

SKAGIT COUNTY
SEWER DISTRICT NO. 2

COMPREHENSIVE
SEWER PLAN

February 2008



COMPREHENSIVE SEWER PLAN

SKAGIT COUNTY SEWER DISTRICT NO. 2 Skagit County, Washington

February 2008

CHS ENGINEERS, LLC

This report was prepared under the direction of a
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SEWER DISTRICT NO. 2**

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SKAGIT COUNTY SEWER DISTRICT NO. 2

COMPREHENSIVE SEWER PLAN

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SUMMARY AND RECOMMENDATIONS

SUMMARY AND RECOMMENDATIONS

SUMMARY

Skagit County Sewer District No. 2 was formed in 1971 as a means of planning for the installation, operation, and maintenance of a sanitary sewer system to protect the environmental quality of Big Lake as the recreational asset that it had become. Soil conditions, high water tables, and the small size of many shoreline lots make the area unsuitable for successful onsite sewage disposal systems. The lake itself, until the summer of 1993, was the primary source of water supply for many of the residences surrounding the lake.

The original *Comprehensive Sewerage Plan* was developed in 1972. Construction of the majority of the sewer system facilities was completed between 1978 and 1980. The system consists of an 8-inch, 10-inch, and 12-inch collector system along both sides of the lake including a series of lift stations and force mains. Near the north end of the lake, a rotating biological contactor (RBC) type sewage treatment plant was constructed. Following treatment, the effluent is pumped to the Skagit River for discharge. The system includes nearly 20 miles of pipe. The comprehensive plan was **updated in 1995. In response to annexations in 1995 and 1998, two "additions and betterments" were adopted by the District** to address the impacts of these two small annexations.

The purpose of this report is to update the 1995 Comprehensive Plan and develop recommendations for the orderly development and upgrade of the sewage collection and treatment system for the next ten years and consideration of ultimate development **in the District's sewer service area.**

For this plan update, a 1,144-acre area adjacent to Big Lake was studied. The area generally includes that area which is or is planned to be served by public sewer within the current District boundary—the **"service area" (approximately 974 acres, excluding the area zoned for agriculture).** The plan also considers the impact on planned facilities of about 170 acres of potential additional area. These study areas were selected based **on the District's outlook regarding the likelihood of future development adjacent to the District boundary** and includes the Overlook Crest area and an area currently zoned as Rural Reserve but which is narrowly sandwiched between the Big Lake Rural Village and the Mount Vernon Urban Growth Area (UGA). Although the effects of serving these areas are considered in this plan, sewer service cannot be provided to these study areas until such time as the zoning is changed to a designation other than rural and/or natural resource land, in the absence of an existing environmental health problem.

The District presently provides sewer service to approximately 741 (through September 2006) connections. At the present time, up to 1,316 existing and potential connections

have been identified within the District. This includes undeveloped lots in the two existing ULIDs, paid connections, letters of availability, developer extensions in progress, and other ongoing coordination of future service with the District. Seventy-five potential additional connections have been identified outside of the District, which are identified as study areas in this comprehensive plan. The build-out for the District and study area connections assumes a density consistent with current zoning or possible future rezoning that would be compatible with the surrounding zoning. Based on recent growth rates in Mount Vernon and unincorporated Skagit County and these potential additional connections, the sewage treatment plant should be expanded and upgraded to serve approximately 1,316 to 1,391 residential connections. An additional 90 commercial and school residential-customer-equivalents (RCEs) are presently served or anticipated for a buildout potential of about 1,481 RCEs.

The 2000 U.S. Census data indicated that approximately 1,046 people lived within the service/study areas. Population projections through 2025 were developed in 2003 and are being used by Skagit County to update their comprehensive plan. However, the predicted rate of growth—to 1,329 people in 2025—is not consistent with the rate of new **connections within the District. Thus, the District's recent historical rate of build-out** at approximately 6 percent per year has been used to develop this comprehensive plan.

For this comprehensive sewer plan update, the 1,144-acre service/study areas have been defined as the area within the present District boundary, predominantly designated as the Big Lake Rural Village by Skagit County, as well as two areas that might logically request annexation to the District during the period covered by this comprehensive plan because of their close proximity to District facilities and the rate of nearby development (see Figure 2.3). The District recognizes that extension of the public sewer system beyond the service area into rural, agricultural and forestry lands would not likely be approved by Skagit County, yet these areas are included due to their proximity and potential future need with the 20-year planning period.

The Capital Improvement Program (CIP) is presented in Chapter 7. The CIP includes recommendations for wastewater treatment plant expansion and several miscellaneous improvements, and improvements and upgrades for the ten District lift stations and force mains, as well as miscellaneous improvements in the collection system.

The most significant project in the CIP is the wastewater treatment plant upgrade. An Engineering Report evaluating upgrade options was prepared concurrently with this Comprehensive Sewer Plan. The Engineering Report concludes that the District should immediately begin to upgrade the facility from an RBC-type plant to an activated sludge process with clarifiers. The upgrade is necessary to maintain capacity for existing and anticipated connections and to meet anticipated ammonia-removal requirements in the next NPDES permit.

Additionally, as summarized in the Engineering Report and as introduced in a feasibility study, the District and Skagit County are considering a joint Nookachamps Creek

instream flow mitigation project. The mitigation project would add process units to the WWTP upgrade for higher-quality effluent (similar to Class A reclaimed water) to allow direct discharge to nearby Nookachamps Creek.

RECOMMENDATIONS

As a result of this study, it is recommended that Skagit County Sewer District No. 2:

1. Hold a public hearing to provide an opportunity for public input to the plan.
2. Adopt and implement the comprehensive sewer plan.
3. Submit this report to Skagit County for review and approval.
4. Submit this report to the Washington State Department of Ecology for review and approval.
5. Develop the necessary plans and seek financial assistance for construction of the identified sewer improvement projects.
6. The general facilities portion of the connection charge should be revised to include the projects planned for the next ten years as discussed in Chapter 7.
7. Implement the Capital Improvement Program.
8. The Capital Improvement Program should be reviewed and updated as appropriate (at least every two years).

CHAPTER 1 – INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 GENERAL

This report presents the results of studies undertaken to develop and update the comprehensive sewer plan for Skagit County Sewer District No. 2 in the Big Lake area southeast of Mount Vernon, in northwestern Washington. The findings, conclusions, and recommendations contained herein address aspects of **collection, treatment, and disposal of sanitary wastes for the District's present and future service area**. Figure 1.1 indicates the general location of Skagit County Sewer District No. 2.

This plan was prepared in accordance with the requirements for general sewer plans as set forth in WAC 173-240.

1.2 AUTHORIZATION

The Commissioners of the Skagit County Sewer District No. 2 authorized CHS Engineers, LLC, to prepare an updated Comprehensive Sewer Plan. The original plan was prepared by URS/Hill, Ingman Chase and Company in 1972 and was updated by CHS Engineers, Inc., in 1995.

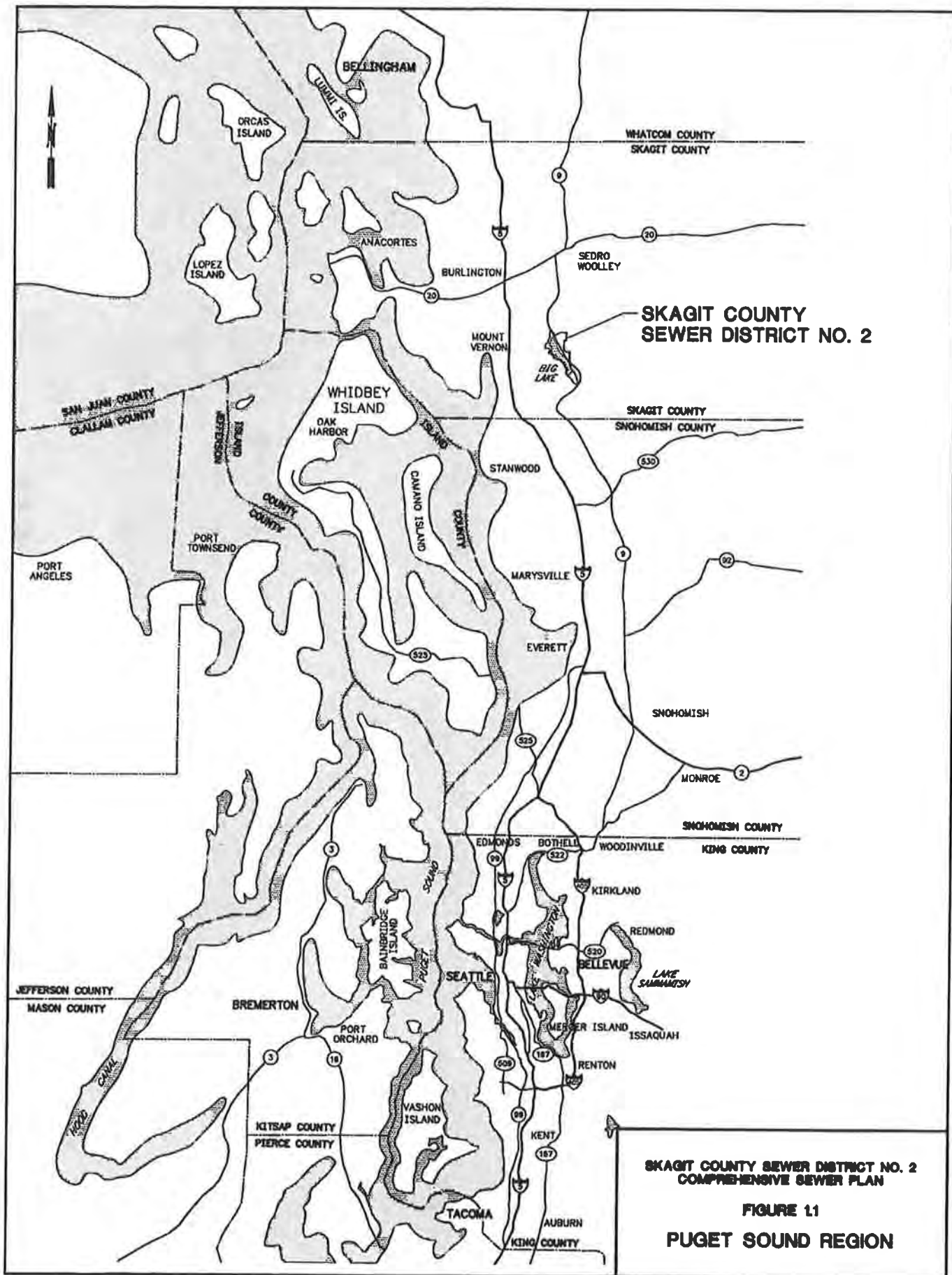
1.3 PURPOSE AND SCOPE

The purpose of this study is to develop comprehensive long-range plans for the construction of sanitary sewer facilities in the service area. The comprehensive plan includes recommendations for collection and treatment facilities, together with cost estimates and recommended construction programs. The plan for these facilities is in compliance with applicable requirements of the various regulatory agencies.

The objectives and scope of this plan are as follows:

- A. Review and analyze available documents concerning the study area.
- B. Prepare an engineering study of the present and future needs of the area and update the comprehensive sewer plan.
- C. Summarize the evaluation of the wastewater treatment plant and recommend expansion and/or modification of the plant as presented in a separate engineering report (prepared concurrently with this plan).

- D. Prepare cost estimates for the various components of the comprehensive plan along with recommended construction to meet immediate and foreseeable future requirements of the other properties adjacent to the study area.
- E. Investigate the most feasible methods of implementing the comprehensive plan in order to provide for financing, maintenance, and operation of the system.



CHAPTER 2 – SERVICE AND STUDY AREAS

CHAPTER 2

SERVICE AND STUDY AREAS

2.1 GENERAL

Big Lake is located on the west side of State Highway 9 approximately five miles east of the City of Mount Vernon. Skagit County Sewer District No. 2 encompasses the area immediately surrounding and adjacent to the lake. The **District's treatment plant outfall extends nearly six miles west to the Skagit River.**

The lake is generally surrounded by moderate to steep forest lands. Much of the area adjacent to the lake has slopes gentle enough to provide sites suitable for residential or recreational development. Easy access to the highway and the short distance from Mount Vernon make the area very desirable for future development of residential properties as well as continued development of the area for recreational purposes.

The lake and its tributary streams are located on Nookachamps Creek. Lake McMurray forms the headwaters of Lake Creek, which flows northerly to the south end of Big Lake. Big Lake is the headwaters of Nookachamps Creek, which continues northerly through predominantly agricultural lands to join the Skagit River. The river flows generally westerly and discharges into Skagit Bay, which is a shallow arm of upper Puget Sound.

2.2 DISTRICT HISTORY

Skagit County Sewer District No. 2 was organized in accordance with State statutes, with election of the first commissioners on August 3, 1971. In January of 1972, the commissioners authorized the engineering studies required to prepare the original comprehensive sewerage system plan.

The District was formed in response to increasing concerns about the health and environmental conditions as a result of development adjacent to Big Lake. At the time, there were no publicly-owned sewage collection or treatment facilities in the area. Waste disposal was primarily by septic tanks and drain fields. These systems affected the water quality in Big Lake, which was the primary water source for the residents. Health authorities had begun to curtail new construction. Soil conditions, high water table, and small lots all contributed to the need for a regional sewage collection and treatment system.

The original comprehensive plan was completed in September 1972. The plan considered alternatives for both collection and treatment. The original study area

included the natural drainage area tributary to Nookachamps Creek south of the outlet from Big Lake, including Devil's Lake and Lake McMurray.

Mechanically aerated waste stabilization ponds with an interim outfall to the east fork of Nookachamps Creek were originally recommended for treatment and disposal. A collection system of 8-inch, 10-inch, and 12-inch sewers and lift stations was proposed to serve the area immediately adjacent to Big Lake.

The first District comprehensive plan was adopted by the Board of Commissioners on September 19, 1972. By the same adopting resolution, the commissioners called for a special election to authorize the sale of Sewer Revenue Bonds to finance the implementation of the comprehensive plan recommendations.

Construction of the existing collection system and treatment plant began in the summer of 1979. The treatment plant consists of two rotating biological contactor units, conventional clarifiers, and an aerobic digester. Its original capacity was for a design population equivalent of 2,000, an average flow of 0.20 million gallons per day (mgd), and a peak flow of 0.82 mgd. The treatment plant began operation in the fall of 1980. The effluent pump station discharges to the Skagit River south of Mount Vernon via a 5.89 mile-long 10-inch force main and gravity outfall system

The collection system serves approximately 500 developed acres and includes approximately 51,300 feet of 6-inch, 8-inch, 10-inch, and 12-inch gravity sewer main, approximately 21,200 feet of 2-inch through 12-inch force main, nine lift/pump stations, and approximately 58 grinder pumps. Expansion of the system has consisted of several developer extensions, especially since the early 1990s.

Two annexations occurred on the easterly border of the District in 1985 and two annexations occurred on the west side of the District in 1995 and 1998. The most recent annexation (2007) added a five-acre parcel on the easterly border. The District boundary presently encompasses approximately 1,149 acres of land area. Development of residential properties began at the shoreline of Big Lake and has progressed slowly outward. In recent years, development activity and interest has increased, especially along Highway 9 and in Walker Valley east of Big Lake.

2.3 TOPOGRAPHY

Topographic features are shown on Figure 2.1. Big Lake water level is about elevation 83. The area along the river at the south end of the lake is low and generally swampy. The ground on the east side of the lake rises gradually to an

elevation of about 400 feet. The west side rises steeply to elevations of 1,200 feet or more.

2.4 WATER SYSTEM

Potable water was, until 1993, obtained from private wells, Big Lake itself or tributary creeks, or from private water companies. The Skagit County Health Department and the Washington State Department of Ecology maintain drilling log records for wells drilled in the area; however, the records are generally incomplete and do not show the exact location of each well.

Because some water users were having problems with quality and quantity of potable water, Public Utility District (PUD) No. 1 of Skagit County extended water service to the Big Lake area. Construction of Local Utility District (LUD) No. 16 began in the summer of 1993 and supplies water to nearly the entire sewer district and adjacent area except for the far southerly end. The extent of the water system is shown in Figure 2.2.

PUD No. 1 obtains the water from its watershed east of Big Lake in the area of Gilligan and Salmon Creeks where it is collected and treated. The PUD also diverts water from Mundt and Turner Creeks. The water is transported to storage reservoirs on the east and west sides of the lake and, from there, distributed to the water users. The system provides one pressure zone with about 120 psi at the lake level and a high water level at elevation 355.5.

2.5 SOILS

Fifteen different soil groups can be found in the area adjacent to Big Lake. A detailed list of the soils can be found in the Soil Survey of Skagit County Area, Washington, U.S.D.A., September 1989.

The eastern area can generally be described as well-drained gravelly loams. Instances of clay deposits increase near the shoreline. The steeper areas show high percentages of cemented till forming the substratum.

The southern area is relatively flat and ranges from muck to gravelly loams as the slope increases.

The northern and eastern areas contain larger areas of clayey, silty loams and clayey gravel. Cemented till can be found on the steeper slopes.

2.6 HYDROLOGY AND SURFACE WATER

Big Lake and its tributary streams are located within the Nookachamps Creek Basin. Lake McMurray is about three miles upstream (south) of Big Lake and

drains via Lake Creek to Big Lake. The total drainage basin, including the Big Lake area, is about 14,500 acres. The basin consists of mostly forested land. North of the District, Nookachamps Creek flows northerly through predominantly agricultural lands to join the Skagit River. The river flows generally westerly and discharges into Skagit Bay, which is a shallow arm of upper Puget Sound.

Local drainage systems within the District's study area consist primarily of natural drainage courses, roadway ditches, and culverts consistent with a rural setting. There is very little control of storm water other than transportation of runoff to the lake and its tributary streams. The 100-year floodplain for Big Lake extends beyond the shoreline approximately 250 feet at the most extreme location. The floodplain is up to 1,800 feet wide at the creek at the south end of the lake and is up to 1,000 feet wide immediately north of the lake.

Average monthly precipitation totals range from a low of 1.0 inch in August to a high of 4.8 inches in November. Monthly precipitation for the months of June through September range from 1 to 2 inches; for October through January, more than 3 inches is received; and between February and May, the monthly rainfall total is between 2 and 3 inches.

Big Lake is included in the Skagit County Shoreline Management Master Program, which is comprised of Skagit County Code 14.26 and the Shoreline Area Designation Map. The lake itself is designated as an Aquatic Shoreline Area; the shoreline is designated Rural Residential, and the area south of the lake is designated as a Conservancy Shoreline Area. The Shoreline Management Master Program indicates that sewer system lines, interceptors, and pump stations are not shoreline-dependent facilities and should not be located on shorelines unless it can be shown that non-shoreline alternatives are infeasible.

2.7 WATER QUALITY

The Skagit County Health Department no longer monitors the water quality of Big Lake because there is no established public beach.

The area immediately adjacent to the lake is presently served by the District's sewer system and this area is the most densely developed. Beyond this narrow lakeshore area, individual onsite sewage disposal systems are still used by residences not served by the public sewer system. Neither the Skagit County Health Department nor the Permit Section of the Skagit County Planning and Development Services were aware of any significant or ongoing problems with onsite sewage disposal systems. At the present time, the area away from the lakeshore is not densely developed where the District system does not serve, with the exception of the area along Little Mountain Road

Lake McMurray is periodically sampled in two locations with no water quality problems evident to date.

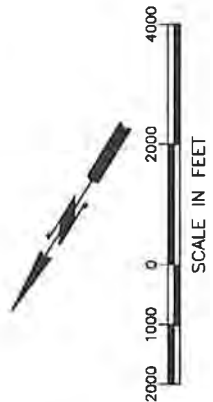
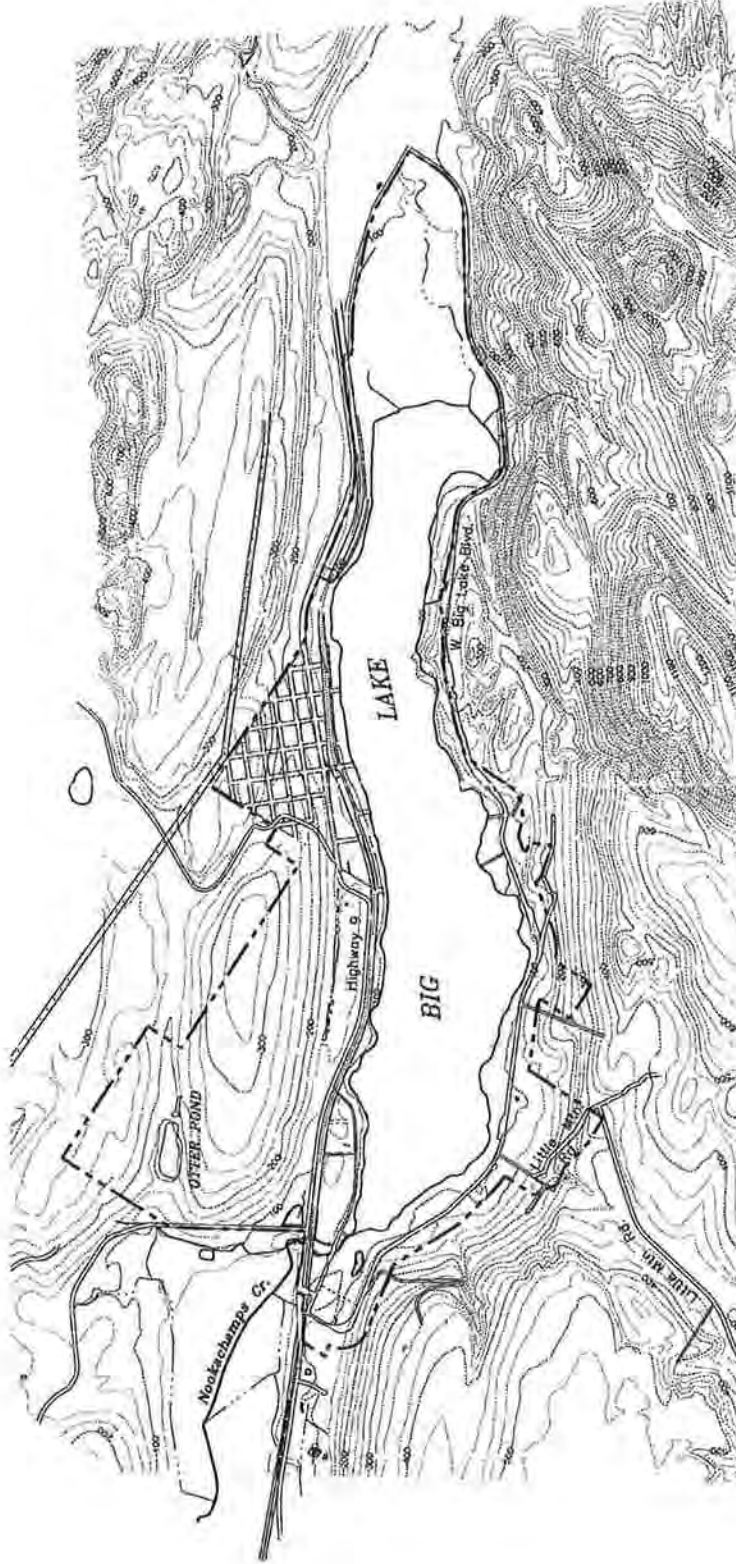
The Skagit County Water Quality Monitoring Program (public works) monitors water quality in the Nookachamps basin.

2.8 SERVICE AND STUDY AREAS

In addition to the area within the sewer district, it is appropriate to consider the area within the natural drainage basin that might be affected by the construction of sewer facilities. The ultimate sewer planning area constituting the entire natural drainage basin for Big Lake is that area which also includes the Lake McMurray and Devil's Lake areas. **This encompasses an area of about 14,500 acres of land.** There has been no activity or discussion of extending sewer service south of Big Lake to the Devil's Lake or Lake McMurray drainage basins in the foreseeable future; therefore, these areas are not included as study areas at this time.

For this comprehensive sewer plan update, the sewer service area is defined as **that area that falls within the District's boundary except for that area zoned as Agricultural Natural Resource Lands** (approximately 175 acres at the south end of Big Lake). The study areas are defined as areas outside of the current District boundary as shown on Figure 2.3. On the east side of the District, the study area includes an area of property ownership split by the current District boundary. This area is part of a larger collection of properties for which County approval has been solicited for development. The property owners desire public sewer service from the District. The District received a petition for annexation of this area in July 2007. The annexation was denied by the Washington State Boundary Review Board for Skagit County in February 2008. On the west side, a portion of Rural Reserve zoning is included because it is narrowly sandwiched between the Rural Village and the Mount Vernon Urban Growth Area. Extension of public sewer service into rural, agricultural, and forestry lands is not allowed by state law, county policy and codes (except under specifically defined existing environmental and public health conditions) and, therefore, such service is not considered in this plan with the exception of the two study areas which recognize that a land use change would first be required prior to any extension of service. The service and study areas encompass approximately 1,144 acres. Due to environmental and land use constraints, sewer service is not planned for the Agricultural portion of the District.

Although the described areas outside the District boundary are identified as **"study areas," the District cannot extend public sewer service to such areas unless such is allowed under state law, case law, county code and/or policy. Presently these areas are considered "rural" and as such, in the absence of an existing environmental problem, cannot be served by public sewer.**



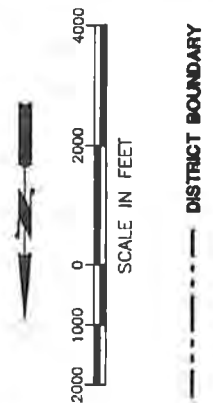
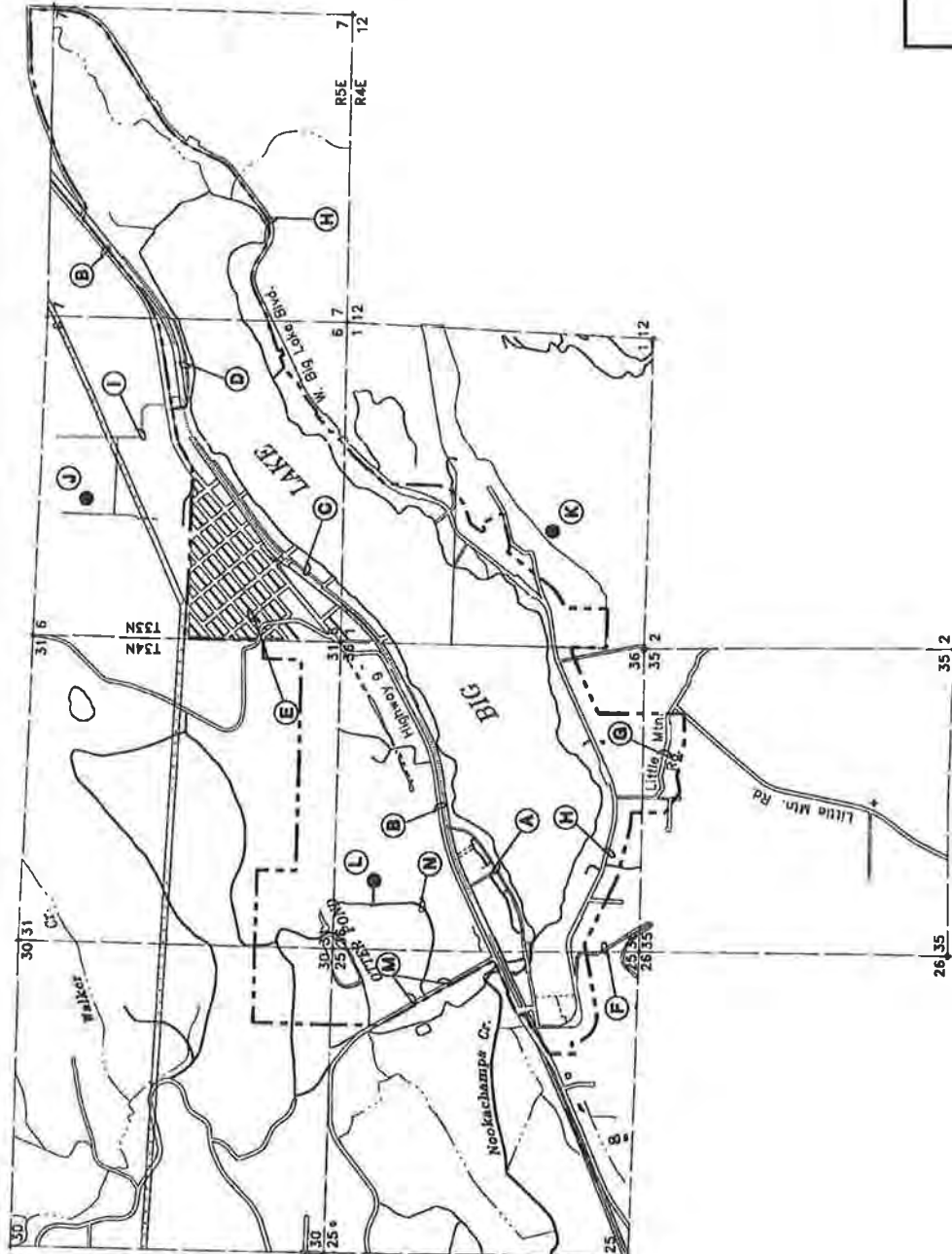
SCALE IN FEET

CONTOUR INTERVAL = 25 FEET

----- DISTRICT BOUNDARY

SKAGIT COUNTY SEWER DISTRICT NO. 2
COMPREHENSIVE SEWER PLAN

FIGURE 2.1
TOPOGRAPHY

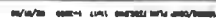


WATER SYSTEM

ITEM	SIZE	LOCATION
A	8"	LAKEVIEW BOULEVARD
B	8"	HIGHWAY 9
C	8"	WESTVIEW ROAD
D	8"	SULPHUR SPRINGS
E	8"	MONTBORNE ROAD
F	8"	MOUNTAIN VIEW ROAD
G	8"	LITTLE MOUNTAIN ROAD
H	8"	WEST BIG LAKE BLVD.
I	12"	BRIARWOOD COURT
J	96,000 GAL	EAST SIDE RESERVOIR
K	125,000 GAL	WEST SIDE RESERVOIR
L	600,000 GAL	GLUNDERSON RD. RESV.
M	12"	OTTER POND DRIVE
N	12"	OTTER POND LOOP

SKAGIT COUNTY SEWER DISTRICT NO. 2
COMPREHENSIVE SEWER PLAN

FIGURE 2.2
PUD NO. 1 WATER SYSTEM



SERVICE AND STUDY AREAS

CHAPTER 3 – POPULATION AND LAND USE

CHAPTER 3

POPULATION AND LAND USE

3.1 INTRODUCTION

In order to project wastewater facility needs over a given period of time, it is necessary to establish reasonable estimates of the probable usage of these services. This can be accomplished in most service areas by a study of the population trends and land uses which impact sewage facility usage.

Skagit County Sewer District No. 2 expands its boundaries as annexations occur and expands its collection system/service area as extensions are completed. Scheduling of future system expansions and extensions is dependent upon the particular property owners involved and cannot be accurately predicted. The District does not have plans to expand its collection system unless initiated by private property owners. **Based on Skagit County's Comprehensive Plan and currently designated Rural Village boundary, the District's boundary is not expected to change, but growth is occurring within the existing boundaries.** The area discussed in this study has been expanded to include two areas that might logically request annexation to the District during the period covered by this comprehensive plan because of their close proximity to District facilities and the rate of nearby development. This plan recognizes that prior to any District expansion or service extension a land use change for the areas considered would first need to occur (except where allowed to address an existing environmental health problem).

3.2 GROWTH MANAGEMENT

Washington State's Growth Management Act (GMA)—Title 36 Revised Code of Washington, 1990, and subsequent amendments—was created to avoid unplanned and uncoordinated growth, which posed a threat to the environment, sustainable economic development, and the quality of life in Washington. It mandated that Skagit County develop a comprehensive plan on the basis of its growth rate. The County's comprehensive plan under GMA was adopted in 1997. In the plan, Big Lake was designated as an independent, non-municipal UGA. An appeal to the Western Washington Growth Management Hearings Board led to passage of a County ordinance designating Big Lake as a Rural Village.

Under the Rural Village designation, the County recognizes the rural nature of the surrounding area and protects it from sprawling, low-density development. According to the 1999 Ordinance No. 17570, the Rural Village boundaries were to be drawn based primarily upon the built environment that existed on or before

July 1, 1990. The County's comprehensive plan has been amended incrementally since 1997 and includes the designation of Big Lake as a Rural Village. As such, new development in Big Lake is limited to one dwelling unit per acre. In 1999, portions of the property associated with the Overlook Golf Course were included in the Rural Village designation but its density was restricted to one dwelling unit per five acres even though this area is within the District boundary. In 2007, the five-acre restriction was lifted provided that several conditions are met for any lots created at a density greater than 1 unit per 5 acres including the connection to a public sewer system. The Rural Village zoning for Big Lake is shown on Figure 3.1.

Every seven years, the GMA requires Skagit County to review and update the entire comprehensive plan and development regulations to ensure compliance with the act.

3.3 DISTRICT POPULATION

According to the U.S. Census, the County population increased 29.5 percent between 1990 and 2000, which corresponds to an annual average growth rate of 2.6 percent. **The state's Office of Financial Management (OFM), as mandated** by the GMA, developed low, medium, and high population forecasts for each county to use in their 20-year planning horizon. Choosing a growth rate within that range for comprehensive planning purposes is left to local governments. A study for the County performed by Berryman & Henigar, Inc., in association with J. McCormick in December 2003 developed the rate that Skagit County and the cities therein are using in the 2007 comprehensive plan updates. The rate was developed by considering data from the 2000 census and data through mid-2003, during which time population growth slowed due to an economic downturn. The study forecasted that population in the urban and rural areas of the County would increase at a rate 2 percent below the midpoint of the OFM low and medium forecasts through 2025. The study noted that, historically, growth increases more rapidly in urban areas and assumed that a similar trend would continue, assigning 80 percent of growth to urban areas and 20 percent to rural areas.

Although the U.S. Census actually breaks out an area entitled Big Lake Census Designated Place, that area encompasses parts of the Mount Vernon UGA and thereby overstates the Big Lake population. The U.S. Census block mapping and data set features were used to estimate the population of the area encompassed by the sewer district (which is also, for the most part, the Rural Village designation). According to the 2000 census, approximately 957 people **reside within the District's boundary and another 89 reside in the study areas.** Using data from the census and the population study (Berryman et al, 2003), the projected 2025 population for the District and combined service/study areas would be 1,216 and 1,329, respectively, as shown in Table 3.1. The

corresponding annual population growth rate in the service/study areas is just under one percent. As discussed below, this is much less than the historical and forecasted rate of increase in connections to the sewer system.

**TABLE 3.1
POPULATION TRENDS**

Jurisdiction	Year					
	2000 ¹	2005 ³	2010 ³	2015 ³	2020 ³	2025 ^{2,3}
Skagit County	102,978	109,309	117,715	126,953	138,421	149,080
Urban	68,868	73,993	80,637	87,995	97,066	105,750
Rural	34,110	35,783	37,537	39,378	41,309	43,330
SCSD#2 ³	957	1,004	1,053	1,105	1,159	1,216
Service/Study Areas ³	1,046	1,097	1,151	1,208	1,267	1,329

¹ 2000 census data

² Population trends study (Berryman et al, 2003)

³ Data for 2005, 2010, 2015, and 2020 and the 2025 data for Skagit County Sewer District No. 2 and the study areas are interpolated or extrapolated

3.4 ZONING

The existing District boundary is reflected in local zoning and regulations developed under the GMA. The primary zoning designation within the District's boundary is Rural Village Residential. Two small pockets of Rural Village Commercial zoning are encompassed within the designated residential area. The District's boundary also incorporates other zoning including Rural Reserve, Rural Resource—Natural Resource Lands within the northeast boundary, and Agricultural—Natural Resource Lands at the southeastern tip of the District bordering the southern shore of Big Lake. Beyond the District's boundary, the zoning is primarily rural, secondary forest, or agricultural except where the District nears the Mount Vernon UGA at its northwest boundary. The small strip of land between the District boundary and the Mount Vernon UGA has been included as a study area for this plan as has another small area on the eastern boundary. Figure 3.1 depicts zoning within and adjacent to the District's boundary.

Actual land use is almost exclusively residential. Commercial establishments are presently limited to a bar-and-grill and small general store. As the area continues to develop, commercial needs are expected to increase to provide additional services. Public use facilities near the north end of the lake are a fire station, school, and the District's treatment plant.

Skagit County Sewer District No. 2 is limited by the parameters set forth in the zoning regulations, which restrict utility connections to those that can be made

within the existing District and Rural Village boundaries. All development outside these boundaries is required to use on-site septic systems. Future connections **are, thus, limited to currently platted lots and parcels within the District's** boundary and new development at the density prescribed by the regulations. Future annexations are possible and would most likely be associated with a rezoning designation of Rural Village. Table 3.2 shows the permitted zoning densities for those areas within the District boundary that are not yet platted.

**TABLE 3.2
ZONING DENSITIES**

Zoning District	Residential Densities
Rural Village Residential (RVR)	1 per acre (with public water)
Rural Village Commercial (RVC)	N/A
Rural Reserve (RRv)	1 per 10 acres (2 per 10 acres with CaRD*)
Agricultural – Natural Resource Lands (Ag-NRL)	1 per 40 acres
Rural Resource – Natural Resource Lands (RRc-NRL)	1 per 40 acres (4 per 40 acres with CaRD*)

*CaRD: Conservation and Reserve Development—the clustering of single-family dwellings on small lots to preserve the rural character of the remaining acreage.

3.5 POPULATION DENSITY AND CONNECTIONS

The 2000 census indicates that the average County household size is 2.5 persons. Using the 2000 data for Census Blocks and Tracts in the Big Lake area, the population per dwelling unit (p/du) ranges from 1 p/du to about 5 p/du. Most are in the range of 2.14 to 3.1 p/du. The Skagit County Forecasting Study used 2.5 p/du, which will also be used for purposes of this analysis. However, the density per connection is approximately 2.0. This figure may not be representative for two reasons. First, it is known, but not quantified, that many residences in the District are not connected to the sewer system. Additionally, the census did show a significant number of unoccupied housing units. Big Lake is currently experiencing development at a rate that is not typical for other rural areas of Skagit County. Since 1997, a typical year of development sustains a connection rate of 5 to 7.5 percent. Development in 2006 through 2009 is expected to generate an unusually high annual increase in connections due to the completion of the Nookachamps Hills development. If the entire service/study areas were developed as allowed by zoning and existing plats, the number of residential connections would be approximately 1,391 (1,316 within the existing District boundary). If the population served by these connections is calculated using the average 2.5 persons per dwelling unit, 3,420 people would reside in the service/study areas at build-out—more than 2,000 over the **projected 2025 population for this “rural” area.**

Based on the analysis of available lots, full development of residential land is estimated to result in approximately 1,391 connections (about 741 at the end of Sept. 2006). An additional 90 commercial and school residential customer equivalents (RCEs) are anticipated of full development (up from the current count of 70) for a total of 1,481 RCEs. Given the relatively few parcels of land that can be subdivided into more than two or three parcels, the growth rate is anticipated to decrease over the next twenty years. For purposes of this report, residential connections are assumed to increase at the rate of 4% per year from 2006 through 2015, then at 2% per year from 2016 through 2025. In addition, the final phases of Nookachamps Hills development (92 lots) are assumed to connect from 2007 to 2009. Commercial RCEs are expected to increase at about 1% per year. Table 3.3 summarizes the forecast growth in RCEs.

**TABLE 3.3
FORECAST CONNECTIONS**

Year	RCEs
2005	700
2006	756
2007	783
2008	801
2009	821
2010	840
2011	871
2012	903
2013	937
2014	972
2015	1,009
2016	1,028
2017	1,048
2018	1,068
2019	1,089
2020	1,109
2021	1,131
2022	1,153
2023	1,175
2024	1,197
2025	1,220

CHAPTER 4 – PLANNING AND DESIGN CRITERIA

CHAPTER 4

PLANNING AND DESIGN CRITERIA

4.1 GENERAL

As previously stated, the purpose of this study is to update the comprehensive plan for the sewer system of the District. This chapter is concerned with the criteria to be used in planning the facilities necessary to achieve this purpose. Compatible with the scope of the study, these criteria include various aspects of sewage collection, treatment, and disposal. Where applicable, the criteria are based on the requirements imposed by the various regulatory agencies and on the accepted standards normally used in the design and construction of sewerage facilities. Consideration is given to both present and future needs.

4.2 ABBREVIATIONS

A number of terms have been abbreviated in this report.

Acre(s)	AC
Cubic feet per second	cfs
Gallon(s)	gal
Gallons per acre per day	gpac
Gallons per capita per day	gpcd
Gallons per minute	gpm
Million gallons per day	mgd

4.3 DATUM

The planning of facilities in this section of the study is based on the United States Geological Survey vertical datum (1927 NGVD, Pacific Northwest Adjustment 1947) of mean sea level as elevation zero. Since hydraulic capacities of sewer system facilities are based on pipeline slopes, it is important that a common datum be used for design purposes.

4.4 DESIGN PERIOD

Economy in design and construction cost is, in general, achieved by the construction of trunk and interceptor sewers with sufficient capacity to meet the long-range needs of the tributary area. This is especially true in congested areas where duplication and paralleling of sewage facilities at some future date would be an extremely difficult and costly project. Pumping stations and treatment

plants, on the other hand, are suited for staged construction under which basic structures only are built initially for ultimate flow requirements.

The term “ultimate” refers to conditions that will approximate saturation of the area as related to development and the need for major sewer improvements.

4.5 SEWAGE FLOW DESIGN CRITERIA

In terms of volume, sewage normally consists of sanitary wastes, ground water infiltration, and storm water inflow. Pipelines and pumping facilities must have capacities sufficient to handle the sum of maximum quantities of each of these components. In order to properly design such facilities, estimates must be made of quantities to be anticipated for each component of flow.

Sanitary Sewage

Actual measured sewage flows represent the total of all components, thus giving no indication of the volume attributable just to sanitary wastes. However during the winter months when lawn and garden irrigation is at a minimum, the volume of sanitary waste is approximately equal to the amount of water consumed. Accordingly, water consumption data may be used to obtain reasonable estimates of this component of sewage flow. Water consumption in the Big Lake area, per PUD records, from October 2002 through January 2005—not including the months of May through September—averaged about 160 gallons per day per connection and, assuming 2.5 persons per connection, about 64 gpcd. An analysis of measured historical sewage flows from 2000 to 2005 that are tributary to the wastewater treatment plant show that dry season average flows are 10 to 15% below the annual average and wet season average flows are 15 to 20% above the annual average. Maximum day flows will normally range from 150 to 200% of the annual average flow. The historical flow and waste strength data reveal a higher-than-average flow rate and waste strength in the months of July and August.

Records from treatment plants in the Puget Sound area that treat only sanitary wastes have indicated that the average daily dry weather flows vary from 65 to 100 gpcd. For this study, an average unit sewage flow of 71 gpcd has been calculated from historical flow data for the last 6 years. Adding the statistical standard deviation results in a value of 82 gpcd. Therefore, the previous District criterion of 85 gpcd will continue to be used for planning and design purposes. The sanitary sewage system, however, must be capable of carrying peak sewage flows that occur daily. For this study, a variable peaking factor will be used to analyze pipe and pump capacities. A peak of 4.0 will be used for initial flows from small basins. As the drainage basin becomes larger, the peaking factor will be reduced and will vary between 4.0 and 2.2 depending on the size of the drainage basin. See Table 4.1 for a summary of the design criteria.

**TABLE 4.1
DESIGN CRITERIA FOR SEWAGE FLOWS**

Quantity of sanitary sewage (average):		85 gpcd	
Quantity of sanitary and industrial waste (average):			
Light industrial		1,000 gpad	
Heavy industrial		4,000 gpad	
Infiltration and inflow:			
Infiltration		600 gpad	
Inflow		<u>500</u> gpad	
Total:		1,100 gpad	
Peaking factors for sanitary waste:			
Tributary acreage:	0-100	100-1,000	1,000-5,000
Peaking factor:	4.0	3.0	2.2

The service/study area is, for the most part, designated as the Big Lake Rural Village. Skagit County has established the development density in the Rural Village as one unit per acre for land served by water. The Big Lake Rural Village designation does not include provision for increased development density due to availability of public sewer. Therefore, the estimated population density for the service/study area is 2.5 persons per acre, subject to size of existing parcels in a particular area.

Ground Water Infiltration

The quantity of water that might infiltrate into a sewer is difficult to determine and generally varies with the age of the sewer, ground water table elevation, and type of pipe materials. However, the design of the sewer system and quality control during construction have much to do with the amount of infiltration that will enter the system. For construction planned under this program, the use of pipe having joints assembled with flexible rubber gaskets has been assumed. The design allowance for infiltration is an estimated value of 600 gpad.

Surface Water Inflow

Surface water inflows consist of water that may enter the sewer system through illegal connections from roof, footing, and area drains. This type of connection is of concern in the design of a sanitary sewer system because the amount of flow from this source may exceed the design capacity of the sewer, thereby causing the sewer to become surcharged or overloaded. Even though this type of connection is strictly prohibited, it periodically occurs and, therefore, an allowance is made during design of facilities for surface water inflow. Inflow values of 1,200 gpad are used in new systems in areas of high ground water whereas 500 gpad is used for new systems in areas with average ground water conditions.

4.6 CONVEYANCE SYSTEMS

Lateral and Trunk Sewers

Sewers must be designed with sufficient capacity to carry the peak flows from the ultimate development of the tributary area. This flow represents the sum of the several loadings calculated separately for each section of sewer or tributary area. The loadings consist of the peak flow of sanitary sewage, groundwater infiltration, surface water inflow, and any special quantities that must be considered.

The ability of a sewer to transport suspended solids contained in sewage is related to the velocity of flow in the sewer. A velocity of two feet per second is generally considered to be the minimum that will keep pipe surfaces clean and free of deposited material. Table 4.2 gives the minimum allowable slope for various sizes of sewers to obtain a cleaning velocity under average flow conditions. The Department of Ecology minimum slopes are not as conservative; however, the District has determined that the Table 4.2 slopes are the minimum for use in the District. The minimum slope for short eight-inch extensions with no possibility of future extensions is 0.0075.

**TABLE 4.2
MINIMUM SLOPES FOR SEWER PIPE**

Pipe Size, Inches	Slope, Foot/Foot
8	0.005
10	0.004
12	0.003

Sizes required for gravity sewers are determined by application of Manning's pipe friction formula, assuming the pipes are flowing full and have a roughness coefficient "n" of 0.013.

Where other provisions are made to provide flushing provisions by means other than normal gravity flow, variations from the minimum slopes shown in Table 4.2 can be made. These variations are often required for systems around lakes where pumping of the sewage becomes necessary and flushing velocities can be obtained by the pump discharge flow.

Force Mains and Inverted Siphons

The design of sewer force mains and inverted siphons is predicated on the fact that they flow full and under pressure. Again, as in the case of gravity sewers, the mains must be capable of carrying the peak flow from a given area. Proper cleaning velocities are obtained in a force main by selecting a size that will ensure a suitable velocity with a specified pumping capacity.

Inverted siphons may consist of two or three parallel lines of different sizes to obtain the desired velocities. Inlet and outlet structures provide for use of one line until the flow increases to the point where the capacity of the second line is needed.

Since the design flow is either pumped or divided between parallel lines, force mains and siphons are commonly of smaller size than adjacent gravity sewers. Diameters of force mains and inverted siphons are determined by means of the Hazen and Williams formula, using a roughness coefficient "C" of 130 or as otherwise appropriate for the pipe material.

Pumping Stations

Capacities of permanent pumping stations in the trunk sewer system are based on the peak flow of all tributary sewers. Structures are normally constructed to be adequate for future requirements, with pumping units installed as required by growth and consequent flow increases. Pumps are electric motor-driven, are of a non-clog design, and the number of units is sufficient to pump design flow with any one unit out of service.

The District minimum standard for pump stations is a duplex, wet well-mounted package station with self-priming non-clog wastewater pumps and integral **control panel**. **Standby power is provided by the District's** portable generator and onsite manual transfer switch and receptacle. The station shall include an auto dialer or remote telemetry unit for remote monitoring of critical status and alarms, with radio or telephone communication. The station shall be accessible by vehicle.

Portions of the collection system include grinder pump stations, and force mains serving multiple pumps and lots. The system of the grinder pumps and force **mains are part of the District's collection system even though the pumps are** typically located on private property. Each pump serves one or more living units (only one since a District standard revision in 2002). Pumping units and control **equipment are purchased and installed by the District at the property owner's** expense.

Sewer Materials

Although below ground and not visible, sewers present structural and maintenance problems just as any visible structure does. The materials acceptable for sewer construction consist of polyvinyl chloride (PVC) and ductile iron. The pipes shall be connected by flexible, rubber-gasket type joints. In addition, the rigid pipes must pass standard crushing, flexural, and fill tests to ensure that the installation will be watertight and able to withstand the earth and traffic loads after placement in the trench.

Precast, reinforced concrete manholes have been the proven standard for manholes for many years. Properly installed rubber gasket seals and gasketed pipe entry collars have significantly reduced infiltration.

Sewer Locations

In general, the lateral and trunk sewers will be located in existing street rights-of-way or in proposed street areas where possible. However, because of the existing topography around the lake and location of the residences near the water, most of the existing sewer system is on private sewer easements near the shoreline. This allows most residences to be served by a gravity system rather than requiring each residence to have an individual pump.

CHAPTER 5 – EXISTING SEWER SYSTEM

CHAPTER 5

EXISTING SEWER SYSTEM

5.1 EXISTING FACILITIES

Skagit County Sewer District No. 2 presently owns, operates, and maintains a domestic wastewater collection and interceptor system consisting of nine lift stations, approximately 19.6 miles of pressure and gravity sewer pipe, a sewage treatment plant, and an 8-inch, 10-inch, and 12-inch diameter gravity and force main outfall system of approximately 5.9 miles. Approximately 500 acres of the District have sewer service available by this system (service area). The existing sewer system is shown on Figure 5.1 and quantified in Table 5.1. Table 5.2 summarizes the development of the system.

Most of the collection system was constructed in 1979 as Utility Local Improvement District (ULID) No. 1 and in 1981 as ULID No. 2. Several sewer extensions have since been constructed each year by private property owners using the developer extension process.

The system consists of a series of lift station/gravity pipe segments along both sides of the lake. Flow is from the south toward the treatment plant near the north end of the lake. The existing collection system force mains range in diameter from 1.5 inches to 12 inches with the majority at 4 inches in diameter. The gravity collection pipes are 6, 8, 10 and 12 inches in diameter. Table 5.1 provides an inventory of the District's system. A more detailed discussion of the treatment plant is presented in Chapter 6.

TABLE 6.1
SEWER SYSTEM INVENTORY

Project	Contract #	Pump Stations	Wastewater Treatment Plant											
			1.5" FM	2" FM	2.5" FM	3" FM	4" FM	6" FM	8" FM	10" FM	12" FM	SS	SS	
ULID #1, Treatment Plant	78-1								15,295'		12,330		3,435'	
ULID #1, Outfall	78-2								2,028'	1,186	4,982	8,385		
ULID #1, Interceptor System	78-3	6						2,372'					3,896'	
ULID #1, Collector System	78-4	2					6,518			5,091				
ULID #2, Lift Station No. 9	81-1	1	450	550	1,670	1,885			22'					
ULID #2, DMH 13-1 to MH 13	82-1									325				
Big Lake Tavern	DE 83-1									627				
Bounds	DE 84-1									484				
Coffey	DE 89-1									*				
Cornwell	DE 90-1									140				
McGarrah	DE 91-1									1,008				
Montbourne	DE 91-2									2,645				
Nelson	DE 92-1									1,245				
Gaspard	DE 93-1									338				
Johnson Grinder Pumps	DE 93-2													
Lee Johnson/Four Jay Lane	DE 93-3									1,412				
Farmer/Blizard	DE 94-1									345				
Shroyer/Finlan/Sweet	DE 94-2									582				
Keith Johnson Lot 7	DE 94-3									247				
(not used/completed)	DE 95-1													
Big Lake Heights	DE 95-2									1,381				
Nookachamp Hills 1	DE 95-3									5,809				
V. Mason	DE 95-4									186				
(not used/completed)	DE 96-1													
Engberg	DE 96-2									1,870				
Overlook Golf Course	DE 96-3									450				
Grandview	DE 98-1									685				
Mahonia Lane	DE 98-2							176		405				
Lohman grinder pumps	DE 99-3		567	162					57					
Ream	DE 00-1									132				
Bailey	DE 00-2									184				
Brown	DE 00-3									55				
Merimbula	DE 00-4									902				
Nookachamp Hills 2A	DE 00-5									5,184				
Perry	DE 01-1							350		490				
Kreider	DE 01-2									799				
Nookachamp Hills 2B	DE 04-1									2,961				
Sager	DE 05-1									631				
Lake View Heights	DE 05-2									742				
Meacham	DE 05-3									52				
Nookachamp Hills 3 and 4	DE 06-1	1	325		459			4,080		7,079				
Brown	DE 06-2								66	343				
Wardell-Washington Street	DE 06-3								69	425				
Totals:	10		567	937	550	1,670	8,862	2,372'	4,798	17,345'	17,312'	8,385	3,435'	
FM total:			53,050 feet (with outfall)						21,206 feet (without outfall)					
SS total:			63,318 feet											

* Not built under this DE; similar design built under DE 93-1

The majority of the properties served are the lakefront properties between Highway 9 and the east shore of the lake and between West Big Lake Boulevard and the west shoreline of Big Lake. Approximately 5.5 miles of shoreline are presently served by the system out of a total of about 6.5 miles of shoreline. The extreme southerly end of the lake is unserved and not designated for development. Several developer extensions have extended service to isolated properties on the west side of West Big Lake Boulevard and to denser developments on the east side of Highway 9.

Presently, the District has ten sewage lift stations in the collector system and a pump station at the treatment plant. Approximate pumping capacity of each station is shown in Table 5.2.

**TABLE 5.2
EXISTING PUMPING FACILITIES**

Lift Station	Pump Capacity*	Station Type	Power Outage Operation
1	430 gpm/69' TDH	Wet Well/Dry Well	Served by WWTP Standby Generator
2	310 gpm/23' TDH	Wet Well Mounted	Portable Generator
3	225 gpm/20' TDH	Wet Well Mounted	Downstream Overflow/ Portable Generator
4	120 gpm/53' TDH	Wet Well Mounted	Portable Generator
5	200 gpm/16' TDH	Wet Well Mounted	Downstream Overflow/ Portable Generator
6	150 gpm/72' TDH	Wet Well Mounted	Portable Generator
7	450 gpm/41' TDH	Wet Well Mounted	Portable Generator
8	265 gpm/49' TDH	Wet Well Mounted	Portable Generator
9	47 gpm/55' TDH	Submersible Grinder	Portable Generator
10**	125 gpm/54' TDH	Wet Well Mounted	Portable Generator
Treatment Plant	500 gpm/250' TDH	Vertical Turbine	Standby Generator

*Capacity is for one pump. Each station has two pumps. Treatment plant has three pumps.

**Anticipated completion in Fall 2007

Duplex pump stations are designed to convey the anticipated peak flow received at the station with only one pump in service. The second pump is for standby service and typically operation alternates with each pumping cycle for equal wear on each unit. Analysis of the sizing criteria can be used to predict how many hours per day a station will operate at full capacity, assuming cyclic operation. Typically, for stations of the size in the District system, **"capacity" is about 10 to 12 hours per day**. For this study, station run-time hours were reviewed for Winter 2007. The lift station with the most hours (taken from weekly totals) is No.1, with average daily run times of about 7 hours per day. Other stations were well below this figure. This confirms the obvious, that No. 1 has the highest flow due to its location in the system, and is closest to reaching capacity. Upgrade of this station is referenced in Chapter 6 and the WWTP Engineering Report in conjunction with recommended WWTP improvements.

Where possible, individual residences are connected to the sewer mains by a gravity side sewer. However, because of the particular ground topography along the lake and placement of the sewer main and building on the lot, some residences are connected to a District force main or pressure sewer system. These connections require an individual grinder pump at the residence. Approximately 58 grinder pumps have been installed and are maintained by the District. Almost all of the lots presently designated for grinder pump service have a pump installed. Where feasible, one pump serves two adjacent lots. However, only one property is served by each grinder pump installed since 2002 due to changes in the electrical code. Connections are to the 2-inch, 2½-inch, 4-inch and 6-inch force mains; no connections have been made to the 8-inch force main or to the sewer outfall system. In limited cases where gravity sewer serves a property but the lowest finished floor of a residence is below the gravity sewer, private solids-handling pumps are required to carry flow from the house to the public side sewer.

The existing collection system has been analyzed to determine its present hydraulic capacity and this capacity was compared to the estimated wastewater flows generated throughout the service/study area. See Appendix D, Collection System Hydraulic Analysis, for a description of the analysis. The capacities of selected portions of the existing collection system are indicated on Figure 5.1. With the sewage design criteria discussed in Chapter 4, only one existing pipe **and four lift stations would be potentially "under capacity" with full development** of the service/study area.

The present capacity of Lift Station No. 2 is 310 gpm whereas a peak flow of 355 gpm is estimated by the hydraulic analysis for full development of the service/study area. The model estimates about 500 gpm for Lift Station No. 7, which has a current capacity of 450 gpm. Similarly, the model estimates about 410 gpm for Lift Station No. 8, which has capacity of 265 gpm. Lift Station No. 1, **which conveys all the District's flow from the interceptor/collection system to the treatment plant**, has a capacity of 430 gpm, whereas the analysis estimates a peak flow of about 1,200 gpm at buildout. Additionally, the existing main entering Lift Station No.1 will need to be upsized for future flows.

It is important to remember that the design criteria are purposely conservative and there is a significant amount of undeveloped land in the service/study area. The estimated peaks are significantly higher than current peak flows. The main objective of this analysis is to point out that, as the District population grows, Lift Stations Nos. 1, 2, 7, and 8 may need to have increased capacity before other existing lift stations.

5.2 OPERATION AND MAINTENANCE

Skagit County Sewer District No. 2 has contracted with Water and Wastewater Services LLC., of Mount Vernon for operation and maintenance of the sewage collection system and the treatment plant. Water and Wastewater Services has a staff of seven certified operators who rotate duty at the District for normal daily operations, for emergency conditions or repairs, and for on-going preventive maintenance of District facilities. The operators are certified by the State of Washington as Wastewater Treatment Plant Operators in the following grades: Group I – one, Group II – four, Group III – one, Group IV – one.

Regular maintenance procedures include annual inspection of manholes and twice-weekly inspection of the sewer lift stations. An operator is present daily at **the sewage treatment plant. This operator's daily work routine includes the following tasks:**

1. Sample collection, lab work, and process control.
2. Data recording/report preparation.
3. Equipment checks.
4. Customer relations/utility locates.
5. Answering phone calls.
6. Side sewer installation observation
7. Lift station checks (twice weekly).
8. Maintenance/repair of grinder pump stations.

Existing pipes are monitored by television inspection on an as-needed basis. Because of the regular spacing and frequent operation of each lift station, regular flushing of the gravity pipes is generally not required. The pumped flow provides adequate flushing action for normal conditions. The portion of the collection system generally between Lift Station No. 6 and Sulphur Springs Road was designed and constructed at less than minimum slopes and requires periodic flushing. It must be analyzed as a pressure line with a minimal amount of surcharging allowed.

All lift stations have provisions for connection to a portable standby generator power source in the event of a power outage. Lift Stations Nos. 3 and 5 also have an emergency gravity overflow to the next downstream manhole.

Normal operation and alarm conditions at all lift stations except No. 9 are relayed via telemetry to the treatment plant and monitored by the operations crew. **Lift Station No. 10 will have radio communication to the plant. The treatment plant's autodialer will page Water and Wastewater Services if an alarm condition is detected outside of normal business hours.**

CHAPTER 6 – WASTEWATER TREATMENT PLANT

CHAPTER 6

WASTEWATER TREATMENT PLANT

6.1 EXISTING FACILITIES

The District owns and operates a wastewater treatment plant (WWTP) east of Highway 9 near the north end of Big Lake. The plant was constructed in 1980 as part of ULID No. 1. Operation of the plant is in accordance with NPDES Permit No. WA-003059-7 issued by the Washington State Department of Ecology. The plant has two rotating biological contracts (RBCs) (see Figure 6.1). See Appendix B for a copy of the NPDES Permit.

The existing RBCs are approximately 27 years old. Historically, RBCs have a life of about 20 years. The common mode of failure is a broken shaft. Flow to each RBC is currently alternated. If one unit were to fail, all flow would be diverted to the remaining unit. This would increase the stress on that unit and possibly shorten its life span. These types of RBCs are no longer manufactured.

The treated effluent is conveyed to the Skagit River for disposal through a 10" force main and 8", 10", and 12" gravity discharge system. Capacity of the gravity outfall line is limited to about 900 gpm, and pumping capacity of the plant effluent pumps is about 850 gpm with two pumps operating (1.15 mgd). The plant has a standby generator for use in the event of a power outage.

As of September 2006, the District served approximately 741 connections (residential customer equivalents or RCEs). The average daily flow for 2005 was about 122,000 gallons per day. The average daily flow for the maximum month in 2005 was 254,000 gpd. Wet season average daily flow was 134,000 gpd and dry season average daily flow was 109,000 gpd. For the five years ending 2005, the unit flow per RCE was about 178 gallons per connection per day or 71 gallons per capita per day assuming 2.5 persons per connection. For the same five-year period, the wet season (October thru March) flow was 191 gpd/RCE or about 76 gpcd. This indicates that the 85 gpcd and the 1,100 gpad inflow/infiltration discussed in Chapter 4 are conservative, as they should be for planning purposes.

WWTP biological oxygen demand (BOD₅) and total suspended solids (TSS) loading data were evaluated for the five years ending 2005. BOD₅ averaged 236 mg/l with a maximum month of 301 mg/l, corresponding to 0.303 ppd/RCE (annual average) and 0.337 ppd/RCE (maximum month). TSS averaged 199 mg/l with a maximum month of 239 mg/l, corresponding to 0.255 ppd/RCE (annual average) and 0.285 ppd/RCE (maximum month).

The effluent limitations in the current NPDES permit address BOD, TSS, fecal coliform and hydraulic capacity. BOD and TSS are monitored at the treatment plant, and fecal coliform levels are monitored at a point on the outfall pipe approximately two miles from the plant. The current permit expires June 30, 2008. With increased emphasis on receiving water quality (Skagit River), the District is required to monitor ammonia in the WWTP effluent from August thru October. It is anticipated the next permit may limit ammonia and total nitrogen discharge.

6.2 EVALUATION AND RECOMMENDATIONS

The existing facility is located within twenty miles of existing public wastewater treatment facilities for Mt. Vernon, Burlington, Sedro Woolley, Anacortes, Oak Harbor, Stanwood and Arlington. The closest facility is at Mount Vernon, a few miles to the northwest. A cursory evaluation of potential regionalization or transfer of effluent to Mount Vernon suggests that the savings from economy of scale of treatment facilities would be offset by the added cost of pumping and piping facilities between Big Lake and the Mount Vernon treatment plant, or a point in their collection system with capacity for the District's flows. Additionally, portions of the existing facility have remaining useful life and cost to replace such would also be an additive cost. Therefore, the District decided to evaluate their existing facility and not consider connection to Mt. Vernon.

Biosolids are disposed of by hauling to other permitted biosolids handling facilities. New regulations pertaining to this practice have been implemented at the Federal and State level, which may impact the treatment, permitting and disposal requirements and ultimately the cost of biosolids handling.

H.R. Esvelt Engineering, with support from CHS, has concurrently prepared an Engineering Report to evaluate the existing plant, consider alternatives for upgrades and recommend a treatment facility capital improvement plan.

The Engineering Report considers two upgrade alternatives to replace the RBC process: membrane bioreactor (MBR) and activated sludge with clarifiers (ASC). A comparison of the cost of improvements for each alternative indicates that ASC has significantly lower cost. Even with additional process units for the ASC alternative for water reclamation (Class A reclaimed water), ASC is the less expensive and therefore the recommended alternative.

The ASC recommended improvements include:

- Headworks in building with two channels, two in-channel fine screens (one future), 3" Parshall Flume, odor scrubber and sampler.
- Anoxic basins for nitrogen reduction and pH control.
- Aeration basins with distribution box and dissolved oxygen control system.
- Activated sludge clarifiers, two existing modified and one new, with distribution box.

- Disinfection and effluent pumping to Skagit River, including replacement equipment and conversion to variable speed pumping
- Electrical equipment and blower building addition
- Belt filter press

The WWTP upgrade will be designed for 0.35 mgd maximum month average daily flow. This is the forecast flow for the year 2025 for 1,220 RCEs, whereas buildout is anticipated beyond 2025 at approximately 1,481 RCEs (about 21% more connections).

6.3 WATER RECLAMATION

Representatives from Skagit County recently approached the District regarding a potential cooperative project to utilize **the District's treated effluent as a resource** for instream flow augmentation and mitigation in the Nookachamps Creek basin. The two municipalities initiated a joint preliminary feasibility study, which was completed in July 2007 (*Feasibility Review: Water Reclamation and Instream Flow Mitigation Project, Nookachamps Creek Basin*, CHS Engineers, LLC). Background information and key findings of the review are summarized below.

Recently DOE adopted amendments to the Skagit River instream flow rule (Chapter 173-503 Washington Administrative Code [WAC]) that places limits on groundwater and surface water withdrawals in the Skagit River and its tributary basins established after April 14, 2001. The rule stipulates that consumptive uses of water in each tributary basin are to be debited against a set water reservation limit established for that tributary basin to protect instream resources. The rule allows water that is returned to the basin via an in-basin septic or wastewater treatment system outfall to be credited back to the reservation. For residences that rely on public water that is imported from another tributary basin, there is no net impact on the reservation amounts since this water was not taken out of the tributary basin. However, if a residence uses water imported from another tributary basin and returns the wastewater back to the tributary basin via a septic system or an in-basin wastewater discharge, the non-consumptive portion of the imported water (currently set at 50% of the total amount used) is credited back to the reservation since this discharge results in a net gain to that tributary basin. For several Skagit River tributaries, including the mainstem of Nookachamps Creek-Upper sub-basin, the amount of water available under the water reservations is not enough to serve projected growth allowable under the current County Comprehensive Plan in areas that presently do not have access to imported public water. Skagit County has been evaluating options to conform to the constraints of rule but still meet its obligation to fulfill its Comprehensive Plan.

Since nearly all of the District's customers get their water from the Skagit PUD's Judy Reservoir water system, whose source of water is located outside of the Nookachamps Creek-Upper sub-basin, the effluent exported out of the

Nookachamps Creek-Upper does not reduce the amount of water in the sub-basin. However, the amount of water available for use under the Nookachamps Creek-Upper sub-basin reservation could be increased if that exported wastewater was reclaimed and kept within the basin. The amount of water credited back to the water reservation could be used to allow additional groundwater withdrawals for new homes located in other parts of the basin that do not have access to PUD water. **Since the District's discharge pipe extends through the Carpenter Creek basin and the amount of water allocated to this basin is also insufficient to meet the needs expected under the County's Comprehensive Plan, the County also wanted to explore the possibility of discharging some of the District's treated effluent into Carpenter Creek as well.**

The District anticipates growth within the District sewer service area from 741 to 1,220 connections with an average daily flow (maximum month) of 0.35 mgd by 2025. All of these new connections are anticipated to be provided with potable **water service via the Skagit PUD's Judy Reservoir system. The developable** area within the current District boundary is estimated to be adequate for buildout of approximately 1,480 connections. At current forecast growth rates, assuming no constraints on development other than typical market conditions, buildout is not anticipated until after 2025.

The District's secondary WWTP is located northeast of the outlet of Big Lake, less than a quarter mile from Nookachamps Creek. Presently the WWTP exports treated effluent out of the Nookachamps Creek basin to the lower Skagit River via a pressure and gravity outfall pipe, which traverses Carpenter Creek.

Skagit County asked the District to consider the work and cost necessary with the next WWTP upgrade to produce Class A reclaimed water that could be used to enhance stream flows in the Nookachamps and possibly, via the existing outfall piping, to the Carpenter Creek basin. The reclaimed water would be conveyed to a suitable location in these basins and discharged directly to surface waters or to groundwater, to mitigate for future withdrawals in these basins.

The primary candidate for a mitigation site is the Nookachamps Creek basin due to its close proximity and elevation at or below the existing WWTP site. Delivery of reclaimed water to Carpenter Creek was evaluated but it was determined this configuration would lead to much higher cost, operational complexity and regulatory resistance. Therefore it was excluded from the final analysis.

For the Nookachamps Creek basin, the Instream Flow Rule would allow Skagit County to issue permits for 70 new homes using wells and septic systems or returned reclaimed water within the Nookachamps basin. As state above, new homes on imported PUD water would not count against the reservation; however, each new home on PUD and septic or reused wastewater would result in a 175 gpd credit to the reservation; the same would be true for existing homes

for which their wastewater is currently exported out of basin and are switched to an in-basin discharge point. The District served approximately 700 residential customer equivalents in 2005 with a projected increase to 1,220 by the year 2025. For purposes of this study it is assumed that effectively all of these sewer customers are served by the PUD water system, and therefore all are eligible for credit if their wastewater is switched to an in-basin discharge location.¹ With the one-half credit system this would allow 350 (as of 2005) to 610 (as of 2025) homes to withdraw water elsewhere in the Nookachamps Creek basin. Based on preliminary data, this analysis assumes that all the effluent should be considered for reclamation and in-basin discharge. That is to say that even the forecast flows through the District are insufficient to address the potential demand for groundwater withdrawal credits in the Nookachamps Creek basin. Water supply from the PUD from an out-of-basin source, or other mitigation measures will likely be necessary for development of some properties in the future.

In addition to typical wastewater treatment requirements for effluent from a residential area (suspended solids, biological oxygen demand, and pH), control of temperature and dissolved oxygen are key parameters for discharge to Nookachamps Creek. Due to its seasonally varying flow and vegetation alteration along its course immediately downstream of Highway 9, the creek is seasonally impaired for fish on the basis of periodically high temperature. Subsurface injection and mixing, use of constructed wetlands or pretreatment at the WWTP may control temperature.

The local soil conditions were evaluated by GeoMatrix Consultants, Inc. and found to have low permeability. The cost of a subsurface recharge system would be significant. Steward and Associates evaluated the potential benefits and impacts of constructed wetlands for returning flow to the environment. Their findings included potential fisheries benefits, challenges with temperature control and potentially significant land area needs and land and project costs. Therefore the recommended means of temperature control is by a re-aeration near the end of the WWTP or water reclamation facility. This same process will ensure appropriate minimum dissolved oxygen levels in the return flow. Flow would be released to the Creek with a streamside discharge pipe or shallow piping gallery a short distance along the stream bank.

To produce Class A water for reuse, the WWTP would need to be converted and upgraded to a water reclamation facility (WRF). In addition to the treatment process improvements, a variety of reliability improvements would be required to assure delivery of the highest quality water at all times. Use of the existing outfall to the Skagit River is a significant factor in meeting the reliability criteria,

¹ The amount of credit may be limited at times, or always, by the need to continue effluent discharge to the Skagit River to meet minimum instream flows in the river in order to avoid water-right impairment issues. Impairment of instream flows would not be an issue for additional discharge volume released to the creek after the change in outfall location occurs.

assuming its use and intermittent standby or emergency discharge to the Skagit River of water not meeting Class A standards would be approved by DOE. Otherwise a large storage facility would potentially be necessary for storage prior to re-treatment.

The base WWTP configuration is as proposed in the District's WWTP Engineering Report and two alternative configurations for a WRF were considered. The base configuration includes upgrade to an ASC facility as described above. This facility would be able to meet future ammonia discharge limitations and have capacity for growth anticipated through year 2025. The first alternative configuration is to add filters, re-aeration and UV disinfections to the ASC configuration, for water reclamation to Class A Standards (ASC with filters). Return flow to Nookachamps Creek would be by pumped discharge to a streamside shallow pipe gallery or structure. The second alternative would replace the existing process with a membrane biological reactor (MBR) for water reclamation to Class A Standards. For comparison purposes the MBR option includes discharge to constructed wetlands for return flow. Both alternative configurations would retain pumps and the existing outfall piping for discharge of substandard (i.e. not Class A) effluent to the Skagit River. The comparative costs are summarized below. Even if a streamside shallow pipe gallery were used with the MBR reclamation option, the MBR alternative is the highest cost alternative.

**TABLE 6.1
INSTREAM FLOW PROJECT COMPARATIVE COSTS**

Plant Configuration	Estimated Construction Cost	Estimated Project Cost
Activated sludge w/ clarifiers (ASC)	\$5,374,000	\$7,202,000
ASC w/ re-aeration, filters and UV	\$7,864,000	\$10,538,000
MBR w/ UV & constructed wetlands	\$12,422,000	\$16,646,000

Note – Construction cost includes 20% contingency. Project cost includes allowance for sales tax, design, and construction engineering (34% of construction cost). These costs have been further refined in the WWTP Engineering Report and that report should be consulted for current estimates.

Nookachamps Hills LLC (developers of nearby subdivision) and a dairy farmer, Case Lanting, own the land between the District and Nookachamps Creek. Routing a return flow path to the Creek will likely require an easement from affected property owners.

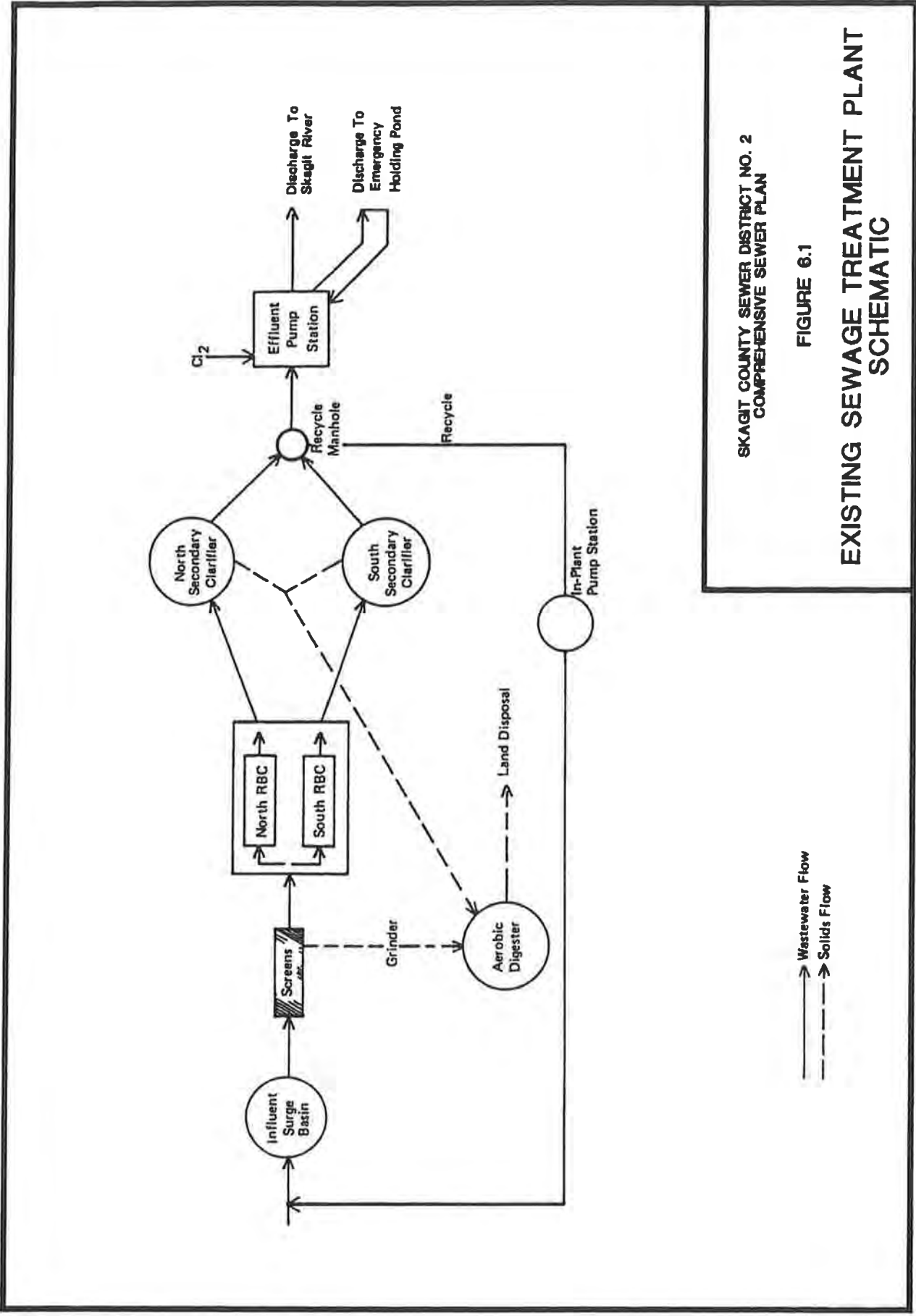
Discharge of treated effluent or reclaimed water to Nookachamps Creek will require a number of regulatory approvals, including approval for discharge from DOE, approval for water reclamation and beneficial use from DOH and a variety of federal, state and local permits for project construction (land use and critical areas permits).

Based on the preliminary analysis to date it appears the project will be beneficial to the stakeholders in the District and County and should have some flow benefits for fish in Nookachamps Creek. The recommended plant improvements for water reclamation are conversion to an activated sludge facility for ammonia removal, with re-aeration, filters and UV disinfection for stream flow augmentation in Nookachamps Creek. The return flow should be pipe to the Creek and discharged in a streamside structure or shallow subsurface piping gallery.

Skagit County Sewer District No. 2 and Skagit County, based on respective jurisdiction and benefits, should jointly implement the project. The District should manage the plant improvements and the County should assume responsibility of treated water at a suitable point between the plant and the Creek discharge or at the discharge. The project should be completed under the terms of a long-term, comprehensive interlocal agreement.

One significant factor in this project is capital and operation and maintenance costs. Ideally the cost would be allocated proportionally among the project beneficiaries. The beneficiaries include the property owners of developed and undeveloped property in the District, owners of undeveloped property in the Nookachamps Creek basin and generally all citizens of the District, County and State, for the environmental benefits. The District would recover its costs for enhanced treatment, increased capacity and replacement equipment/processes through a combination of increases in sewer connection charges and monthly rates, to allocate the cost of improvements to the benefiting parties.

The funding gap for the instream flow mitigation benefit is approximately \$3.34 million in capital costs and a yet to be estimated annual operation and maintenance cost. The State, County and property owners in the basin benefited by the project should cover this gap. A separate cost evaluation should be completed to explore the options for pro-rata cost allocation and mechanisms for collecting revenue for covering the funding gap.



SKAGIT COUNTY SEWER DISTRICT NO. 2
COMPREHENSIVE SEWER PLAN

FIGURE 6.1

EXISTING SEWAGE TREATMENT PLANT SCHEMATIC

CHAPTER 7 – CAPITAL IMPROVEMENT PROGRAM

CHAPTER 7

CAPITAL IMPROVEMENT PLAN

7.1 GENERAL

The development of a comprehensive plan for the maintenance and expansion of the Skagit County Sewer District No. 2 sewer system is set forth in this plan. The land use, design criteria, and existing system review presented in preceding chapters were used to formulate the plan.

The existing system was reviewed to determine the necessity of replacing or repairing any components of the system. Once deficiencies were noted, each project was evaluated and a recommended sequence for construction was established. The timing of construction or of upgrading such facilities is contingent upon that point in time for which system demand is expected to exceed the capacity of the existing facilities.

Following is a discussion of the service area of Skagit County Sewer District No. 2, a capital improvement plan which includes cost estimates and a recommended schedule for upgrading and/or improving the District's facilities, and the means by which areas outside of the District may be annexed into it.

7.2 SERVICE AND STUDY AREAS

It is expected that future sewer line construction within the District will occur primarily by means of developer extensions in accordance with established District standards and policies as outlined in the District's *Developer Project Manual*. All such extensions are designed and constructed in accordance with District standards and policies, Department of Ecology design criteria and good engineering practice. Development of this type will progress outward and upward from the existing system. Scheduling of these projects is dependent on the actions and desires of the property owners wanting or needing sewer service.

Because future improvements depend on how and when a particular property is developed, the scope of future system improvements cannot be detailed. However, the general framework for connecting unserved property with the existing system has been outlined and is shown on Figure 7.1. Particular properties may be served by connection to the existing system at a point different than anticipated in development of this plan, depending on the size and location of the property to be served, site/profile constraints and sewer extensions occurring after completion of this plan. The service pattern shown on Figure 7.1 generally follows the natural topography and connects to the existing system as far upstream as reasonably possible to conservatively assess the potential impact on system capacity.

In order to provide local independent review and avoid haphazard and disjointed provision of municipal services, the Washington State Boundary Review Board (BRB) for Skagit County has been established in accordance with state statutes. The BRB reviews actions proposed by cities, towns and special purpose districts. Actions requiring review include boundary changes and permanent extension of water and sewer lines and service beyond city limits or district boundaries. To initiate the Board's review, the action initiator must prepare a Notice of Intention with the details of the proposed action. A public hearing is held, and the Board reviews the proposed action against criteria cited in the state statute.

The BRB may waive a formal review and approve the request as submitted, or review for up to 45 days, invoke the BRB jurisdiction, collect public comment during a 120-day hearing period, and then act on the request.

The District has maintained a general practice that it would serve areas upon petition of owners within the area subject to land use regulations and reasonable cost. Owners of property representing 60% or more of an area are required to petition for sewer service and annexation when District services were desired.

In those areas where such requests are likely, in the judgment of the District, they have been included as study areas within this comprehensive plan. The District recognizes that it cannot extend public sewer service to such areas unless such is allowed under state law, case law, county code and/or policy. **Presently these areas are considered "rural" and as such, in the absence of an existing environmental problem, cannot be served by public sewer.**

District Resolution No. 64, as amended, stipulates the rules and regulations governing the operation of the collection system. Per this resolution, properties within the District and within 300 feet of the public sewer are required to connect to the District's system for sewer service.

7.3 FINANCES

The revenue to operate the District is obtained through a monthly service charge. Essentially the entire charge is for repair, replacement, administration, operation, and maintenance of the District's facilities. The monthly service charge is \$40.00. The District imposes a surcharge of \$10.50 per month for properties served by grinder pumps to recover some of the cost of maintenance and replacement of grinder pumps. Properties with a grinder pump's electrical connection are charged 55¢ less per month recognizing that the customer is paying for the pump's electrical power.

The current general facilities charge (January 2007) is \$5,443 per residential customer equivalent (RCE). (Following adoption of this Comprehensive Sewer Plan, it is anticipated that the District will review and revise the general facilities

charge to reflect the new Capital Improvement Plan.) The cost of a side sewer permit is \$200.00. Costs associated with developer extensions are discussed in the District's *Developer Project Manual*.

A number of years ago, the District established repair and replacement funds and established budgets for these funds and for depreciation of District facilities. All needed replacements and repairs have been financed through District revenues, not bond sales. Bond sales and federal grants were used for initial construction of District facilities. Should expansion of the WWTP or major system improvements be required, additional bond sales may be necessary. See Figure 7.2 for a general schematic of special purpose district finances and Section 7.5 below for additional project funding discussion.

7.4 CAPITAL IMPROVEMENT PLAN

The following sections outline the Capital Improvement Plan for the Skagit County Sewer District No. 2. This plan is intended to be a guide for improving the existing District facilities and expanding the system. Each section discusses proposed projects and estimated project cost. Locations of the capital improvement projects are shown on Figure 7.1.

Cost estimates involve an engineering judgment based on experience, but construction costs can vary over a wide range because of the many factors that cannot be predicted such as labor availability, competitive conditions, management, environmental considerations, and other intangibles affecting construction costs at the time the work is actually performed. Generally, actual costs cannot be known until bids are received, and even these may be subject to adjustment because of changed conditions. The District, in its decision-making, must always keep in mind that the costs presented in this plan are estimates.

Construction costs are estimated from prices obtained from various sources, including manufacturers and suppliers of materials and equipment and bid prices for projects in other communities in the area. In considering these estimates, it is important to realize that changes during final design quite possibly will alter the total cost to some degree, and future changes in the cost of material, labor, and equipment will also have a direct impact. Prior to the initiation of the projects shown in this Capital Improvement Plan, the project costs should be reviewed and updated to reflect current conditions.

The cost estimates presented are based on 2007 prices and represent estimated total project costs. Project costs include construction cost plus a contingency of 20 percent as well as allied costs. Allied costs include consultant services, interest, taxes, District administration costs, etc. These allied costs have been estimated at 35 percent of the construction cost based on the following breakdown:

State sales tax	8.0%±
Permitting, environmental, engineering design, surveying, inspection, administrative, etc.	25.0%
Legal	1.0%
Administration, interest during construction, financial fees, etc.	1.0%
	<hr/>
TOTAL	35.0%

Operation and maintenance costs are not reflected in the project cost estimates. However, these costs are important and require thorough consideration during the design phase of a proposed facility or project. As new facilities are constructed, the sewer service rates should be reviewed and increased appropriately to provide continued funding for an expanding and aging system. In addition, as the District grows, additional funding will be necessary for administration, automation of customer accounts, etc. Rates must keep pace with these funding requirements.

Wastewater Treatment Plant

As discussed in Chapter 6, improvements at the treatment plant will be necessary in the immediate future. To provide adequate capacity for growth anticipated by year 2025 and to enhance plant performance to meet more stringent discharge requirements, a significant WWTP upgrade is recommended. The estimated project cost of the necessary improvements is budgeted at \$7.2 million. The current NPDES permit is valid through June 2008. Renewal of the permit may include the need to implement other WWTP improvements not yet identified or anticipated.

The recommended improvements incorporate an upgrade to an activated-sludge-with-clarifiers system and include:

- Headworks in building with two channels, two in-channel fine screens (one future), 3-inch Parshall Flume, odor scrubber, and sampler.
- Anoxic basins for nitrogen reduction and pH control.
- Aeration basins with distribution box and dissolved oxygen control system.
- Activated sludge clarifiers, two existing modified and one new, with distribution box.
- Disinfection and effluent pumping to Skagit River, including replacement equipment and conversion to variable speed pumping.
- Electrical equipment and blower building addition.
- Belt filter press.

The WWTP upgrade will be designed for 0.35 mgd maximum month average daily flow. This is the forecast flow for the year 2025 for 1,220 RCEs, whereas buildout is anticipated beyond 2025 at approximately 1,481 RCEs (about 21% more connections).

Other improvements and repair/replacement projects recommended for the WWTP prior to WWTP upgrade are listed in Table 7.1. Some of these projects are maintenance projects rather than growth-related projects.

**TABLE 7.1
TREATMENT PLANT PROJECTS**

<u>Project Description</u>	<u>Preliminary Estimated Project Cost</u>
Upgrade WWTP to activated sludge with clarifiers (see WWTP Engineering Report)	\$7.2 million
Radio-based telemetry communication system conversion	\$50,000
New paint for plant equipment and structures	\$10,000
Automatic precipitation recorder (to collect data for future inflow/infiltration analysis)	\$5,000

Lift Station and Force Main Improvements and Additions

All but one of the lift stations were constructed in 1980 as part of the formation of the District. The equipment at Lift Stations No. 2 and No. 7 was replaced in 2005 and similar work was completed at Lift Station No. 3 in early 2008. Otherwise, no renovation or upgrade of the lift stations has been done.

As properties continue to develop in the service area, and with the normal wear of motors and pumps over the intervening years, the lift stations should be upgraded and improved to provide more reliable service, safety features, longer operating life, and increased capacity as required. Some equipment is outdated or obsolete and may be subject to failure. Future capacity requirements were determined by the hydraulic analysis discussed in Chapter 5 and Appendix D. Based on an examination of each station's condition and expected future capacity requirements, Table 7.2 lists the recommended improvements for each station. The stations are listed in prioritized order.

Lift Stations No. 5 and No. 8 are deteriorating to the point where all new electrical and mechanical systems are recommended for installation on existing wet wells. Capacity increases shown on Table 7.2 are for ultimate development (per land use discussed in Chapter 3).

**TABLE 7.2
LIFT STATION IMPROVEMENTS**

Priority	Station No.	Project Description	Estimated Project Cost (2007 dollars)
1	8	Replace mechanical and electrical equipment, increase capacity to 410 gpm.	\$175,000
2	1	Convert to VFD, add fall protection assembly, water service, paint, increase capacity to 1,200 gpm and replacement 10-inch force main (1,400 lf +/-).	(PS work with WWTP upgrade) – Force Main Replacement \$215,000
3	5	Replace mechanical and electrical equipment.	\$175,000
4	9	Replace mechanical and electrical equipment, add telemetry at pump station and modify headquarters telemetry, add pump removal equipment and landscaping.	\$125,000
5	6	Replace mechanical and electrical equipment, add landscaping.	\$175,000
6	4	Replace mechanical and electrical equipment, landscaping, walkway and drainage improvements.	\$200,000
7	7	Increase capacity to 500 gpm when peak flows reach existing station capacity of 450 gpm.	\$50,000
8	2	Increase capacity to 355 gpm when peak flows reach existing station capacity of 310 gpm.	\$50,000

Interceptor/Collection System Improvements

As discussed in Section 7.2, future sewer system extensions are expected to be by developer extensions or small utility local improvement districts (ULIDs). All gravity sewer extensions anticipated in this plan are eight- or ten-inch diameter pipes. These are considered local facilities and extension of such local facilities is not specifically listed herein. The system hydraulic analysis representing the development of the future service/study area indicates that all but one segment of the existing collection system piping will be adequate for future flows.

However, should inflow and infiltration and/or allowable and actual land use density increase, the existing system should be evaluated again.

Many of the District's approximately 60 grinder pumps are approaching twenty years in service and will be due for replacement over the next several years. Also, electrical code revisions pertaining to the hazardous environment of the grinder pump wet well will require modification of the pump power and float control cable connections. The estimated pump replacement/rehabilitation cost is \$7,000 per station. Replacement of at least 10 per year for the next five years is recommended, resulting in an annual cost of \$70,000. Funds for this replacement work are collected as a portion of the monthly service charge for all District customers and a monthly surcharge for those customers served by grinder pumps. The monthly surcharge for customers served by pumps generates about \$10,000 per year, enough to replace about one and one-half pumps. The balance is generated by monthly service charges to all customers.

Up to 25 additional grinder pumps are anticipated for service along West Big Lake Boulevard. These lots would be difficult to serve with gravity sewer extensions due to hilly terrain, shallow rock outcroppings, and little potential for extension west due to the current zoning. These additional pumps would eventually result in 80 to 100 grinder pumps within the District. New grinder pumps are purchased from the District and installed by the District staff or contractor. All District costs are reimbursed by the property owner. Once installed, the District is responsible for maintenance and repair of the stations.

The frames and covers of approximately 20 manholes throughout the District need to be adjusted to match the adjacent ground elevation. The estimated cost for this work is \$20,000.

The Comprehensive Sewer Plan will need to be updated if the County significantly changes the land use or zoning in the service/study area, or if there is need and support for significant extension of sewer service beyond the service/study area. A budget of \$75,000 is recommended for a Comprehensive Sewer Plan update.

Construction Schedule

The following Table 7.3 is a proposed construction schedule for implementing the projects identified in the Capital Improvement Plan. The probable funding source key letter(s) (A, B or C) listed with the project costs references the potential sources discussed in Section 7.5.

**TABLE 7.3
TEN-YEAR PROJECT SCHEDULE**

YEARS 2008-2012

CAPITAL IMPROVEMENT	Funding	2008	2009	2010	2011	2012
Manhole Adjustment	B	\$10,000	\$10,000			
Grinder Pump Upgrade	B	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
WWTP Design and Permitting	B, C	\$700,000				
WWTP and LS #1 Upgrade	B, C		\$3,500,000	\$3,000,000		
LS #1 Force Main Replacement	B, C		\$215,000			
WWTP Paint	B		\$10,000			
Precipitation Recorder	B	\$5,000				
Rehabilitate Lift Station No. 8	B	\$175,000				
Rehabilitate Lift Station No. 5	B		\$175,000			
Rehabilitate Lift Station No. 9	B			\$125,000		
Rehabilitate Lift Station No. 6	B				\$175,000	
Rehabilitate Lift Station No. 4	B					\$200,000
TOTAL		\$960,000	\$3,980,000	\$3,195,000	\$245,000	\$270,000

YEARS 2013-2017

CAPITAL IMPROVEMENT	Funding	2013	2014	2015	2016	2017
Comprehensive Sewer Plan Update	B	\$75,000				
TOTAL		\$75,000	0	0	0	0

7.5 PROJECT FUNDING SOURCES

There are three principal ways that the improvements outlined in this report can be financed. Rates and charges must be maintained at an adequate level to ensure a sufficiency of funds to properly maintain and operate the system and provide funds for construction of the comprehensive sewer plan through a combination of cash contributions and debt financing.

A. Developer Financing

Most of the new facilities constructed in the District will be financed by developers of presently unimproved property. All of the improvements required for service to property within new plats or presently unserved parcels will be designed and constructed in accordance with the District's *Developer Project Manual*. In some cases, latecomer agreements may be executed for sewer mains serving property other than the property owned by the developer that is financing the project.

B. General Facilities Charges/Revenue Bonds

WWTP improvements, lift stations, and force mains are of a general benefit to the District and may be financed by revenue bonds or through accumulation of general facilities charges. The District may use whatever funds are available for the payment of the debt service on the revenue bonds. A major source of these funds is from sewer service payments from District customers. However, all funds, such as general facilities charges, local facilities charges, or latecomer charges, may be used for debt service.

Sewer system improvements that will service many different property owners in areas that are already developed may be financed through the establishment of a ULID. The financing is accomplished through the sale of revenue bonds. These bonds are retired with income from the assessments and/or other funds of the District.

C. Grant/Loan Funds

The state and federal authorities have previously provided funds under the various grant and loan programs for the construction of major improvements to or rehabilitation of sewer systems. The only known programs available at this time are the Centennial Clean Water Grant Fund, State Revolving Loan Fund, Farmers Home Administration (RDA), and Public Works Trust Fund Loan Program. With the recent emphasis on water conservation and reuse, the State Legislature has committed to supporting water reuse programs with new loan and grant programs targeted for this purpose. The District should continuously monitor the activities of the state or federal agencies to determine the requirements of

these programs or of any new grant programs that may be developed in the future.

The District develops annual capital and operation/maintenance estimated expense forecasts following review of prior year's expenses and growth and anticipated new customers and projects. The District sets aside a fixed amount of service charge revenue to its construction fund for replacement costs associated with the collection system pump stations and grinder pump system. The utility charges (revenue projections) are also reviewed annually to determine if changes in the rates are necessary. In recent years, due to moderate growth and no debt service, the District has been able to hold rates to moderate increases every two to three years.

The District has been planning for upgrades to its pump stations and treatment plant for many years and annually reviews and updates its general facilities charge. Three recent pump upgrade projects were paid for with cash accumulated from service charges and connection charges. With the recommended treatment plant upgrade the balance of accumulated construction funds and new debt will be necessary. The cost of the upgrade will be allocated among the beneficiaries, including existing and new customers, and potentially Skagit County if the instream flow mitigation project is implemented. Capital cost and increased operation and maintenance cost recovery through service charges and general facilities charges will be evaluated in a separate study concurrently with preliminary design of the WWTP upgrade to assure a sound financial plan is in place prior to final design.

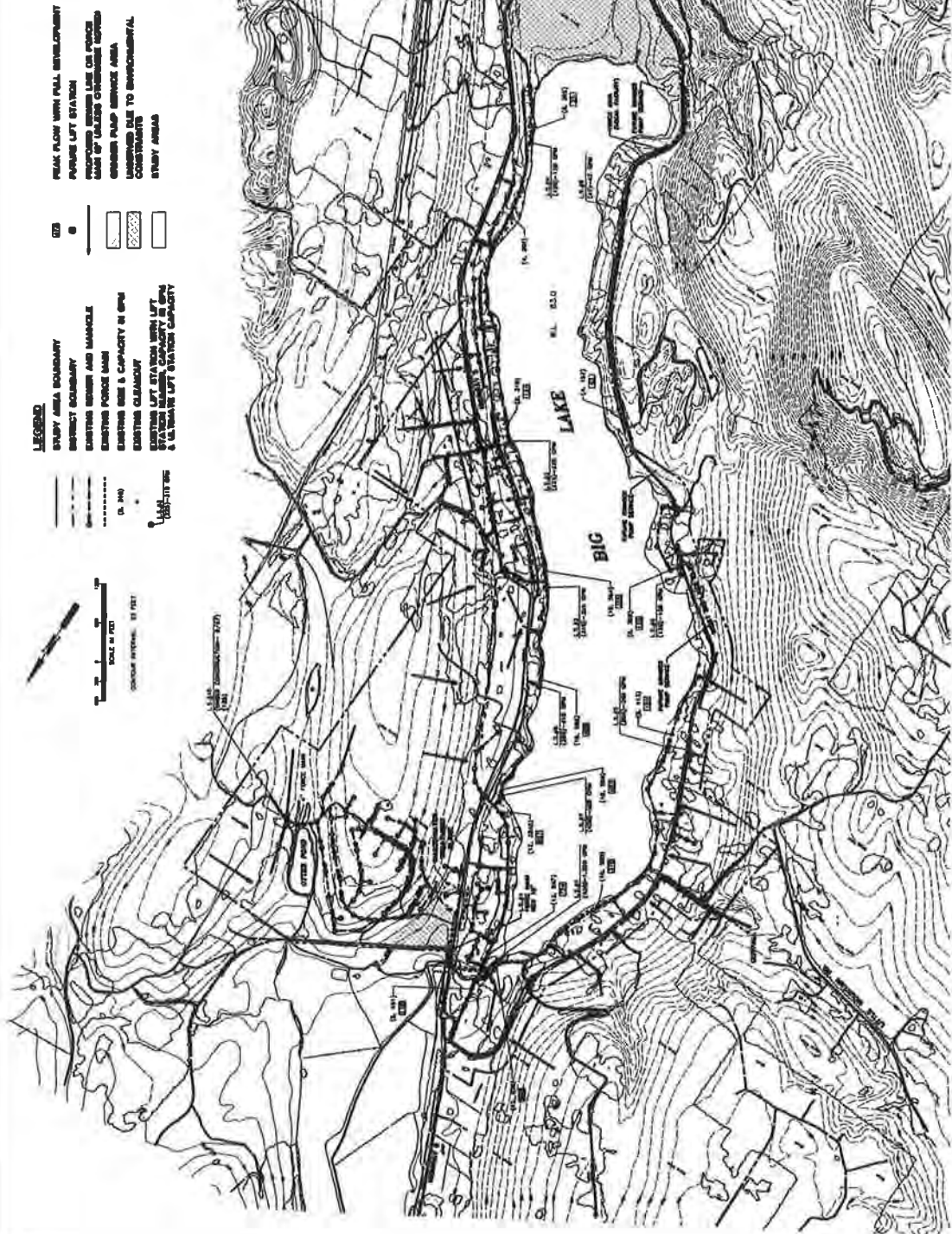
Table 7.4 indicates 2007 debt service and operation/maintenance expenses.

TABLE 7.4

DEBT SERVICE AND OPERATION/MAINTENANCE EXPENSES

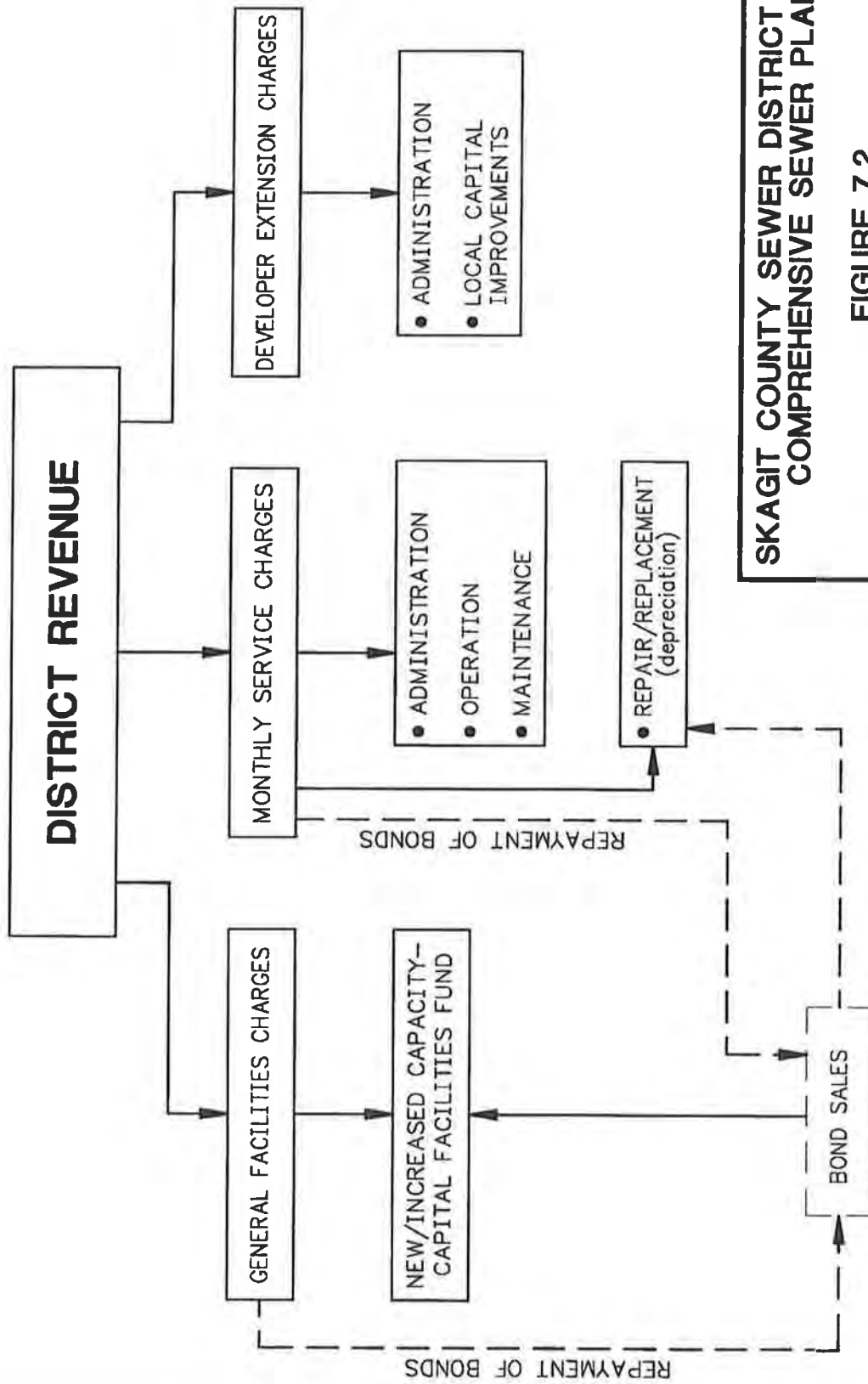
<i>Description</i>	<i>Actual 2007</i>
Debt Service	\$0
Oper./Maint.:	
Collection	\$30,150
WWTP	\$180,926
Gen. & Admin	\$73,244
Repair/Replc.	\$69,312
Total Expenses	\$353,632
No.of Sewer Connections	750
O&M Cost/Conn./Year	\$472

SKAGIT COUNTY SEWER DISTRICT NO. 2
COMPREHENSIVE SEWER PLAN
FIGURE 7.1
CAPITAL IMPROVEMENT PLAN



NOTES: 1. THIS MAP AND DESIGN OF PROPOSED SEWER LINES, LIFT STATIONS, AND PUMP STATIONS ARE BASED ON THE DATA PROVIDED BY THE DISTRICT. THE DISTRICT IS RESPONSIBLE FOR THE ACCURACY OF THE DATA. 2. THE DISTRICT IS RESPONSIBLE FOR THE ACCURACY OF THE DATA. 3. THE DISTRICT IS RESPONSIBLE FOR THE ACCURACY OF THE DATA.

SKAGIT COUNTY SEWER DISTRICT NO. 2



SKAGIT COUNTY SEWER DISTRICT NO. 2
COMPREHENSIVE SEWER PLAN

FIGURE 7.2
SCHEMATIC OF FINANCES

CHAPTER 8 – DEVELOPER PROJECT STANDARDS

CHAPTER 8

DEVELOPER PROJECT STANDARDS

Skagit County Sewer District No. 2 has had and will continue to have developer extensions for sewer service to residential and commercial development.

The Board of Commissioners of Skagit County Sewer District No. 2 has established certain standards for the extension of existing mainline sewers either within or adjacent to the boundaries of existing utility local improvement districts within the District. These standards are included in the *Developer Project Manual* that is updated periodically, with the last revision dated March 9, 2005. The *Developer Project Manual* is available for public review and purchase at the District office.

The following is the Design Criteria section of the *Developer Project Manual*, subject to future update by the Board.

DESIGN STANDARDS

1. GENERAL

All extensions to the sewer system must conform to the design standards of the District. In general, the Developer is required to construct the sewer lines through his property in order to allow for future extension, expansion, and **continuation of the District's collection system or for conformance with the Comprehensive Sewer Plan.** The following items are necessary to meet the conditions.

The District and its consultants do not ensure the correctness of the information **supplied to the Developer from the District's records.** The developer shall verify by survey any information provided by the District prior to using the information in design or construction.

A. Plans and Specifications

The installation of sewer extensions shall be made in accordance with **these Conditions and Standards.** The scale shall be: horizontal 1" = 50' or other scale as appropriate for the specific project, subject to the approval of the District Engineer; vertical 1" = 5' on 24" x 36" or 22" x 34" mylar. Scales used in plan views and/or profiles on multiple sheets shall correspond to one another. The minimum text height shall be 0.12 inch. The plans shall be sealed by a Professional Engineer licensed in Washington. Enclosed is a sample plan showing a typical sewer design. Drafting of plans for the District shall conform to this example. The sewer extension shall be shown on a sheet separate from the water, storm

The construction plans shall be reviewed or prepared by the District's Engineer. The developer shall submit three (3) sets of plans for review by the District. When the plans have been determined to meet the District standards, then a final set of reproducible plans shall be submitted to the District. **These reproducible plans shall receive the District's "Plan Review" approval stamp.** The District shall submit the plans to the regulatory agencies for approval. After approvals have been received, **a set of plans stamped "Issued for Construction" shall be made available to the developer.**

B. Right-of-Way and Monuments

All rights-of-way in which the sewer extension is to be made shall be improved prior to preparation of construction plans and installation of the sewers. Permanent private easements shall be not less than ten (10) feet in width. Public rights-of-way shall be cleared, grubbed and graded in accordance with the requirements of Skagit County. Monuments disturbed or destroyed shall be replaced at the developer's expense.

2. DESIGN STANDARDS

- A. **Unless otherwise called for by the District's Engineer in the specifications and plans, gravity sewers shall be PVC pipe. Ductile iron or concrete may be required in certain applications.**

Plastic-PVC ASTM D3034-SDR 35 or F789

Ductile Iron (Polyethylene Encased) AWWA C151

Concrete ASTM C-14 Class 2

- B. **Manholes shall be precast, shall be 48" I.D. in accordance with Detail Nos. 1 and 2, and shall conform to ASTM C478. Manhole frames and covers shall be locking type in accordance with the specifications and**

Detail No. 3 and shall be supplied with stainless steel allen head cap screws.

- C. Pressure mains shall be ductile iron or PVC.
- D. All joints for sewers or pressure mains shall be of the rubber gasket type.
- E. The pipe sizes and routing (including build-through) shall be selected as is indicated by good practice and shall conform to the Comprehensive Plan, as approved by the District.
- F. Minimum grade for 8-inch mains shall be 0.5% and the minimum grade for end sewer mains that will not be extended shall be 0.75% unless **otherwise approved by the District's Engineer**. Minimum grade and design criteria, unless District criteria is more stringent, shall be in accordance with *Criteria for Sewage Works Design*, State of Washington, DOE; however, minimum grades shall not be used without prior approval from the District's Engineer.
- G. Manholes shall be placed at each grade and direction change. Distances between manholes shall not exceed 400 feet. Manholes shall be a minimum of six (6) feet deep and shall be seven (7) feet deep where possible and shall be used at the termination of each sewer unless **otherwise approved by District's Engineer**. Joints on manhole sections shall be rubber gasket type. The exterior joint line of the manhole shall be grouted after the manhole is assembled.
- H. The sewer grade for 6-inch side sewer stubs shall be a minimum of 2 percent (2%).
- I. A tight line bypass shall be required to separate existing flows from the new connection until final acceptance of the sewer extension. A grouted in-place plug shall be required at the connection of a new system to a dead end existing manhole until final acceptance of the sewer extension.

REFERENCES

REFERENCES

Berryman & Henigar, Inc. in association with Michael J. McCormick; *Skagit County Population & Employment Allocation Final Report*; December 2003.

CHS Engineers, LLC; *Developer Project Manual* for Skagit County Sewer District No. 2; March 9, 2005.

CHS Engineers, LLC; *Feasibility Review: Water Reclamation and Instream Flow Mitigation Project, Nookachamps Creek Basin*; for Skagit County Sewer District No. 2 and Skagit County; July 2007.

CHS Engineers, Inc.; *Comprehensive Sewer Plan* for Skagit County Sewer District No. 2; May 1995.

Natural Resources Conservation Service, U. S. Department of Agriculture; *Soil Survey of Skagit County Area, Washington*; September 1989.

Public Utility District No. 1 of Skagit County;

- Water LUD No. 16, Big Lake Water System (March 1993)
- Phone conversations with Scott Spahr

Skagit County Board of Commissioners; *Ordinance 17570*, September 20, 1999.

Skagit County Department of Health; phone conversations with:

- Daniel Bounds, Shoreline Administrator
- Andy Ross, Environmental Health Specialist

Skagit County Department of Planning and Development Services; phone conversations with:

- Guy McNally, Associate Planner, Community Planning Division
- Greg Geleynse, Planning and Permit Center

www.skagitcounty.net/Common/asp/default.asp?d=PlanningAndPermit&c=General&p=comp_toc.htm (for County Comprehensive Plan).

Skagit County Department of Public Works; phone conversations with Rick Haley, who consulted with Ann Bylin, Planning and Permit Center.

Skagit County Geographic Information Services, online Map Gallery (zoning/parcels); www.skagitcounty.net/Common/Asp/Default.asp?d=GIS&c=General&p=Gallery/main.htm

Skagit County Sewer District No. 2; records and staff consultations.

Skagit County code:

- Zoning (14.16)

www.skagitcounty.net/PlanningAndPermit/Documents/code/title14/Ch14_16.pdf

- Land Divisions (14.18)

www.skagitcounty.net/PlanningAndPermit/Documents/Code/title14/Ch14_18.pdf

URS/Hill, Ingman, Chase & Company; *Skagit County Sewer District No. 2, Comprehensive Sewerage Plan for Big Lake*; September 1972.

Washington State Department of Ecology, Water Quality Program; *Criteria for Sewage Works Design* (Orange Book); www.ecy.wa.gov/pubs/9837.pdf, December 1998.

Washington State Office of Financial Management, Forecasting Division; 2004 *Population Trends*, September 2004.

Washington State University; *Public Agricultural Weather System*; [www.paws.prosser.wsu.edu/paws/MONTHLY NORMALS DAY_pawsnew](http://www.paws.prosser.wsu.edu/paws/MONTHLY_NORMALS_DAY_pawsnew) (precipitation data).

Water & Wastewater Services, LLC (staffing/NPDES reports).

U.S. Census Bureau; <http://factfinder.census.gov>, for demographic data.

APPENDICES

APPENDIX A – ADOPTING RESOLUTION AND APPROVALS

RESOLUTION NO. 401

A RESOLUTION of the Board of Commissioners of Skagit County Sewer District No. 2, Skagit County, Washington, adopting a revised Comprehensive Plan for a system of sewers of the Sewer District.

WHEREAS, on October 16, 2007, the Board of Commissioners (hereinafter referred to as "Board") of Skagit County Sewer District No. 2, Skagit County, Washington (hereinafter called "District"), adopted Resolution No. 395 accepting a revised Comprehensive Sewer Plan dated September 2007 for a system of sanitary sewers for the District; and

WHEREAS, the Comprehensive Sewer Plan was submitted to the State Department of Ecology, Skagit County Commissioners and Skagit County Health, Public Works and Planning Departments for approval; and

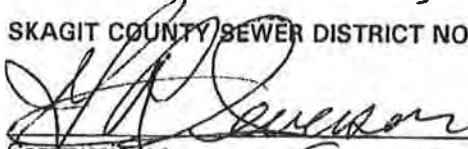
WHEREAS, the State Department of Ecology and Skagit County Health, Public Works and Planning Departments provided comments and questions following their reviews of the Comprehensive Sewer Plan; and


WHEREAS, the District's Engineers have prepared revisions to address comments received and recommends revisions to the existing Comprehensive Plan for the District,

NOW, THEREFORE, BE IT RESOLVED by the Board that the Comprehensive Sewer Plan proposed by the District's Engineers, dated February 2008, a copy of which is attached hereto and by this reference incorporated herein as Exhibit "A", be and the same is hereby authorized and adopted by this Board.

ADOPTED by the Board of Commissioners of Skagit County Sewer District No. 2, Skagit County, Washington, at a regular meeting thereof this 19th day of February, 2008.


SKAGIT COUNTY SEWER DISTRICT NO. 2


Commissioner


Commissioner


Commissioner

ATTEST:


Secretary

I, Secretary of the Board of Commissioners of Skagit County Sewer District No. 2, Skagit County, Washington, do hereby certify that the foregoing resolution is a true and correct copy of Resolution No. 401 of said Board, duly adopted at a regular meeting hereof held on February 19, 2008.

SKAGIT COUNTY
Resolution # R20080160

RESOLUTION NO. Page 1 of 2

**APPROVING THE SKAGIT COUNTY SEWER DISTRICT #2 COMPREHENSIVE SEWER PLAN
DATED FEBRUARY 18, 2008 PURSUANT TO RCW 57.16.010(6)**

Whereas RCW 57.16.010(6) requires the Skagit County legislative authority, the Board of County Commissioners, to approve, conditionally approve, or reject sewer district plans based on the requirements of RCW 57.02.040 and RCW 36.70A.110; and

Whereas Skagit County Sewer District #2 submitted its Comprehensive Sewer Plan update, dated September 2007, to Skagit County for review and approval on October 25, 2007; and

Whereas on January 15, 2008, the Board of County Commissioners (Board) passed a motion to extend Skagit County's review time of the Sewer District #2 Comprehensive Sewer Plan (Plan), and set the date of January 29, 2008 for discussion and possible action; and

Whereas the Plan proposed to expand the Sewer District's boundaries by approximately 170 acres into lands designated on the Skagit County Comprehensive Plan and Zoning Map as Rural Resource-Natural Resource Land and Rural Reserve; and

Whereas the Growth Management Act at RCW 36.70A.110(4), the Skagit County Countywide Planning Policies at policy 1.8, the Skagit County Comprehensive Plan at policies 6A-3.4 and 6A-3.6, and Skagit County Code 14.16.850(3)(a) all prohibit the extension of urban sewer service into rural and resource designated areas, except in limited circumstances shown to be necessary to protect basic public health and safety and the environment; and

Whereas no such showing of necessity had been made to support the expansion of the Sewer District #2 boundaries by approximately 170 acres into rural and natural resource lands; and

Whereas on January 29, 2008, the Board of County Commissioners met with both Planning & Development Services (PDS) staff as well as Sewer District #2 (District) representatives in a public meeting and directed that PDS staff work with the District to develop language addressing the deficiencies identified in the Plan; and

Whereas PDS staff and District representatives collaborated to achieve mutually acceptable revisions to the Plan and a revised Plan was adopted by Sewer District #2 Commissioners on February 18, 2008; and

Whereas Skagit County Sewer District #2 submitted its revised Comprehensive Sewer Plan update, dated February 2008, to Skagit County for review and approval on February 25, 2008; and

Whereas on March 11, 2008, the Board passed a motion directing PDS staff to prepare a resolution to approve the Plan.

Now Therefore Be It Resolved that the Board of County Commissioners, as the legislative authority, approves the revised Skagit County Sewer District #2 Comprehensive Sewer Plan dated February 2008, pursuant to RCW 57.16.010(6).

WITNESS OUR HANDS AND THE OFFICIAL SEAL OF THIS OFFICE THIS
25 DAY OF MARCH, 2008.

BOARD OF COUNTY COMMISSIONERS
SKAGIT COUNTY, WASHINGTON



Don Munks
Don Munks, Chair

Kenneth A. Dahlstedt
Kenneth A. Dahlstedt, Commissioner

Sharon D. Dillon
Sharon D. Dillon, Commissioner

ATTEST:

Linda Hanumana, Assistant
~~JoAnne Giesbrecht~~, Clerk of the Board

APPROVED AS TO FORM:

Jill Olson
Jill Olson, Civil Deputy
Skagit County Prosecutor's Office

APPROVED AS TO CONTENT:

Kirk Johnson
Kirk Johnson, Senior Planner
Planning & Development Services

SKAGIT COUNTY
Resolution # R20080160

Page 2 of 2



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

February 28, 2008

Commissioner Mark Pearson
Commissioner Jerry Sieverson
Commissioner Larry Van Sickle
Skagit County Sewer District No. 2
17079 State Route 9
Mt. Vernon, WA 98274-9366

CHS ENGINEERS

MAR 03 2008

Received

Dear Commissioners Pearson, Sieverson, and Van Sickle:

Re: **Comprehensive Sewer Plan for Skagit County Sewer District No. 2**
(February 2008)

Pursuant to RCW 90.48.110 and WAC 173-240-030, the above-referenced general sewer plan has been reviewed. Ecology provided initial comments to the District's consultant on January 18, 2008. Based upon the responses to those comments, received in an e-mail dated February 1, 2008, the Comprehensive Sewer System Plan for Skagit County Sewer District No. 2 is hereby approved.

Sewage facilities within the planning area boundary shall be constructed according to the approved general sewer plan or amendments thereto. Engineering reports and plans/specifications for construction of planned collection, treatment, and disposal facilities shall be submitted to this department for review and approval in accordance with Chapter 173-240 WAC.

Engineering reports and plans and specifications for sewer line extensions, including pump stations, need not be submitted for approval. Prior to construction, you are required to submit a written description of the project and written assurance that the extension is in conformance with the general sewer plan. In the following situations Ecology approval is necessary for sewer line extensions prior to construction:

- a) The proposed sewers or pump stations involve installation of overflows or bypasses; or
- b) The proposed sewers or pump stations discharge to an overloaded treatment, collection, or disposal facility.

You have the right to appeal this approval to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this approval, your notice of appeal must contain a copy of the Ecology approval you are appealing.



Skagit Co. Sewer District No.2
February 28, 2008
Page 2

Your appeal must be filed with:
Pollution Control Hearings Board
4224 - Sixth Ave SE, Rowe Six, Bldg. 2
PO Box 40903
Lacey, WA 98504-0903

Your appeal must also be served on:
Department of Ecology
Appeals Coordinator
PO Box 47608
Olympia, WA 98504-7608.

In addition, please send a copy of your appeal to:
Ms. Tonya Lane
Department of Ecology
3190 160 Ave SE
Bellevue, WA 98008

If you have any questions concerning this approval, please feel free to contact Tonya Lane at (425) 649-7050 or by e-mail at tlan461@ecy.wa.gov.

Sincerely,

 for Kevin Fitzpatrick

Kevin C. Fitzpatrick
Water Quality Section Manager

KF:TL
Enclosures (1)

cc: . Rodney Langer, P.E., CHS Engineers, LLC
Tonya Lane, DOE/Water Quality-NWRO
Central Files, WA-0030597, WQ-4.1

APPENDIX B – NPDES PERMIT



JUL 01 2003

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

June 30, 2003

CERTIFIED MAIL

7002 3150 0004 8540 3008

Mr. Kelly Wynn
Water and Wastewater Services LLC
14263 Calhoun Road
Mt. Vernon, WA 98273-8186

Dear Mr. Wynn:

RE: NPDES Permit Issuance
WA-003059-7; Skagit Valley Sewer District #2 (Big Lake)
Expiration Date: June 30, 2008

Under the provisions of Chapter 90.48 RCW Water Pollution Control Laws as amended and the Federal Water Pollution Control Act (The Clean Water Act) Title 33 United States Code, Section 1251 et seq., the enclosed NPDES Permit No. WA-003059-7 is hereby issued to the Skagit County Sewer District No. 2 (Big Lake) located at Highway 9, Mount Vernon, WA (Skagit County).

The permit authorizes the Permittee to discharge secondary treated and disinfected effluent into the Skagit River, River Mile 7.8 subject to the terms and conditions of the permit.

Pursuant to RCW 90.48.465, a permit fee will be assessed. The annual fee for both industrial and municipal/domestic discharges is computed according to the permit fee schedules contained in WAC 173-224-040. We notify permit holders of fee charges by mailed billing statements. Failure to pay the applicable permit fee may result in the suspension or revocation of the permit, and could result in the issuance of civil penalties or actions to enjoin the activity under the permit.

Any person feeling aggrieved by this NPDES permit may obtain review thereof by application, within 30 days of receipt of this permit, to the Washington Pollution Control Hearings Board, Post Office Box 40903, Olympia, WA 98504-0903. Concurrently, a copy of the application must be sent to the Department of Ecology, Post Office Box 47600, Olympia, WA 98504-7600. These procedures are consistent with the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

Any appeal must contain the following in accordance with the rules of the hearings board:

- a) The appellant's name and address;
- b) The date and number of the permit appealed;
- c) A description of the substance of the permit, that is the subject of the appeal;
- d) A clear, separate, and concise statement of every error alleged to have been committed;



Mr. Kelly Wynn
Water and Wastewater Services LLC
June 30, 2003
Page 2

- e) A clear and concise statement of facts which the requester relies to sustain his or her statements of error; and
- f) A statement setting forth the relief sought.

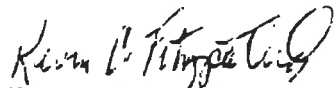
Your appeal alone will not stay the effectiveness of this permit. Stay requests must be submitted in accordance with RCW 43.21B.320. The notice of appeal to the PCHB shall include, as attachments:

- a copy of the NPDES permit
- the permit application, and
- any updated application information submitted during the permit issuance process.

An application for permit renewal must be made at least 180 days prior to the expiration date of this permit. If at any time during the term of this permit a question should arise regarding the permit or discharge, or if there is a significant change in the discharge or operation, please contact Chandler Smith at (425) 649-7228.

Also enclosed is a pre-printed Discharge Monitoring Report (DMR) form. Please note that your permit limits, frequency, and sample type are printed in the shaded areas of your DMR. This is your master copy. Please make copies as needed for our submittals. If no discharge occurs during a monitoring period, you must still submit a DMR with a statement that no discharge occurred.

Sincerely,



Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office

KCF:tm
Enclosures

cc: Skagit County Sewer District No. 2 (Big Lake)
Bev Poston, Permit Fee Unit
Chandler Smith, Permit Manager
Chris Smith, WPLCS
Central Files: WQ 1.1, WA-003059-7; Skagit Valley Sewer District #2 (Big Lake)

Issuance Date: June 30, 2003

Effective Date: July 1, 2003

Expiration Date: June 30, 2008

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT No. WA-003059-7**

State of Washington
DEPARTMENT OF ECOLOGY
Northwest Regional Office
3190 - 160th Avenue SE
Bellevue, Washington 98008-5452

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 et seq.

Skagit County Sewer District No. 2 (Big Lake)

17079 Highway 9

Mount Vernon, Washington 98273

Plant Location:

Highway 9
Mount Vernon, Washington 98273

Receiving Water:

Skagit River, River Mile 7.8

Water Body I.D. No.:

02-03-06

Discharge Location:


Latitude: 48° 22' 30" N

Longitude: 122° 22' 30" W

Plant Type:

Rotating Biological Contactor

is authorized to discharge in accordance with the special and general conditions that follow.



Kevin C. Fitzpatrick
Water Quality Section Manager
Northwest Regional Office
Washington State Department of Ecology

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SUMMARY OF PERMIT REPORT SUBMITTALS

Refer to the Special and General Conditions of this permit for additional submittal requirements.

Permit Section	Submittal	Frequency	First Submittal Date
S3.	Discharge Monitoring Report	Monthly	August 15, 2003
S3.	Discharge Summary Report	Monthly	August 15, 2003
S3.E.	Noncompliance Notification	As necessary	
S4.B.	Plans for Maintaining Adequate Capacity	As necessary	
S4.C.	Notification of New/Altered Sources	As necessary	
S5.G.	Operations and Maintenance Manual Update or Review Confirmation Letter	As necessary	
G1.	Notice of Change in Authorization	As necessary	
G4.	Permit Application for Substantive Changes to the Discharge	As necessary	
G5.	Engineering Report for Construction or Modification Activities	As necessary	
G7.	Application for Permit Renewal	1/permit cycle	January 1, 2008
G21.	Notice of Planned Changes	As necessary	
G22.	Reporting Anticipated Noncompliance	As necessary	

SPECIAL CONDITIONS

S1. DISCHARGE LIMITATIONS

A. Effluent Limitations

All discharges and activities authorized by this permit shall be consistent with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a level in excess of, that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit.

Beginning on the effective date of this permit and lasting through the expiration date, the Permittee is authorized to discharge municipal wastewater at the permitted location subject to complying with the following limitations:

EFFLUENT LIMITATIONS ^a : OUTFALL # 1		
Parameter	Average Monthly	Average Weekly
Biochemical Oxygen Demand ^b (5-day)	30 mg/L, 50 lbs./day	45 mg/L, 75 lbs./day
Total Suspended Solids ^b	30 mg/L, 50 lbs./day	45 mg/L, 75 lbs./day
Fecal Coliform Bacteria	200/100 mL	400/100 mL
pH	Daily minimum is equal to or greater than 6 and the daily maximum is less than or equal to 9.	
^a The average monthly and weekly effluent limitations are based on the arithmetic mean of the samples taken with the exception of fecal coliform, which is based on the geometric mean.		
^b The average monthly effluent concentration for BOD5 and Total Suspended Solids shall not exceed 30 mg/L or 15 percent of the respective monthly average influent concentrations, whichever is more stringent.		

B. Mixing Zone Descriptions

The maximum boundaries of the mixing zones are defined in accordance with WAC 172-201A-100 as follows:

- The boundary of the mixing zone is limited to 300 feet downstream of the outfall discharge and 100 feet upstream. The associated dilution factor at the edge of this mixing zone is estimated to be 635 to 1.
- The zone of acute criteria exceedance is limited to 30 feet downstream of the outfall discharge and 10 feet upstream. The associated dilution factor at the edge of the acute zone is estimated to be 1800 to 1.

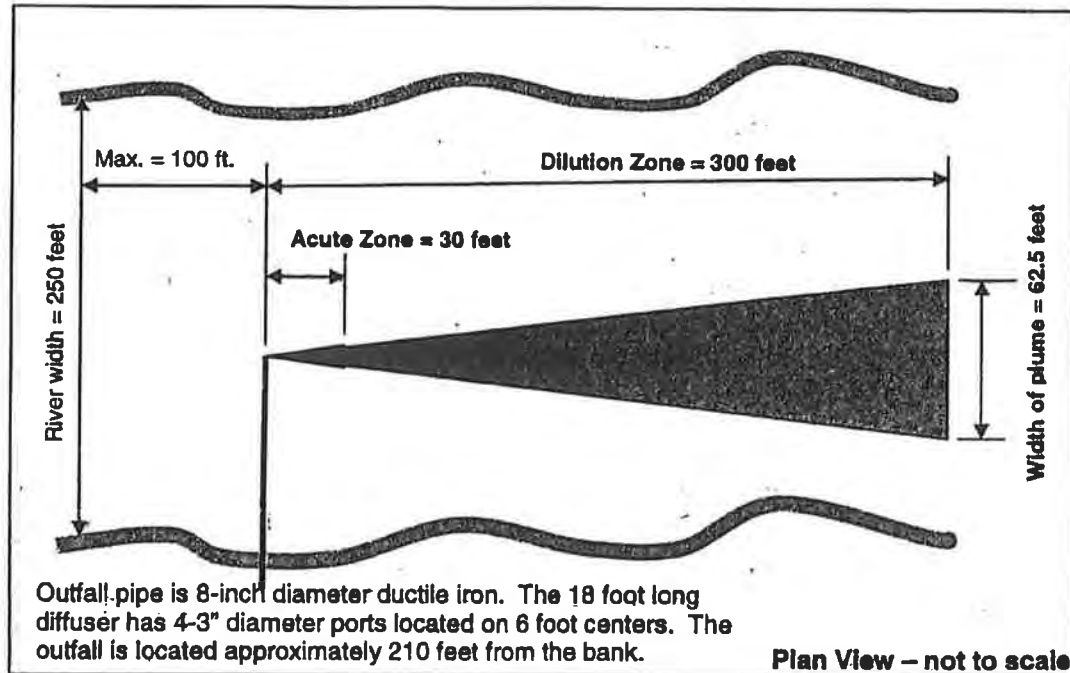


Figure 1: Mixing Zone Diagram

S2. MONITORING REQUIREMENTS

A. Monitoring Schedule

The Permittee shall perform the following compliance monitoring according to the schedule listed below:

Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
BOD ₅	mg/L	Influent	1/week	24-hour comp.
TSS	mg/L	Influent	1/week	24-hour comp.
Flow	MGD	Effluent	7/week, daily	Continuous*
BOD ₅	mg/L	Effluent	1/week	24-hour comp.
TSS	mg/L	Effluent	1/week	24-hour comp.
Fecal Coliform Bacteria	cfu/100 mL	Effluent	1/week	Grab
pH	Standard Units	Effluent	7/week, daily	Grab
Total Residual Chlorine (at Plant)	mg/L	Effluent	7/week	Grab
Total Residual Chlorine (at the same time and location as fecal coliform sample)	mg/L	Effluent	1/week	Grab
Ammonia (NH ₃ as N)	mg/L	Effluent	1/week (during Aug. 1-Oct. 31 each year.)	24-hour comp.

* Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance.

The Permittee shall perform the following characterization monitoring according to the schedule listed below:

Category	Parameter	Units	Sample Point	Minimum Sampling Frequency	Sample Type
Additional Chemical Analysis of Effluent	As required, refer to S8.		Final Effluent	3/permit cycle during last year of permit cycle.	

B. Sampling and Analytical Procedures

Samples and measurements taken to meet the requirements of this permit shall be representative of the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition, including bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the monitoring requirements specified in this permit shall conform to the latest revision of the *Guidelines Establishing Test Procedures for the Analysis of Pollutants* contained in 40 CFR Part 136 or to the latest revision of *Standard Methods for the Examination of Water and Wastewater* (APHA), unless otherwise specified in this permit or approved in writing by the Department of Ecology (Department).

C. Flow Measurement

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the quantity of monitored flows. The devices shall be installed, calibrated, and maintained to ensure that the accuracy of the measurements is consistent with the accepted industry standard for that type of device. Frequency of calibration shall be in conformance with manufacturer's recommendations and at a minimum frequency of at least one calibration per year. Calibration records shall be maintained for at least three (3) years.

D. Laboratory Accreditation

All monitoring data required by the Department shall be prepared by a laboratory registered or accredited under the provisions of, *Accreditation of Environmental Laboratories*, chapter 173-50 WAC. Flow, temperature, settleable solids, conductivity, pH, and internal process control parameters are exempt from this requirement. Conductivity and pH shall be accredited if the laboratory must

otherwise be registered or accredited. The Department exempts crops, soils, and hazardous waste data from this requirement pending accreditation of laboratories for analysis of these media.

S3. REPORTING AND RECORDKEEPING REQUIREMENTS

The Permittee shall monitor and report in accordance with the following conditions. The falsification of information submitted to the Department shall constitute a violation of the terms and conditions of this permit.

A. Reporting

The first monitoring period begins on the effective date of the permit. Monitoring results shall be submitted monthly. Monitoring data obtained during each monitoring period shall be summarized, reported, and submitted on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by the Department. DMR forms shall be received by the Department no later than the 15th day of the month following the completed monitoring period, unless otherwise specified in this permit. Priority pollutant analysis data shall be submitted no later than forty-five (45) days following the monitoring period. Unless otherwise specified, all toxicity test data shall be submitted within sixty (60) days after the sample date. The report(s) shall be sent to the Department of Ecology, Northwest Regional Office, 3190 – 160th Avenue SE, Bellevue, Washington 98008-5452.

All laboratory reports providing data for organic and metal parameters shall include the following information: sampling date, sample location, date of analysis, parameter name, CAS number, analytical method/number, method detection limit (MDL), laboratory practical quantitation limit (PQL), reporting units, and concentration detected.

Discharge Monitoring Report forms must be submitted monthly whether or not the facility was discharging. If there was no discharge during a given monitoring period, submit the form as required with the words "no discharge" entered in place of the monitoring results.

B. Records Retention

The Permittee shall retain records of all monitoring information for a minimum of three (3) years. Such information shall include all calibration and maintenance records and all original recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit. This period of retention shall be extended during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by the Department.

C. Recording of Results

For each measurement or sample taken, the Permittee shall record the following information: (1) the date, exact place, method, and time of sampling or measurement; (2) the individual who performed the sampling or measurement; (3) the dates the analyses were performed; (4) the individual who performed the analyses; (5) the analytical techniques or methods used; and (6) the results of all analyses.

D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by this permit using test procedures specified by Condition S2 of this permit, then the results of such monitoring shall be included in the calculation and reporting of the data submitted in the Permittee's DMR.

E. Noncompliance Notification

In the event the Permittee is unable to comply with any of the terms and conditions of this permit due to any cause, the Permittee shall:

1. Immediately take action to stop, contain, and cleanup unauthorized discharges or otherwise stop the noncompliance, correct the problem and, if applicable, repeat sampling and analysis of any noncompliance immediately and submit the results to the Department within thirty (30) days after becoming aware of the violation.
2. Immediately notify the Department of the failure to comply.
3. Submit a detailed, written report to the Department within thirty (30) days (five [5] days for upsets and bypasses), unless requested earlier by the Department. The report shall contain a description of the noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

S4. FACILITY LOADING

A. Design Criteria

Flows or waste loadings of the following design criteria for the permitted treatment facility shall not be exceeded:

Average flow for the maximum month: 0.2 MGD

BOD₅ loading for maximum month: 400 lb/day

TSS loading for maximum month: 500 lb/day

B. Plans for Maintaining Adequate Capacity

The Permittee shall submit to the Department a plan and a schedule for continuing to maintain capacity when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three (3) consecutive months; or
2. When the projected increase would reach design capacity within five (5) years, whichever occurs first.

If such a plan is required, it shall contain a plan and schedule for continuing to maintain capacity. The capacity as outlined in this plan must be sufficient to achieve the effluent limitations and other conditions of this permit. This plan shall address any of the following actions or any others necessary to meet the objective of maintaining capacity.

1. Analysis of the present design including the introduction of any process modifications that would establish the ability of the existing facility to achieve the effluent limits and other requirements of this permit at specific levels in excess of the existing design criteria specified in paragraph A above.
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limitation on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities necessary to accommodate increased flow or waste load.
5. Reduction of industrial or commercial flows or waste loads to allow for increasing sanitary flow or waste load.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by the Department prior to any construction. The plan shall specify any contracts, ordinances, methods for financing, or other arrangements necessary to achieve this objective.

C. Duty to Mitigate

The Permittee is required to take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

D. Notification of New or Altered Sources

The Permittee shall submit written notice to the Department whenever any new discharge or a substantial change in volume or character of an existing discharge into the POTW is proposed which: (1) would interfere with the operation of, or exceed the design capacity of, any portion of the POTW; (2) is not part of an approved general sewer plan or approved plans and specifications; or (3) would be subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act. This notice shall include an evaluation of the POTW's ability to adequately transport and treat the added flow and/or waste load, the quality and volume of effluent to be discharged to the POTW, and the anticipated impact on the Permittee's effluent [40 CFR 122.42(b)].

S5. OPERATION AND MAINTENANCE

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of this permit.

A. Certified Operator

An operator certified for at least a Class II plant by the State of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class 1 plant shall be in charge during all regularly scheduled shifts.

B. O & M Program

The Permittee shall institute an adequate operation and maintenance program for their entire sewage system. Maintenance records shall be maintained on all major

electrical and mechanical components of the treatment plant, as well as the sewage system and pumping stations. Such records shall clearly specify the frequency and type of maintenance recommended by the manufacturer and shall show the frequency and type of maintenance performed. These maintenance records shall be available for inspection at all times.

C. Short-term Reduction

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limitations on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee shall give written notification to the Department, if possible, thirty (30) days prior to such activities, detailing the reasons for, length of time of, and the potential effects of the reduced level of treatment. This notification does not relieve the Permittee of their obligations under this permit.

D. Electrical Power Failure

The Permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations either by means of alternate power sources, standby generator, or retention of inadequately treated wastes.

The Permittee shall maintain Reliability Class II (EPA 430-99-74-001) at the wastewater treatment plant, which requires a backup power source sufficient to operate all vital components and critical lighting and ventilation during peak wastewater flow conditions, except vital components used to support the secondary processes (i.e., mechanical aerators or aeration basin air compressors) need not be operable to full levels of treatment, but shall be sufficient to maintain the biota.

E. Prevent Connection of Inflow

The Permittee shall strictly enforce their sewer ordinances and not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

F. Bypass Procedures

Bypass, which is the intentional diversion of waste streams from any portion of a treatment facility, is prohibited, and the Department may take enforcement action against a Permittee for bypass unless one of the following circumstances (1, 2, or 3) is applicable.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.

Bypass is authorized if it is for essential maintenance and does not have the potential to cause violations of limitations or other conditions of this permit, or adversely impact public health as determined by the Department prior to the bypass. The Permittee shall submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.

This bypass is permitted only if:

- a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.
- b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment downtime (but not if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance), or transport of untreated wastes to another treatment facility.
- c. The Department is properly notified of the bypass as required in Condition S3.E of this permit.

3. Bypass which is anticipated and has the potential to result in noncompliance of this permit.

The Permittee shall notify the Department at least thirty (30) days before the planned date of bypass. The notice shall contain: (1) a description of the bypass and its cause; (2) an analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing; (3) a cost-effectiveness analysis of alternatives including comparative resource damage assessment; (4) the minimum and maximum duration of bypass under each alternative; (5) a recommendation as to the preferred alternative for conducting the bypass; (6) the projected date of bypass initiation; (7) a statement of compliance with SEPA; (8) a request for modification of water quality standards as provided for in WAC 173-201A-110, if an exceedance of any water quality standard is anticipated; and (9) steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.

For probable construction bypasses, the need to bypass is to be identified as early in the planning process as possible. The analysis required above shall be considered during preparation of the engineering report or

facilities plan and plans and specifications and shall be included to the extent practical. In cases where the probable need to bypass is determined early, continued analysis is necessary up to and including the construction period in an effort to minimize or eliminate the bypass.

The Department will consider the following prior to issuing an administrative order for this type bypass:

- a. If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- b. If there are feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- c. If the bypass is planned and scheduled to minimize adverse effects on the public and the environment.

After consideration of the above and the adverse effects of the proposed bypass and any other relevant factors, the Department will approve or deny the request. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration, to the extent feasible. Approval of a request to bypass will be by administrative order issued by the Department under RCW 90.48.120.

G. Operations and Maintenance Manual

The approved Operations and Maintenance Manual shall be kept available at the treatment plant and all operators shall follow the instructions and procedures of this manual.

The O&M Manual shall be reviewed by the Permittee as needed to keep all information current. Substantial changes or updates to the O&M Manual shall be submitted to the Department whenever they are incorporated into the manual.

S6. PRETREATMENT

A. General Requirements

The Permittee shall work with the Department to ensure that all commercial and industrial users of the publicly owned treatment works (POTW) are in compliance with the pretreatment regulations promulgated in 40 CFR Part 403 and any additional regulations that may be promulgated under Section 307(b) (pretreatment) and 308 (reporting) of the Federal Clean Water Act.

B. Wastewater Discharge Permit Required

The Permittee shall not allow significant industrial users (SIUs) to discharge wastewater to the Permittee's sewerage system until such user has received a wastewater discharge permit from the Department in accordance with chapter 90.48 RCW and chapter 173-216 WAC, as amended.

C. Identification and Reporting of Existing, New, and Proposed Industrial Users

1. The Permittee shall take continuous, routine measures to identify all existing, new, and proposed SIUs and potential significant industrial users (PSIUs) discharging or proposing to discharge to the Permittee's sewerage system (see Appendix B of Fact Sheet for definitions).
2. Within thirty (30) days of becoming aware of an unpermitted existing, new, or proposed industrial user who may be a SIU, the Permittee shall notify such user by registered mail that, if classified as an SIU, they shall be required to apply to the Department and obtain a State Waste Discharge Permit. A copy of this notification letter shall also be sent to the Department within this same thirty (30)-day period.
3. The Permittee shall also notify all PSIUs, as they are identified, that if their classification should change to an SIU, they shall be required to apply to the Department for a State Waste Discharge Permit within thirty (30) days of such change.

D. Duty to Enforce Discharge Prohibitions

1. In accordance with 40 CFR 403.5(a), the Permittee shall not authorize or knowingly allow the discharge of any pollutants into its POTW which cause pass through or interference, or which otherwise violates general or specific discharge prohibitions contained in 40 CFR Part 403.5 or WAC-173-216-060.
2. The Permittee shall not authorize or knowingly allow the introduction of any of the following into their treatment works:
 - a. Pollutants which create a fire or explosion hazard in the POTW (including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21).
 - b. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0, or greater than 11.0 standard units, unless the works are specifically designed to accommodate such discharges.

- c. Solid or viscous pollutants in amounts that could cause obstruction to the flow in sewers or otherwise interfere with the operation of the POTW.
 - d. Any pollutant, including oxygen-demanding pollutants, (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW.
 - e. Petroleum oil, non-biodegradable cutting oil, or products of mineral origin in amounts that will cause interference or pass through.
 - f. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity which may cause acute worker health and safety problems.
 - g. Heat in amounts that will inhibit biological activity in the POTW resulting in interference but in no case heat in such quantities such that the temperature at the POTW headworks exceeds 40° C (104° F) unless the Department, upon request of the Permittee, approves, in writing, alternate temperature limits.
 - h. Any trucked or hauled pollutants, except at discharge points designated by the Permittee.
 - i. Wastewaters prohibited to be discharged to the POTW by the Dangerous Waste Regulations (chapter 173-303 WAC), unless authorized under the Domestic Sewage Exclusion (WAC 173-303-071).
3. All of the following are prohibited from discharge to the POTW unless approved in writing by the Department under extraordinary circumstances (such as a lack of direct discharge alternatives due to combined sewer service or the need to augment sewage flows due to septic conditions):
- a. Noncontact cooling water in significant volumes.
 - b. Stormwater, and other direct inflow sources.
 - c. Wastewaters significantly affecting system hydraulic loading, which do not require treatment, or would not be afforded a significant degree of treatment by the system.
4. The Permittee shall notify the Department if any industrial user violates the prohibitions listed in this section.

S7. RESIDUAL SOLIDS

Residual solids include screenings, grit, scum, primary sludge, waste activated sludge, and other solid waste. The Permittee shall store and handle all residual solids in such a manner so as to prevent their entry into state ground or surface waters. The Permittee shall not discharge leachate from residual solids to state surface or ground waters.

S8. CHEMICAL ANALYSIS

A. Additional Chemical Analysis

The following parameters shall be tested on the Permittee's final effluent, from three grab samples taken during the calendar year 2007. Analytical results are to be submitted with the application for renewal.

Ammonia (as N)
Dissolved Oxygen
Total Kjeldahl Nitrogen (TKN)
Nitrate + Nitrite Nitrogen
Oil & Grease
Total Phosphorus
Total Dissolved Solids (TDS)

B. Quality Assurance/Quality Control Procedures

The Permittee shall follow the quality assurance procedures of 40 CFR Part 136.

GENERAL CONDITIONS

G1. SIGNATORY REQUIREMENTS

All applications, reports, or information submitted to the Department shall be signed and certified.

- A. All permit applications shall be signed by either a principal executive officer or a ranking elected official.
- B. All reports required by this permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
 - 1. The authorization is made in writing by a person described above and submitted to the Department.
 - 2. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)
- C. Changes to authorization. If an authorization under paragraph B.2 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph B.2 above must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.
- D. Certification. Any person signing a document under this section shall make the following certification:

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. RIGHT OF INSPECTION AND ENTRY

The Permittee shall allow an authorized representative of the Department, upon the presentation of credentials and such other documents as may be required by law:

- A. To enter upon the premises where a discharge is located or where any records must be kept under the terms and conditions of this permit.
- B. To have access to and copy - at reasonable times and at reasonable cost - any records required to be kept under the terms and conditions of this permit.
- C. To inspect - at reasonable times - any facilities, equipment (including monitoring and control equipment), practices, methods, or operations regulated or required under this permit.
- D. To sample or monitor - at reasonable times - any substances or parameters at any location for purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act.

G3. PERMIT ACTIONS

This permit may be modified, revoked and reissued, or terminated either at the request of any interested person (including the Permittee) or upon the Department's initiative. However, the permit may only be modified, revoked and reissued, or terminated for the reasons specified in 40 CFR 122.62, 122.64 or WAC 173-220-150 according to the procedures of 40 CFR 124.5.

- A. The following are causes for terminating this permit during its term, or for denying a permit renewal application:
 - 1. Violation of any permit term or condition.
 - 2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
 - 3. A material change in quantity or type of waste disposal.
 - 4. A determination that the permitted activity endangers human health or the environment, or contributes to water quality standards violations and can only be regulated to acceptable levels by permit modification or termination [40 CFR part 122.64(3)].
 - 5. A change in any condition that requires either a temporary or permanent reduction, or elimination of any discharge or sludge use or disposal practice controlled by the permit [40 CFR part 122.64(4)].
 - 6. Nonpayment of fees assessed pursuant to RCW 90.48.465.
 - 7. Failure or refusal of the Permittee to allow entry as required in RCW 90.48.090.

- B. The following are causes for modification but not revocation and reissuance except when the Permittee requests or agrees:
1. A material change in the condition of the waters of the state.
 2. New information not available at the time of permit issuance that would have justified the application of different permit conditions.
 3. Material and substantial alterations or additions to the permitted facility or activities which occurred after this permit issuance.
 4. Promulgation of new or amended standards or regulations having a direct bearing upon permit conditions, or requiring permit revision.
 5. The Permittee has requested a modification based on other rationale meeting the criteria of 40 CFR part 122.62.
 6. The Department has determined that good cause exists for modification of a compliance schedule, and the modification will not violate statutory deadlines.
 7. Incorporation of an approved local pretreatment program into a municipality's permit.
- C. The following are causes for modification or alternatively revocation and reissuance:
1. Cause exists for termination for reasons listed in A1 through A7 of this section, and the Department determines that modification or revocation and reissuance is appropriate.
 2. The Department has received notification of a proposed transfer of the permit. A permit may also be modified to reflect a transfer after the effective date of an automatic transfer (General Condition G8) but will not be revoked and reissued after the effective date of the transfer except upon the request of the new Permittee.

G4. REPORTING PLANNED CHANGES

The Permittee shall, as soon as possible, but no later than sixty (60) days prior to the proposed changes, give notice to the Department of planned physical alterations or additions to the permitted facility, production increases, or process modification which will result in:

- 1) the permitted facility being determined to be a new source pursuant to 40 CFR 122.29(b);
- 2) a significant change in the nature or an increase in quantity of pollutants discharged; or
- 3) a significant change in the Permittee's sludge use or disposal practices.

Following such notice, and the submittal of a new application or supplement to the existing application, along with required engineering plans and reports, this permit may be modified, or revoked and reissued pursuant to 40 CFR 122.62(a) to specify and limit any pollutants not previously limited. Until such modification is effective, any new or increased discharge in excess of permit limits or not specifically authorized by this permit constitutes a violation of the terms and conditions of this permit.

G5. PLAN REVIEW REQUIRED

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications shall be submitted to the Department for approval in accordance with chapter 173-240 WAC. Engineering reports, plans, and specifications shall be submitted at least one hundred and eighty (180) days prior to the planned start of construction unless a shorter time is approved by Ecology. Facilities shall be constructed and operated in accordance with the approved plans.

G6. COMPLIANCE WITH OTHER LAWS AND STATUTES

Nothing in this permit shall be construed as excusing the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. DUTY TO REAPPLY

The Permittee shall apply for permit renewal at least one hundred and eighty (180) days prior to the specified expiration date of this permit.

G8. TRANSFER OF THIS PERMIT

In the event of any change in control or ownership of facilities from which the authorized discharge emanate, the Permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Department.

A. Transfers by Modification

Except as provided in paragraph (B) below, this permit may be transferred by the Permittee to a new owner or operator only if this permit has been modified or revoked and reissued under 40 CFR 122.62(b)(2), or a minor modification made under 40 CFR 122.63(d), to identify the new Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

B. Automatic Transfers

This permit may be automatically transferred to a new Permittee if:

1. The Permittee notifies the Department at least thirty (30) days in advance of the proposed transfer date.
2. The notice includes a written agreement between the existing and new Permittees containing a specific date transfer of permit responsibility, coverage, and liability between them.
3. The Department does not notify the existing Permittee and the proposed new Permittee of its intent to modify or revoke and reissue this permit. A modification under this subparagraph may also be minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the written agreement.

G9. REDUCED PRODUCTION FOR COMPLIANCE

The Permittee, in order to maintain compliance with its permit, shall control production and/or all discharges upon reduction, loss, failure, or bypass of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

G10. REMOVED SUBSTANCES

Collected screenings, grit, solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall not be resuspended or reintroduced to the final effluent stream for discharge to state waters.

G11. DUTY TO PROVIDE INFORMATION

The Permittee shall submit to the Department, within a reasonable time, all information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee shall also submit to the Department upon request, copies of records required to be kept by this permit.

G12. OTHER REQUIREMENTS OF 40 CFR

All other requirements of 40 CFR 122.41 and 122.42 are incorporated in this permit by reference.

G13. ADDITIONAL MONITORING

The Department may establish specific monitoring requirements in addition to those contained in this permit by administrative order or permit modification.

G14. PAYMENT OF FEES

The Permittee shall submit payment of fees associated with this permit as assessed by the Department.

G15. PENALTIES FOR VIOLATING PERMIT CONDITIONS

Any person who is found guilty of willfully violating the terms and conditions of this permit shall be deemed guilty of a crime, and upon conviction thereof shall be punished by a fine of up to ten thousand dollars (\$10,000) and costs of prosecution, or by imprisonment in the discretion of the court. Each day upon which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit shall incur, in addition to any other penalty as provided by law, a civil penalty in the amount of up to ten thousand dollars (\$10,000) for every such violation. Each and every such violation shall be a separate and distinct offense, and in case of a continuing violation, every day's continuance shall be deemed to be a separate and distinct violation.

G16. UPSET

Definition – "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of the following paragraph are met.

A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that: 1) an upset occurred and that the Permittee can identify the cause(s) of the upset; 2) the permitted facility was being properly operated at the time of the upset; 3) the Permittee submitted notice of the upset as required in Condition S3.E; and 4) the Permittee complied with any remedial measures required under S4.C of this permit.

In any enforcement, proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

G17. PROPERTY RIGHTS

This permit does not convey any property rights of any sort, or any exclusive privilege.

G18. DUTY TO COMPLY

The Permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

G19. TOXIC POLLUTANTS

The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if this permit has not yet been modified to incorporate the requirement.

G20. PENALTIES FOR TAMPERING

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two (2) years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this Condition, punishment shall be a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than four (4) years, or by both.

G21. REPORTING ANTICIPATED NONCOMPLIANCE

The Permittee shall give advance notice to the Department by submission of a new application or supplement thereto at least one hundred and eighty (180) days prior to commencement of such discharges, of any facility expansions, production increases, or other planned changes, such as process modifications, in the permitted facility or activity which may result in noncompliance with permit limits or conditions. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Department.

G22. REPORTING OTHER INFORMATION

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Department, it shall promptly submit such facts or information.

G23. REPORTING REQUIREMENTS APPLICABLE TO EXISTING MANUFACTURING, COMMERCIAL, MINING, AND SILVICULTURAL DISCHARGERS

The Permittee belonging to the categories of existing manufacturing, commercial, mining, or silviculture must notify the Department as soon as they know or have reason to believe:

- A. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following "notification levels":
 - 1. One hundred micrograms per liter (100 µg/l).
 - 2. Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony.
 - 3. Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7).
 - 4. The level established by the Director in accordance with 40 CFR 122.44(f).

- B. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in this permit, if that discharge will exceed the highest of the following "notification levels":
1. Five hundred micrograms per liter (500 µg/L).
 2. One milligram per liter (1 mg/L).
 3. Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7).
 4. The level established by the Director in accordance with 40 CFR 122.44(f).

G24. COMPLIANCE SCHEDULES

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule date.

**APPENDIX C – SEPA CHECKLIST
AND DETERMINATION OF NON-SIGNIFICANCE**

SEPA DNS ADDENDA
Skagit County Sewer District No. 2
Comprehensive Sewer Plan

Skagit County Sewer District No. 2 previously evaluated a SEPA Checklist for the non-project action of District adoption of its September 2007 *Comprehensive Sewer Plan* (checklist dated 8/27/07) and issued a Declaration of Non-Significance (DNS) on August 31, 2007. No comments were submitted to the District in response to the DNS. The District adopted the plan on October 16, 2007.

Skagit County Sewer District No. 2 is preparing to adopt revisions to its September 2007 *Comprehensive Sewer Plan* in response to informal requests for additional information from the State Department of Ecology and Skagit County Planning and Public Works departments. The revisions are non-substantive in nature with respect to the primary purpose of the plan, development of a capital improvement plan, and will result in no new or additional significant adverse impacts to the environment. The revisions are summarized in the attached outline.

This addenda updates the August 31, 2007 DNS.

Responsible Official: Kelly Wynn

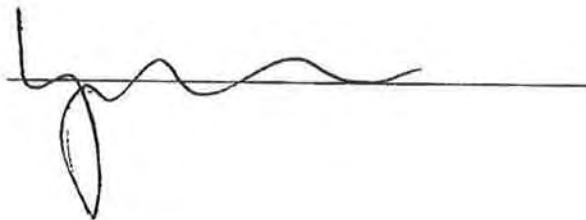
Position/Title: District Manager

Phone: (360) 422-8373 or (360) 466-4443

Address: Skagit County Sewer District No. 2, 17079 Highway 9,
Mount Vernon, WA 98274

Date: 2/1/08

Signature

A handwritten signature in black ink, appearing to be 'Kelly Wynn', written over a horizontal line.

Comprehensive Sewer Plan – Revisions Outline
Skagit County Sewer District No. 2

1. Cover – Changed date to February 2008
2. Inside Cover – Changed date to February 2008, re-stamp and re-sign
3. Table of Contents
 - a. Revised section or figure titles to reflect service and study area clarifications
4. Summary and Recommendations
 - a. Changed footer date to February 2008
 - b. Clarified service area and study areas
 - c. Corrected typo in Recommendation 1, p. S-3
5. Chapter 1 – Introduction
 - a. Changed footer date to February 2008
 - b. Revised Figure 1.1 – change Study Area to call out District by name
6. Chapter 2 – Study Area
 - a. Changed footer date to February 2008
 - b. Clarified service area and study areas
 - c. Misc revisions suggested by Gary Stoyka, Skagit County Public Works
7. Chapter 3 – Population and Land Use
 - a. Changed footer date to February 2008
 - b. Clarified service area and study areas
 - c. Revised Figure 3.1 to clarify study and service areas.
8. Chapter 4 – Planning and Design Criteria
 - a. Changed footer date to February 2008
9. Chapter 5 – Existing Sewer System\
 - a. Changed footer date to February 2008
 - b. Revised 5.1 to clarify service area and study areas
10. Chapter 6 – Wastewater Treatment Plant
 - a. Revised divider page to read “Wastewater” rather than “Sewage”
 - b. Replaced with version of Chapter with edits by Gary Stoyka, which correct typos or clarify instream flow mitigation project discussion
 - c. Corrected two “units” typos on page 6-1
 - d. Referenced other plants in vicinity per DOE comment
11. Chapter 7 – Capital Improvement Plan
 - a. Changed footer date to February 2008
 - b. Clarified service area and study areas
 - c. Added sentence recognizing recent emphasis on reuse water grant and loan programs
 - d. Added discussion of rates and O&M costs per DOE comment
12. Chapter 8 – Developer Project Standards
 - a. Changed footer date to February 2008
13. References
 - a. Changed footer date to February 2008
14. Appendix A – Adopting Resolution and Approvals
 - a. Will add new resolution and approvals, when available.
15. Appendix C – Add SEPA Addenda acknowledging changes in Plan but no new significant environmental impacts.

**DETERMINATION OF NON-SIGNIFICANCE
WAC 197-11-970**

Description of Proposal: Adoption of Comprehensive Sewer Plan Update

Proponent: Skagit County Sewer District No. 2

Location of Proposal, including Street Address, if any: Approximately 1,149 land acres adjacent to Big Lake, Skagit County.

Lead Agency: Skagit County Sewer District No. 2.

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

☐

There is no comment period for this DNS.

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This DNS is issued under 197-11-340(2); the lead agency will not act on this proposal for 15 days from the date below. Comments must be submitted by September 17, 2007.

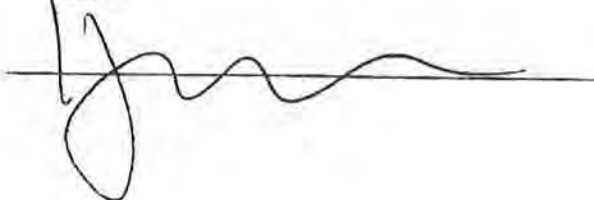
Responsible Official: Kelly Wynn

Position/Title: District Manager Phone: (360) 422-8373 or (360) 466-4443

Address: Skagit County Sewer District No. 2, 17079 Highway 9,
Mount Vernon, WA 98274

Date: August 31, 2007

Signature



**STATE ENVIRONMENTAL POLICY ACT
ENVIRONMENTAL CHECKLIST**

A. BACKGROUND

1. Name of proposed project (if applicable):

Skagit County Sewer District No. 2 Comprehensive Sewer Plan and WWTP
Engineering Report

2. Name of Applicant:

Skagit County Sewer District No. 2

3. Address and phone number of applicant and contact person:

Skagit County Sewer District No. 2
17079 Highway 9
Mount Vernon, WA 98274
(360) 422-8373
Kelly Wynn, District Manager

4. Date checklist prepared:

July 2007

5. Agency requesting checklist:

Skagit County Sewer District No. 2

6. Proposed timing or schedule (including phasing, if applicable):

Adoption of Comprehensive Sewer Plan – Summer 2007.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

The plan will serve as the guideline for future capital improvement activity by the District.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

None.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

None Known.

10. List any government approvals or permits that will be needed for your proposal, if known.

Skagit County
Washington State Department of Ecology
Washington State Department of Health (potentially)

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (lead agencies may modify this form to include additional specific information on project description).

The Comprehensive Sewer Plan (CSP) discusses the existing service area characteristics, population and land use and projects the growth within the District service area. The plan discusses design criteria, sewer demand, the existing system and proposed system expansion and improvements. The plan will be used as a guide for improving the existing system and for future planning and growth in Skagit County Sewer District No. 2. The last CSP update was completed in 1995. Since that time, the District has experienced growth and facilities have continued to age. Similarly the WWTP Engineering Report reviews existing and forecast wastewater flows and loadings, existing process and discharge requirements and identifies improvement needed for providing adequate capacity and treatment in the future.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or details plans submitted with any permit applications related to this checklist.

The District surrounds Big Lake, Skagit County, Washington, and includes areas in: Sections 25, 35, and 36, Township 34 North, Range 4 East; Section 1, Township 33 North, Range 4 East; Sections 6, 7, and 8, Township 33 North, Range 5 East; and Sections 30 and 31, Township 34 North, Range 5 East.

B. ENVIRONMENTAL ELEMENTS

1. Earth

- a. General description of the site (circle one):** Flat, rolling, hilly, steep slopes, mountainous, other: lakes.

Hilly, steep slopes surrounding flat lakeshore.

- b. What is the steepest slope on the site (approximate percent slope)?**

80%.

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck): If you know the classification of agricultural soils, specify them and note any prime farmland.**

Fifteen different soil groups can be found in the area adjacent to Big Lake. A detailed list of the soils can be found in the Soil Survey of Skagit County Area, Washington, U.S.D.A., September 1989.

The eastern area can generally be described as well-drained gravelly loams. Instances of clay deposits increase near the shoreline. The steeper areas show high percentages of cemented till forming the substratum.

The southern area is relatively flat and ranges from muck to gravelly loams as the slope increases.

The northern and eastern areas contain larger areas of clayey, silty loams and clayey gravel. Cemented till can be found on the steeper loams.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

No.

- e. Describe the purpose, type and approximate quantities of any filling or grading proposed. Indicate source of fill.**

Sewer-line trenches will be excavated and backfilled as much as possible with native material. The County may require imported backfill depending on condition and type of native soil. Backfill will come from local suppliers.

- f. **Could erosion occur as a result of clearing, construction, or use? If so, generally describe.**

Erosion during construction should be minimal. Construction erosion requirements will be imposed.

- g. **About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?**

There are no plans to cover sewer lines with impervious surfaces other than those existing in the right-of-way; these include asphalt and concrete road surfaces.

- h. **Proposed measures to reduce or control erosion, or other impacts to the earth, if any:**

Construction documents prepared for sewer-line construction and the SCSD#2 Developer Project Manual will require the contractor to utilize erosion/sedimentation control measures to prevent erosion by covering erodible embankments, hydroseeding, filter fabric and straw bale filters, and other measures as necessary to meet local and state requirements. The contractor will be required to schedule operations such that the excavation, embankment, and restoration work proceeds commensurate with his ability to complete restoration, mulching, seeding, and other erosion control measures immediately following disturbance of the earth.

2. **Air**

- a. **What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.**

There will be normal dust and machinery emissions during construction, but no emissions after construction. The contractor will be required to limit emissions as required by the appropriate regulatory agencies and to control dust emissions so as not to damage property or vegetation or create a nuisance for the public. Expansion of the sewer collection system will include expansion of and upgrade modifications to the existing sewage treatment plant. An analysis of and recommendation for controlling odors associated with the plant will be included in the design.

- b. **Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.**

No.

- c. **Proposed measures to reduce or control emissions or other impacts to air, if any:**

The contractor will be required to control dust during construction via sweeping and washing.

3. Water

a. Surface:

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands). If yes, describe type and provide names. If appropriate, state what stream or river it flows into.**

Yes, the District surrounds Big Lake. Big Lake drains to the Skagit River via Nookachamps Creek.

- 2) Will the project require any work over, in or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

Expansion of the collection system or connection to the existing system may encroach within 200-feet.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.**

All areas impacted by construction will be restored to original contours, to the extent feasible. Construction will consist of excavation of sewer-line trenches (average 9 feet deep, 1½ cy per foot of trench) and installation of pipe and backfill with native materials. If required by the County due to poor materials and close proximity to or location within roadway, backfill gravel will replace native material in about 2/3 of the trench cross-section (1 cy per foot of trench). Backfill gravel would come from local materials yards.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.**

No.

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.**

At its furthest extent, the 100-year floodplain for Big Lake extends approximately 250 feet from the shoreline at the south end of the lake. Sewer service or system extension is not anticipated in this area.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

Treated effluent is currently discharged, via force main, to the Skagit River. Growth is anticipated that will result in discharge of 0.35 million gallons per day by the year 2025 (maximum month average day flow). The Engineering Report and related feasibility study include consideration of an alternative to discharge treated effluent to Nookachamps Creek for an instream flow mitigation project.

b. Ground:

- 1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.**

No.

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.**

N/A.

c. Water Runoff (including storm water):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known) Where will this water flow? Will this water flow into other waters? If so, describe.**

The finished collection systems projects will not result in an increased amount of impervious area, with the exception of additional crushed rock surfacing on existing roadway shoulders as may be required by the County. Improvements at the WWTP will result in additional impervious area (buildings, basins, etc) and drainage impacts will be addressed per Skagit County regulations. Current drainage patterns will not be altered by the finished projects.

Storm water runoff impacting the construction zone will be intercepted for sediment control prior to release to its normal outfall.

The construction documents will require that the contractor utilize sediment control facilities per the specifications and local/state requirements to ensure that sediment-laden water does not enter the natural drainage system.

- 2) Could waste materials enter ground or surface waters? If so, generally describe.**

No. [except in rare circumstances when, sewer blockages, or extended power outages combined with backup power system failure could result in wastewater overflow.

d. Proposed measures to reduce or control surface, ground and runoff water impacts, if any:

Erosion/sediment control facilities will be required as discussed in response to 3.c.1. above. Projects are planned to provide adequate capacity for anticipated wastewater flows, to improve maintenance abilities, to replace deteriorated sewer mains, and to increase the reliability of the lift stations and standby power equipment.

4. Plants

a. Check or circle types of vegetation found on the site:

<u>X</u>	Deciduous trees: alder, maple, aspen, other
<u>X</u>	Evergreen trees: fir, cedar, pine, other
<u>X</u>	Shrubs
<u>X</u>	Grass
<u>X</u>	Pasture
<u> </u>	Crops or grain
<u>X</u>	Wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
<u>X</u>	Water plants: water lily, eelgrass, milfoil, other
<u> </u>	Other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

To be determined on a project-specific basis.

c. List threatened or endangered species known to be on or near the site.

None known.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Vegetation removed or disturbed will be restored following construction.

5. Animals

a. Circle any birds and animals that have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other:

mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site.

Bald eagles are present in the vicinity of Big Lake. Correspondence with Skagit County Public Works, with input from the Planning and Permit Center, identified only "waterfowl concentrations" as being shown in the Big Lake area on the County's official *Species and Habitats of Local Significance* map.

c. Is the site part of a migration route? If so, explain.

Big Lake is in the Pacific Flyway.

- d. **Proposed measures to preserve or enhance wildlife, if any:**

None

6. **Energy and Natural Resources**

- a. **What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

Electricity will be necessary for pumping of wastewater as well as vault lighting, control and ventilation. Diesel fuel is used for operation of standby generator engines.

- b. **Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.**

No.

- c. **What kinds of energy conservation features are included in the plans of this proposal. List other proposed measures to reduce or control energy impacts, if any:**

None.

7. **Environmental Health**

- a. **Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.**

The main risk would occur during construction from machinery and construction practices. This could include spills of small amounts of oil and gas because of improper filling and/or machinery failures.

- 1) **Describe special emergency services that might be required.**

Spill clean-up services during construction. Emergency/portable generators for continued operation of system.

- 2) **Proposed measures to reduce or control environmental health hazards, if any:**

Contractors are required to ensure all personnel are properly trained and construction equipment is properly maintained as required by WISHA.

b. Noise

1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

During construction, noise levels will increase from construction equipment engines during normal working hours. Periodic testing and operation of standby generators during power outages will generate noise for short periods of time. Following construction, noise levels will return to their previous levels and consist of minimal noise from pump stations and the sewage treatment plant during operations.

3) Proposed measures to reduce or control noise impacts, if any:

Construction would be limited to daylight hours and insure proper maintenance of equipment. Federal, state and local noise standards will regulate construction noise. Contractors will be required to ensure proper maintenance of equipment.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

Construction will take place within existing county right-of-way or on private properties. Adjacent properties range from single-family homes to grass fields to dense trees.

b. Has the site been used for agriculture? If so, describe.

N/A.

c. Describe any structures on the site.

Typically, the "site" is within public right-of-way, free of structures. The actual "site" will vary depending on the project. Several existing District structures include the treatment plant and lift station buildings, which are below grade in most cases.

d. Will any structures be demolished? If so, what?

N/A.

e. What is the current zoning classification of the site?

The majority of the District is zoned Rural Village Residential. There are isolated pockets of Rural Village Commercial, Rural Reserve, and Rural Resource-Natural

Resource Lands. The extreme southerly end of the lake is zoned as Agricultural-Natural Resource Lands. Beyond the study area, the zoning is mostly rural or forestry.

Actual land use is almost exclusively residential. Commercial establishments include a tavern and small general store. Public use facilities near the north end of the lake are a fire station, school, and the District's treatment plant.

f. What is the current comprehensive plan designation of the site.

The area is designated as the Big Lake Rural Village in the Skagit County Comprehensive Plan.

g. If applicable, what is the current shoreline master program designation of the site?

The lake itself is designated as an Aquatic Shoreline Area; the shoreline is designated Rural Residential, and the area south of the lake is designated as a Conservancy Shoreline Area.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

No.

i. Approximately how many people would reside or work in the completed project?

The estimated population for the study area is 1,329 for the year 2025.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

None.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

All projects are submitted for review and approval by the regulating authority.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None.

- b. **Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.**

None.

- c. **Proposed measures to reduce or control housing impacts, if any:**

None.

10. Aesthetics

- a. **What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**

To be determined on a project-specific basis.

- b. **What views in the immediate vicinity would be altered or obstructed?**

None.

- c. **Proposed measures to reduce or control aesthetic impacts, if any:**

Design review of all proposed construction.

11. Light and Glare

- a. **What type of light or glare will the proposal produce? What time of day would it mainly occur?**

None.

- b. **Could light or glare from the finished project be a safety hazard or interfere with views?**

No.

- c. **What existing off-site sources of light or glare may affect your proposal?**

None.

- d. **Proposed measures to reduce or control light and glare impacts, if any:**

None.

12. Recreation

- a. What designated and informal recreational opportunities are in the immediate vicinity?**

Boating, fishing, water skiing.

- b. Would the proposed project displace any existing recreational uses? If so, describe.**

No.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:**

None.

13. Historic and Cultural Preservation

- a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.**

None known.

- b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.**

None.

- c. Proposed measures to reduce or control impacts, if any:**

None.

14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.**

The primary access is State Route 9 with several county roads throughout the area. Typically, existing streets will remain in service, with minor delays, during construction.

- b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?**

There is no public transit service in the Big Lake community.

- c. How many parking spaces would the completed project have? How many would the project eliminate?**

None.

- d. **Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).**

No.

- e. **Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

No.

- f. **How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.**

One to two trips per week could be associated with maintenance of the system.

- g. **Proposed measures to reduce or control transportation impacts, if any:**

During construction signage and flaggers will be used to control traffic.

15. Public Services

- a. **Would the project result in an increased need of public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.**

No.

- b. **Proposed measures to reduce or control direct impacts on public services, if any.**

None.

16. Utilities

- a. **Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.**

- b. **Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.**

Future construction activities, specific for each project, will consist of trenching for sewer line installation and restoration and upgrading lift stations facilities and the WWTP. Skagit County Sewer District No. 2 will own the system.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: *Robert Langer*

Date Submitted: *8/27/07*

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

- 1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?**

Temporary increase in noise and air emissions due to construction of proposed sewer facilities. As the community grows, more sewage flow will be generated requiring an increase in conveyance capacity.

Proposed measures to avoid or reduce such increases are:

Require compliance with local and state regulations.

- 2. How would the proposal be likely to affect plants, animals, fish, or marine life?**

The implementation of the 2007 Comprehensive Sewer Plan would reduce the possibility of soil and water pollution by allowing for the conversion from on-site sewage disposal to central collection and treatment.

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

Utilizing a comprehensive plan reduces the overall amount of construction activity and minimizes the effects of development.

- 3. How would the proposal be likely to deplete energy or natural resources?**

Installation of materials and use of electricity, diesel oil, and fuel are required in relatively small amounts. The 2007 Comprehensive Sewer Plan is not expected to have a significant impact on natural resources.

Proposed measures to protect or conserve energy and natural resources are:

Energy conservation may be realized through appropriate materials and processes that would be required for each element of construction and ongoing operation.

- 4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?**

The implementation of the plan will not have a significant impact on environmentally sensitive areas. Most of the proposed facilities will be installed along existing transportation and utility corridors. The 2007 Comprehensive Sewer Plan would reduce the possibility of soil and water pollution by allowing for the conversion from on-site sewage disposal to central collection and treatment. Some projects may involve construction in critical areas, such as wetlands or along shorelines. Each project will be permitted and constructed in accordance with the appropriate regulations.

Proposed measures to protect such resources or to avoid or reduce impacts are:

Comply with local and state requirements. Implementing a sewer comprehensive plan reduces the overall amount of construction activity and minimizes the effects of development.

- 5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?**

The plan will not significantly affect land and shoreline use. The proposal would provide new facilities and improve existing facilities, keeping in compliance with existing land and shoreline use plans.

Proposed measures to avoid or reduce shoreline and land use impacts are:

None. No significant impacts are anticipated.

- 6. How would the proposal be likely to increase demands on transportation or public services and utilities?**

This proposal will not significantly increase demands on transportation or public services and utilities.

Proposed measures to reduce or respond to such demand(s) are:

None. No significant impact is anticipated.

- 7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.**

No conflicts.



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

February 28, 2008

Commissioner Mark Pearson
Commissioner Jerry Sieverson
Commissioner Larry Van Sickle
Skagit County Sewer District No. 2
17079 State Route 9
Mt. Vernon, WA 98274-9366

CHS ENGINEERS

MAR 13 2008

Received

Dear Commissioners Pearson, Sieverson, and Van Sickle:

Re: **Comprehensive Sewer Plan for Skagit County Sewer District No. 2**
(February 2008)

Pursuant to RCW 90.48.110 and WAC 173-240-030, the above-referenced general sewer plan has been reviewed. Ecology provided initial comments to the District's consultant on January 18, 2008. Based upon the responses to those comments, received in an e-mail dated February 1, 2008, the Comprehensive Sewer System Plan for Skagit County Sewer District No. 2 is hereby approved.

Sewage facilities within the planning area boundary shall be constructed according to the approved general sewer plan or amendments thereto. Engineering reports and plans/specifications for construction of planned collection, treatment, and disposal facilities shall be submitted to this department for review and approval in accordance with Chapter 173-240 WAC.

Engineering reports and plans and specifications for sewer line extensions, including pump stations, need not be submitted for approval. Prior to construction, you are required to submit a written description of the project and written assurance that the extension is in conformance with the general sewer plan. In the following situations Ecology approval is necessary for sewer line extensions prior to construction:

- a) The proposed sewers or pump stations involve installation of overflows or bypasses; or
- b) The proposed sewers or pump stations discharge to an overloaded treatment, collection, or disposal facility.

You have the right to appeal this approval to the Pollution Control Hearings Board. Pursuant to chapter 43.21B RCW, your appeal must be filed with the Pollution Control Hearings Board, and served on the Department of Ecology, within thirty (30) days of the date of your receipt of this document.

To appeal this approval, your notice of appeal must contain a copy of the Ecology approval you are appealing.



Skagit Co. Sewer District No.2
February 28, 2008
Page 2

Your appeal must be filed with:
Pollution Control Hearings Board
4224 - Sixth Ave SE, Rowe Six, Bldg. 2
PO Box 40903
Lacey, WA 98504-0903

Your appeal must also be served on:
Department of Ecology
Appeals Coordinator
PO Box 47608
Olympia, WA 98504-7608.

In addition, please send a copy of your appeal to:
Ms. Tonya Lane
Department of Ecology
3190 160 Ave SE
Bellevue, WA 98008

If you have any questions concerning this approval, please feel free to contact Tonya Lane at (425) 649-7050 or by e-mail at tlan461@ecy.wa.gov.

Sincerely,

 for Kevin Fitzpatrick

Kevin C. Fitzpatrick
Water Quality Section Manager

KF:TL
Enclosures (1)

cc: . Rodney Langer, P.E., CHS Engineers, LLC
Tonya Lane, DOE/Water Quality-NWRO
Central Files, WA-0030597, WQ-4.1

APPENDIX D – COLLECTION SYSTEM HYDRAULIC ANALYSIS

APPENDIX D

COLLECTION SYSTEM HYDRAULIC ANALYSIS

Sewer system planning, design, and analysis are based on the definition of tributary areas, estimated population densities, and per capita sewage flows for **particular locations with the District's design criteria**. The calculations to determine capacities of existing sewer runs or the selection of appropriate pipe size for given conditions can be tedious for large areas, so an Excel spreadsheet has been used.

The District's Engineer delineated the sewer basins and sub-basins and compiled existing pipe data from the District's record drawings. The system data was entered into the spreadsheet for calculation of sub-basin and cumulative flows at selected points in the collection system, particularly at each lift station. The design criteria discussed in Chapter 4 are utilized for this analysis. The analysis begins at the upstream end of the basin, the south end of the lake. Tributary area and population are determined from the system maps and zoning district information as discussed in Chapter 3. The spreadsheet tracks a total tributary area and population, applies the appropriate peaking factor, and adds the appropriate allowance for I/I at each node. (Each node is the beginning of a pipe segment.) The capacity of each segment is determined from the input data **by means of Manning's Equation (open channel flow)**. **Then the pipe capacity is** compared to the predicted flow at that pipe segment or lift station to determine if the existing facility is adequate for the given conditions and desired service area.

The results of the system analysis are discussed in Chapters 5 and 7.

Skagit County Sewer District No. 2
Comprehensive Sewer Plan
Full Build-Out Population and Sewage Flows

Sewage Flow 65 gpcd
Pop Density 2.5 p/duft
Peak Infiltration 590 gpcd
Total I/I 1100 gpcd

Peak Factor Curve
4.00
3.00
2.20
100 AC
1000 AC
5000 AC

gpm to cfs conversion = 0.00222601
Manning's n = 0.013
Dia (gravity, inches) = $2 \times ((1.4874 \times n \times \text{conversion factor} \times Q)^{1/49} \times \pi \times S^{1/2})^{(4/49)}$ x 12
Look-up function for PF: $\text{PF} = (1.4874 \times n \times \text{conversion factor} \times Q)^{1/49} \times \pi \times S^{1/2}$

prepared by: **CHS Engineers, LLC**
date: **8/28/2007**
checked: **RL**

Basin/Sub-basin (Tributary to)	Sub-Basin Area, AC	Average Density, Units/AC	Basin Peak Factor	Sub-Basin Flows					PF for $A_{\text{sub-basin}}$	$Q_{\text{sub-basin}}$ gpm	$Q_{\text{sub-basin}}$ cfs	Slope of Gravity Main*, ft/ft	Existing Gravity Main, inches	Q_{gravity} gpm	Q_{gravity} %	Minimum Force Main Diameter @ 2.5 ft/s, inches	Existing Force Main Diameter (if applicable), inches	Notes
				Q_{sub} gpm	Q_{sub} cfs	Q_{sub} gpm	Q_{sub} cfs	Q_{sub} gpm										
LS44	13.9	1.7	4.00	15.6	10.6	24.8	16.8	47	1.22	4.00	72	36	108	243	44.3%	4.2	4	OK
92-47 (700)	6.3	1.4	4.00	6.9	4.3	13.3	9.3	50	1.40	4.00	86	43	131	226	76.9%	4.0	6	OK
PAC	2.1	1.9	4.00	2.4	1.6	4.9	3.4	60	85	4.00	90	81	111	1,067	10.0%	4.3		
M4170 (700)	7.8	8.4	4.00	29.5	20.0	38.4	26.8	150	254	3.50	137	104	241	373	46.1%	6.3		
Cumulative M4170														450				
M4183-1 (A)	4.0	2.9	4.00	7.9	3.6	11.4	8.0	126	200	3.93	187	126	292	322	65.9%	6.9		
M4183-1 (B)	9.0	2.0	4.00	11.7	7.8	16.3	11.3							N/A	N/A	(Not yet developed)		
Cumulative M4183-1																		
LS45 (Cumulative)	9.2	2.9	4.00	16.7	11.3	22.8	16.1	47	1.22	4.00	72	36	108	243	44.3%	4.2		
M4191-1	45.5	1.0	4.00	26.9	18.8	34.8	24.8	50	1.40	4.00	86	43	131	226	76.9%	4.0	6	OK
M4191-2	27.2	0.8	4.00	12.8	8.8	20.2	14.5	60	85	4.00	90	81	111	1,067	10.0%	4.3		
M4191-3	7.2	2.5	4.00	10.6	6.5	16.1	11.3	150	254	3.50	137	104	241	373	46.1%	6.3		
Cumulative M4191														450				
M4192-1	13.7	3.0	4.00	18.0	12.7	24.7	17.8	183	280	3.93	187	126	292	322	65.9%	6.9		
M4192-2	1.9	1.0	4.00	10.0	7.0	16.3	11.3							N/A	N/A	(Not yet developed)		
M4192-3	5.4	1.9	4.00	8.1	5.5	16.3	11.3							N/A	N/A	(Not yet developed)		
Cumulative M4192																		
M4192-5	24.2	1.0	4.00	14.3	10.0	24.7	17.8	183	280	3.93	187	126	292	322	65.9%	6.9		
M4192-6	0.2	2.3	4.00	8.4	5.7	13.3	9.3							N/A	N/A	(Not yet developed)		
M4192-7	6.3	3.3	4.00	15.2	10.6	24.7	17.8	183	280	3.93	187	126	292	322	65.9%	6.9		
LS46 (Cumulative)	0.7	1.5	4.00	0.6	0.6	1.2	0.8	201	350	3.09	201	154	355	522	60.0%	7.6	6	NEED 335 GPM
M4199 (A)	4	1.3	4.00	2.8	2.8	5.7	4.1							N/A	N/A	(Not yet developed)		
M4199 (B)	30	0.9	4.00	16.0	11.3	24.7	17.8	183	280	3.93	187	126	292	322	65.9%	6.9		
LS48 (Cumulative)	7.0	2.9	4.00	8.3	5.3	13.3	9.3	242	386	3.94	225	165	409	540	71.9%	8.2		
M4200-1	7.6	2.0	4.00	27.1	19.1	34.8	24.8	50	1.40	4.00	86	43	131	226	76.9%	4.0	6	NEED 409 GPM
LS49 (Cumulative)	7.6	3.2	4.00	11.0	7.6	17.2	12.4	316	482	3.76	255	241	491	540	92.0%	8.0	6	NEED 487 GPM
M4201-2	117.1	0.4	3.68	27.5	19.5	117.9	84.3	433	515	3.63	276	331	607	702	14.8%	10.0		
Cumulative M4201														1,261	26.1%	10.0		
M4201-3	1.3	4.8	4.00	3.7	2.6	4.7	3.4	643	602	3.60	315	350	644	1,261	53.6%	10.4		
Cumulative M4201														1,261	53.6%	10.4		
M4201-4	24.2	3.2	4.00	46.7	33.3	64.3	46.3	344	563	3.60	344	363	644	1,261	70.0%	10.7		
Cumulative M4201														1,261	70.0%	10.7		
M4201-5	16.0	3.2	4.00	34.0	24.3	47.8	34.3	351	567	3.67	351	372	724	1,261	92.4%	10.9		
Cumulative M4201														1,261	92.4%	10.9		

