CHAPTER 1

INTRODUCTION

INTRODUCTION

This Wastewater System Comprehensive Plan (Plan) has been developed in accordance with the latest revisions to Chapter 173-240-050 of the Washington Administrative Code (WAC) and the Revised Code of Washington (RCW) 90.48. The Plan is an update of the *2000 Wastewater System Comprehensive Plan*. Comments regarding the Plan from King County and the neighboring cities are included in Appendix A.

PURPOSE

The purpose of this Plan is to describe a long-term wastewater planning strategy for the District's sewer service area. The Plan evaluates the existing system and its ability to meet the anticipated requirements of current and future sewer customers across a 20-year planning horizon in accordance with the Growth Management Act (GMA). Collection system improvement projects have been developed to meet the changing demands of regulatory impacts, population growth and development, and infrastructure repair and replacement. The Plan also identifies the costs of the improvement projects and provides a financial plan for funding the projects.

PLAN SUMMARY

This Plan consists of ten chapters:

- Chapter 1 provides an introduction, Plan summary, and historical information about the wastewater collection system.
- Chapter 2 provides an overview of the current and new regulatory requirements applicable to the District. This chapter includes discussions regarding legislation, regulatory agencies, and system design standards.
- Chapter 3 provides the planning criteria used in developing the planning strategy for the next 20 years, including growth management, land use planning, intergovernmental coordination, related planning documents, and population trends. This chapter includes a discussion of franchise agreements with adjacent agencies.

- Chapter 4 provides a discussion of the existing wastewater system components including gravity collection mains, lift stations, grinder pump systems, and SCADA system.

- Chapter 5 characterizes wastewater flow rates and quantities for the planning period utilizing District infiltration and inflow (I/I) data and updated residential winter water use data. This chapter discusses the potential for water reuse and reclamation.

- Chapter 6 provides an updated hydraulic analysis for the collection system using MOUSE modeling software. Updated information is incorporated into the model, including I/I and diurnal peaking factors to project future demand.

- Chapter 7 summarizes operation and maintenance and emergency management and security information and includes an established list of capacity, management, operations, and maintenance (CMOM) goals.

- Chapter 8 analyzes the collection system components and their ability to meet projected demands based on the results from the hydraulic model. The chapter includes an evaluation of the impacts of King County Department of Natural Resources (KCDNR) improvements. Also includes operations and maintenance deficiencies.

- Chapter 9 provides a prioritized Capital Improvement Plan incorporating the District's Sewer Buildout Catalog and information from Chapter 7.

- Chapter 10 presents a review of the current financial status of the District along with a discussion of funding for the identified capital improvement projects.

HISTORY OF THE DISTRICT

Development within the District began in the early 1950s. Poor soils resulted in septic tank failures and eventually lead to the formation of the 200-acre Kenmore Sewer District in 1955. Construction of the sewer system began in 1959. A series of annexations followed as the Kenmore Sewer District grew to about 4,400 acres by 1960. The first service charge rate resolution was passed at that time, setting a monthly charge of $3. The name of the District was changed to The Northeast Lake Washington Sewer District in 1962.

The first wastewater comprehensive plan was adopted in 1963. The Northeast Lake Washington Sewer District operated only as a sewer district until 1979 when it merged

with King County Water District No. 79, at which time it became known as the Northeast Lake Washington Water and Sewer District. In 1992, the name was changed to Northshore Utility District. Today the District's sewer system comprises 11 lift stations; four grinder systems; approximately 240 miles of gravity pipe, ranging in size from 8 to 30 inches in diameter; and approximately 6,500 feet of force mains, ranging from 2 to 10 inches in diameter.

A historical timeline is presented in Table 1-1. The location of the District within Washington State and an aerial photograph of the area are presented in Figures 1-1 and 1-2, respectively.

TABLE 1-1

Historical District Timeline

Year	Event
1955	Kenmore Sewer District formed.
1959	Construction of the sewer system begins.
1960	First service charge rate resolution passed.
1962	Name changed to Northeast Lake Washington Sewer District.
1963	First wastewater comprehensive plan adopted.
1965	Construction of the Swamp Creek Trunk begins.
1975	Construction of the Holmes Point Trunk begins.
1979	WD 79 mergers with Northeast Lake Washington Sewer District.
1992	Name changed to Northshore Utility District.
1998	District office facility completed.
2002	Swamp Creek Extension Trunk constructed.
2005	2006 District Design Standards adopted.

ORGANIZATION

The District is a special purpose district with the authority to operate under Title 57 of the Revised Code of Washington. A five-member board of commissioners elected by voters to serve a 6-year term governs the District. The terms are staggered so that elections for each position are held in alternate years. The Board sets the general policies for the operation of the District. The General Manager is selected by the Board and administers the daily operations of the District.

District staff is organized into six departments: Engineering, Operations, Finance, Information Systems, Human Resources, and Fleet/Facilities. These departments are operated by individual Directors who report to the General Manager, who reports to the Board of Commissioners. The Engineering Department is responsible for developing and implementing the capital improvement programs and for bringing water and sewer

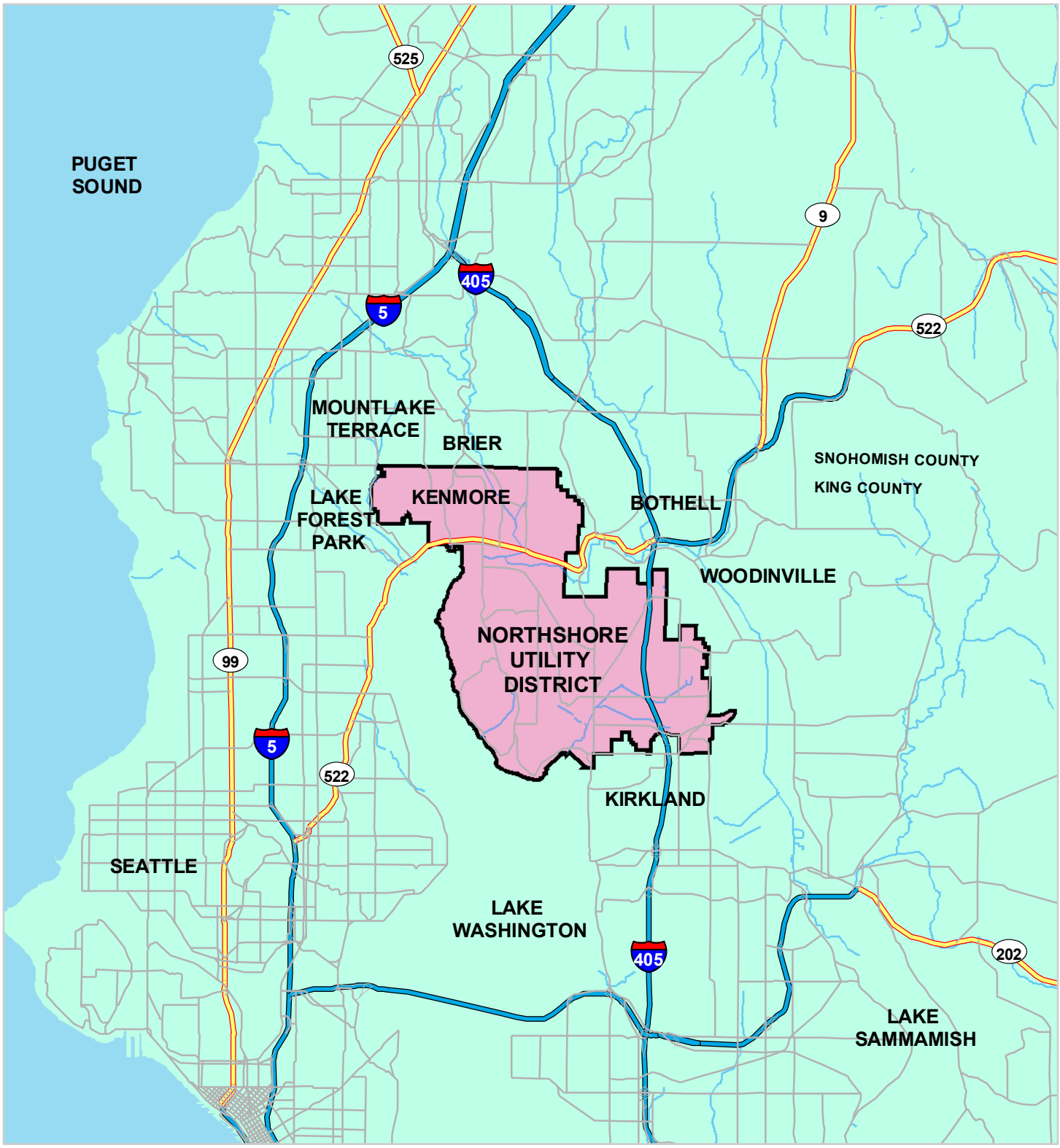
services to areas of new development. It interacts with developers and contractors, develops and reviews design plans, monitors contracts, and inspects constructions. The Finance Department is responsible for utility billing and the financial affairs and functions of the District. The Fleet & Facilities Department is responsible for District vehicle and facility upkeep. This department also maintains vehicles for local agencies that contract with the District for the service, including the Northshore Fire Department, City of Kenmore, City of Lake Forest Park Public Works Department, and the City of Lake Forest Park Police Department. The Human Resources Department is responsible for the development and administration of policies and matters relating to personnel. It is also responsible for purchasing/inventory, employee safety, and emergency response planning. The Information Systems & Technology Department is responsible for the information systems and technological resources for the District. The Operations and Maintenance Department is responsible for the operation and maintenance of the water and sewer systems including all related support services.

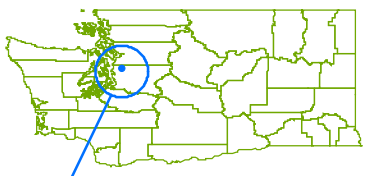
The Directors oversee the functions of their respective departments and may be assisted by one or more Supervisors. Many functions like emergency response planning and long-term planning are accomplished through coordinated group efforts.

LIST OF ABBREVIATIONS

The abbreviations used in this Plan are defined as follows:

AC	asbestos cement
AWWF	average wet weather flow
BOD	biological oxygen demand
CFR	Code of Federal Regulations
cfs	cubic feet per second
CIP	Capital Improvement Plan
CMOM	Capacity, Management, Operations, and Maintenance
CWA	Clean Water Act
CSO	combined sewer overflow
DI	ductile iron
DNS	Determination of Non-Significance
DOH	Washington State Department of Health
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERU	equivalent residential unit
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
FML	flow meter location
fps	feet per second
GIS	Geographic Information Systems
GFC	general facilities charge





NORTHSHORE UTILITY DISTRICT
WATER SEWER

WASTEWATER SYSTEM PLAN

FIGURE 1-1
LOCATION MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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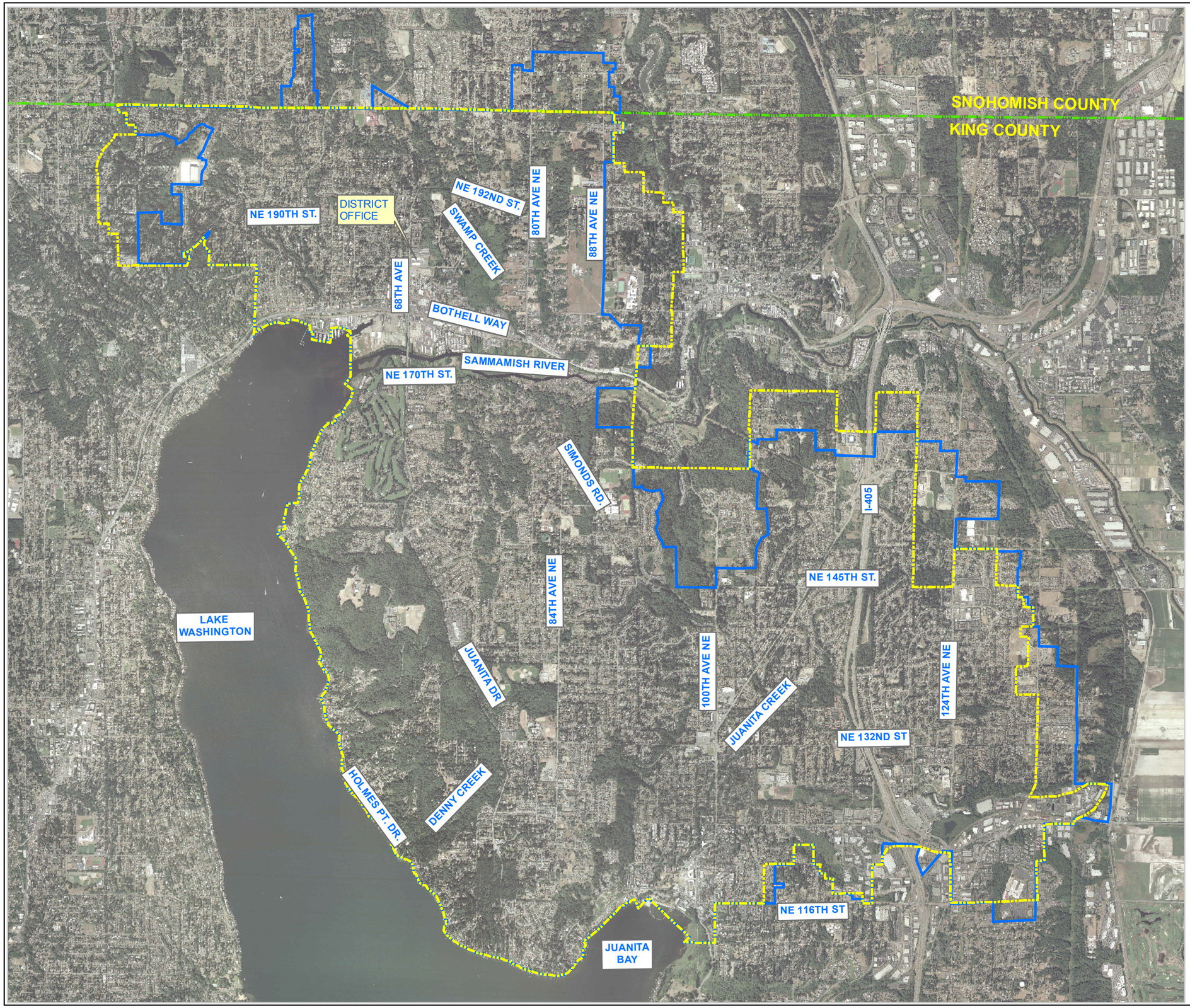

N

0 1,600 3,200 6,400
Feet

LEGEND:

- CORPORATE BOUNDARY
- SEWER SERVICE STUDY AREA BOUNDARY
- COUNTY LINE

SOURCE: KING COUNTY GIS

NORTHSHORE UTILITY DISTRICT

WASTEWATER SYSTEM PLAN

FIGURE 1-2
AERIAL PHOTO

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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GMA	Growth Management Act
gpcd	gallons per capita per day
gpad	gallons per acre per day
gpd	gallons per day
gpm	gallons per minute
HCP	Habitat Conservation Plan
HPA	Hydraulic Project Approval
I/I	infiltration and inflow
KCDNR	King County Department of Natural Resources
LS	lift station
MG	million gallons
μg/L	micrograms per liter
mg/L	milligrams per liter
mgd	million gallons per day
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
PSRC	Puget Sound Regional Council
PVC	polyvinyl chloride
PWTF	Public Works Trust Fund
PWWF	peak wet weather flow
RCW	Revised Code of Washington
SCADA	Supervisory Control and Data Acquisition
SCS	Soil Conservation Service
SEPA	State Environmental Policy Act
SDC	system development charge
SRF	State Revolving Fund
TAZ	transportation analysis zone
TSS	total suspended solids
UBC	Uniform Building Code
UGA	Urban Growth Area
ULID	Utility Local Improvement District
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife

GLOSSARY OF TERMS

Some important terms used in this Plan are defined as follows:

- **Average Wet Weather Flow (AWWF):** Wastewater that flows during periods when the groundwater table is high and the precipitation is at the

highest amount of the year. The wet weather flow period in western Washington normally occurs from October to May.

- **Commercial and Industrial Wastewater:** Wastewater generated by commercial and industrial users. Commercial and industrial wastewater flow is usually expressed as a unit flow based on the average contribution in gallons per acre per day (gpad).

- **Domestic Wastewater:** Wastewater generated by single- and multi-family residences. Domestic wastewater flow is usually expressed as a unit flow based on the average contribution from each person per day. The unit quantity is expressed in terms of gallons per capita per day (gpcd).

- **Equivalent Residential Unit (ERU):** A baseline wastewater contributor representing the average residential household. The District bills commercial customers based on water use, assuming 900 cubic feet is the average monthly contribution from a single ERU. This is equivalent to about 220 gallons per day (gpd) per residence.

- **Infiltration:** Groundwater that enters a wastewater system by means of defective pipes, pipe joints, or manhole walls. Infiltration quantities often exhibit seasonal variation in response to groundwater levels. Storm events can trigger a rise in groundwater levels and increase infiltration flows. The highest infiltration flows are observed following significant storm events or following prolonged periods of precipitation. Since infiltration is related to the total amount of piping and appurtenances in the ground and not to any specified water use component, it is usually expressed in terms of the total land area being served or in terms of the lengths and diameters of sewer pipe. The unit quantity used in this study is gallons per acre per day (gpad).

- **Inflow:** Surface water which enters the wastewater system from yard, roof, and footing drains; from cross-connections with storm drains; and through holes in manhole covers. Peak inflow can occur during heavy storm events when storm sewer systems are surcharged, resulting in hydraulic backups and local ponding. Inflow is expressed in terms of gallons per acre per day (gpad).

- **Institutional Wastewater:** Wastewater from institutional facilities such as schools, government buildings, and hospitals. In this study, institutional wastewater flow is combined with commercial and industrial wastewater and classified as non-residential. Like commercial and industrial

wastewater, institutional wastewater is expressed as a unit flow based on the average contribution in gallons per acre per day (gpad).

- **Maximum Winter Month Flow:** The average daily flow during the highest flow month of the year. This flow is composed of the normal wastewater flow with contributions to the wastewater system from infiltration and inflow.

- **Peak Hour Flow:** Peak wastewater flow sustained for one hour of a day. A published peaking factor may be used, or the actual peaking factor may be determined by taking the ratio of the peak hour flow to the actual average daily flow. In general, lower peaking factors are associated with larger collection systems due to more varied use patterns and because peaks are modulated as wastewater travels from the most distant reaches of the system to the point of interest.

- **Peak Wet Weather Flow (PWWF):** The peak hour wastewater flow during a wet weather period. This flow includes contributions to the wastewater system from infiltration and inflow and from peak wastewater discharge. Peak wet weather flows are used in sizing and evaluating the hydraulic capacity of conveyance and pumping components of a wastewater collection system.

- **Reclaimed water:** Effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for beneficial use or a controlled use that would not otherwise occur, and it is no longer considered wastewater.

- **Wastewater:** Water-carried wastes from residential, business, and public use facilities, together with I/I (groundwater and surface water that enters the wastewater system through defective piping and direct surface water inlets). Wastewater quality is often characterized in terms of biological oxygen demand (BOD) and total suspended solids (TSS). The total wastewater flow is quantitatively expressed in millions of gallons per day (mgd) or in gallons per minute (gpm).