

APPENDIX G

WASTEWATER

Introduction

This Appendix presents a description of the City of Poulsbo's existing wastewater system, a forecast of future wastewater system requirements, and a schedule of improvements to provide for service needs to the community over the next 20 years.

The City's wastewater system is currently operated under the direction of the Public Works Department. The City's sewer system serves approximately 2,050 customers, or 3,150 equivalent residential units (ERUs) within an area of approximately 2.5 square miles. Generally, the existing service area is congruent with the corporate city limits and additional services are provided to a limited area outside of the City proper. The City's future proposed service area includes those areas within the existing city limits, together with those areas included in the City's Urban Growth Area that is the result of the Joint Planning process.

Wastewater System Comprehensive Management Plan

The City recently completed a draft Comprehensive Wastewater System Plan pursuant to the requirement of WAC 173-240. The purpose of the plan is to:

- Evaluate existing wastewater collection and treatment requirements and project future wastewater system demands.
- Analyze the existing wastewater system to determine if it meets minimum requirements mandated by the Department of Ecology, the City of Poulsbo Municipal Code, and the City of Poulsbo's design and development criteria.
- Identify wastewater system improvements necessary to resolve existing system deficiencies and accommodate future needs of the system for at least 20 years into the future.
- Prepare an implementation schedule of improvements that meets the goals of the City's community service needs.

Existing System Description

Collection and Conveyance System

The collection sewer system consists of approximately 28 miles of collection system main, 7 wastewater pump stations, and a gravity interceptor connecting the City of Poulsbo's system with Kitsap County's conveyance system and the Central Kitsap Wastewater Treatment Plant. The City contracts with Kitsap County Department of Public Works for treatment and disposal of its wastewater.

INSERT MAP G-1 HERE

Collection System

The collection sewer system consists primarily of gravity collection mains, which vary in size from 6 to 18 inches in diameter. Generally, wastewater drains toward Liberty Bay and is collected and routed around the bay through a series of pump stations until it reaches the Central Interceptor, where it flows into the Kitsap County metering station at Johnson Road.

The City of Poulsbo sewer system provides collection of wastewater from 11 separate drainage basins and sub-drainage basins within the city limits and Joint Planning Area, as defined below.

West Poulsbo/Viking Avenue Basin

The Viking Avenue/West Poulsbo drainage basin provides service to those customers located along the east side of Viking Avenue south of Lindvig Street. Wastewater flows from the drainage basin into the Liberty Bay Pump Station located on the west side of Liberty Bay and are pumped from the West Poulsbo drainage basin into the Lindvig Drainage Basin via 4-inch force main on the west side of Liberty Bay.

Lindvig Drainage Basin

The Lindvig Drainage Basin provides service to the west side of Viking Avenue south of Lindvig Street and along both sides of Viking Avenue north of Lindvig Avenue. Wastewater flows from the drainage basin into the Lindvig Pump station located on Lindvig and Front Street at the north end of Liberty Bay. This pump station additionally receives flows from Liberty Bay/Viking Avenue pump station.

Wastewater is pumped from the Lindvig Pump Station into the Central Poulsbo drainage Basin via an 8-inch force main and a 15- and 18-inch diameter PVC gravity main located along Front Street into the Central Poulsbo Pump Station.

Central Poulsbo/Marine Science Center Drainage Basin

The Central Poulsbo/Marine Science Center Basin provides service to the central area of Poulsbo to include the downtown business area. Wastewater flows from the drainage basin into the Central Poulsbo Pump station located off Front Street adjacent to the Marine Science Center. This pump station additionally receives flows from the Lindvig Pump Station.

Wastewater is pumped from the Central Poulsbo Pump Station via a 12-inch force main located along Harrison Avenue into the Central Interceptor located on Highway 305.

6th Avenue Drainage Basin

The 6th Avenue Drainage Basin provides service to the 6th Avenue area south of Harrison Street. Wastewater flows from the drainage basin flow into the 6th Avenue Pump station located at the south end of 6th Avenue and Fjord Drive.

Wastewater is pumped from the 6th Avenue Pump Station via a 6-inch force main located along Fjord Drive into the Central Interceptor located on Highway 305.

9th Avenue Drainage Basin

The 9th Avenue Drainage Basin provides service to the 9th Avenue area south of Harrison Street. Wastewater flows from the drainage basin flow into the 9th Avenue Pump Station located at the south end of 9th Avenue and Fjord Drive.

Little Valley Drainage Basin

The Little Valley Drainage Basin is located on the west side of Highway 305 in the commercial district of the City of Poulsbo. This basin collects and conveys predominantly commercial wastewater flows from the drainage basin into the Little Valley Pump Station located at the north end of 7th Avenue.

Wastewater is pumped from the Little Valley Pump Station via a 4-inch force main south along 7th Avenue into the Central Interceptor.

Applewood Drainage Basin

The Applewood Drainage Basin provides service to the Plat of Applewood Estates located off Lincoln Avenue. Wastewater flows from the drainage basin into the Applewood Pump Station located in the Applewood Subdivision.

Wastewater is pumped from the Little Valley Pump Station via a 4-inch PVC force main located on Lincoln Avenue into the East Poulsbo Basin.

East Poulsbo Drainage Basin

The East Poulsbo Drainage Basin is located on the east side of Highway 305. Wastewater flows from the drainage basin flow into the Central Interceptor via an 8-inch main.

South Poulsbo Drainage Basin

The South Poulsbo Drainage Basin is located east of Highway 305 and south of the Poulsbo Elementary School. Wastewater flows from the drainage basin flow from the south section.

Pump Stations

The City of Poulsbo currently operates and maintains 7 pump stations, which are located throughout the existing service area. They vary in size from approximately .1 MGD to 1.8 MGD.

Table G-1 Existing Pump Stations	
Location	Design Flow MGD
Liberty Bay Pump Station	0.20
Lindvig Pump Station	0.80
Central Poulsbo Pump Station (Marine Science Center)	1.80
Little Valley Pump Station	0.50
Applewood Pump Station	0.08
9 th Avenue Pump Station	0.20
6 th Avenue Pump Station	0.30

The seven wastewater pump stations convey wastewater to the Central Interceptor that conveys wastewater from the west end of Liberty Bay to the Kitsap County conveyance system metering station located on Highway 305 at Johnson Road.

Central Interceptor

The Central Interceptor located along the west side of Highway 305 consists of 12, 15, and 18-inch sections of gravity main. It conveys all the wastewater flows from the City of Poulsbo to Kitsap County's metering station located on Highway 305 at Johnson Road.

County Conveyance System

The City of Poulsbo's Central Interceptor connects to the Kitsap County conveyance system at the intersection of SR 305 and Johnson Road, the location of Kitsap County's metering station. At this point, the Central Interceptor connects to a 14-inch gravity/force main. The force main continues south to the two, 12-inch Lemolo siphons, where it crosses under Liberty Bay to Keyport. At Keyport, it continues south through Pump Station 16 and southwest through a 16-inch force main to Pump Station 15. From Pump Station 15 it discharges through a 24-inch force main past Aeration Unit No. 2 and is discharged into the Central Kitsap Wastewater Treatment Plant (CKWWTP).

Wastewater Treatment

The City of Poulsbo has a contract with Kitsap County, which initially allowed for the treatment of the City's sewage at the CKWWTP. The contracted amount is for 0.75 million gallons per day (MGD), maximum month flows. The flows are measured at the Kitsap County metering station located near Johnson Road and SR 305.

The original agreement was amended to provide for the Phase I upgrade to the treatment plant. The upgrades increase the capacity of the treatment plant from 4.8 to 6.0 MGD. Poulsbo's capacity increased from .75 MGD to .95 MGD. The County is also preparing to move ahead with a Phase II upgrade, which will increase the capacity of the plant to 10.8 MGD (currently scheduled for 2003).

A second agreement established the shared cost method associated with system improvements necessary to meet future treatment requirements. The amendments require that the County shall make capacity available to Poulsbo to receive and dispose of existing and future wastewater flows from Poulsbo's customers in accordance with the City of Poulsbo's and Kitsap County's Wastewater Comprehensive Plans. The City of Poulsbo agrees to collect and convey to the County a capital facilities charge for all new connection to the systems to offset the cost of system improvements to the County's conveyance and treatment facilities in response to the City of Poulsbo impacts on the County's system. To date the City has paid approximately \$2 million dollars to the County to cover the costs of the County's sewer treatment plant handling additional waste due to Poulsbo's planned population growth within the City and that population that needs to be accommodated within the City's UGA.

System Evaluation

Evaluation of the existing system consisted of review of collection system records associated with the pump stations and interviews with maintenance staff and the hydraulic modeling of the collection system in order to identify capacity problems within the system.

The Poulsbo sanitary sewer system was evaluated using the Hydra Graphics software package, Version 4.85. The analysis of the City of Poulsbo's sewer system determined that the majority of the sewer main within the system is adequately sized to meet existing flows from tributary areas. The primary capacity problems identified by the analysis were the ability of the Central Interceptor, as well as the Central Poulsbo Pump Station and the East Poulsbo collection system to accommodate the "peak design flows" (PDF). System deficiencies are as noted:

Central Poulsbo Pump Station

The major capacity concern with this facility is that the peak flow rate at the Central Poulsbo Pump Station exceeds the pump stations designed capacity by approximately 200 gpm. If the excessive flows continue for more than a short length of time, the wet well could become surcharged, which requires the third (or standby) pump to operate.

East Poulsbo Collection System

The major capacity concern with this facility is the 8-inch main that flows south along Caldart Avenue. It is at capacity due to the very flat slope of the pipe, which causes surcharging in the manholes.

Infiltration and Inflow (I/I) - Central Poulsbo, 6th Avenue, and 9th Avenue Drainage Basins

A major capacity concern with the Central Poulsbo, 6th Avenue, and 9th Avenue Drainage Basins is the amount of infiltration and inflow of stormwater and surface water from the drainage basins tributary to the Central Poulsbo, 6th Avenue and 9th Avenue Pump Stations entering the collection system. The I/I contributes to reduced capacity of the collection system; pump stations, and the Central Interceptor.

Central Interceptor

The major capacity concern with this facility is its ability to meet peak flows. The estimated peak design flow rate generated by the Central Interceptor is 3,100 gpm. Several lengths of 18-inch main laid at a minimum slope limit the flow capacity of the interceptor. During peak flow events, the Central Interceptor surcharges and thus limits capacity.

Downstream Impacts

It is important to note that any increase in capacity of the City of Poulsbo system would require an upgrade of Kitsap County's conveyance facilities and wastewater treatment plant. The City of Poulsbo wastewater flow currently routes through the Kitsap County metering manhole through a 14-inch pipeline and through two 12-inch siphon lines crossing under Liberty Bay. One 12-inch siphon line is used at a time and has a capacity of approximately 1.6 MGD.

The specific upgrades for these facilities identified in the CKCWFP include installing a pump station at Lemolo to pressurize the crossing and increase flows to 6 MGD and upgrading Pump Stations 15 and 16.

A result of the City's inventory of the existing wastewater system, the City has embarked on an aggressive program to remedy the I & I problems identified in specific parts of the Citywide system. Improvements in the 6th Street basin have dramatically reduced the amount of Stormwater infiltrating the wastewater system and thereby freeing up capacity of the entire system and the County's treatment facility (see following discussion on page 41).

In addition, the City's Department of Public Works is currently in the process of updating the City's Comprehensive Wastewater Plan and a Supplemental Environmental Impact Statement (SEIS) has been developed in cooperation with Kitsap County and a preferred alternative has been identified.

FUTURE IMPROVEMENTS

Collection Improvements

To accommodate future growth and development in the City and in the Urban Growth Area, the City, in concert with Kitsap County, has developed a Comprehensive Sewer Plan to guide repair, maintenance and upgrade of these facilities to increase the capacity of the system and to serve future growth throughout the UGA.

Implementation of the improvements noted below has been initiated and completion of the improvements will provide sufficient capacity to serve the anticipated growth and development within the UGA. For a list of system improvements, see Appendix B.

Sewer Rehabilitation (Infiltration and Inflow Reduction)

The proposed improvements consist of sewer main rehabilitation and side sewer replacement in the 6th Avenue, 9th Avenue and Central Poulsbo drainage basins. These areas are the oldest developed areas of town and the associated sanitary sewers are identified as having the highest occurrence of infiltration and inflow in the City.

The City will be able to implement the I&I improvements within the City-owned right-of-way fairly easily. The work will include the rehabilitation and/or removal and replacement of 8-inch sewer mains and side sewer to the property line. Side sewer replacement on private property to eliminate infiltration and inflow will require the cooperation of private property owners; therefore, a public education process will be implemented as part of this alternative.

The schedule of the proposed improvements will be prioritized based on the completion of flow monitoring, video inspection of sewer mains and smoke testing. It is estimated that the complete rehabilitation of sanitary sewer main and side sewer could reduce I&I into the system by as much as 0.5 MGD.

This project will involve replacement of approximately 31,000 linear feet of pipe in the 6th Avenue, 9th Avenue and Marine Science Center Basins. Pump station maintenance upgrades to the 6th and 9th Avenue Pump Stations will be completed as part of this work.

Central Poulsbo Pump Station Improvements

The proposed improvements to the Central Poulsbo Pump Station will increase the flow capacity from approximately 1.8 MGD to approximately 2.2 MGD, based on operating two pumps with a third pump on stand-by.

Improvements will consist of replacing the existing pumps with new 50 horsepower pumps. The electrical panels and associated emergency generator will need to be upgraded to facilitate the high horsepower pumping equipment. No major building modifications are anticipated.

Central Interceptor By-Pass

The proposed improvement consists of the installation of an additional interceptor connecting the City's collection system to the Kitsap County Conveyance system. A new central interceptor would be constructed in parallel to the Central Interceptor.

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Central Interceptor By-Pass

The proposed improvement consists of the installation of an additional interceptor connecting the City's collection system to the Kitsap County Conveyance system. A new central interceptor would be constructed in parallel to the Central Interceptor. The City Code (Section 13.14 PMC) contains a provision that allows for the extension of City sewer, water, and surface water facilities outside of the City proper under strict circumstances. The extension of these services outside of the City occurred in the past when the City had a true UGA.

Now that the City's UGA is the city limits, the City has been prevented from entering into these types of agreements because the County had as yet designated a UGA for Poulsbo.

When the City has entered into such an agreement, the City required the developer or landowner to agree to execute a utility extension agreement. This agreement requires the owner to agree to annexation when a petition containing the subject property is presented to the City for consideration. The City used this process to serve a few subdivisions in the Noll Hill area prior to this area's annexation into the City. Since then the City has only used this process on two occasions to provide services to property where there were public health concerns.

Through this agreement, the City also requires the developer or property owner to pay all costs associated with designing, engineering, and constructing the extension to City standards. This agreement does not, however, guarantee or reserve sewer capacity within the system. Capacity is only assured when a building permit is actually issued. The agreement also requires the developer/landowner to turn over and dedicate any capital facilities such as main lines, pump stations, and wells to the City at no cost. All agreements must be approved by the City Council. The City anticipates this process will be used more often to serve development occurring throughout the UGA, once designated.

Summary

To accommodate future growth and development, the City has developed a Comprehensive Sewer Plan to guide repair, maintenance, and new construction to increase the available capacity to serve future growth throughout the UGA. This plan uses the County's population allocation to the City as a basis for designing upgrades to the system. It should be noted that any increase to the capacity of the City of Poulsbo's system would require an upgrade to some of the downstream system owned and operated by Kitsap County.

Implementation of this sewer plan has been initiated with the upgrade of the Lindvig pump station and the SEIS for the Central Interceptor. As the City continues to implement the sewer plan, the system will be of sufficient capacity to serve the anticipated growth and development within the UGA.

