

EXECUTIVE SUMMARY

INTRODUCTION

The Northshore Utility District (the District) 2006 Wastewater Comprehensive Plan outlines the wastewater utility's planning strategy for the next 20 years and beyond. The Plan evaluates the system and identifies future improvements necessary to support growth and maintain a high level of service.

This Plan has been prepared to meet the requirements of the Washington Administrative Code (WAC), Revised Code of Washington (RCW), Washington State Department of Ecology (Ecology), and the Growth Management Act (GMA).

STUDY AREA AND PLANNING CRITERIA

The District corporate boundary encompasses approximately 11,860 acres. The District's corporate boundary legally defines the political boundaries of the District and establishes the residents eligible to vote for District commissioners. The District's corporate boundary is shown in Figure 3-1.

The sewer service area is also shown in Figure 3-1. The sewer service area boundary was determined based on District sewer maps showing existing and future facilities. The sewer service area is not entirely coincidental with the District's corporate boundary since wastewater conveyance systems tend to follow topographical features as opposed to political boundaries. Out of over the 22,000 existing lots within the sewer service area, there are approximately 600 parcels within the sewer service area without access to sewer service.

The sewer service *study* area includes the entire sewer service area and all additional areas that impact the District's sewer service facilities. For example, flows from the areas north of the King County boundary served by the Alderwood Water and Wastewater District are conveyed to KCDNR sewers via the District's sewers. These areas will impact the District's facilities; however, the areas are not within the District's sewer service area. The sewer service study area comprises approximately 11,280 acres (includes rights-of-ways) and is shown in Figure 3-1.

The District does not directly own, operate, or maintain a wastewater treatment facility. Wastewater from the District is currently treated by King County Department of Natural Resources (KCDNR) at the South and Westpoint Treatment Plants. In 2010, when the Brightwater Wastewater Treatment Facility (WWTF) begins operation, flows from the north portion of the District will be treated at the Brightwater WWTF, and the south portion of the District will continue to be treated at the South Treatment Plant.

The planning period for this Plan is through 2026, coinciding with a 20-year planning interval. Because the service life of many wastewater system components is greater than twenty years, the planning of future facilities considers a build-out scenario as an estimate of the ultimate capacity required to serve all land under current zoning.

The current and future populations within the sewer service area are estimated based on transportation analysis zone (TAZ) population projections. A summary of the projected annual population growth rate, population, employee growth rate, and number of employees within the District’s sewer service area for the 20-year planning period and buildout is presented in Table E-1. The projected buildout population for the District’s sewer service area is 124,871.

TABLE E-1

Projected Sewer Service Study Area Population and Employment

Year	Population Growth Rate	Population	Employee Growth Rate	Employees
2006	0.42%	69,461	1.43%	22,467
2007	0.42%	69,754	1.43%	22,788
2008	0.42%	70,049	1.43%	23,113
2009	0.42%	70,346	1.43%	23,442
2010	0.42%	70,643	1.43%	23,777
2011	0.54%	71,028	1.67%	24,173
2012	0.54%	71,415	1.67%	24,576
2013	0.54%	71,804	1.67%	24,985
2014	0.54%	72,195	1.67%	25,402
2015	0.54%	72,589	1.67%	25,825
2016	0.54%	72,984	1.67%	26,255
2017	0.54%	73,382	1.67%	26,693
2018	0.54%	73,782	1.67%	27,137
2019	0.54%	74,184	1.67%	27,589
2020	0.54%	74,588	1.67%	28,049
2021	0.33%	74,834	1.30%	28,414
2022	0.33%	75,080	1.30%	28,784
2023	0.33%	75,327	1.30%	29,158
2024	0.33%	75,575	1.30%	29,538
2025	0.33%	75,824	1.30%	29,922
2026	0.33%	76,074	1.30%	30,312
Buildout	NA	124,871	NA	31,921 ⁽¹⁾

(1) TAZ Projection for 2030.

EXISTING SYSTEM

The District owns and operates a wastewater collection system consisting primarily of collection sewers, trunk sewers, lift stations, and force mains. The District’s collection system serves portions of Lake Forest Park, Kenmore, Bothell, Woodinville, Kirkland, and unincorporated King County. The District’s collection system comprises approximately 240 miles of gravity sewer pipe ranging in size from 8 to 30 inches in diameter. Approximately 85 percent of the sewer pipe is 8-inch diameter.

The District operates and maintains eleven lift stations and four grinder pump stations. Most of the lift stations have a wet well/dry well arrangement, with the exceptions of Lift Stations Nos. 17 and 18, which have submersible pumps. Most of the lift stations have emergency connections for bypass pumping of the wet well. All the lift stations have emergency generator power receptacles and a telemetry alarm system that connects to the District’s SCADA system. Lift Station Nos. 10 and 20 have permanent standby generators.

The District owns and operates four low-pressure grinder pump stations located near the shore of Lake Washington that pump south to Lift Station No. 15.

Table E-2 summarizes the District’s facilities and characteristic data.

TABLE E-2
2005 Sewer System Data

Description	Data
Sewer Service Study Area Population	69,168
Sewer Service Study Area	11,280 acres
Total Connections	20,258
Total ERUs	26,262
KCDNR Residential Customer Equivalent Wastewater Production	187 gpd
Residential Per Capita Flow Rate	71 gpcd
Non residential Flow Rate	26 gpcd
Baseline Infiltration and Inflow	200 gpad
Peak Infiltration and Inflow	2,265 gpad
Peaking Factor	2.5
Average Wastewater Production	4.91 mgd
Number of Lift Stations	11
Number of Grinder Pump Stations	4
Number of Manholes	6,800
Total Length of Sewer Main	240 miles

WASTEWATER CHARACTERIZATION

The District's wastewater is predominantly domestic in origin, with lesser amounts contributed by commercial and industrial businesses, as well as by public use facilities, such as schools, parks, hospitals, shopping centers, and government offices.

The parameters that were identified for estimating future flows are domestic and non-residential (commercial, industrial, and institutional) wastewater, peaking characteristics, infiltration, and inflow. The peak I/I rates established by KCDNR based on the sewered area in the 2001/2002 KCDNR Wet Weather Flow Monitoring are summarized in Table E-3 for each basin defined by KCDNR within the District sewer service area. The KCDNR established peak I/I rates were recalculated based on the total area of the basin (rather than the estimated sewered area). The basin areas established by KCDNR were redefined following parcel lines. Additionally, KCDNR did not establish basins for some areas within the District sewer service area; basins were created for these areas and the peak hour I/I rate is estimated based on the surrounding basins. The average peak I/I rate recalculated is also presented in Table E-3.

TABLE E-3

KCDNR 2001/2002 I/I Flow Monitoring Results

Basin	Peak I/I Rate⁽¹⁾ Sewered Area (gpad)	Peak I/I Rate^{(1),(2)} Total Area (gpad)
Average	3,231 ⁽³⁾	2,265 ⁽³⁾
Median	2,738	NA ⁽⁴⁾
Maximum	10,415	NA ⁽⁴⁾

Source: King County Department of Natural Resources

- (1) Based on a 30-minute peak I/I rate.
- (2) Basin areas are reconfigured to follow parcel lines and to include the entire area of the District; the I/I rate is based on the total area of the basin.
- (3) Area weighted average.
- (4) Not applicable.

For the purposes of estimating future flows, the parameters shown in Table E-4 are used.

TABLE E-4

Summary of Wastewater Flow Design Criteria

	Design Value
KCDNR Residential Customer Equivalent Wastewater Production (gpd)	187
Residential Per Capita Flow Rate (gpcd)	71
Non residential Flow Rate (gpcd)	26
Baseline Infiltration and Inflow (gpad)	200 ⁽¹⁾
Peak Infiltration and Inflow (gpad)	2,265 ⁽²⁾
Decreased Infiltration and Inflow (gpad)	1,100
Peaking Factor	2.5

- (1) A value of 148 was estimated from KCDNR 2001/2002 I/I Flow Monitoring results based on the total area of the basin; the value was rounded up to 200 to provide a conservative estimate.
- (2) Estimated District average based on KCDNR 2001/2002 I/I Flow Monitoring and the total area of reconfigured basins.

REUSE

KCDNR is planning to produce Class A reclaimed water at the Brightwater WWTF and to convey the reclaimed water to three distribution portals throughout King County. The North Kenmore Portal lies within the District and will serve the District. The District has identified potential uses for reclaimed water within the District, which are summarized in Table E-5.

TABLE E-5

Potential Uses for Reclaimed Water

Irrigation/Landscaping Use⁽¹⁾	Area (acre)	Annual Usage (MG/year)	Peak Day (gpd)
Public Parks	43	16.2	133,000
Public Schools	33	12.5	103,000
Private Businesses ⁽²⁾	84	31.9	262,000
Industrial Use		Annual Usage (MG/year)	Peak Day (gpd)
Glacier Concrete Northwest ⁽³⁾		0.08	715
Jetting of Sewer Lines		Annual Usage (MG/year)	Peak Day (gpd)
		360,000	1.4 ⁽⁴⁾
			5,700 ⁽⁵⁾
Total Potential Reclaimed Water Usage		62	504,000

- (1) Based on a typical irrigation rate of 14 inches per year over the period of 4 months (from mid May to mid September).
- (2) Includes Bastyr University and Inglewood Golf Club.
- (3) Based on water billing records.
- (4) Assumes 30 percent of the District’s sewers (360,000 lineal feet) are flushed per year at a rate of 4,000 gallons per 1,000 lineal feet.
- (5) Assumes 180 lineal feet per hour are flushed for eight hours a day using 4,000 gallons of reclaimed water per 1,000 lineal feet of sanitary sewer.

The estimated cost to construct a transmission system from the North Kenmore Portal to the various water reuse irrigation sites (total 43,700 linear feet) is \$6,120,000. This cost does not include permitting and engineering. Additional operation and maintenance would also be incurred. Furthermore, the District would incur additional costs to establish franchise agreements for the reclaimed water distribution system. The District is supportive of KCDNR’s efforts with regard to Class A reclaimed water but does not currently have the infrastructure in place to provide service as a reuse utility.

COLLECTION SYSTEM HYDRAULIC MODEL

A hydraulic model of the District’s sanitary sewer system was developed. The output from this model was used to evaluate the capacity of the existing system and to recommend future improvements.

OPERATION AND MAINTENANCE PROGRAM

The Operations Department is responsible for the operation and maintenance of the water and wastewater systems. The Operations Department is also responsible for emergency response planning and drills. The District is continuing to improve its operation and

maintenance programs to meet existing and future regulations and to provide the best service possible to District customers.

SYSTEM EVALUATION

The hydraulic model is used to evaluate the existing system and determine which pipes will need to be upgraded in the future. Providing service to currently unsewered areas is also included in the evaluation. Improvements that will improve efficiency and reliability are also identified.

The District completed a Sewer System Buildout Catalog in 2005. This catalog identified parcels within the District that currently do not have access to sewer and includes draft design schematics and cost estimates for the improvements needed to provide sewer to the parcels. The District identified approximately 600 lots (568) within the District that do not have access to sewers. Sewer facilities required to serve developed areas are included in the Capital Improvement Program (CIP).

CAPITAL IMPROVEMENT PROGRAM

Table E-6 summarizes the projects completed since the CIP established in the *2000 Wastewater System Comprehensive Plan*. A total of approximately \$11,000,000 was spent on the CIP from 2000 through 2006. Approximately, \$8,990,000 was spent on sewer extensions and approximately \$850,000 was spent on sewer replacement and repair. Lift Station Nos. 1 and 2 were rehabilitated for \$600,000, Lift Station No. 20 was constructed for approximately \$500,000, and \$36,000 was spent video inspecting and cleaning ULID 5.

TABLE E-6

Completed Capital Improvement Projects 2000 through 2006

Project	Name	Project Cost
2000 SPWP-1	Sewer Extension	\$ 635,370
Contract 2000-02	Sewer Extension	\$ 451,554
Contract 2001-01	Sewer Extension	\$ 937,704
Contract 2002-01	Sewage Lift Stations #1 and #2 Rehabilitation	\$ 605,355
Contract 2002-03	128/76 Sewer Extension Project	\$ 1,106,799
Contract 2002-05	Goat Hill Sewer Replacement	\$ 25,118
Contract 2002-06	Arrowhead Sewer Repair	\$ 711,148
Contract 2002-07	Lift Station #20 Construction	\$ 488,860
Contract 2002-10	154/112 Sewer Extension	\$ 139,631
Contract 2004-02	Sewer Extensions	\$ 835,244
Contract 2004-03	Totem Lake Sewer and Water Improvements	\$ 1,413,640
Contract 2005-01	ULID 5 Video Inspection and Cleaning	\$ 36,547
Contract 2005-04	Miscellaneous Sewer and Water Improvements	\$ 1,456,501
Contract 2006-01	Miscellaneous Sewer Extensions	\$ 1,192,467
Contract 2006-03	ULID 115 – Sewer Extension Project	\$ 817,268
Contract 2006-05	CIPP Sewer Repair	\$ 110,000
Totals		\$10,963,205

Included in the CIP is the construction of new facilities, supporting facilities, and upgrades, as well as other improvements that will increase system efficiency. Table E-7 is a summary of the costs of the recommended 10-year capital improvements for 2007 through the year 2016.

In the future, other projects may arise that are not identified as part of the District’s CIP. Such projects may be deemed necessary for accommodating improvements proposed by other agencies or addressing unforeseen problems with the District’s wastewater system. Due to budgetary constraints, the completion of these projects may require that the proposed completion date for projects in the CIP be rescheduled. The District retains the flexibility to reschedule proposed projects and to expand or reduce the scope of proposed projects, as best determined by the District’s Commissioners when new information becomes available for evaluation. Each capital improvement project should be reevaluated to consider the most recent planning efforts as the proposed completion date for the project approaches.

TABLE E-7

10-Year Capital Improvement Projects Summary

Year	Total Water	Total Wastewater	Total Water and Wastewater
2007	\$ 1,739,000	\$ 3,414,000	\$ 5,153,000
2008	\$ 1,865,000	\$ 4,059,000	\$ 5,924,000
2009	\$ 2,084,000	\$ 3,757,000	\$ 5,841,000
2010	\$ 2,476,000	\$ 2,348,000	\$ 4,824,000
2011	\$ 1,621,000	\$ 2,931,000	\$ 4,552,000
2012	\$ 3,246,000	\$ 3,233,000	\$ 6,479,000
2013	\$ 966,000	\$ 2,024,000	\$ 2,990,000
2014	\$ 1,266,000	\$ 2,067,000	\$ 3,333,000
2015	\$ 1,659,000	\$ 3,644,000	\$ 5,303,000
2016	\$ 2,233,000	\$ 1,490,000	\$ 3,723,000
Total	\$19,155,000	\$28,967,000	\$48,122,000

FINANCE

In order to implement the capital improvement plan, a basic financial program must be established. Through the financial program, the District Commissioners and District Manager are assured that the capital improvement schedule can be implemented. The financial program plays a key role in establishing sewer rates and general facilities charges that reflect the actual costs of providing service to the District.

The District maintains a combined water and sewer utility but tracks revenues and expenses separately. Total sewer revenues in 2005 were \$12,737,093, of which \$8,762,528 (69 percent) was paid to KCDNR for treatment charges. Total water sales in 2005 were \$9,750,310, of which \$4,568,754 (47 percent) was paid to SPU for wholesale water. As a combined utility, the District has experienced a net positive operating income each year from 2003 to 2005.

Several funding source alternatives are available to the District for the financing of proposed capital improvement projects. Five such alternatives are revenue bonds, Public Works Trust Fund loans, developer financing, connection charges, and local improvement districts. In addition, King County may also fund cost-effective I/I removal projects.