

"WORKING TOWARD A BETTER ENVIRONMENT"

Valley View
SEWER DISTRICT

2023 GENERAL SEWER PLAN

Approved by the
Board of Commissioners

February 21, 2023

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PROJECT CERTIFICATION

The technical material and data contained in this report were prepared by PACE Engineers, Inc. under the supervision of the below listed individuals. Those responsible staff members who are registered professional engineers are licensed in the State of Washington.



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EXECUTIVE SUMMARY

This Comprehensive Sewer System Plan is a summary of the conclusions and findings of recent planning and engineering studies completed by PACE Engineers, Inc., for Valley View Sewer District.

The District's current service area reflects the 1995 merger of Rainier Vista Sewer District into Val Vue Sewer District, which was later changed to "Valley View Sewer District." This document provides the District with one consolidated Comprehensive Sewer System Plan which covers the entire District sewer service area. This document updates and supersedes the previous plans and provides the District with one document to guide future development of the sanitary sewer system. It has been prepared in accordance with the requirements of the State of Washington Department of Ecology, King County and the cities within which the District operates.

The primary objectives in developing this document were as follows:

1. To determine the adequacy of the existing sanitary sewer system to meet the current and projected needs of the customers of the District in accordance with all applicable state, federal and local regulations governing the provision of sanitary sewer service;
2. To analyze the sanitary sewer system and identify potential deficiencies and recommended improvements, including potential ways of improving service by interconnecting the sanitary sewer systems of the previous Districts; and,
3. To develop a capital improvements program to serve as a guideline for future development of the sewer system. The future sewer rates will be adjusted in the near future and will be derived from this capital improvement program.

Valley View's sewer service area consists of approximately 6,000 acres of land located north and east of the Sea-Tac International Airport, in southern King County. The service area generally extends from the Seattle City limits on the north, to South 176th and 182nd Streets on the south, and from Interstate Highway 5 and State Route 599 on the east to First Avenue South and State Route 509 on the west. The District serves within the limits of the cities of Burien, SeaTac, Seattle and Tukwila, and within a small area of unincorporated King County.

Land use within the service area is predominantly single family residential with multi-family residential and commercial uses concentrated along major thoroughfares. The northeastern portion of the District, along East Marginal Way South and adjacent to the Duwamish River, is classified as industrial. The District currently serves approximately 8,600 connections. Population within the service area is estimated at 44,684 people and approximately 19,460 people are employed within the service area.

Projected development within the service area is limited to that associated with infill development in the short term, and redevelopment in the future. It is expected that population and employment within the District will increase over the immediate and long-range planning periods. The most significant increases are expected in the multi-family and commercial (including industrial) customer classification. This shift in development is expected as a result of infill development and single-family property redevelopment around the two light rail stations built by Sound Transit. One light rail station is at the intersection of International Boulevard (Pacific Highway South) and Southcenter Boulevard in Tukwila, and the other has been built just west of the City of SeaTac's city center at Sea-Tac International Airport. The biggest

influence on future development and growth within the District is expected to be increased activity and development related to these light rail stations.

A reduction in single family residential uses and an increase in multi-family and commercial uses is anticipated to occur in the future. Based on interpolation of population and employment projections provided by the Puget Sound Regional Council and area City planners, it is estimated that population will increase from approximately 44,684 in 2020 to over 54,000 by the year 2040.

The District's sanitary sewer system has been divided into eleven primary drainage basins and twenty five drainage sub-basins for the purpose of analysis of the system and projection of future needs. Pipe sizes within the District range from 6- to 24-inches and the District currently maintains 19 pump stations to compensate for the hilly terrain within the service area. The District does not maintain wastewater treatment or disposal facilities and instead relies on the service of King County-Metro, Southwest Suburban Sewer District and Midway Sewer District for these services. Delivery of flow to these entities for treatment and disposal of wastewater is accomplished through system connections and in accordance with existing interlocal agreements.

Analysis of the sewer system identified several areas where deficiencies exist, either due to pipe size or condition. The capacity analysis was performed using various tools; including a spreadsheet analysis accomplished using Microsoft Excel™ and a computer model that was constructed to simulate how the sewer system operates under various flow and growth projections. The computer software used in modeling the system is InfoSWMM® by InnoVize. The model produced capacity concerns and operational deficiencies were identified by staff through historic known areas of concern and CCTV records. A significant portion of the recommended improvements outlined in this Plan are for extension of service to areas which are currently unsewered. These areas occur throughout the District, but as indicated on the CIP map, there are large unsewered areas located in the western portion of the service area. It is proposed that these sewers will flow into the Southwest Suburban Sewer District sewer system for treatment and discharge. The unsewered areas in the eastern portion of the District could logically be served by Valley View but extension of service to these areas would only be accomplished at the request of the City of Tukwila.

In addition to the system analyses completed for the planning process, a specific infiltration and inflow study was accomplished as part of previous planning effort to compile the results of flow monitoring in the system. This study can be found at the District office and outlines the District's program for future infiltration and inflow reduction.

Approximately \$85 million dollars in improvements for rehabilitation or replacement and \$58 million dollars for sewer extension project are recommended for the sanitary sewer system for the next thirty years. This prepares the District to update their rate study and adjust its monthly rates, general facility charges and local facility charges in response to the Capital Improvements Plan outlined in Chapter 7. Projects not funded by rates and charges are anticipated to be financed by developers extensions, ULIDs, and/or Grants or low interest loans. It is recommended that the District continue to support ULIDs and extension of sewers into unsewered areas in accordance with the Growth Management Planning mandate that an urban level of services be provided to all areas within the urban growth area.

All developments within urban growth area served by sewer unless on-site systems are temporarily allowed per KCC 13.24.136 and 13.08.070.

TABLE OF CONTENTS

Engineer’s Certification	i
Executive Summary	iii
Table of Contents	vii
Glossary of Terms	xv

CHAPTER 1 INTRODUCTION

1.1 Overview	1-1
1.2 Location	1-1
1.3 History of the District	1-5
1.4 Authority and Management of the District	1-5
1.5 Goals and Objectives	1-6
1.6 Related Planning Studies	1-7
1.7 Rules and Regulations	1-7
1.7.1 Federal Requirements	1-7
1.7.2 State of Washington Requirements	1-8
1.7.3 King County Requirements	1-9
1.7.4 City Requirements	1-9

CHAPTER 2 DESCRIPTION OF THE SERVICE AREA

2.1 District Boundaries	2-1
2.2 Future Service Area	2-1
2.3 Interlocal Agreements	2-1
2.4 Service Area Conflicts	2-2
2.4.1 Unsewered Areas	2-2
2.5 Physical Characteristics	2-7
2.5.1 Topography	2-7
2.5.2 Drainage Basins	2-7
2.5.3 Geology and Soils	2-7
2.5.4 Climate	2-8
2.5.5 Hydrology	2-8
2.5.6 Sensitive Areas	2-8

CHAPTER 3 DEMOGRAPHICS AND SYSTEM FLOWS

3.1 General	3-1
3.2 Zoning and Land Use	3-1
3.3 Projected Development	3-5
3.4 population and Employment	3-5
3.4.1 Unsewered Areas	3-5
3.5 Flow Projections	3-6
3.6 Pretreatment Devices	3-7

CHAPTER 4 EXISTING SYSTEM DATA

4.1 General	4-1
4.2 Drainage Basins	4-1

4.2.1 McMicken Basin 4-2

4.2.2 Midway Basin 4-5

4.2.3 Three Tree Basin 4-5

4.2.4 Macadam Basin 4-5

4.2.5 Riverton Basin 4-6

4.2.6 Duwamish Basin 4-7

4.2.7 South Park Basin..... 4-7

4.2.8 Beverly Park Basin 4-8

4.2.9 Glen Acres Basin..... 4-8

4.2.10 Rainier Vista Basin 4-9

4.2.11 Southwest Suburban Basin 4-9

4.3 Pump Stations 4-10

4.4 Wastewater Treatment and Disposal..... 4-10

CHAPTER 5 MINIMUM DESIGN CRITERIA

5.1 Introduction 5-1

5.2 Minimum Design Requirements 5-1

5.3 Design Period 5-2

5.4 Reference Datum 5-2

5.5 System Design 5-2

5.5.1 Combined Sewers 5-2

5.5.2 Overflows 5-2

5.5.3 Collection Sewers 5-2

5.5.4 Trunk and Interceptor Sewers 5-3

5.5.5 Flow Rates 5-3

5.5.6 Infiltration and Inflow 5-4

5.5.7 Pipe Materials 5-4

5.5.8 Sewer Locations 5-5

5.5.9 Depth 5-5

5.5.10 Separation 5-5

5.5.11 Roughness Coefficient 5-5

5.5.12 Slope 5-5

5.5.13 Alignment 5-6

5.5.14 Downsizing 5-6

5.5.15 Grinder Pump Stations..... 5-6

5.6 Manholes 5-7

5.7 Pump Stations 5-7

5.7.1 Location and Flood Protection 5-7

5.7.2 Pumping Rate and Number of Units 5-8

5.7.3 Pump Cycle Ratios 5-8

5.7.4 Pumps 5-8

5.7.5 Controls 5-8

5.7.6 Site Water 5-8

5.7.7 Bypass/Storage 5-9

5.7.8 Alarm System 5-9

CHAPTER 6 SYSTEM ANALYSIS AND RECOMMENDATIONS

6.1 General..... 6-1

6.2 System Analysis..... 6-1

 6.2.1 Data Input..... 6-1

 6.2.2 Development Of System Flows 6-2

 6.2.2.1 Wastewater Flows 6-2

 6.2.2.2 Infiltration And Inflow..... 6-2

 6.2.2.3 Pattern Of Usage..... 6-3

6.3 Drainage Basin Analysis 6-5

CHAPTER 7 CAPITAL IMPROVEMENTS PLAN

7.1 General..... 7-1

7.2 Recommended Improvements..... 7-1

7.3 Cost Estimates 7-2

7.4 Project Schedules..... 7-3

CHAPTER 8 OPERATIONS AND MAINTENANCE

8.1 General..... 8-1

8.2 System Responsibility and Authority 8-1

 8.2.1 Board of Commissioners 8-1

 8.2.2 District Manager and Assistant Manager 8-1

 8.2.3 Field Superintendent..... 8-1

 8.2.4 Outside Consultants..... 8-2

 8.2.5 Other Assistance 8-2

8.3 Record Maintenance 8-2

8.4 Preventive Maintenance..... 8-2

8.5 Emergency Procedures..... 8-3

 8.5.1 District Personnel..... 8-3

 8.5.2 Communications 8-3

 8.5.3 Supplies and Spare Parts..... 8-3

 8.5.4 Outside Assistance 8-3

8.6 System Vulnerability 8-4

 8.6.1 Treatment and Disposal..... 8-4

 8.6.2 Sewer Mains, Trunks, and Regional Interceptors 8-4

 8.6.3 Pump Stations 8-4

 8.6.4 Electrical Power..... 8-5

CHAPTER 9 FINANCING

9.1 General..... 1

9.2 Financial Considerations..... 1

9.3 Funding Sources..... 1

 9.3.1 Rates..... 1

 9.3.2 Utility Local Improvement District Financing 3

 9.3.3 Bond Financing..... 4

 9.3.4 Grant Financing 4

 9.3.5 Loan Financing 4

9.4 Financing Capital Improvements..... 5

9.4.1	General Facilities	5
9.4.2	Local Facilities	5
9.4.3	Individual Service Lines	6
9.5	Financing Recommended Improvements	6
9.6	Other Considerations.....	6

APPENDICES

Appendix A	SEPA Checklist
Appendix B	Modeling Results
Appendix C	Pump Run Times
Appendix D	Financial Statements
Appendix E	Comments and Approvals

LIST OF TABLES

Table 2-1:	Summary of Interlocal Agreements.....	2-1
Table 2-2:	Soil Types.....	2-8
Table 3-1:	Land Area Comparison.....	3-1
Table 3-2:	Population and Employment by Drainage Basin	3-7
Table 3-3:	Base Flows by Drainage Basin (GPM)	3-8
Table 3-4:	Peak Flows without Infiltration and Inflow (I&I) by Drainage Basin (gpm)	3-9
Table 3-5:	Peak Flows with I & I (gpm).....	3-10
Table 4-1:	Pump Station Characteristics	4-10
Table 4-2:	Connections to Other Systems	4-12
Table 5-1:	Estimated Sewer Flows By Land Use Type.....	5-3
Table 5-2:	Peaking Factors (used to convert average daily flows to peak daily flows)	5-3
Table 5-3:	Minimum Required Pipe Slopes.....	5-5
Table 7-1:	Cost Estimates – Overhead	7-5
Table 9-1:	2022 Rates, Fees, and Charges	9-2

LIST OF FIGURES

Figure 1-1	Location Map	1-3
Figure 2-1	Boundary Map.....	2-3
Figure 2-2	Service Area Map	2-5
Figure 3-1	Zoning Map	3-4
Figure 4-1	Drainage Basins	4-3
Figure 6-1:	Diurnal Curve – Residential Usage.....	6-4
Figure 6-2:	Diurnal Curve – School Usage	6-5
Figure 8-1	Emergency Call-Up List	8-6

GLOSSARY OF TERMS

ACRONYMS

AAF	Average Annual Flow; the average day flow for the entire year
AC	Asbestos-Cement
ADD	Average Daily Demand
ADWF	Average Dry Weather Flow
APWA	American Public Works Association
AWWF	Average Wet Weather Flow
BOD ₅	Biochemical Oxygen Demand
CBOD	Carbonaceous Biochemical Oxygen Demand
ccf	One hundred cubic feet
cfs	Cubic Feet per second
CFP	Capital Facilities Plan
CI	Cast Iron
CT	Census Tract
DOE	Washington State Department of Ecology
DOH	Washington State Department of Health
EPA	United States Environmental Protection Agency
ERU	Equivalent Residential Unit
ES	Equalizing Storage
FAZ	Forecast Analysis Zone
gpad	Gallons per acre per day
gpcd	Gallons per capita per day
gpd	Gallons per day
gpm	Gallons per minute
GFC	General Facility Charge
GMA	Growth Management Act
GWI	Groundwater-Related Infiltration
HGL	Hydraulic Grade Line
I & I	Infiltration and Inflow
LFC	Local Facility Charge
MCL	Maximum Contaminant Level
MDD	Maximum Daily Demand
MG	Million Gallons
MGD	Million gallons per day
mg/l	Milligrams per liter
OFM	Office of Financial Management
PHD	Peak Hour Demand
PHF	Peak Hour Flow
PMF	Peak Month Flow
ppb	Parts per Billion
ppm	Part per Million
PSRC	Puget Sound Regional Council
psi	Pounds per square inch

PVC	Polyvinyl Chloride
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SPU	Seattle Public Utilities
ULID	Utility Local Improvement District
USGS	United States Geological Survey
WAC	Washington Administrative Code
WUTC	Washington Utilities and Transportation Commission
WWTP	Wastewater Treatment Plant

TERMS

Activated Sludge Process	A biological wastewater treatment process whereby a mixture of wastewater and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation, and wasted or returned to the process as needed.
Aeration	A process that mixes and/or infuses air into a liquid by one or more methods, such as spraying the liquid in the air, forcing air bubbles through the liquid, or agitating the liquid to promote surface absorption of the air.
Anaerobic	An environment devoid of oxygen.
Anoxic	An environment devoid of oxygen where nitrate acts as the electron acceptor.
Aquifer	A porous, water bearing geologic formation. Generally restricted to materials capable of yielding an appreciable supply of water.
Average Annual Flow (AAF)	The average day flow for the entire year.
Average Dry Weather Flow (ADWF)	ADWF is the flow for an average day during the dry weather months of May through October, and represents the baseline of sewage flow for the service area. The ADWF includes sewage discharges plus the average amount of groundwater infiltration (base GWI) which occurs throughout the dry season. In the absence of actual data, 100 gallons per capita per day is often used to predict the ADWF for a new service area. Peaking factors for existing flows are derived on the basis of ADWF.
Average Wet Weather Flow (AWWF).	AWWF is the flow for an average day during the wet weather months of November through April. The AWWF includes sewage discharges, groundwater infiltration and stormwater inflow which occurs throughout the wet season.

Biochemical Oxygen Demand (BOD ₅)	The quantity of oxygen required to support biological oxidation of the organic matter contained in wastewater. Usually referred to as BOD, this characteristic defines the strength of a wastewater and often determines the type and level of treatment which must be provided to produce a required effluent quality. BOD is commonly expressed as the amount of oxygen utilized in the oxidization of organic matter over a five day period at 20°C and is typically represented as (BOD ₅).
Carbonaceous Biochemical Oxygen Demand (CBOD)	Similar to biochemical oxygen demand, except that nitrification is excluded from the oxygen demand calculation. CBOD is measured using nitrification inhibiting agents.
Combined Sewer	A sewer which receives both wastewater and storm or surface water.
Commercial Wastewater	Wastewater generated in predominantly business or commercial areas, including both sanitary wastes and wastes from the commercial activities. Typically, commercial wastewater includes, but is not limited to, wastes from restaurants, laundromats, and service stations.
Denitrification	Removal of nitrogen from wastewater by conversion of nitrate into nitrogen gas under anoxic conditions.
Domestic Wastewater	Wastewater principally derived from the sanitary conveniences of residences or produced by normal residential activities.
Dry Weather Flow	Wastewater flow during periods of little or no rainfall; in the Puget Sound area, this typically occurs during the months May through October. Rates of flow exhibit hourly, daily, and seasonal variations. A certain amount of infiltration may also be present.
Dry Well	The dry compartment in a pumping station, near or below pumping level where the pumps and/or motors and controls are located.
EPA	The United States Environmental Protection Agency.
Force main	A sewer pipeline that flows full under pressure, discharging from a pump station (as opposed to an inverted siphon).
GMA	State of Washington Growth Management Act.
Hydrogen Sulfide	A potentially toxic and lethal gas (chemical symbol H ₂ S) produced in sewers and digesters by anaerobic decomposition. Detectable in low (<0.0001 percent) concentrations by its characteristic "rotten egg" odor, it deadens the sense of smell in higher concentrations or after prolonged exposure.
Industrial Wastewater	Wastewater generated predominately from industrial area, including both sanitary wastes and waste from the industrial activity.

Infiltration	The quantity of groundwater that leaks into the wastewater collection system from the surrounding soil. Common points of entry include broken pipes and defective joints in the pipe or in walls of manholes. Infiltration may result from defective sewers being located below the groundwater table or from saturation of the soil by rain or irrigation water. Infiltration is divided into two categories: Groundwater-related Infiltration (GWI) which occurs throughout the year, and Rainfall-Dependent Infiltration (Rain GWI) which occurs during and shortly after storm events as a result of temporarily raising the groundwater table.
Inflow	Rainwater which enters the collection system through roof drain connections, catch basin connections, and holes in the tops of manhole covers in flooded streets. Inflow is generally distinguished from infiltration by the rapidity with which inflow begins and ends after a period of rainfall.
Interceptor	A sewer that receives flow from a number of main or trunk sewers, force mains, etc.
Inverted siphon	Inverted Siphon is defined as a sewer that dips below the hydraulic grade line to avoid an obstruction such as a creek, ravine or other utility.
King County-Metro	Refers to the operator of a regional wastewater treatment and disposal which was formerly known as "Metro" but is now under the jurisdiction of the King County government.
Lateral	A sewer that has no other common sewers discharging into it.
Main	A sewer that receives flow from one or more laterals. Also referred to as "trunk".
Nitrification	The process of converting organic and ammonia nitrogen into nitrate nitrogen by nitrifying autotrophic bacteria.
Nitrogen	An essential nutrient that is often present in wastewater as ammonia, nitrate, nitrite, and organic nitrogen. The concentrations of each form and the sum, total nitrogen, are expressed as mg/l elemental nitrogen. Also present in some ground water as nitrate and in some polluted ground water in other forms.
Peak Day Flow (PDF)	The maximum flow received over a calendar day, usually occurring during the wet weather.
Peak Design Flow Peak Hour Flow (PHF)	The largest estimated flow sustained over a 60 minute period in the design year of the wastewater facility.

pH	A measure of the hydrogen ion concentration in a solution, expressed as the logarithm (base ten) of the reciprocal of the hydrogen ion concentration in gram moles per liter. On the pH scale (0 14), a value of 7 at 25°C represents a neutral condition. Decreasing values, below 7, indicate increasing acidity; increasing values, above 7, indicate increasing alkalinity.
Peak Month Flow (PMF)	The largest estimated flow rate sustained over a calendar month.
Phosphorus	An essential chemical element and nutrient for all life forms. Occurs in orthophosphate, pyrophosphate, tripolyphosphate, and organic phosphate forms. Each of these forms is expressed as mg/l elemental phosphorus.
Sewerage	A complete system of piping, pumps, basins, tanks, unit processes, and appurtenances for the collection, transporting, treating, and discharging of wastewater. Term is declining in use, generally being replaced by sewer system or wastewater facilities.
Submain	A sewer that receives flow from one or more lateral sewers.
Suspended Solids (SS)	The suspended undiluted material transported in wastewater. The quantity of suspended material removed during treatment varies with the type and degree of treatment and has an important bearing on the size of many mechanical and process units. Also referred to as "Total Suspended Solids (TSS).
Trunk	A sewer that receives flow from one or more sewer mains.
Volatile Suspended Solids	The organic portion of the total suspended solids which will oxidize and be driven off as a gas at 600°C. VSS typically represents 75 to 85 percent of the TSS for digested and undigested sludge.
Washington Administrative Code (WAC)	Document which consists of regulations adopted by the State to carry out the RCW.
Wastewater	Water-carried wastes from residences, businesses, institutions, and industrial establishments, together with such ground and storm waters as may be present.
Wastewater Treatment Plant (WWTP)	A water pollution control facility engineered and constructed to remove pollutants from wastewater. Also referred to as a sewage treatment plant.
Wet Weather Flow	Wastewater flow during or following periods of moderate to heavy rainfall; in the Puget Sound area, this typically occurs during the months November through April. Infiltration and inflow may increase the wet weather flow to a rate many times greater than the dry weather flow, and unless provided for in sewerage design, can produce hydraulic overloads resulting in wastewater overflows to streets or water courses.

Wet Well

The compartment in a pump station where wastewater flow is collected and from which the pumps intake wastewater to be discharged into a force main.