CHAPTER 1

INTRODUCTION

The Village of Sister Bay is a community of approximately 900 persons located in northern Door County. Sister Bay is in northeastern Wisconsin, approximately 25 miles north of Sturgeon Bay, and 60 miles north of Green Bay. The Sister Bay water and wastewater utilities provide water and sewer service to residences and businesses within the Village limits and the Liberty Grove Sanitary District No. 1. The Village and Sanitary District also operate and maintain a very limited storm sewer system.

The Village is surrounded almost entirely by the Town of Liberty Grove. The Liberty Grove Sanitary District No. 1 (LGSD No. 1) is located immediately north of the Village corporate limit, and is provided with sanitary sewer and water service from the Village of Sister Bay. The Village of Ephraim is located less than one half mile to the south of the Village's corporate limit.

The Village of Sister Bay's location as a major seasonal tourist center offers significant potential for future growth and development. Therefore, proper planning is essential to coordinate the improvement and expansion of municipal utility facilities with short-term as well as long-term needs of the community.

1.1 PURPOSE

This report summarizes the results of a comprehensive utility planning study for the Village of Sister Bay, LGSD No. 1, and adjacent areas within the Town of Liberty Grove. This comprehensive utility planning study included a review and evaluation of the following water-related utility systems:

- Drinking water
- Sanitary sewer collection
- Storm water

The primary purposes of the study were to evaluate the existing and future water and sewer needs of the existing service area, and the utility infrastructure improvements and expansion required to serve current and future planning area residents. In addition, a review and evaluation of the area's existing storm water infrastructure was performed, and a planning area storm water management plan was developed.

Present and future needs of the Sister Bay comprehensive utility planning area have been evaluated, and recommendations made concerning improvements necessary to maintain an adequate level of water, sewer and storm water service. This report will serve as a plan to guide future expansion of the three utility systems.

1.2 SCOPE

The planning approach used for the study began with the identification of existing planning area conditions, and an evaluation of service area needs and characteristics. Current and future water-related needs were evaluated over a 20-year planning period extending to the year 2025.

In planning for the long-term growth anticipated for the study planning area, identifying the physical characteristics affecting the water-related infrastructure systems was performed. Chapter 2 summarizes the physical characteristics of the planning area for this study. Population, community growth, and water

consumption projections serve as the foundation for evaluating and identifying recommended improvements to the water and sanitary sewer systems. Chapter 3 discusses existing and expected future land uses and community growth. The assumptions and conclusions presented in Chapter 3 were used to develop projections of water requirements that are presented in Chapter 4.

A review of existing water system facilities is presented in Chapter 5. Chapter 6 summarizes the evaluation of the water system. A summary of recommended water system improvements is presented in Chapter 7.

A review of the existing sanitary sewer collection system is presented in Chapter 8. Chapter 9 summarizes the evaluation of the sanitary sewer system. A summary of recommended sanitary sewer system improvements is presented in Chapter 10.

A review of the existing storm water system is presented in Chapter 11. Chapter 12 summarizes the evaluation of the storm water facilities and storm sewer system. A recommended storm water management plan is presented in Chapter 13.

Chapter 14 presented the overall recommended Comprehensive Utility capital improvements plan for the Sister Bay planning area.

Because needs change with time, municipal utility system planning is a continuous function. Therefore, the longer term projections and improvements discussed in this report should be reviewed, re-evaluated, and modified, as necessary, to assure the adequacy of future planning efforts. Proper future planning will help assure that utility system expansion is coordinated and constructed in the most effective manner.

CHAPTER 2

EXISTING PLANNING AREA CHARACTERISTICS

This chapter summarizes the pertinent characteristics of the identified Comprehensive Utility Planning Area for this study. To maintain consistency between this and other area planning efforts, the results of previous planning efforts were reviewed. In particular, the information presented in this chapter has been summarized from the Village of Sister Bay's 20-Year Comprehensive Plan, completed in October 2003, as prepared by the Bay-Lake Regional Planning Commission.

2.1 INTRODUCTION

The Village of Sister Bay is located near the northern end of the Door County Peninsula at the intersections of State Highways 42 and 57. These highways provide access to the Village of Sister Bay from the city of Sturgeon Bay which is located 27 miles south. Historically, the village has derived much of its revenue from fishing and tourism. Presently, the village serves as an important recreational and residential center for northern Door County.

The Sister Bay Comprehensive Utility Planning Area, illustrated on Figure 2-1, contains a variety of natural resources. The principal elements of the area's natural resources that impact the utility planning project include:

- Climate
- Topography
- Geology
- Soils
- Natural areas, including woodlands, wetlands, and water resources

Knowledge and recognition of these elements and their interrelationships are essential for the ability to adequately identify and evaluate their impact on overall water resource planning for the Sister Bay area. The remainder of this chapter summarizes the planning areas natural resources.

2.2 CLIMATE

The climate of the Village of Sister Bay and the surrounding town of Liberty Grove is significantly affected by Green Bay and Lake Michigan. The cool waters of the lake and bay delay the onset of spring weather, while the relatively warm surface water in autumn delays the occurrences of early frosts. Summers, on average, are mild due to the planning area's proximity to the water which moderates daily temperature extremes.

The annual average temperature for the Sister Bay area approximately is 43 degrees Fahrenheit. January has the lowest average monthly temperature of 17 degrees, while July has the highest average temperature of 66 degrees. Frost generally leaves the ground by mid-May, and usually returns during the first week of October. The average growing season typically lasts about 135 days. Ice forms on Green Bay in late December, and generally covers the entire bay by mid-January. During mild winters, the bay does not freeze completely. Ice breakup usually occurs in early April.

The normal annual total precipitation for the area is 28.9 inches. The lowest monthly average of 0.97 inches occurs in February, while the highest of 3.60 inches occurs in June. More than one-half the average annual precipitation falls between May and September. The first half of June and middle of August are the likely time that the heaviest rainfall events occur. The end of August is normally the driest period of the year.

2.3 GEOLOGY

Geology is divided into two categories: glacial (or Pleistocene geology) and bedrock geology. Glacial geology is the material that the most recent glaciers deposited in the area. Bedrock geology is the material beneath the glacial geology.

2.3.1 Bedrock Geology

The bedrock units which underlie the Sister Bay planning area range in age from Precambrian to Silurian. The oldest are impermeable crystalline rock of Precambrian age at depths that average more than 1,500 feet below the ground surface. These are overlain by consolidated sedimentary rocks of Cambrian, Ordovician, and Silurian ages. The sedimentary rocks are solidified marine sediments that dip to the southeast at approximately 45 feet per mile. The rock formations deepen toward the southeast.

Silurian dolomite, which is the uppermost bedrock in the area, is exposed in outcroppings throughout the planning area but primarily along the bluffs near the Green Bay shoreline. This dolomite reaches in thickness up to almost 600 feet. Below the dolomite (commonly referred to as Niagara), is a shale formation known as Maquoketa. It reaches a maximum thickness of 450 feet. The Maquoketa Shale overlies a dolomite formation, termed Platteville-Galena, which is approximately 500 feet in thick. This rock formation overlies Cambrian sandstones which are 450 feet thick. All of these formations overlie Precambrian igneous rocks that form the bottom bedrock unit.

The Silurian or "Niagara" dolomite is perhaps the most notable and influential bedrock unit within the planning area. It makes up the landform known as the "Niagara Escarpment". The Niagara Escarpment is a cuesta which is a gently sloping plain that is terminated on one side by a steep slope (refer to Map 2.4 in the *20-Year Comprehensive Plan Report*). The gentle slope of the Niagara Escarpment dips to the southeast throughout much of the planning area but is somewhat difficult to observe due to glacial deposits. It does emerge, however, along the shoreline of Green Bay as a prominent feature. Because of the dolomite's proximity to the ground surface, especially in the western portions of the planning area, little agriculture, with the exception of orchard cultivation, is practiced. The Silurian dolomite is also the primary source of groundwater for the planning area.

2.3.2 Glacial Geology

The last glacial ice, which left the planning area approximately 10,000 years ago, modified the bedrock surface by scouring highlands and depositing this material in lowlands created by preglacial erosion. Three major types of glacial features are identifiable within the planning area: these include glaciolacustrine deposits, ground moraines, and end moraines (refer to Map 2.4 in the *20-Year Comprehensive Plan Report*). Glaciolacustrine deposits are composed primarily of sand, silt, and clay. These sediments were deposited by glacial predecessors of Green Bay and Lake Michigan. Shorelines of these early lakes fluctuated 20 to 60 feet above the present Lake Michigan level.

The eastern portion of the planning area is located upon glaciolacustrine deposits, indicating these areas were inundated by water several thousand years ago. Most of these deposits are located adjacent to Lake Michigan extending from the northeast to southeast area of the planning area. End moraines are glacial landforms composed of unsorted sand, gravel, cobbles, and boulders that were deposited at the terminus of the glacial ice. Acting as an enormous bulldozer, the ice pushed and mounded this material into substantial hills. The area of end moraine deposits is located primarily within the north central portion of the planning area.

Ground moraines, like end moraines, are composed of unsorted material; however, ground moraines are considerably thinner deposits and have an irregular, gently rolling surface as compared to the more pronounced topography of end moraines. Ground moraines are scattered throughout the planning area. Sand dunes are also present along the Lake Michigan side of the area and drumlins have been identified in the east central portion of the area. The dominant role glacial ice played in shaping the physical setting of the Liberty Grove area, both in terms of deposition, is evidenced by the various topographic features of the area.

2.4 SOIL LIMITATIONS

2.4.1 General Soils Description

Soils are grouped into general soil associations which have similar patterns of relief and drainage. These associations typically consist of one or more major soils and some minor soils. The general character of the soils of the planning area is largely the result of various types of glacial deposits overlying the Silurian dolomite. Within the study planning area, there are two general soils associations (refer to Map 2.5 in the *20-Year Comprehensive Plan Report*):

Carbondale-Seelyeville-Markey. Soils in this association consist of very deep, very poorly drained soils in outwash plains, lakes plains and glacial moraines. The Carbondale series consists of very deep, very poorly drained soils formed in organic deposits more than 51 inches thick on ground moraines, outwash plains and lake plains. These soils have moderately slow to moderately rapid permeability. Slopes range from zero to two percent.

The Seelyeville series consists of very deep, very poorly drained soils that formed in organic materials more than 51 inches thick. These soils are on glacial outwash plains, valley trains, flood plains, glacial lake plains and glacial moraines. They have moderately rapid to moderately slow permeability. Slopes are zero to 15 percent.

The Markey series consists of very deep, very poorly drained organic soils. They formed in herbaceous organic material 16 to 51 inches thick overlying sandy deposits in depressions on outwash plains, lake plains, flood plains, river terraces valley trains and moraines. Permeability is moderately slow to moderately rapid in the organic layers and rapid or very rapid in the sandy material. Slopes range from zero to two percent.

Longrie-Summerville-Kolberg. These soils are shallow to deep, level to moderately steep, well drained, and have a sandy loam or loam subsoil over sandy loam or fine sandy loam till or dolomite bedrock. The Longrie series consists of moderately deep, well drained soils formed in loamy glacial deposits underlain by limestone bedrock at a depth of 20 to 40 inches on ground moraines, glacial lake benches and terraces. Permeability is moderate. Slopes range from zero to 25 percent.

The Summerville series consists of shallow, well drained soils formed in loamy materials overlying limestone on ground moraines, end moraines, and glacial lake benches. Permeability is moderate. Slopes range from zero to 45 percent.

The Kolberg series consists of well drained soils moderately deep to limestone. These upland soils formed in thin, loamy deposits and the underlying moderately fine or fine textured glacial till. Permeability is moderately slow or slow. Slopes range from zero to 12 percent.

2.4.2 On-Site Sewage Disposal Systems

20-Year Comprehensive Plan Report Map 2.6 depicts soil limitations for septic tank absorption fields. These are subsurface systems of tile or perforated pipe that disperse effluent from a septic tank into the natural soil. If the degree of soil limitation is slight, soils are favorable for absorption fields, and limitations are minor and easily overcome. Soils with a moderate rating indicate that soil properties or site features are generally unfavorable for absorption fields, but limitations can be overcome by special planning and design. A severe rating indicates that soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required.

Soils that have slight limitations for absorption fields generally are well-drained and have sufficient depth before encountering bedrock or groundwater. They are located primarily in the western portion of the planning area, east of Old Stage Road. Soils with moderate and severe limitations generally have insufficient depths to bedrock or groundwater, percolate slowly, and are subject to flooding. Soils with moderate limitations are generally located throughout the planning area, while soils with severe limitations are encountered to the north and south of the Village in the planning area. Without consideration of the properties of these soils, on-site wastewater treatment systems may fail and collection systems may require expensive and frequent maintenance. Factors which are considered when evaluating soils for on-site waste systems include:

High or Fluctuating Water Table	When groundwater is near the soil surface, proper filtering cannot take place and often results in on-site systems either backing up into the home or contamination of groundwater. In addition, construction techniques used to de-water systems are costly.
Bedrock	Large stones or bedrock near the soil surface may hinder excavation and considerably increase the cost of construction. In addition, conventional on-site septic systems cannot function properly, which may result in wastewater passing through the cracked bedrock and contaminating the groundwater.
Soil Permeability	Permeability refers to the rate at which water flows through the soil. When passage in too rapid, groundwater can become polluted. If it is too slow, the soils can become saturated and effluent ponding may result.
Flooding	On-site waste disposal systems that are located within a floodplain can result in problems. As water levels rise during periods of flooding, the system become saturated and results in untreated solid and liquid waste being discharged into the ground or surface waters.

New technologies for private wastewater treatment systems are allowed under the revised COMM 83 health and safety code. The code will allow the use of soil absorption systems on sites with at least six inches of suitable native soil. The revised code also gives property owners the opportunity and flexibility to meet environmental performance standards with several treatment technologies. It allows for better planning and land use because it assures that every residentially-zoned lot can be used for the purpose intended by the local zoning board. The code will allow for infill development where it was not permitted previously due to lack of access to an improved septic system.

Housing and population density will likely increase due to the revised COMM 83 code. This in turn may increase the need for land use planning and integration of environmental corridors to address the adverse impacts related to development. Planning along with land use controls such as zoning, will help achieve more efficient development patterns.

2.4.3 Prime Agricultural Lands

Most of the land within the planning area is classified as prime agriculture land with minimal modifications. These lands are located all around the Village of Sister Bay, primarily away from the shoreline. Two classes of prime farmland are identified; those areas where all land is prime farmland and those areas that are considered prime farmland only where drained. The rest of the planning area is classified as not prime farmland. Map 2.7 in the *20-Year Comprehensive Plan Report* shows these areas of prime farmland.

2.4.4 Basements

Many of the soils in the planning area have severe limitations for dwellings with basements. According to the *Soil Survey of Door County*, severe limitations indicate one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

In the planning area, the main limitation for dwellings with basements is depth to bedrock or wetness. The soils in the planning area that have severe limitations are located along the in the southwestern portion of the planning area and in a band from the northwest to the southeast in the planning area north of the Village of Sister Bay. The rest of the planning area is rated either moderate or slight. These areas are mostly located in the central part of the planning area. Map 2.8 in the *20-Year Comprehensive Plan Report* shows these limitations.

2.5 TOPOGRAPHY

Topography of the planning area is controlled primarily by the underlying bedrock with two distinct types of relief. The first of these includes an area with relief in excess of 700 feet USGS. It is located within the extreme southwest portion of the planning area. This area is characterized by relatively level tops, similar to plateaus, with steep slopes to the west or north. Many of the steep slopes are near vertical bluffs, especially in the areas immediately adjacent to Green Bay shoreline (refer to Map 2.9 in the *20-Year Comprehensive Plan Report*). These areas are undoubtedly the most obvious in terms of topographic expression within the Village and planning area.

The second group of topographic features includes the eastern portions of the planning area. This large area is characterized by a flat to gently rolling land surface occasionally marked by small depressions. The area slopes gently to the southeast.

2.6 WATER RESOURCES

There are no lakes or named streams within the planning area; however, the western edge of the planning area is adjacent to the bay of Green Bay. The direction of precipitation runoff is primarily southeasterly towards Lake Michigan for the majority of planning area. Runoff into Green Bay is limited to the Village area and a zone along the coast.

2.6.1 Watersheds and Sub-Watersheds

The Village of Sister Bay lies within the Upper Door County watershed. Within this watershed there are four sub-watersheds: Lake Michigan watershed; Green Bay watershed; Three Springs Creek watershed; and the Ephraim Creek watershed.

The Lake Michigan watershed covers the eastern half of the planning area. The Green Bay watershed covers the Village and the western part of the planning area. Three Springs Creek covers the northeastern part of planning area and the Ephraim Creek watershed covers a small portion in the southwest part of the town of Liberty Grove. Map 2.10 in the *20-Year Comprehensive Plan Report* shows these sub-watersheds in the planning area.

2.6.2 Groundwater

In Wisconsin the primary sources of groundwater contamination are agricultural activities, municipal landfills, leaky underground storage tanks, abandoned hazardous waste sites, and spills. Septic tanks and land application of wastewater are also sources for possible contamination. The most common groundwater contaminant is nitrate-nitrogen, which comes from fertilizers, animal waste storage sites and feedlots, municipal and industrial wastewater and sludge disposal, refuse disposal areas, and leaking septic systems.

Groundwater within the study area is derived primarily from the Silurian dolomite aquifer. Well depths range from 60 to 700 feet with yields as high as 1,200 gallons per minute. Water from the Silurian dolomite is a very hard calcium magnesium bicarbonate type with varying concentrations of iron and nitrate. The dolomite has numerous joints and crevices which allow water to move relatively easily through the rock. Pollutants may also enter the groundwater supply via these fractures. The dolomite aquifer is recharged by surface seepage of direct precipitation and snowmelt.

2.6.3 Shoreland Corridors

Coastal areas within the study boundaries include the steep dolomite bluffs adjacent to the shoreline of Green Bay. There are approximately seven miles of Great Lakes shoreline within the planning area. This large amount of shoreline makes residential development very desirable.

2.6.4 Floodplains

Floodplains are often viewed as valuable recreational and environmental resources. These areas provide for storm water retention, groundwater recharge, and habitat for various kinds of wildlife unique to the

water. The planning area contains one small area of floodplain on the eastern edge of the planning area adjacent to Three Springs Creek (refer to Map 2.11 in the *20-Year Comprehensive Plan Report*). Development permitted to take place in these areas is susceptible to storm damage and can have an adverse effect on water quality and wildlife habitat. In addition, it can also result in increased development and maintenance costs such as: providing floodproofing, repairing damage associated with flooding and high water, increased flood insurance premiums, extensive site preparation, and repairing water related damage to roads, sewers, and water mains.

Some communities have special ordinances for buildings within the floodplain for remodeling and expanding. New expansions may have to be compliant to the rules of floodplain construction. As a result, the state of Wisconsin requires that counties, cities and villages adopt shoreland/floodplain zoning ordinances to address the problems associated with development in floodplain areas. Development in shoreland areas is generally permitted, but specific design techniques must be considered. Development in floodplain areas is strictly regulated and in some instances is not permitted.

For planning and regulatory purposes, the floodplain is normally defined as those areas, excluding the stream channel, that are subject to inundation by the 100-year recurrence interval flood event. This event has a one percent chance of occurring in any given year. Because of this chance of flooding, development in the floodplain should be discouraged and the development of park and open space in these areas encouraged. The authority to enact and enforce these types of zoning provisions in counties is set forth in Chapter 59.97 of the Wisconsin Statutes and Wisconsin Administrative Code NR 116. This same authority is also vested to cities and villages in Chapter 62.23 of the Wisconsin Statutes.

2.6.5 Wetlands

According to the Wisconsin DNR, wetlands are areas where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophilic vegetation. Other common names for wetlands are swamps, bogs, or marshes. Wetlands serve as a valuable natural resource. They provide scenic open spaces in both urban and rural areas. Wetlands act as natural pollution filters, makings many lakes and streams cleaner and drinking water safer. They act as groundwater discharge areas, and retain floodwaters. Finally they provide valuable and irreplaceable habitat for many plants and animals.

Because of the importance of wetlands, there are strict state and federal regulations regarding wetlands. Wisconsin Administrative Codes NR 115 and NR 117 fall under the jurisdiction of the Wisconsin Department of Natural Resources and mandate that shoreland wetlands be protected in both the rural and urban areas of the state. In the unincorporated areas, NR 115 provides the legislation to protect wetlands of five acres or more that are within the jurisdiction of county shoreland zoning ordinances. This wetland provision would be applicable in the Village of Sister Bay planning area.

NR 117 provides for the protection of wetlands within an incorporated community as provided by the Village's zoning ordinance and state and federal regulations. Wetlands within the planning boundaries include an extensive area along the eastern and southern boundaries and three small areas within the Village. Map 2.12 in the *20-Year Comprehensive Plan Report* shows the WDNR inventoried wetlands greater than two acres. It should be noted that all wetlands, no matter how small, are subject to WDNR and possible federal regulations if they meet the state definition of wetlands.

CHAPTER 3

POPULATION AND COMMUNITY GROWTH

This chapter summarizes the planning assumptions made regarding future service area characteristics for the Village of Sister Bay and the immediate surrounding area. To maintain consistency between individual planning efforts, the results of previous planning efforts were reviewed. The input received from local officials and Utility staff members was also considered and incorporated.

3.1 POPULATION

There is generally a close relationship between a community's population, total water consumption volumes and wastewater discharge flows. Future water usage can be expected to generally reflect future changes in service area population. Similarly, commercial, public, and industrial water consumption will also tend to vary proportionately with the growth of the community.

The Village of Sister Bay has experienced a steady increase in population since 1920. The Village's population according to 2000 Census Bureau data was 886. Since 1990, Sister Bay's permanent population grew an average of almost 3 percent per year. Table 3-1 summarizes past trends and projected future population of the Village of Sister Bay. Future population estimates were based on projections from the *20-Year Comprehensive Plan Report*. Table 3-2 summarizes population changes in Door County communities since the previous census was conducted.

Current projections indicate the Village's total permanent population is expected to increase to approximately 1,160 by the year 2015, and 1,400 by the year 2025. Population projections for the existing service area of the Liberty Grove Sanitary District and surrounding planning area were also developed. For this study, it was assumed the total permanent population served by the Sister Bay Water Utility by the year 2025 will be approximately 2,000.

3.2 EXISTING LAND USE

For this study, an existing Village zoning map and Town land use map were reviewed. From this existing data, the Comprehensive Utility Planning Action Committee prepared a Comprehensive Utility Planning map, previously illustrated in Figure 2-1. This map represents the nature and extent of existing development within the Sister Bay area, as well as planned land uses outside the Village and Sanitary District. Older sections of the Village consist largely of single family residential uses and the Central Business District. New single family and multi-family residential development in recent years has occurred throughout the Village and Sanitary District.

The Village of Sister Bay currently covers approximately 1,650 acres; LGSD No. 1 encompasses approximately 275 acres. Within this area, 13 land use categories have been identified and locations illustrated on Figure 2-1. A summary of the current land use/zoning area is presented in Table 3-3. A detailed study of the planning area land uses was performed by the Bay Lake Regional Planning Commission, and the findings were presented in the *20-Year Comprehensive Plan Report.*

TABLE 3-1

POPULATION TRENDS & PROJECTIONS

VILLAGE OF SISTER BAY, WISCONSIN

Year	Total	Percent Change
1920	190	---
1930	238	25.3%
1940	309	29.8%
1950	429	38.8%
1960	520	21.2%
1970	483	-7.1%
1980	564	16.8%
1990	675	19.7%
2000	886	31.3%
2005	**967**	**9.1%**
2010	**1,047**	**8.3%**
2015	**1,163**	**11.1%**
2020	**1,279**	**10.0%**
2025	**1,407**	**10.0%**

Notes

1. Historical Village population figures taken from Census Data.
2. Year 2005 population estimate based on data from Wisconsin Department of Administration.
3. Year 2010 - 2020 Village population projections based on forecasts from Village Comprehensive Plan.
4. Year 2025 Village population projection based on extrapolation of Comprehensive Plan forecasts.

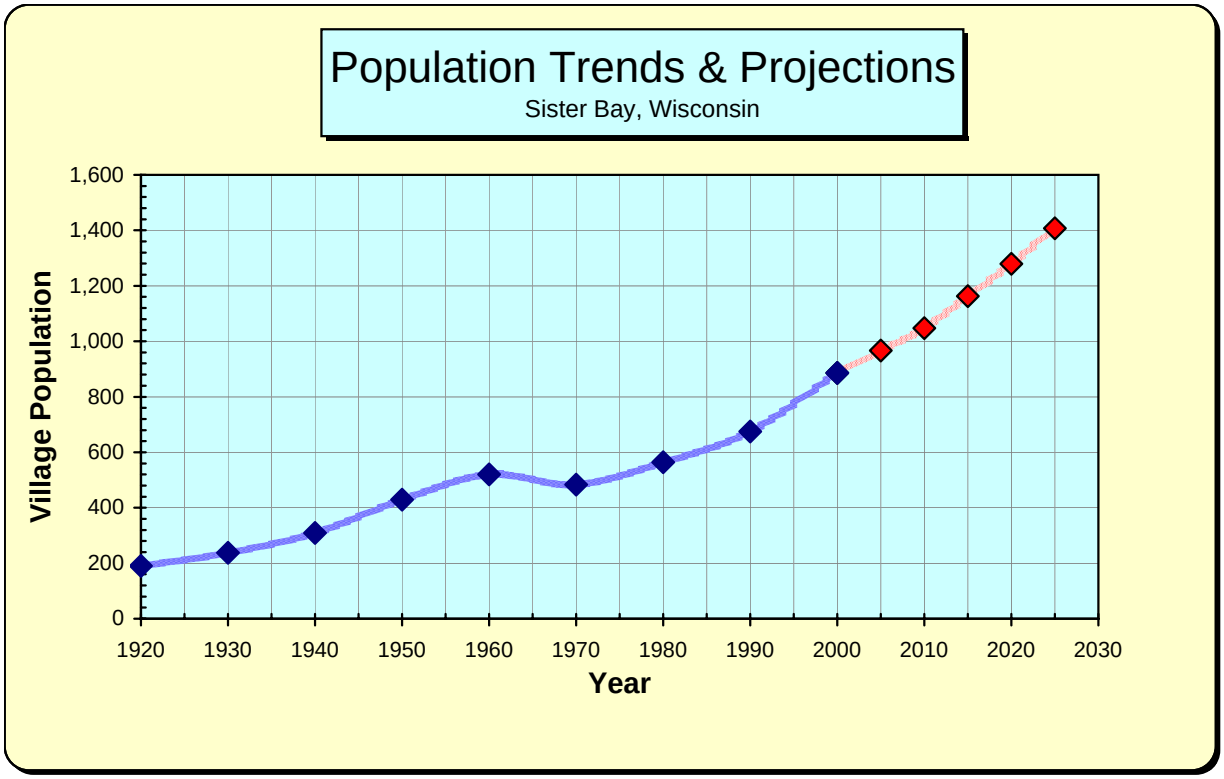

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TABLE 3-2

POPLUATION TRENDS
DOOR COUNTY COMMUNITIES
VILLAGE OF SISTER BAY, WISCONSIN

Community	2000	2004	Increase	Percent Change
Village of Sister Bay	***886***	***914***	***28***	***3.2%***
Door County				
City of Sturgeon Bay	9,437	9,696	259	2.7%
Village of Ephraim	353	356	3	0.8%
Village of Egg Harbor	250	261	11	4.4%
Town of Baileys Harbor	1,003	1,080	77	7.7%
Town of Gibraltar	1,063	1,156	93	8.7%
Town of Liberty Grove	1,858	1,958	100	5.4%
Town of Sevastopol	2,667	2,790	123	4.6%
Door County Total	**25,690**	**27,961**	**2,271**	**8.8%**
Wisconsin Total	5,363,715	5,532,000	168,285	3.1%

Source: U.S. Census Bureau & Wisconsin Department of Administration.

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TABLE 3-3

EXISTING LAND USE
SISTER BAY UTILITY SERVICE AREA
SISTER BAY, WISCONSIN

General Land Use Categories	*Existing Land Use (acres)*		
	Village of Sister Bay	Liberty Grove S.D. No. 1	**Total**
General Business	265.4	84.7	**350.1**
Downtown Business Transition	17.7	0.0	**17.7**
Downtown Business	25.9	0.0	**25.9**
Countryside	47.8	0.0	**47.8**
Institutional	81.9	0.0	**81.9**
Natural	0.0	12.0	**12.0**
Park/Recreational	51.7	0.0	**51.7**
Single Family/ Medium Density Residential	601.1	116.4	**717.5**
Multi-family/ High Density Residential	290.3	47.3	**337.6**
Large Lot/ Low Density Residential	202.3	14.3	**216.6**
Small Lot/ High Density Residential	5.8	0.0	**5.84**
ROW	62.0	0.0	**62.0**
TOTAL	**1,651.9**	**274.7**	**1,926.6**

Source: Acreages computed from Figure 2-1.

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3.3 FUTURE COMMUNITY GROWTH

In general, projected growth patterns for Sister Bay and the surrounding area are consistent with recent development trends, and reflect the Village's long-term land use planning goals and objectives as stated in the *20-Year Comprehensive Plan Report*.

The expected increase in residential development is directly related to previous projections of population growth. Commercial land use is also expected to increase with increases in population. There is minimal industrial activity that exists in the area, and no significant changes are anticipated in the future for the planning area. The growth of the utility planning area will be a function of changes in population and commercial activity and employment opportunities in Sister Bay as well neighboring Door County communities.

The Comprehensive Utility Planning Area identified in Figure 2-1 encompasses approximately 4,000 acres. Over one-half of this acreage is currently located outside the Village and LGSD No. 1 boundaries. The vast majority of this outlying area (90 percent) is currently planned to be developed in the future as low to medium density residential or countryside land uses. A breakdown of the planned future land uses of the outlying planning area is summarized in Table 3-4.

3.4 FUTURE UTILITY SERVICE AREA

Figure 2-1 identified the boundaries of the year 2025 Sister Bay utility service planning area. The utility service area is defined as the area in which the Village of Sister Bay is anticipated to provide water and sewer service during the planning period. Future service area expansion is projected to occur primarily in the northern and southern areas of the Village.

The outer boundary of the future utility service area illustrated in Figure 2-1 was used for this study to identify the area which is expected to develop over the next 20 years and require Sister Bay water and sanitary sewer utility service, as well as be incorporated into a comprehensive storm water management area.

3.5 SUMMARY

This chapter summarizes the primary assumptions regarding future growth of the Village of Sister Bay utility service planning area. The present and future needs and characteristics of the identified service area will have a direct impact on the need for expansion of water, sanitary and storm sewer facilities. Therefore, the conclusions discussed in this chapter were used as a primary basis for projecting future water needs, evaluating the adequacy of existing utility system facilities, and identifying needs for future municipal utility system expansion.

TABLE 3-4

CURRENT PLANNED LAND USE
COMPREHENSIVE UTILITY PLANNING AREA
SISTER BAY, WISCONSIN

General Land Use Categories	*Existing and Proposed Planning Area Land Use (acres)*			
	Village of Sister Bay	Liberty Grove S.D. No. 1	Outlying Area	**Total**
General Business	265.4	84.7	32.5	**382.6**
Downtown Business Transition	17.7	0.0	0.1	**17.8**
Downtown Business	25.9	0.0	0.0	**25.9**
Countryside	47.8	0.0	412.0	**459.9**
Institutional	81.9	0.0	5.5	**87.4**
Industrial	0.0	0.0	27.7	**27.7**
Natural	0.0	12.0	26.3	**38.3**
Park/Recreational	51.7	0.0	1.0	**52.7**
Single Family/ Medium Density Residential	601.1	116.4	442.1	**1,159.6**
Multi-family/ High Density Residential	290.3	47.3	97.1	**434.6**
Large Lot/ Low Density Residential	202.3	14.3	1,000.4	**1,217.0**
Small Lot/ High Density Residential	5.8	0.0	0.0	**5.84**
ROW	62.0	0.0	0.0	**62.0**
TOTAL	**1,651.9**	**274.7**	**2,044.5**	**3,971.1**

C:\Documents and Settings\pplanton\My Documents\Sister Bay copy\[table3-3.xls]Table 3-4