency to flood due to their orientation and soil types. Significant sheet flow across agricultural land in spring and fall is also a problem since, without a cover crop, there is little to no vegetation to slow the water flow rate. Increased urbanization in Oostburg will also increase flow rates if specific measures are not taken to retain the water that is discharged into the Black River.

Historically, there has not been major flood damage in the Southern Segment, especially compared to that near the Fisherman's Creek. This is mainly due to the lack of development in the area, combined with the significant buffer zones that exist throughout the segment. Kohler Andrae State Park (sometimes referred to as Terry Andrae State Park) offers protection to the downstream properties by allowing the river to flood its banks and retain the increased water load. There are also several other large wetlands throughout the segment, including the wetland near the east end of Wilson Lima Road. The deep valley near C.T.H. OK and I-43 is another good example of a buffer that has not been altered development. These buffers offer some flood moderation. Therefore, with increasing development, care should be taken to protect and preserve these areas or duplicate their capabilities elsewhere.

4.2.2 Water Quality

In the Southern Segment, as in the Northern Segment, streams are being adversely affected by both increased sediment and chemical loads. However, in the Southern Segment, the primary source of sediment is from agricultural fields. Fields are most susceptible to erosion during the early spring and late fall, when there is no cover crop. This is especially true for soils in the western watershed which allow limited infiltration. Therefore, much of the precipitation will become surface runoff.

However, there are several conditions in the Southern Segment that improve the sedimentation problem. Cover crops and grass filter strips in the agricultural fields greatly reduce the amount of sediment that reaches the streams. There are also numerous wetland buffers that allow the water to slow down and settle out much of the sediment. In particular, Kohler Andrae State Park offers a very large buffer zone.

Chemical loads are also influenced by activities in the Southern Segment. Again, agricultural farmland adds pesticides and fertilizers to the streams. Livestock and barnyard runoff also add to the increased nutrient loads. Although regulated, treated wastewater from Oostburg has potential to increase chemical loads.

Increased urbanization in Oostburg, like that in Sheboygan, is adding similar urban storm water runoff to the streams. This may become a significant impact on the southern most reaches of the Black River (like the in the Northern Segment) Fisherman's Creek, if proper management steps are not taken.

Although large wetland buffers in the Southern Segment can help reduce the chemical and sediment load in the streams and river by natural biodegradation, care must be taken to not rely only on the wetlands to clean the water. Many native species of plants and animals are very sensitive to their environment.

4.2.3 Critical Areas

Critical areas in the Southern Segment have been identified according to the general guidelines outlined in the northern section. In this segment, special attention should be given to the southern most tributary due to its special characteristics; steep slopes, significant meandering, and high hydraulic load and erosion potential. Preservation buffers in this area should possibly extend several hundred feet wide, particularly between Minderhaud Road and C.T.H. KK. Special control should also be considered on lands near Oostburg, since they are directly upstream of this sensitive area. As in the Northern Segment, critical areas include wetlands.

5. REGULATORY AND NON-REGULATORY MANAGEMENT OPTIONS

The characteristics and assessment of the Black River Watershed (Section 3 and 4) indicate a significant potential for water quality and quantity concerns. The impacts of current land use in the watershed are already causing degradation. Future demands on the land within the watershed could have compounding effects on flooding and sedimentation due to excess and uncontrolled runoff.

Four steps for the town to control impacts and improve management strategies within the watershed are:

- Recognizing that a potential problem exists
- Becoming familiar with Best Management Practices (BMPs)
- Educating land stewards of the impacts of using or not using BMPs
- Developing a method of ensuring that the BMPs are being implemented

The fact that the Town of Wilson has been proactive in evaluating the Black River Watershed indicates that the first step (recognition of problem) has been realized by town officials. This

report and the *Fisherman's Creek Watershed Study* further emphasize that a problem does exist and could be magnified by encroaching urban development.

Becoming familiar when and where BMPs should be implemented is a vital part of the management of the Black River Watershed. This responsibility ultimately lies with the land stewards. However, local, county, state, and federal government must play a role in educating the landowners (and users) and developing management regulations when necessary.

The task of educating and/or enforcing BMPs does not need to be the sole responsibility of one group (i.e., Town of Wilson). A significant amount of current and pending legislation exists which has an impact on land use and BMPs. The pertinent regulations which effect management of the watershed are briefly described in this section. In addition, appropriate contacts for the various regulations and other informational sources are listed in the Appendix.

5.1 Current Regulatory Programs

Wisconsin Shoreland Management Program (NR115)–The *Wisconsin Shoreland Management Program* was initiated in the late 1960s. The purpose was to require counties to adopt zoning and subdivision regulations for protection of all shorelands in unincorporated areas.

> *"Shoreland" (def per NR115) means lands within the following distances from the ordinary high-water mark of navigable waters: 1,000 feet from a lake, pond, or flowage; and 300 feet from a river or stream or to the landward side of the flood plain, whichever distance is greater.*

Wisconsin Floodplain Management Program (NR116 WI STATS 87.30)–The purpose of the *Floodplain Management Program* is to protect human life, health, and minimize property damages and economic losses. Municipalities (county, city, village) are required to develop and maintain floodplain zoning maps and administer and enforce reasonable floodplain zoning ordinances.

"Floodplain" (def per NR116) means that land which has been on or may be covered by flood water during the regional flood (100 year return).

Some of the prohibited uses in a floodplain area include:

- Development causing obstruction of flood flow
- Development causing increase in regional flood discharge
- Human inhabited structures
- Structures prone to flood damage
- Storage of buoyant or dangerous materials
- Sewage systems
- Potable wells

Any new land use or change in building use within a floodplain must be authorized by the local floodplain zoning administrator. Local floodplain zoning administrators within the Black River Watershed are listed under *Contacts* in the Appendix.

Wetland Mapping Units have been developed by the State of Wisconsin Department of Natural Resources (WDNR) and several federal agencies, for the purpose of conserving the natural values of wetland resources. The definition of a wetland can vary depending on the governmental agency, however, wetlands are typically defined by a combination of soil characteristics, existence of aquatic or hydrophytic vegetation, and the presence of surface water for a specified duration. The wetland areas delineated typically only include individual wetlands which have an area of two acres or more, however, restrictions can apply to any size wetland.

Any land use which could potentially have adverse effects on a wetland must undergo an analysis to determine if other land use alternatives exist. If no practical alternatives exist, a wetland assessment must be completed to determine if the functional values of a wetland (as outlined in NR103) can be preserved.

Priority Watersheds–Voluntary participation in BMPs can be up to 70% cost shared if land is designated as being within a non-point priority watershed. The Black River Watershed is not currently a "priority" watershed, but has a "high" ranking within it's local basin. The Sheboygan County Land Conservation Department (LCD) can recommend watersheds rated "high" for consideration as a future priority watershed.

Barnyard Runoff Program–Funding exists to assist farmers in constructing structures which minimize effects of barnyard runoff.

Farm Conservation Plans–Farm compliance plans are required on all farms which have significant amounts of highly erodible land. The plans are also required for farmers to remain eligible for United States Department of Agriculture (USDA) assistance programs.

Conservation Reserve Program (CRP)–Farms are eligible for payments when land that is easily erodible or in floodplains is taken out of production for a period of at least 10 years. An approved conservation plan is required for land in the CRP program.

Farmland Preservation Program–Farmland preservation is an agreement between the state and the owner to jointly hold rights to develop the land. Agricultural land of 35 or more contiguous acres can be eligible. State tax credits and exemptions from local government assessments are provided to the owner to ensure that farmland is not developed in areas susceptible to development. In addition to encouraging land to remain in agricultural production, the tax credits counterbalance increased property taxes due to escalating land values.

Construction Site Erosion Control and Storm Water Management Ordinances–Minimum standards for controlling erosion and storm water runoff have been developed by the state. The ordinance provides regulation of any construction activity which is conducted by a state agency and:

- Involves disturbance of 4,000 or more square feet of land
- Involves excavation/filling of 400 or more cubic yards

- Involves road construction/reconstruction
- Involves a development of 3 or more acres
- Is likely to result in storm water runoff exceeding existing drainage facility capacity; cause undue channel erosion; increase water pollution, or endanger; downstream property

The WDNR and University of Wisconsin–(UW-Ex) are available to assist the town in developing local construction site erosion control and/or storm water ordinances.

The regulations that have been listed in this section are the most common programs that could potentially effect methods of land use. Several new regulations and changes to existing regulations that could effect the management of a watershed are currently pending at the state and federal levels, and should be monitored for applicability to the Black River Watershed.

5.2 Local Regulatory Alternatives

The Town of Wilson has the authority to initiate regulatory actions which will assist in preserving the quality of the Black River watershed. The main regulatory avenues available to a town are policy statements, zoning, and ordinances.

Policy statements by the town, although not directly enforceable, can provide a means of publicly portraying the objectives, goals, and intent of the town in regard to management of the watershed.

Specialized zoning districts within the town can be developed to assist in managing the quality of the watershed. An example of a district that can be formed is a storm water runoff district. The formation of a specialized district can be beneficial when a drainage area involves more than one political unit. A storm water runoff district also allows for fees or taxation which can be directly used for implementation and enforcement of the district policies and management plans. Because the Black River Watershed is mostly within the Town of Wilson and encompasses a majority of

the Town's land, policies or ordinances covering the entire town may be more advantageous than creating a specialized district for the Black River Watershed.

Some examples of town zoning/ordinances that could potentially benefit the watershed are:

- New zoning to define "critical areas" to promote beneficial land uses and restrict land uses causing degradation
- More stringent ordinances for use of shorelands, wetlands, and/or floodplains
- Ordinances requiring that all farms develop conservation plans
- Ordinances requiring that all development provide approved drainage, erosion, and water quality plans

5.3 Non-Regulatory Alternatives

Although regulatory programs can be effective because they are enforceable, they also can be quite unpopular, especially at a local level. Several non-regulatory alternatives exist which can be a means of achieving the same objectives without forcing mandatory compliance. Several non-regulatory alternatives for local governments are explained below:

Land Preservation–Preservation of land by the means of purchase or long-term lease can be the best method of ensuring proper management of critical land areas. A land acquisition plan can be coordinated with interested non-profit organizations and other government agencies to minimize the financial burden on the town.

Economic Incentives–Economic incentives could include local **cost sharing** or **tax credits** for implementing BMPs similar to the non-point source priority watershed

program. Under this scenario, the town would provide cost sharing or tax credits to landowners that implement approved BMPs.

Economic Disincentives–Economic disincentives in the form of **fees, fines,** or **taxes** could be implemented on those practices which have potential for impacting the quality of the watershed.

Performance Bonds–Requiring that water quality performance bonds be posted for activities which could potentially impact the watershed is an innovative technique to ensure compliance of existing regulations. Failure to protect the quality of the watershed would result in partial or complete loss of the bond. This could be particularly effective for large construction or development projects.

Education/Information–Educating individuals who own or utilize lands within the watershed can be an effective tool in ensuring that current regulations and BMPs are being followed and implemented. Distributing appropriate information can be accomplished using numerous forums.

5.4 Other Municipality Examples

Several municipalities in the State of Wisconsin are facing similar demands on their land. It may be beneficial for the Town of Wilson to investigate the initiatives of other municipalities regarding local non-point pollution and runoff programs. Several municipalities (and contacts) with current innovative programs are listed in the Appendix.

6. CONCLUSIONS/RECOMMENDATIONS

The Black River Watershed is undergoing increasing urbanization. Some of the natural characteristics of the watershed are highly vulnerable to degradation which can have temporary or

permanent effects on the ability of the watershed to control flooding and minimize sedimentation. It is in the Town's interest to preserve and improve these characteristics in the course of future changes in land use. If properly managed, future land use changes can occur with minimal impairment, and in some cases improvement, to the quality of the watershed. Toward an appropriate balance of short-term cost and long-term land and community quality, MILLER recommends that the Town consider the following actions:

- Land acquisitions or long-term leases wherever practical to preserve the following "critical areas":
    - Approximately 75 feet on each side of designated streams and drainage ways
    - An area of approximately 300 feet either side of the southern most branch of the Black River between Minderhaud Road and C.T.H. KK (north-south)
    - Land with elevations less than 600 feet U.S.G.S. paralleling the main channel of the Black River
- When "critical area" lands are developed, action should be taken to restore the land's ability to reduce runoff and sedimentation over both short-term and long-term use of that land.
- Provide educational materials on Best Management Practices (BMPs) that are readily available to landowners/users and provide instruction on the significance of BMPs
- Coordinate with the Sheboygan County LCD office and WDNR to lobby for "priority watershed" status for the Black River

- Cooperate with other governmental agencies to enforce those regulations which are intended to protect water quality

- Initiate local regulatory and non-regulatory methods to preserve and improve the quality of the watershed

- Develop water quality monitoring plan to measure the results of land use practices

7. CLOSURE

MILLER has appreciated the opportunity to provide the Town of Wilson with an assessment of the Black River Watershed. Being located within the watershed, MILLER has a strong interest in preserving and improving the quality of the Black River. We commend the Town's

proactive position regarding the watershed and will eagerly provide assistance to the Town regarding any further management strategies.

Prepared by,

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WILS31C2.WSR

Figures

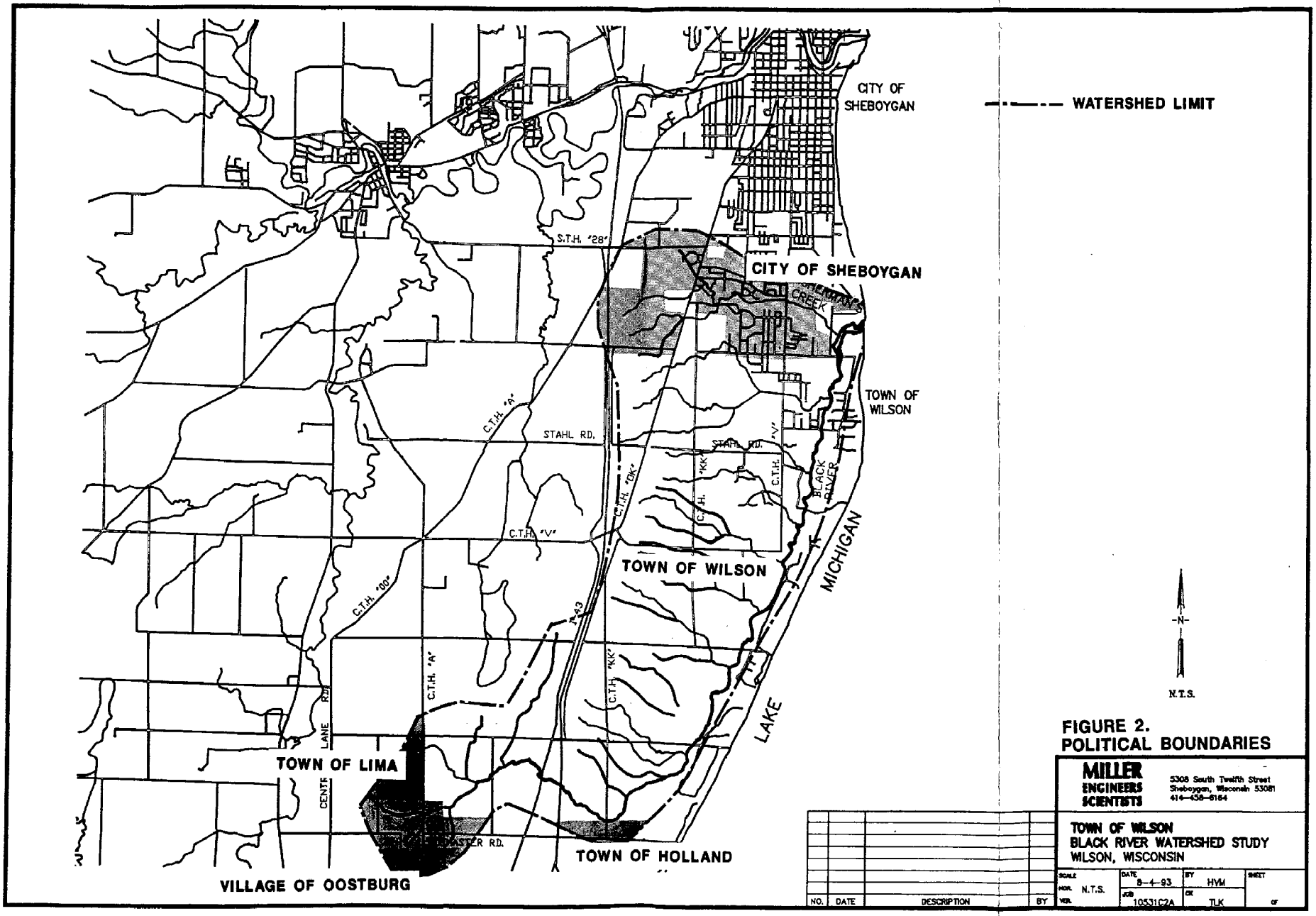

FIGURE 2.
POLITICAL BOUNDARIES

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TOWN OF WILSON
BLACK RIVER WATERSHED STUDY
WILSON, WISCONSIN

SCALE	DATE	BY	SHEET
HOR. N.T.S.	8-4-93	HVM	
VER.	JOB 10531.02A	CK TLK	OF

NO.	DATE	DESCRIPTION	BY

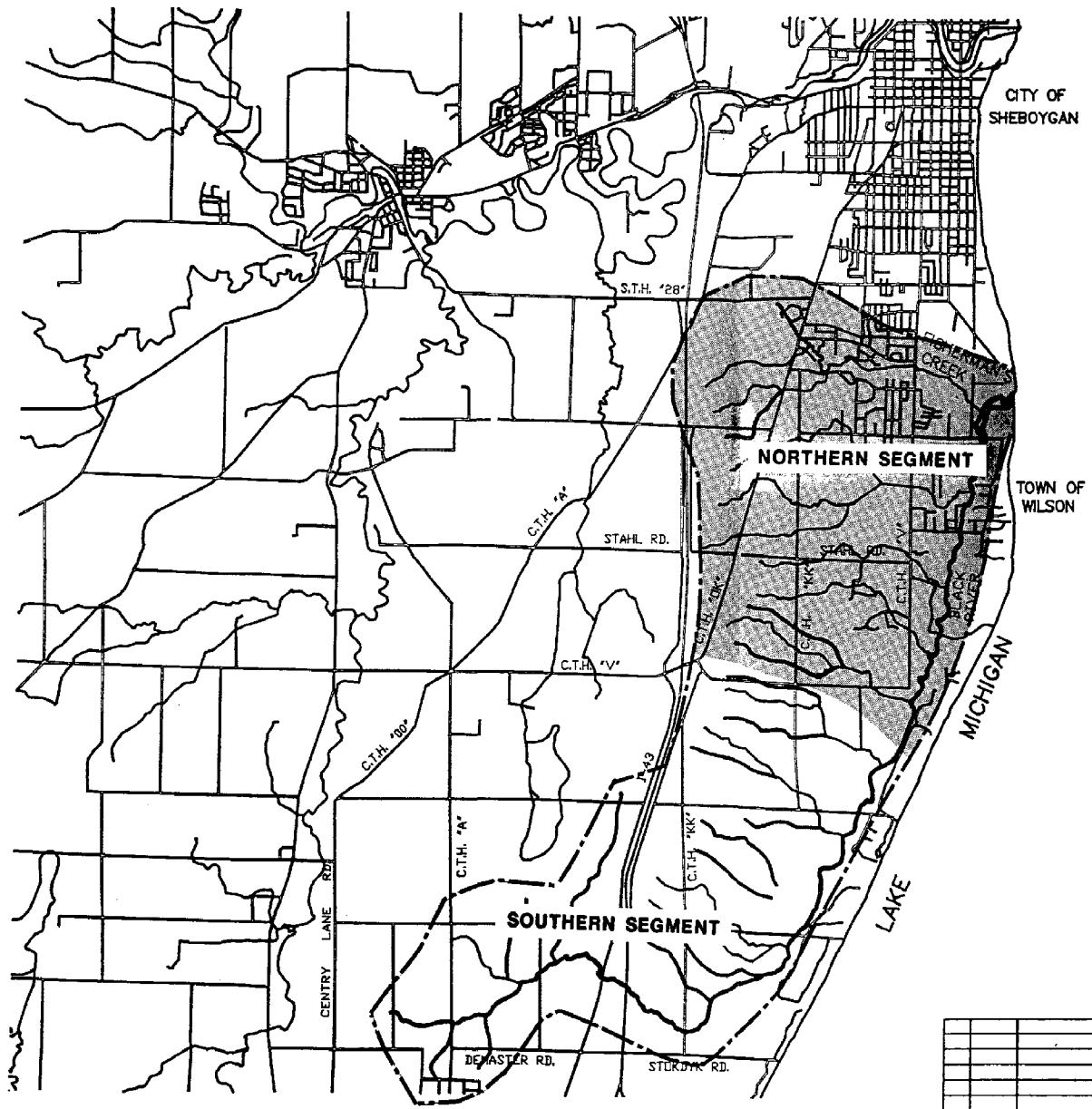

FIGURE 3.
BLACK RIVER SUBWATERSHEDS

NO.	DATE	DESCRIPTION	BY

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Tables

Hydrologic Soil Groups

Soil Group	Characteristics	Infiltration Rates
A	Well-drained and excessively drained soils	High
B	Moderately well drained	Moderate
C	Fine-textured soils impede downward water movement	Slow
D	Clay soils and/or restrictive layer, high water table	Very Slow
Variable	Cut and fill or alluvial deposits, too variable to classify	Variable

Appendix

List of References	(Green Sheets)
List of Contacts	(Yellow Sheet)
Site Photographs	(Colored Photos)

WILS31C2.APP

LIST OF REFERENCES

Bay-Lake Regional Planning Commission. Sheboygan Urbanized Area Sewer Service Plan. October 1989.

Bay Lake Regional Planning Commission and Sheboygan County Planning and Resources Department. Town of Wilson, Sheboygan County, Wisconsin. Aerial Photographs. 18 April 1990.

Craven, Scott, et al. The Benefits of Well-Managed Stream Corridors. Department of Agricultural Journalism, University of Wisconsin-Madison. 1987.

Department of Natural Resources Bureau of Water Regulation and Zoning. Wisconsin Wetlands' Inventory--Sheboygan County T15N R23E and T14N R23E. April 1987.

Donohue & Associates, Inc. Flood Control Plan for Fisherman's Creek Watershed. 27 February 1985.

Donohue & Associates, Inc. Indian Meadows Detention Basin Study. February 1990.

Federal Emergency Management Agency. Flood Insurance Study: Sheboygan County, Wisconsin (Unincorporated Areas). 16 December 1988.

Ferguson, Bruce K. "Urban Stormwater Infiltration: Purposes, Implementation, Results." Journal of Soil and Water Conservation. November–December 1990: 605–609.

Land Conservation Departments of: Sheboygan, Fond du Lac, Manitowoc, and Calumet Counties, et al. A Nonpoint Source Control Plan for the Sheboygan River Watershed. October 1990. Draft copy.

Miller Engineers. Black River Water Level Study. February 1977.

Miller Engineers. Fisherman's Creek Watershed Study. 9 September 1991.

Miller Engineers. Indian Mound Bridge Hydrologic Study. 1975.

Peterson, Gary L., and Associates. General Plan: The Official Plan of the Town of Wilson Sheboygan County, Wisconsin. February 1977.

Soil Conservation Services. Aerial photographs. 1990.

Sheboygan, City of. Storm Sewer Plan.

Sheboygan, City of. Zoning Districts Map. 12 December 1991.

Sheboygan County Planning and Resources Department. Sheboygan County Comprehensive Outdoor Recreation and Open Space Plan. September 1975.

LIST OF REFERENCES (Continued)

Sheboygan County Planning and Resources Department. Shoreland--Floodplain Ordinance for Sheboygan County. 18 April 1989.

Sheboygan County Planning and Resources Department. Zoning District Map for Town of Wilson T14N R23E. 26 December 1990.

Sheboygan River Priority Watershed. Steps for Urban Areas to Carry Out the Sheboygan River Watertshed Plan.

United States Department of Agriculture Soil Conservation Service in Cooperation with Research Division of the College of Agricultural and Life Sciences, University of Wisconsin. Soil Survey of Sheboygan County, Wisconsin. January 1978.

United States Department of the Interior Geological Survey. Sheboygan South Quadrangle: Wisconsin–Sheboygan County. Photorevised 1973.

United States Department of the Interior Geological Survey. Sheboygan Falls Quadrangle: Wisconsin–Sheboygan County. Photorevised 1973.

University of Wisconsin–Extension and Wisconsin Department of Agriculture, Trade and Consumer Protection. Nutrient and Pesticide Best Management Practices for Wisconsin Farms. June 1989.

Wisconsin Department of Natural Resources. "Fisherman's Creek Tributary (Black River Tributary No. 1)." Black River Watershed. HEC1 and HEC2 computer software. 3-1/2" disk.

Wisconsin Department of Natural Resources. Wisconsin Construction Site Best Management Practice Handbook. June 1990.

Wisconsin Department of Natural Resources, et al. A Nonpoint Source Control Plan for the North Branch Milwaukee River Priority Watershed Project. July 1989.

Wisconsin State Statutes.

Wisconsin Adminstratative Codes. Department of Natural Resources.

Wisconsin Coastal Management Program. Wisconsin Great Lakes Coastal Needs Assessment–Executive Summary. 1991.

U. S. Environmental Protection Agency. January 1993. Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance.

Contacts

Other Town/Village Programs

Town of Caledonia, Marcel Dandeneau (414) 639-6209
Town of Norway, Jeanne Branzolewski (414) 895-6335
Village of Grafton, Mark Gottlieb (414) 375-5325
Muskego/Wind Lake Watershed, Kathleen Aron (414) 895-6457

Floodplain/Shoreland Administrators

Sheboygan County Zoning Administrator, Chuck Mayer (414) 459-3060
Southeast District WDNR, Kathy Karmasz (414) 263-8682

State Wetland Coordinator

State Wetland Inventory Coordinator (608) 266-8852

Agricultural Related Programs

Sheboygan County Land Conservation Department, Pat Miles (414) 459-4360
Soil Conservation Service, Dexter Porter (414) 459-3148
WDNR, Jim Baumann, Priority Watersheds (608) 266-9277
WDNR, Jim D'Antuono, Priority Watersheds–S.E. District (414) 263-8696
Wisconsin Department or Agriculture, Trade, and Consumer Protection (DATCP) (608) 273-6280

Construction Erosion Control/Storm Water Runoff

Sheboygan County Land Conservation Department, Pat Miles (414) 459-4360
Southeast District UWEX (414) 547-6721
Southeast District WDNR, Kathy Karmasz (414) 263-8682
Sheboygan County, Michael DeMaster (414) 459-3060
City of Sheboygan, Lloyd Reilley (414) 459-3394

Adjacent Municipalities

City of Sheboygan, Lloyd Reilley (414) 459-3394
Village of Oostburg (414) 564-3214
Town of Holland (414) 668-6696
Town of Lima (414) 564-3263

Other Pertinent Contacts

Wisconsin Coastal Management Program, Gary Schultz (608) 266-8269
Kohler Andrae State Park (414) 452-3457
WDOT–District 3, Green Bay (414) 492-5717
Army Corps of Engineers, Howard Ecklund (414) 547-6986
SEWRPC, Don Reed (414) 547-6721

Construction erosion sediment increases

Erosion/water quality concerns involving farm fields and livestock

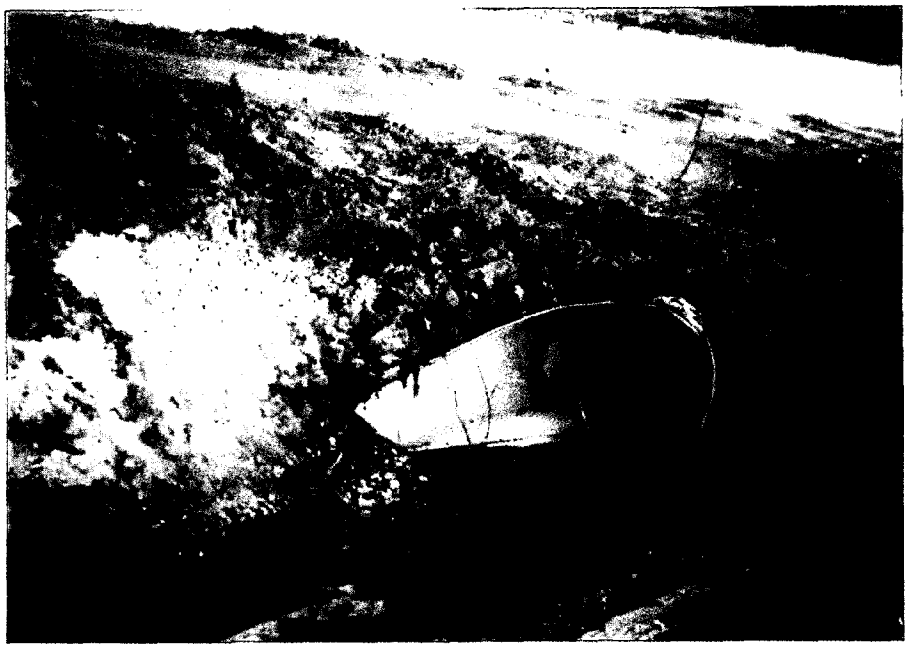
Loss of wetlands due to filling reduces flooding buffer zones and natural filters.

Runoff from cultivated fields is a major contributor of sediment in waterways.

Urban storm water runoff reduces water quality.

Channelization and rerouting caused by flooding.

Effective...



and erosion susceptible hydraulic structures

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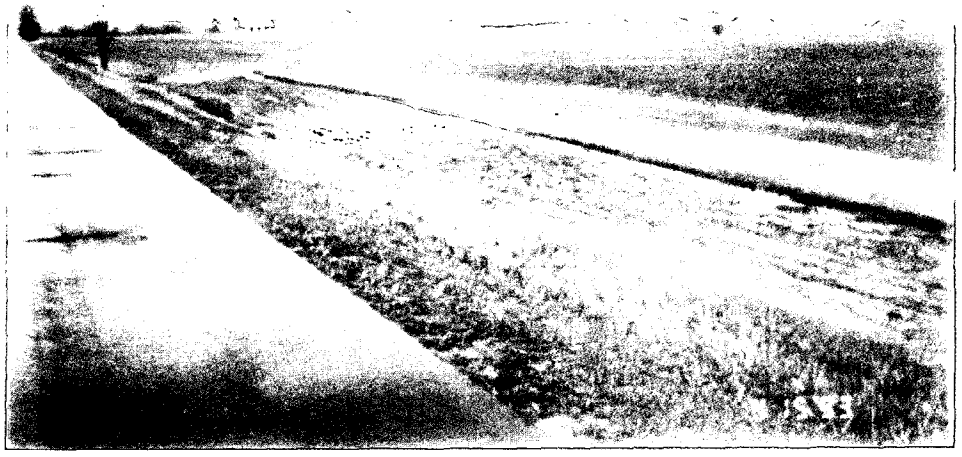
SCIENTISTS

Cover crops established in drainage ways reduce erosion.

Retention (by a pond on the other side of the road) and natural filtration improve water quality.

Flooding zones store and pass flood waters.

Silt fences on construction sites reduce sediment in the river channels.



Grass filter strips reduce sediment in water.

Natural wetland buffers provide filtration and reduce flooding in populated areas.

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