



CITY OF BLACK DIAMOND

General Sewer System Plan

November 16, 2023
(Ecology Edits)

DRAFT



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INCORPORATING
ECOLOGY REVIEW
COMMENTS

Engineers Certification

I hereby certify that this General Sewer Plan for the City of Black Diamond, Washington has been prepared under the supervision and direction of the undersigned, Daniel R. Ervin, whose seal as a Licensed Professional Engineer of the State of Washington is affixed below.



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ACKNOWLEDGEMENTS

Special thank you to the Public Works Department, the Master Development Review Team, the Mayor's office, and the City Council for their insight and comments.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	4
TABLE OF CONTENTS	5
ABBREVIATIONS	11
INTRODUCTION	13
THE IMPORTANCE OF WASTEWATER SYSTEMS	13
A LIVING PLAN	14
CONTENTS.....	15
Plan Requirements (WAC).....	16
1. SYSTEM DESCRIPTION.....	18
Ownership and Management – WAC 173-240-050(3)(b)	18
Organization Chart.....	19
History.....	21
Service Area - WAC 173-240-050 (3)(c)	22
Location.....	23
Adjacent Sewer Service Providers	24
Sewer Coordination Agreements	24
Typical System Components	25
Collection Facilities (Side Sewer, Lateral, and Collection Sewer Lines)	25
Conveyance Facilities (Main and Trunk Sewer Lines)	26
Drainage Basins	26
Jones Lake	26
Force Mains	27
Infiltration and Inflow	27
Lift Station	27
System Overview– WAC 173-240-050(3)(d)	27
Sensitive Areas	28
Mining Activity.....	28
Climate.....	28
Surface Waters	28
Topography	29
SEPA Compliance and Approval Process.....	29
2. ADJACENT SYSTEMS AND PLANNING POLICIES.....	37
PLANNING CONTEXT AND RELATED PLANS	37
RELATED AGREEMENTS	38
POLICIES	38
Customer Service Policies	39
Planning Policies.....	39
Service Area Policies:	40

Financial Policies:.....	41
Facility Policies:	41
Operations Policies:.....	42
3. PLANNING DATA AND DEMAND FORECASTS.....	45
PURPOSE OF DEMAND FORECASTING.....	45
DEMOGRAPHIC DATA AND PROJECTIONS – WAC 173-240-050(3)(e).....	46
Wastewater Use Trends	47
RETAIL WASTEWATER CUSTOMERS	47
LARGEST WASTEWATER CUSTOMERS	47
Industrial Customers – WAC 173-240-050(3)(d)(i)	48
Development Activity	48
WASTEWATER USE FACTORS AND EQUIVALENT RESIDENTIAL UNITS (ERUS)	50
BASIN PLANNING AREAS.....	55
ROCK CREEK BASIN	57
WEST BLACK DIAMOND BASIN.....	59
JONES LAKE BASIN	61
EAST BLACK DIAMOND BASIN	63
MAJOR FACILITIES.....	65
PLANNING AND FORECASTING CONCLUSIONS	66
4. SYSTEM ANALYSIS.....	68
SYSTEM OVERVIEW – WAC 173-240-050(3)(d)	68
WASTEWATER TREATMENT - KING COUNTY	70
WASTEWATER CONVEYANCE CAPACITY EVALUATION.....	70
Jones Lake Basin	70
Rock Creek Basin	71
BD West Basin	71
BD East Basin.....	72
CONVEYANCE SYSTEM INFLOW AND INFILTRATION	73
LIFT STATION EVALUATION	73
INDIVIDUAL GRINDER PUMPS AND PRESSURE SEWERS.....	74
ODOR AND CORROSION.....	74
COLLECTION SYSTEM EVALUATION	74
COLLECTION SYSTEM LATERALS.....	77
SUPPORT INFRASTRUCTURE	77
Support Infrastructure Life Cycle Considerations.....	77
RECLAIMED WATER USE	80
SUMMARY OF EXISTING DEFICIENCIES.....	80
5. CITY FACILITIES DESIGN AND CONSTRUCTION STANDARDS	82
Sewer Planning and Design Standards.....	82
6. MAINTENANCE AND OPERATIONS	84
GENERAL	84
Infrastructure Maintenance Programs	84
Large Equipment Capability	84

Collection System Repair and Replacement	85
Performance Indicator: Sewer System Integrity	85
LIFT STATIONS	85
AFTER-HOURS STAFFING.....	86
PREVENTATIVE MAINTENANCE AND MONITORING PROGRAMS	86
CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION	86
FLOW MONITORING	87
SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) PROGRAM	87
SECURITY	88
FACILITY, EQUIPMENT, AND FLEET MAINTENANCE AND INVENTORY	88
FACILITY MAINTENANCE	88
EQUIPMENT AND FLEET MAINTENANCE	89
INVENTORY.....	89
RECORDKEEPING AND REPORTING	89
MAINTENANCE MANAGEMENT SYSTEM	89
MAPPING AND GEOGRAPHIC INFORMATION SYSTEM (GIS) PROGRAM	90
RECORDKEEPING AND REPORTING	90
REGULATORY ENVIRONMENT	90
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT	90
PUGET SOUND WATER QUALITY MANAGEMENT PLAN	91
SEWAGE SPILL RESPONSE PLAN	91
Potential Future Requirement: Capacity Management, Operations, and Maintenance (CMOM)	92
7. EMERGENCY PLANNING.....	94
GENERAL	94
PREPAREDNESS.....	94
VULNERABILITY ASSESSMENT AND EMERGENCY RESPONSE PLANS.....	95
SYSTEM IMPROVEMENTS.....	95
EDUCATION AND TRAINING.....	96
AGENCY COORDINATION	96
COMMUNICATION.....	96
RESPONSE.....	97
RECOVERY	97
8. PERSONNEL	99
THE WORKFORCE.....	99
STAFFING TURNOVER	99
LEVELS OF SERVICE	100
SAFETY	100
9. INFORMATION TECHNOLOGY	104
CURRENT STATE.....	104
STRATEGIC DIRECTION.....	105
PLANNED IMPROVEMENTS.....	105
10. CAPITAL IMPROVEMENT PROGRAM.....	108
SYSTEM OVERVIEW – WAC 173-240-050(3)	108
CAPITAL IMPROVEMENT PROGRAM DEVELOPMENT.....	108

THE BASIS FOR CIP COST ESTIMATES.....	110
VALIDATION OF PREVIOUSLY PROPOSED CAPITAL PROJECTS	112
VALIDATION OF SYSTEM CAPACITY	112
ASSET MANAGEMENT.....	112
BASIN-SPECIFIC CAPITAL IMPROVEMENT PROJECTS.....	113
Jones Lake Basin Improvements	114
Black Diamond West Basin Improvements	118
Black Diamond East Basin Improvements.....	121
Rock Creek Basin Improvements.....	127
System-Wide Capital Improvement Projects	130
11. FINANCIAL PLAN	139
Past Financial Performance.....	140
Existing Long-Term Debt	141
Review of the City’s Wastewater Rates	141
Development of the Financial Plan.....	142
Sources of Revenue	143
Operating Expenses	144
The sewer utility contributes to city administrative costs through the Expenditure Line Item “Services and Charges”. This includes pro-rated costs in the Mayor’s office, the Council, and the Finance Department. We have assumed that the actual expenses incurred in 2022 will continue with a 5%/year increase.	145
Taxes	145
Debt Service	145
Capital Improvement Projects Expenses and Funding	146
Internal Sources of Funds	146
External Sources of Funds	146
Revenue Bonds.....	147
Summary of Financial Projections	148
APPENDIX A: MAPS.....	152
APPENDIX B: CAPITAL IMPROVEMENTS PLAN TECHNICAL MEMORANDUM	153
APPENDIX C: DEMAND FORECAST TECHNICAL MEMORANDUM.....	154
APPENDIX D: NPDES PERMIT	155
APPENDIX E: PLAN REVIEW COMMENTS.....	156
APPENDIX F: SEPA CHECKLIST AND DETERMINATION OF NON-SIGNIFICANCE	157
APPENDIX G: COUNCIL RESOLUTION.....	158
APPENDIX H: AGREEMENTS AND FRANCHISES	159
APPENDIX I: DEVELOPMENT STANDARDS	160
APPENDIX J: UTILITY RATE STUDY	161
APPENDIX K: KING COUNTY METRO AGREEMENT FOR DISPOSAL.....	162
APPENDIX L: SOOS CREEK AGREEMENT FOR CONVEYANCE OF SEWAGE	163
APPENDIX M: UNIT FLOW ANALYSIS	164

APPENDIX N: PLANNING AND DESIGN STANDARDS.....	165
Figure 1: Location Map	23
Figure 2: Typical System Components.....	25
Figure 3: Sewer Service Area Boundary.....	30
Figure 4: Sewer Basin and Sub-Basin Boundaries	31
Figure 5: Pipelines and Major Sewer Facilities.....	32
Figure 6: Pipelines and Major Sewer Facilities with Flow Direction.....	33
Figure 7: Pipelines and Major Sewer Facilities with Potable Well Locations.....	34
Figure 8: Service Area Topography	35
Figure 9: System Growth in ERU (high growth scenario).....	54
Figure 10: System Growth in ERU (low growth scenario).....	55
Figure 11: Sewage Basins.....	56
Figure 12: Rock Creek Basin ERU Growth	57
Figure 13: West Black Diamond Basin ERU Growth	59
Figure 14: Jones Lake Basin ERU Growth.....	61
Figure 15: East Black Diamond Basin ERU	63
Figure 16: Major Facilities.....	65
Figure 17: Existing Trunk Line Capacity	76
Figure 18 – Jones Lake Basin CIP	114
Figure 19 - BD West Basin CIP	118
Figure 20 - BD East Alt 1 CIP.....	121
Figure 21 - BD East Alt 2 CIP.....	122
Figure 22 - Rock Creek CIP	127
Figure 23: Rate Framework.....	140
Figure 24: Past Financial Performance	141
Figure 25: Annual Customer Growth Rate (High Growth Model)	142
Figure 26: Financial Plan	149
Figure 27: Capital Improvement Plan.....	150

APPENDICES

Appendix A:	Maps
Appendix B:	Capital Improvement Program Technical Memorandum
Appendix C:	Demand Forecast Technical Memorandum
Appendix D:	NPDES Permit
Appendix E:	Plan Review Comments
Appendix F:	SEPA Checklist and Determination of Non-Significance
Appendix G:	Council Resolution
Appendix H:	Agreements and Franchises
Appendix I:	Development Standards
Appendix J:	Utility Rate Study
Appendix K:	King County METRO Agreement for Disposal
Appendix L:	Soos Creek Agreement for the Conveyance of Sewage
Appendix M:	MPD Unit Flow Analysis
Appendix N:	Sewer Planning and Design Standards

ABBREVIATIONS

AAF	Average Annual Flow
ADWF	Average Dry Weather Flow
AWWF	Average Wet Weather Flow
CFR	Code of Federal Regulations
CIP	Capital Improvement Program
COBD	City of Black Diamond
CSO	Combined Sewer Overflow
CWA	Clean Water Act
WSDOH	Washington State Department of Health
EDP	Electronic Data Processing
WSDOE	Washington State Department of Ecology
USEPA	United States Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
FAZ	Forecast Analysis Zone
FEMA	Federal Emergency Management Act
FF	Frequently Flushed
FOG	Fats, Oils and Greases
FPS	Feet per second
CWA	Federal Water Pollution Control Act ("The Clean Water Act")
GMA	Growth Management Act
DPCD	Gallons per capita per day
GPS	Global Positioning System
GPAD	Gallons per acre per day
GPD	Gallons per day
HPA	Hydraulic Project Approval
I/I	Infiltration and Inflow
JARPA	Joint Aquatic Resources Permit Application
DNR	King County Department of Natural Resources
LS	Lift Station
MMF	Maximum Month Flow
MGD	Million Gallons per Day
MG	Million Gallons
MPL	milligrams per liter
M&O	Maintenance and Operations
MDRT	Master Development Review Team
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
PPD	Pounds per day
PRV	Pressure Reducing Valve
PSRC	Puget Sound Regional Council
PUD	Public Utility City
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow

RCE	Residential Customer Equivalent (= 1 ERU)
RCW	Revised Code of Washington
SCADA	Supervisory Control and Data Acquisition
SEPA	State Environmental Policy Act
SRF	State Revolving Fund
TSS	Total Suspended Solids
UGA	Urban Growth Area
ULID	Utility Local Improvement City
WAC	Washington Administrative Code
WAWARN	Water Wastewater Agency Response Network Water Maintenance

INTRODUCTION

THE IMPORTANCE OF WASTEWATER SYSTEMS

The collection and treatment of wastewater is an important part of environmental stewardship: returning sewage back to streams and oceans so that it can be used again. For thousands of years, communities have disposed of human waste in nearby water bodies, without regard to damage to the water, or the effects on people or animals downstream. In 1854, a cholera outbreak in London drove home the importance of separating sewage runoff from drinking water. It took a long time for what we take for granted today to become common knowledge.

In the past few decades, the region has invested billions of dollars in the development of modern collection and treatment systems. In addition to studying and combating contamination of salmon and other marine life, the health of our lakes, rivers, and Puget Sound is a top priority. New regulations are being debated to determine appropriate levels of contaminants. Wastewater treatment plants are obvious targets of concern; however, the newer plants already produce effluent with extraordinarily low contaminant levels. Surface water runoff and finding economical ways to separate surface water from sewage are of more importance, difficulty, and cost, especially in older, rural municipal systems that were built before the impact of combined systems was known.

The City of Black Diamond is affected by all these issues. Wastewater from our service area is collected and sent to King County for treatment and disposal, limiting the City's ability to completely control sewage conveyance and treatment rates. The newer MPD portions of the City have constructed collection and conveyance systems that should have minimal O&M costs, but they rely on pumping facilities for the conveyance which have high O&M costs. This potentially complicates the policies surrounding rate equity and normal O&M vs. Capital project expenses.

Another growing challenge for the City is preparing to replace aging infrastructure. None of the City's pipes are nearing the 100-year age mark; however, some are showing wear, and this is the time to increasingly evaluate their condition, perform preventive maintenance to extend their life, and plan for their replacement. The lead contamination issues in Flint, Michigan drove home the need for continuing investment in infrastructure. In an era of fierce competition for public money, it is made clear once again that neglecting basic pipes and pumps may save a few dollars now but will be very expensive--in money and lives--sometime down the road.

For Black Diamond, all this is happening in a fast-growing community with increasing ethnic and economic diversity. Almost perfectly situated at the urban/rural edge south of Seattle, the City is seeing large new developments, many inhabited by young homeowners who commute to tech jobs to the north. A challenge for City staff is to work with customers speaking various languages and assuring that our service rates remain affordable for the community as a whole.

The City and Region also operate under a cloud--the concern that a major earthquake will someday strike. This is an active seismic zone, and some geologists believe that we are overdue for a major quake and that the region will get one in the next fifty years. City staff needs to work with regional partners to prepare for such an event, to try to minimize the damage when it happens, and to speed up recovery. Safe potable

water and sanitary sewage treatment will be vital in such a catastrophe, and restoring the region's water and wastewater systems will be crucial to getting the community back on its feet.

A LIVING PLAN

State Law (RCW 57-16 and WAC 173-240) requires cities to prepare comprehensive plans to ensure that their systems will meet the future needs of their communities. However, the Plan you are reading seeks to do much more than what was contemplated by Legislators. It recognizes the multiple challenges facing us and attempts to be a vital, dynamic tool for Staff, the Mayor, and Council in allocating our resources. Staff throughout the City were directly involved in developing and writing this Plan, and we expect that they will refer to it in deciding how to develop programs, select projects, and spend our ratepayers' resources.

Doing so will require that:

- Staff develop a project prioritization process that includes the Plan.
- Staff regularly update various parts of the Plan: population, customer numbers, usage numbers and forecasts, water main maps, finances, etc.
- Staff in all departments develop, update, and use the Plan as "One City".
- Field observations must be incorporated into facility assessments.
- Work plans and budgets have been designed around a long-term perspective, with a constant focus on reliable service and affordability over decades rather than just this year.

The expected results will be smarter decisions and more efficient use of ratepayer dollars. The process seeks to do the following:

- Promote preventative maintenance to assure reliable service and stretch out the life of facilities.
- Upsize pipes and other facilities only to serve an actual need.
- Replace facilities before they break.
- Utilize modern equipment and information technology to be more efficient and increase the life of City assets.
- Harden key facilities against damage from natural and manmade disasters and prepare staff to respond to emergencies.
- Anticipate surges and ebbs of capital projects and staff accordingly.
- Hire capable staff and train them to take on increasing levels of responsibility.

CONTENTS

Here is a summary of what you will find in the Plan:

Chapter 1: System Description

Explanation of the legal structure of the City, maps of the service area, a summary of existing facilities (when and where they were built), and a detailed timeline of milestones in the City's history.

Chapter 2: Related Plans, Agreements, and Policies

Discussion of the various documents and agreements with which the City interacts as part of the broader community.

Chapter 3: Planning Data and Demand Forecast

Historical population and water usage numbers, together with forecasts on which our programs are based.

Chapter 4: System Analysis

Evaluation of how the wastewater system works, and where improvements are needed.

Chapter 5: City Facilities Design and Construction Standards

Explanation of the standards to which the system is built.

Chapter 6: Maintenance and Operations

Discussion of how the City operates and maintains its system.

Chapter 7: Emergency Planning

Explanation of the City's preparations for responding to various emergencies so as to restore service to the community.

Chapter 8: Personnel

Overview of steps the City is taking to hire and train highly capable staff so as to better serve our customers.

Chapter 9: Information Technology

Summary of steps the City plans to take to better integrate and utilize IT tools.

Chapter 10: Capital Improvement Plan

Documentation of the City's long-range plan for improving and replacing its physical infrastructure.

Chapter 11: Finance Plan

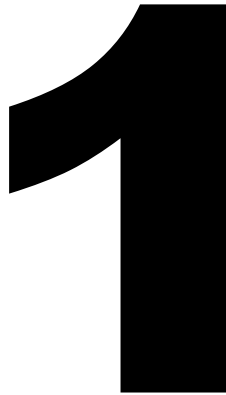
Evaluation of how the City will pay for necessary operations and the CIP while remaining financially strong and maintaining affordable rates for our customers.

Plan Requirements (WAC)

Requirement	Location in Plan
Purpose and Need for the Proposed Plan	Chapter 1
Ownership and operation of the system	Chapter 1
Existing and proposed boundaries	Chapter 1
Map Including: Proposed sewers and areas to be served, Boundary line of City and service area, Existing sewers, Topography and elevations, Streams, lakes, and water bodies, Water system information	Chapter 1
Population trends and analysis methods	Chapter 3
Information on wastewater facilities	Chapter 4
Discussion of infiltration and inflow	Chapter 4
Treatment discussion	Note Below
Info on industrial customers	Chapter 3&4
Info on existing wells and water supply sources	Chapter 4
Discussion of alternatives	Chapter 4&11
Existing and proposed cost of service	Chapter 11
SEPA compliance	Appendix F
Reclaimed water considerations	Note Below
Water conservation measures	Chapter 4

Note: The provisions for treatment, discharge, and reuse are not included in this General Plan. Those are provided by King County under Agreement.

SYSTEM DESCRIPTION



1. SYSTEM DESCRIPTION

The characteristics of a wastewater service area define the conditions for meeting customer demands. The economy, land use patterns, geography, climate, population trends, and governing agencies influence the type and location of wastewater collection and treatment within a service area. This chapter provides a description of The City of Black Diamond (COBD) management, history, relationship with adjacent sewer system providers, and system and City facilities. Descriptions and functions of the primary system components and how they integrate with one another are also included.

Ownership and Management – WAC 173-240-050(3)(b)

The City was established in the late 1800s as a coal mining town. The City has maintained a rural atmosphere and has a 2023 estimated population of 4,668. The City encompasses just over 4,250 acres, or 6.6 square miles, which includes the Lake Sawyer area that was annexed in 1998. The Lake Sawyer area is currently served by the Soos Creek Water and Sewer District (SOOS Creek) and is not included in the City's existing Sewer Service Area (SSA). Therefore, the City's sewer system only provides service to approximately 67 percent of the City's total population.

The City was incorporated by a vote of the people in 1959 and operated under the Revised Code of Washington Title 35 RCW. Governed by a five-member Council, which is elected by voters within the service area, its daily operations are overseen by a Public Works Director. The organizational structure includes roads, water, parks, and wastewater positions.

A summary of the Wastewater system is listed in **Table 1: Basic Wastewater System Information**.

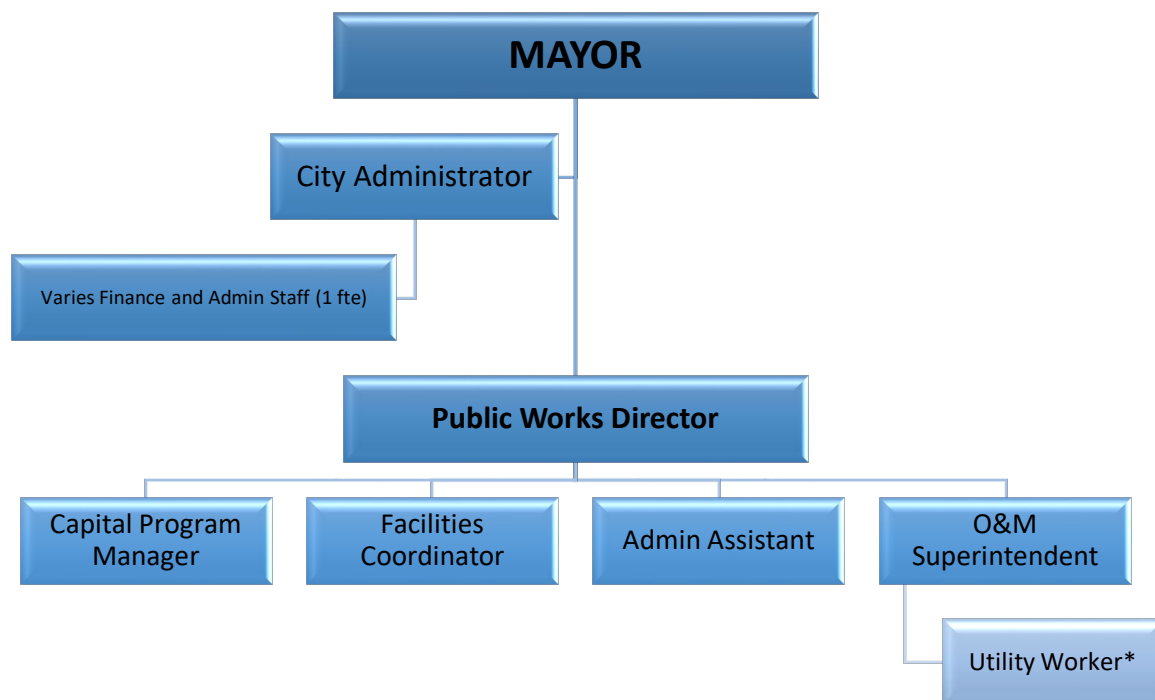
Table 1: Basic Wastewater System Information

ITEM	INFO
<i>System Name</i>	<i>City of Black Diamond</i>
<i>NPDES Permit Number</i>	<i>WAR045505</i>
<i>Owner Name</i>	<i>City of Black Diamond</i>
<i>Owner Type</i>	<i>Incorporated City</i>
<i>Owner Address</i>	<i>24301 Roberts Dr, Black Diamond, WA 98010</i>
<i>Location</i>	<i>King County Washington</i>
<i>Retail Service Connections</i>	<i>1,975</i>
<i>Residential Population Served</i>	<i>4,668</i>
<i>Employment Population Served</i>	<i>597</i>
<i>Outside Service Connections</i>	<i>0</i>

Organization Chart

All personnel responsible for the planning, operation, and maintenance of the wastewater system are employees of the City, managed by the Public Works Director who in turn reports to the Mayor. An organization chart is shown in **Table 2a: Existing Organization Chart**.

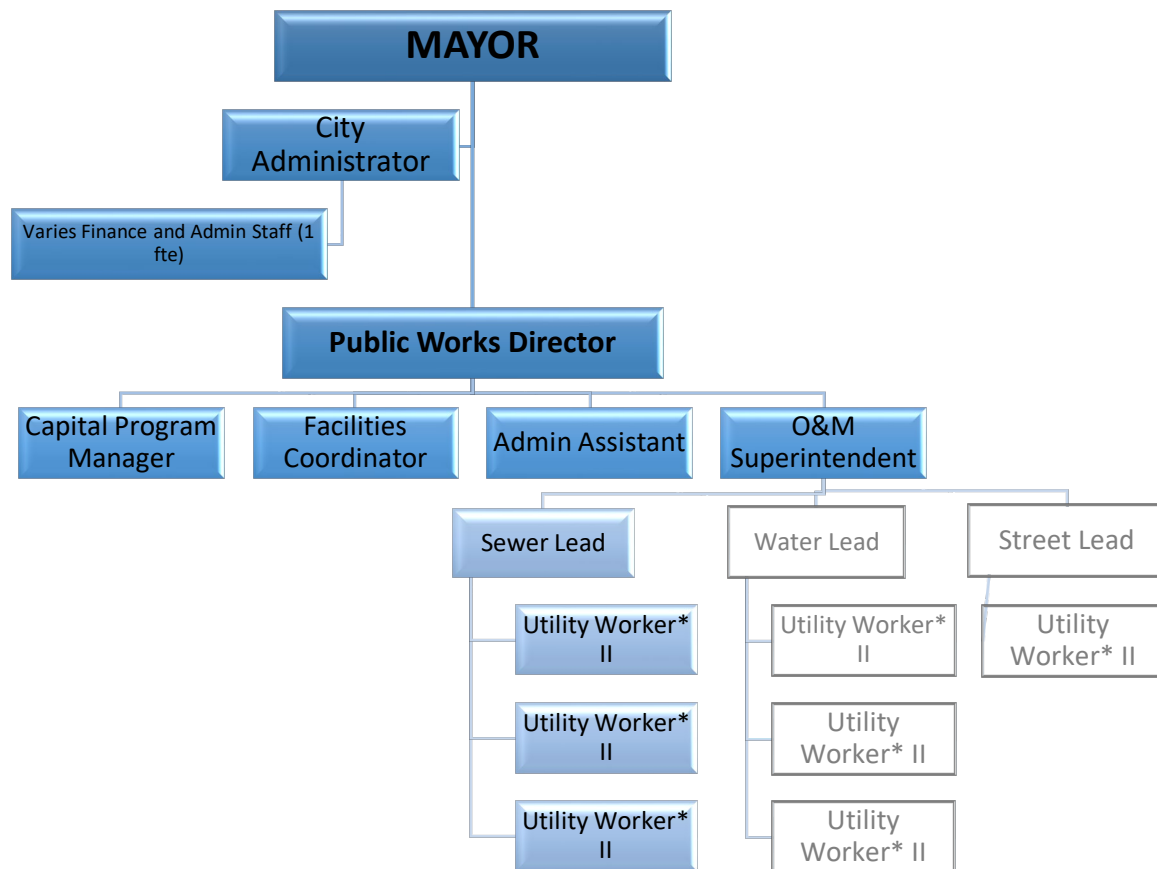
Table 2a: Existing Organization Chart



** time is also allocated to and shared with other departments including water, streets, and parks.*

As the sewer utility grows to respond to development in the City, the staff in the sewer department will also need to grow. As recommended in Chapters 10 and 11, three new staff will be needed in the next few years. The following organization chart reflects the recommended changes in the organizational structure to accommodate the increased staffing level including the addition of a Department Lead to manage the additional staff.

Table 3b: Proposed Organization Chart



History

The residents of Black Diamond used individual on-site septic systems from the 1860s when Black Diamond was settled until the mid-1980s. In the 1960s, the City initiated plans for the first public sewer system after public health concerns arose from approximately 500 failing septic systems. Several studies were completed between 1970 and 1981, and in 1981, the City accepted a sewerage plan which included a city-wide collection system and an aerated lagoon treatment plant. Construction of the collection system and treatment plant was mainly accomplished between 1981 and 1983 with an EPA Innovative and Alternative grant.

After a substantial commitment had been made to the treatment plant project and the original plant design, the City was informed that the permits necessary to construct the marsh portion of the treatment plant could not be obtained. The facility was redesigned and included a natural marsh, which was classified as “innovative” technology by the Environmental Protection Agency (EPA) and was funded through an EPA grant. In 1984, it was determined that the natural marsh was not operating efficiently and was causing intense algae blooms downstream in Lake Sawyer. The EPA hired consultants to evaluate the situation, and it was concluded that the natural marsh system had failed to remove phosphorus as designed. DOE then ordered that the treatment plant be upgraded or the outfall to Rock Creek (which drains to Lake Sawyer) be abandoned. The situation was again evaluated, and it was recommended that the City abandon the improperly functioning treatment plant and construct a connection to the King County WTD system through Soos Creek Water and Sewer District, funded by a Modification or Replacement Grant from EPA and DOE. This connection was constructed in 1992, and the treatment plant was taken out of service later that same year.

In 2010, the City approved an ordinance authorizing the development of two major Master Planned Developments: currently known as Ten Trails and Lawson Hills. As a part of the Development Agreement, utility service was planned, and preliminary project designs used the planned utility service scenario as the basis for entitlement and construction.

Under the previous planning scenarios, King County would provide sewage conveyance capacity as needed by the City using a combination of peak-flow detention (equalizing storage), pump system upgrades and interceptor pipe upgrades. A variety of planned improvements have been studied by King County over the years. A critical part of the previous planning efforts included an assumption that all of the future development in Black Diamond (both in-fill and MPD development) would eventually discharge to the Jones Lake Lift Station and be pumped to the Lake Sawyer Road Interceptor.

Several years ago, in conjunction with utility planning and permitting, a Lift Station was constructed in the Ten Trails portion of the approved MPD development (the Ten Trails Lift Station), and that lift station collects sewage from a majority of the Ten Trails MPD entitlement and pumps it directly to the County Interceptor in Lake Sawyer Road. This fundamentally changed the future sewer capacity planning needs since the Jones Lake Lift Station will no longer be used to pump ALL of the sewage for the Black Diamond service area. Instead, sewage from the West Basin, and much of the sewage from the Rock Creek basin will discharge directly to the King County Interceptor pipe in Lake Sawyer Road, either directly or via force main.

Service Area - WAC 173-240-050 (3)(c)

The City of Black Diamond's existing sanitary sewer service area consists of all areas within the Urban Growth Boundary, except for an area around Lake Sawyer that is served by the Soos Creek Water and Sewer District. See **Figure 3: Sewer Service Area Boundary**. There are no proposed changes to the City's Sewer service area.

Location

The City of Black Diamond is located approximately 30 miles southeast of Seattle, Washington. The Black Diamond community was established in 1880 and developed as a coal mining town over the next fifty years. Black Diamond was incorporated as a city in 1959. The City is located along State Route 169, just west of the Cascade Mountains as shown in **Figure 1: Location Map**.

Figure 1: Location Map



Adjacent Sewer Service Providers

Soos Creek Water and Sewer District is the only adjacent sewer service provider. A portion of the Soos Creek service area is shown in **Figure 3: Sewer Service Area Boundary**.

The Soos Creek Water and Sewer District has been serving south King County since 1939. Formerly Water City 58 and Cascade Sewer District, the two merged in 1987. The Soos Creek Water and Sewer District encompasses over 35 square miles and provides water and sewer service to almost 100,000 people in southeast King County. The sanitary sewer system includes 30 pump stations. The sewer system conveys wastewater to the King County facilities in Kent and ultimately to the King County Wastewater Treatment Plant in Renton for treatment and disposal.

Soos Creek not only provides sewer service inside the city limits, but they also convey sewage to King County METRO for treatment.

Sewer Coordination Agreements

King County - The City of Black Diamond entered into an agreement with King County WTD (then known as Metro) on September 12, 1990, to provide for regional conveyance and treatment of all sewage from Black Diamond after the failure of the City's treatment plant that discharged into the Rock Creek core wetland complex. The abandonment of the City sewage treatment plant and connection to the King County regional sewer system was funded by a DOE grant and an EPA grant. The agreement specifies that the City owns and King County operates, maintains, repairs, replaces, and improves as needed the Black Diamond Pump Station at Jones Lake and the force main to Lake Sawyer Road SE and the sewage trunk line that runs from the City to the Soos Creek Sewer District System. The City's agreement with King County runs until July 2036. A copy of the interagency agreement between the City and King County WTD and amendments thereto is included in Appendix K – King County Metro Agreement for Disposal.

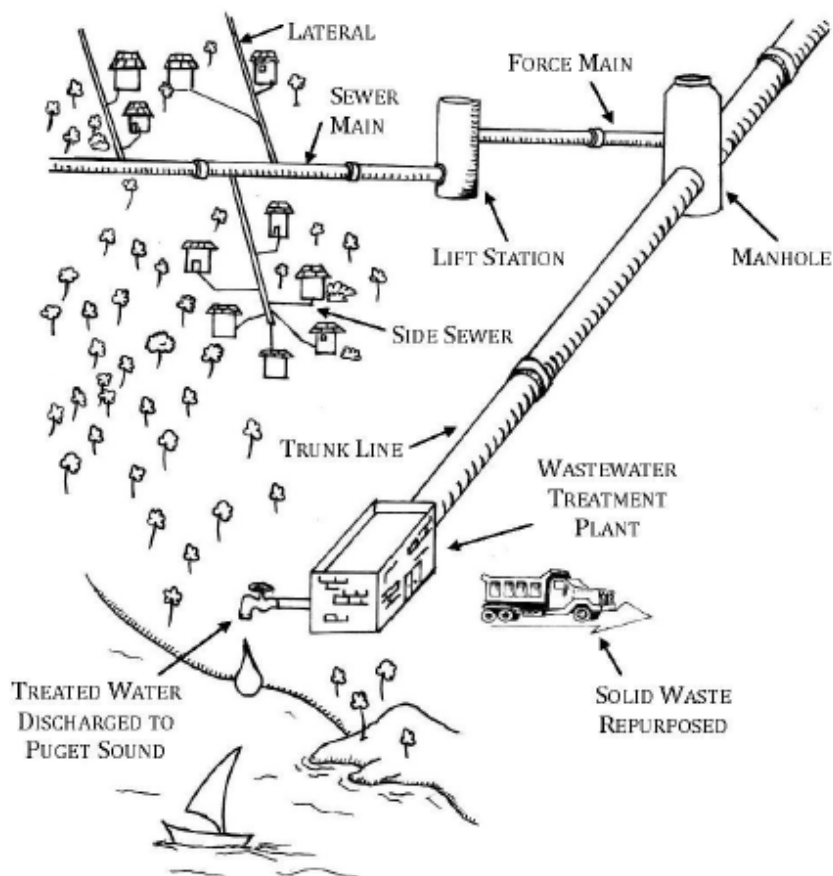
Soos Creek - The City of Black Diamond entered into an interagency agreement with the Soos Creek Water and Sewer District on September 5, 1990, to relay Black Diamond sewage to the King County Wastewater Treatment Division facilities, and it was later amended on April 21, 1999. The agreement and the amended agreement are included in Appendix L – Soos Creek, King County, Black Diamond: Conveyance of Black Diamond Wastewater Flows. The agreement was entered into after the failure of the City's treatment plant, and the agreement outlines that the Soos Creek Water and Sewer District will provide for the conveyance of Black Diamond Wastewater Flows through City facilities to the King County regional collection facilities.

King County/Soos Creek - In 2006, King County entered into an agreement with the Soos Creek Water and Sewer District, assuming Black Diamond's obligations to Soos Creek Water and Sewer District, for wheeling of sewage through the Soos Creek system (see Appendix L – Soos Creek Agreement for the Conveyance of Sewage). In July of 2010, King County did in fact assume the Black Diamond obligations to Soos Creek for sewage conveyance.

Typical System Components

There are many parts and pieces that go into making a wastewater system function smoothly-- starting at the customer, through collection, treatment, and discharge into Puget Sound (shown in **Figure 2: Typical System Components**). This section provides descriptions of the various components within the City's system, including their purposes and functions, and why they are important parts of the system.

Figure 2: Typical System Components



Collection Facilities (Side Sewer, Lateral, and Collection Sewer Lines)

A side sewer line is a private line that collects wastewater from individual customers and transports it to City-owned lateral sewer lines. Side sewers are typically on private property, while laterals are generally located within the public right-of-way or easements. The lateral line takes the wastewater from a single, or multiple customers and transports it by gravity to the City's conveyance system. Side sewers are a minimum of four inches, while lateral lines are a minimum of six inches in diameter.

Conveyance Facilities (Main and Trunk Sewer Lines)

Main lines are the second-largest pipes within a wastewater system and are used to transport wastewater from the collection facilities to lift stations and trunk lines. Sewer main lines make up the “branches” of the wastewater system and are a minimum of eight inches in diameter.

Trunk lines are the largest pipes in a system and have very few connections in them in order to limit infiltration and inflow. They are used to transport wastewater from collection facilities to wastewater treatment facilities. Trunk lines are analogous to the “trunk” of a tree and are 10 inches in size and larger.

Drainage Basins

A drainage basin is a geographic area defined by the topography of an area, with the highest elevations at the edges and sloping down to a lower point. Drainage basins are used in the City to maximize the use of gravity-flow sewers to as many customers as possible. Topographic considerations are important because the use of lift stations and force mains to overcome large elevation changes can quickly become cost-prohibitive and increase operation and maintenance costs. The four drainage basins are shown in **Figure 4: Sewer Basin and Sub-Basin Boundaries.**

Jones Lake - The Jones Lake Basin includes most of the historic city, generally occupying the central lowland area west of Lawson Hills. This area drains to the Jones Lake Lift Station, the Morganville Lift Station, and the Diamond Glen Lift Station. The Diamond Glen and Morganville Lift Stations pump to the collection system that eventually drains back to the Jones Lake Lift Station. The Jones Lake Lift Station pumps to the King County interceptor in Lake Sawyer Road.

East Black Diamond Basin – The East Black Diamond Basin includes Lawson Hills to the east of the Jones Lake Basin. This area is sparsely developed but is within the Lawson Hills Development Agreement and development is regulated by that agreement. Most of this area will include new wastewater facilities as the area develops under the MPD, and this area will discharge either to the King County Interceptor in Lake Sawyer Road via a new Palmer Lift Station or to the existing Jones Lake Lift Station. The Lift Station is tentatively located in the Palmer Gravel pit as shown on the Basin Map. The eventual discharge location will depend upon the timing of development in Lawson Hills and the completion of Pipeline Road. If Pipeline Road is available for the construction of an interceptor pipe, then Lawson Hills will discharge directly to the King County interceptor in Lake Sawyer Road. If the Pipeline Road alignment is not available, then Lawson Hills will discharge to the Jones Lake Lift Station and King County will need to increase capacity in the Lift Station.

Rock Creek Basin - The Rock Creek Basin includes the area to the north and west of the Jones Lake Basin. This area is sparsely populated and will likely be developed in the future under a Development Agreement. It is anticipated that most of this area will eventually drain to the new Palmer Lift Station.

West Black Diamond Basin – The West Black Diamond Basin includes the Ten Trails MPD development. This Basin drains to the Ten Trails Lift Station which discharges directly to the King County interceptor on Lake Sawyer Road. It is likely that the Ten Trails Lift Station will be abandoned in the future, and the Lift Station will be relocated to the west and south of the current Lift Station.

Force Mains

A force main is a pressurized sewer conveyance line, where wastewater is pumped through the pipe to a point where gravity can be used. Force mains typically begin at the discharge point of a lift station in order to convey wastewater to a higher elevation. City force mains are a minimum of four inches in diameter.

Infiltration and Inflow

Infiltration is groundwater or stormwater which enters the system through defective joints, manhole risers, or broken pipes. Infiltration typically occurs where the groundwater level is higher than the pipe. Inflow is water that enters the system from an inappropriate connection, such as a roof drain or storm drainage facilities. Together, infiltration and inflow (known as I/I, I&I or I and I) dilute the wastewater and can cause the system to exceed its designed conveyance capacity. In many systems, peak flows consist of more than 50% I/I rather than sewage, so this can be a major factor in the sizing of pipes.

Lift Station

A lift station is used to raise wastewater to a higher elevation. Sewer lines normally flow by gravity, but in locations where the pipe would be too deep to access safely or is below its intended delivery point, then a lift station is used to “raise” the wastewater. Wastewater fills a “wet well,” or storage area, within the lift station. Once the level reaches a certain height, the wastewater is pumped through a force main to a gravity-fed line.

System Overview– WAC 173-240-050(3)(d)

The City’s wastewater system currently has four basins served by six lift stations and over 25 miles of pipe. The following sections describe major system components which are summarized in **Table 4: Major System Components**. Major facilities are shown in **Figure 5: Pipelines and Major Sewer Facilities**.

Table 4: Major System Components

ITEM	
<i>Gravity Mains</i>	<i>28 miles</i>
<i>Force Mains</i>	<i>3.3 miles</i>
<i>Manholes</i>	<i>485</i>
<i>Lift Stations</i>	<i>5</i>
<i>Jones Lake Basin</i>	<i>905 acres</i>
<i>Rock Creek Basin</i>	<i>750 acres</i>
<i>West Black Diamond Basin</i>	<i>1,625 acres</i>
<i>East Black Diamond Basin</i>	<i>433 acres</i>
<i>Current Service Area</i>	<i>693 acres</i>

Sensitive Areas

The Black Diamond Municipal Code Chapter 19.10 establishes regulations for development in environmentally sensitive areas. Specific information on the location and extent of sensitive areas within the City can be obtained from the City while sensitive area information for other areas is available from King County.

Environmentally sensitive areas include wetlands, fish and wildlife habitat conservation areas, and geologically hazardous areas. Geologically hazardous areas include areas that are not suitable for development due to their susceptibility to erosion, sliding, earthquake, or other geological events. Fish and wildlife conservation areas within the City include Rock Creek and Ginder Creek corridors, open water ponds, lakes, and riparian forests. Geologically hazardous areas include steep slopes and past coal mine working areas.

Mining Activity

There are many abandoned, underground mines present in the Black Diamond area that have been documented by the State. The John Henry Coal Mine adjacent and northeast of the city is still under permit but has been inactive for over 10 years. The mining company is now under an order to proceed with mine reclamation activities. Projects located in the vicinity of abandoned coal mines may require geotechnical evaluation to determine the risks that an abandoned underground coal mine might present.

Climate

Annual precipitation ranges from 45 to 70 inches, averaging approximately 55 inches. More than 80% of the precipitation occurs from October through May and 50% from November through February. Total evaporation averages approximately 25 inches per year with approximately 75% occurring during the months of May through August. Precipitation and evaporation were measured at the Landsburg weather station located approximately five miles north northeast of the City of Black Diamond.

Available temperature data is also from the Landsburg weather station. Low temperatures in December and January average 30° to 33° F and the highs range from 41° to 46° F. In July and August, the average low temperature is approximately 50° F and the high is 75° F. The lowest recorded temperature from 1976 to 1993 was 0° F in February 1989 and the highest recorded temperature was 102° F in August 1981 and May 1983.

Surface Waters

The City's service area lies within the Duwamish/Green River drainage basin. A number of lakes, wetlands, and creeks lie within the service area. Black Diamond Lake and Jones Lake are located in the southern part of the City limits. Ginder Lake and Lake No. 12 are located east of the City limits. Two smaller lakes, Oak Lake and Frog Lake, are located within the western part of the City limits. Lake Sawyer is one of the largest lakes in terms of size and volume in the Green River basin, and it discharges to Covington Creek which in turn discharges to Big Soos Creek. The Big Soos Creek flows into the Green River near the City of Auburn. The lake levels of Lake Sawyer are controlled by a privately owned and operated concrete dam near the intersection of SE 296th Street East and 224th Ave SE.

Rock Creek is the principal drainage basin in the City and flows west from the Jones Lake area and then north to Lake Sawyer just west of Morganville. Ginder Creek, Lawson Creek, and three smaller tributary creeks drain into Rock Creek.

Topography

The City is situated on an upland plateau bounded on the south and southeast by the Green River and on the northeast by the Cascade Range. Depressions and hummocks characterize the rolling glacial terrain.

The Black Diamond Sewer Service area is divided from the northwest to the southeast by Rock Creek and the Rock Creek core wetland complex. The area northeast of the Rock Creek drainage rises significantly and can easily be served by gravity to the low area (in the Palmer Coking Coal Company (PCC) gravel pit) dividing the City's sewer service area. The area to the southwest of the Rock Creek Drainage system gently rises to an upland plateau with high elevations of around 600 to 770 feet. Between the gentle rises in the plateau are depressions that limit the gravity collection of sewage from this area to the Rock Creek area or to the Jones Lake area. The low point nearest the largest developable area of land is on the western boundary of the sewer service about one-quarter mile north of the southwest corner of the city. Elevations within the existing City limits vary between approximately 500 feet at Morganville to 1,000 feet at the eastern perimeter. Most of the development within the City is located at lower elevations, between approximately 500 and 700 feet.

Topography is shown in **Figure 8: Service Area Topography**.

SEPA Compliance and Approval Process

A SEPA Checklist has been prepared for this General Plan and is presented in Appendix F. It is anticipated that this proposed General Plan will not have a probable significant adverse impact on the environment and that an environmental impact statement (EIS) will not be required.

Some of the projects proposed herein will require SEPA checklists and an engineering determination will be made with each individual project.

This General Plan includes a review by adjacent utility systems. It has also been reviewed and approved by the King County Utilities Technical Review Committee and the Department of Ecology. All comments are included in Appendix E, Agency Comment Letters, and Responses.

Programmatic SEPA Checklists, like the one included in this plan, are not appealable by Code (Section 19.04.260).

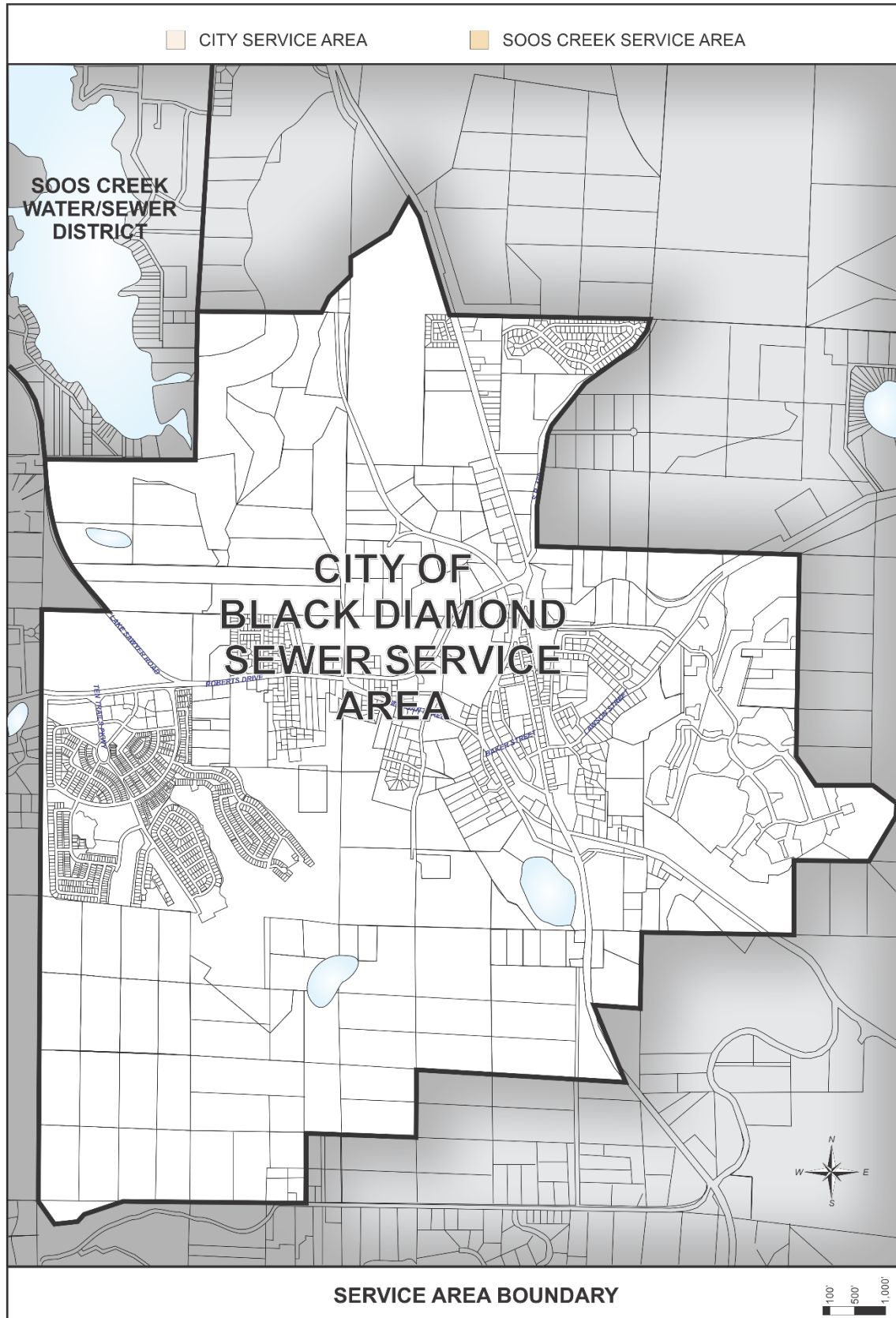
Figure 3: Sewer Service Area Boundary

Figure 4: Sewer Basin and Sub-Basin Boundaries

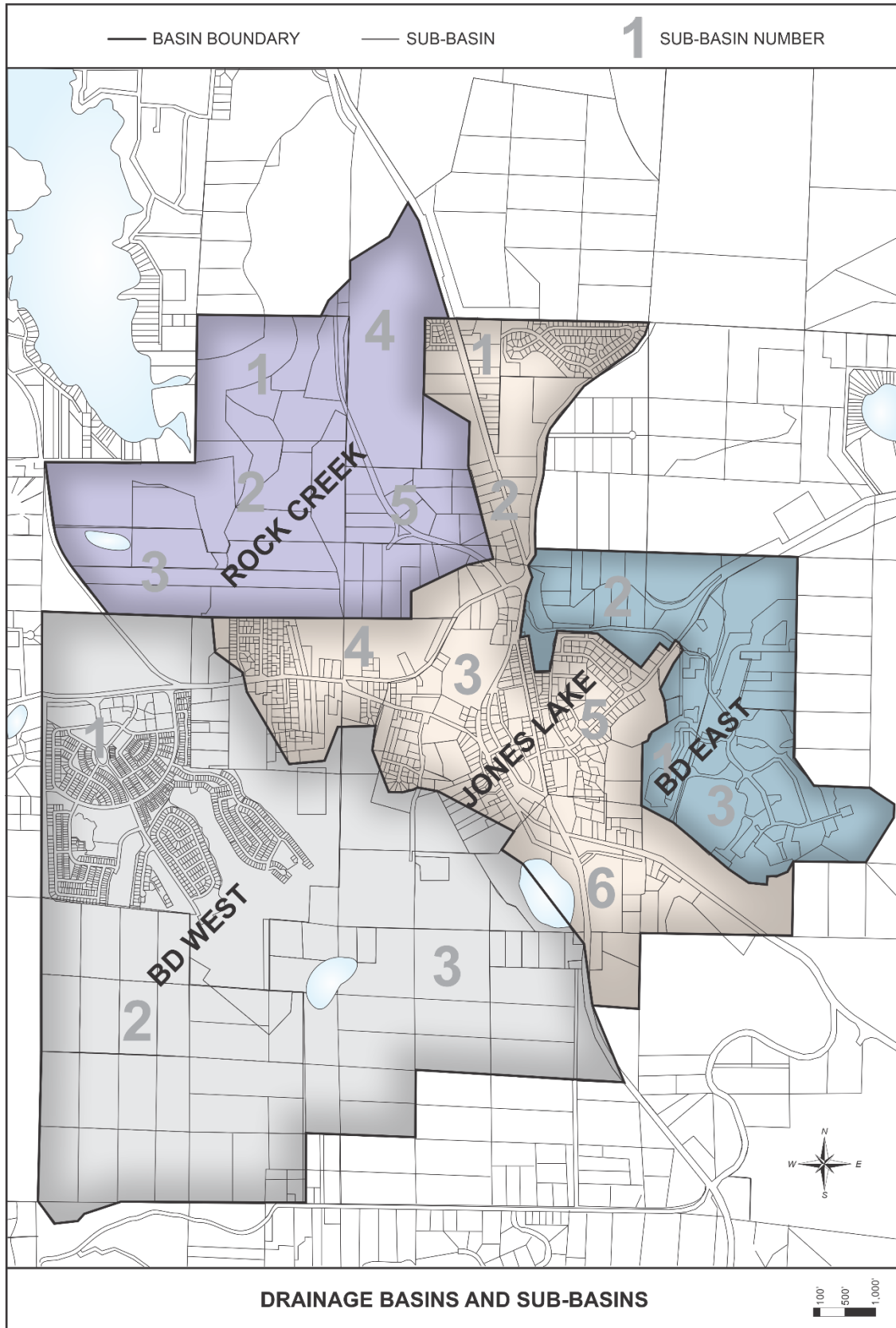


Figure 5: Pipelines and Major Sewer Facilities

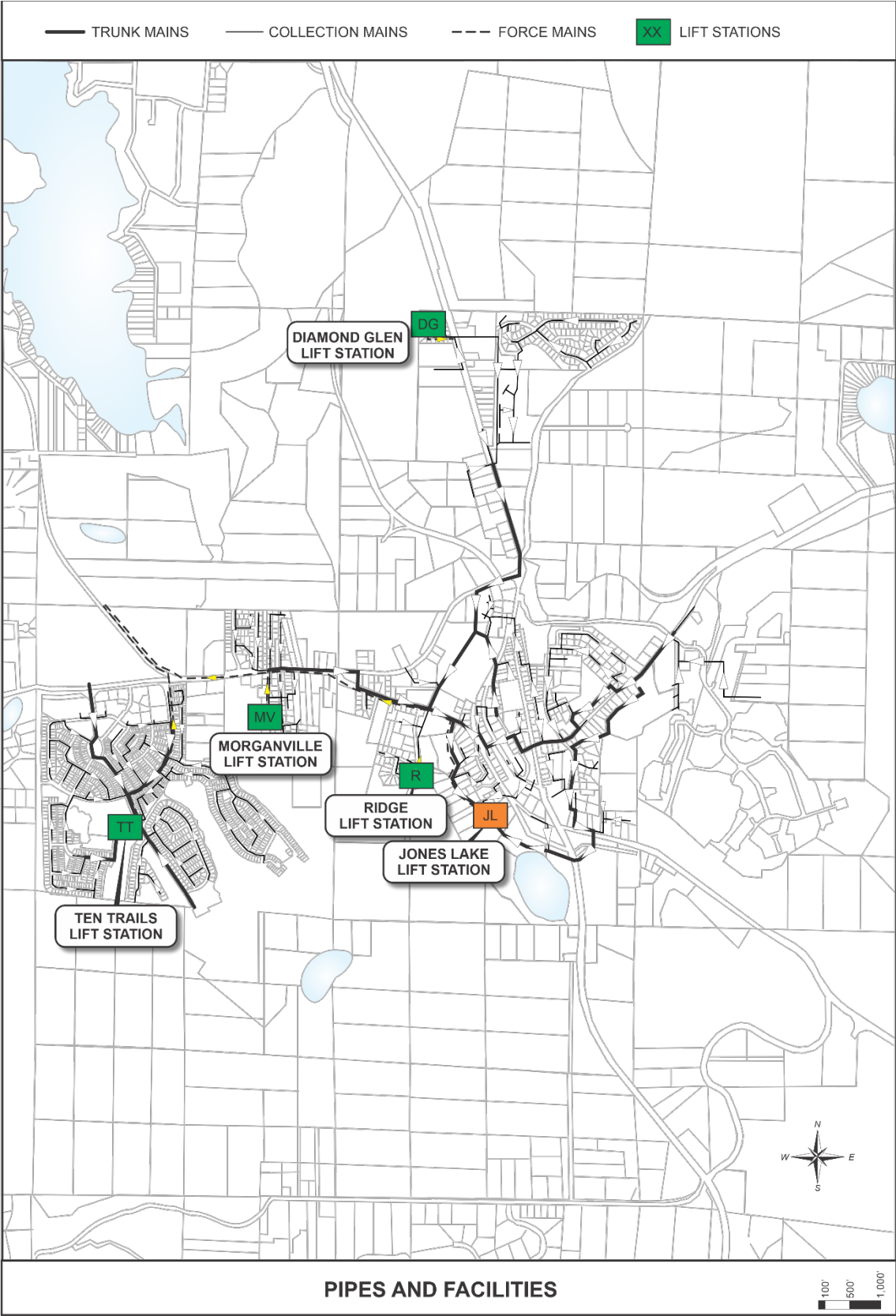


Figure 6: Pipelines and Major Sewer Facilities with Flow Direction

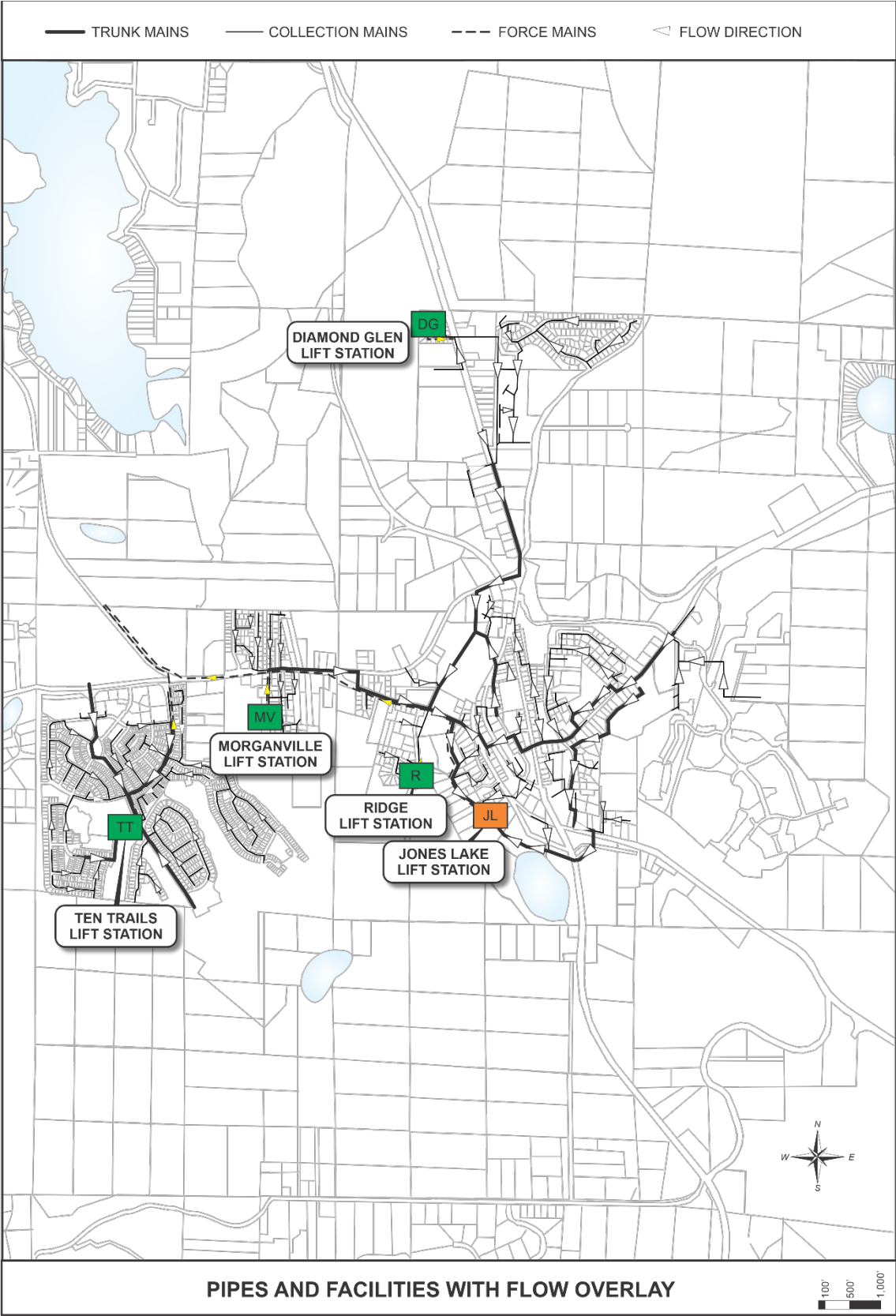


Figure 7: Pipelines and Major Sewer Facilities with Potable Well Locations

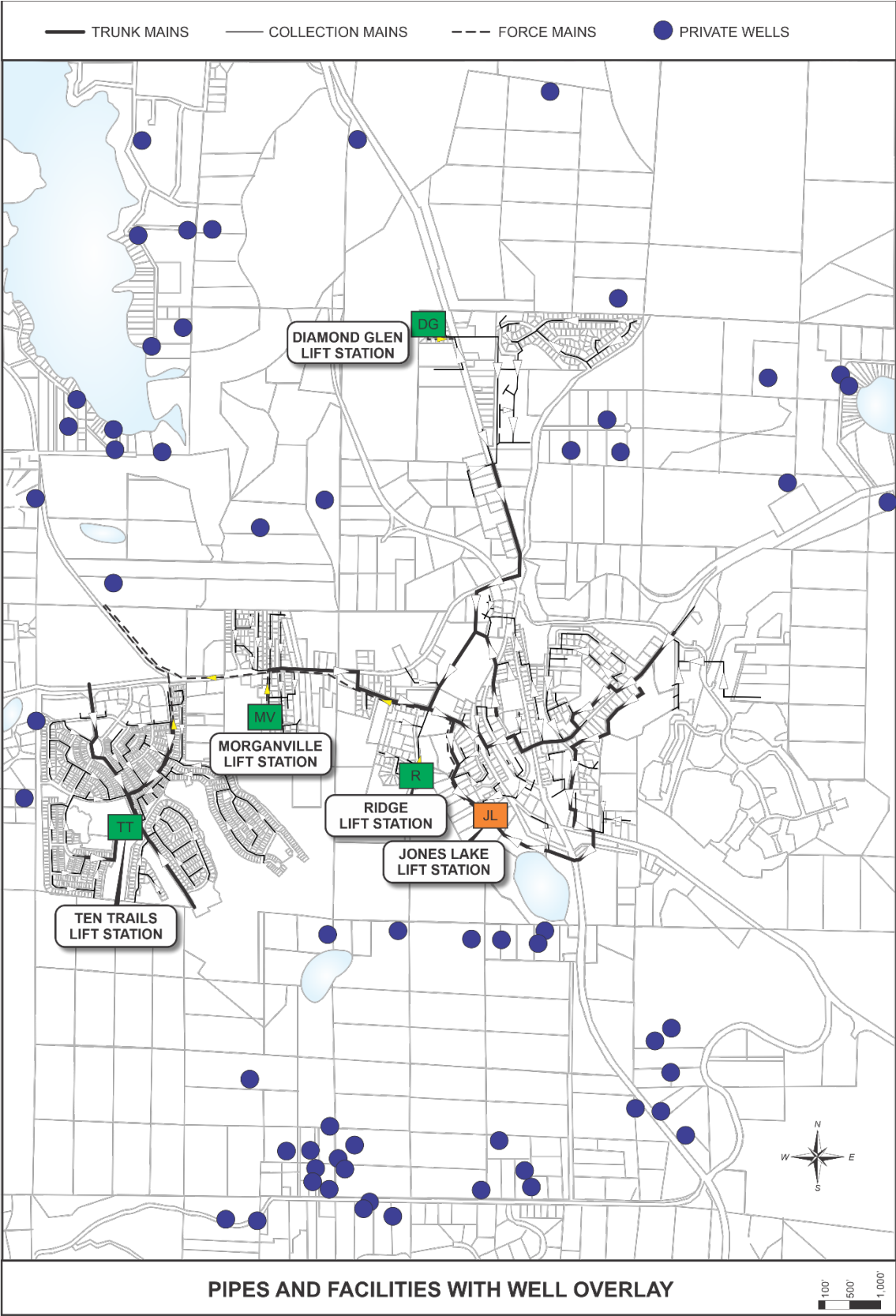
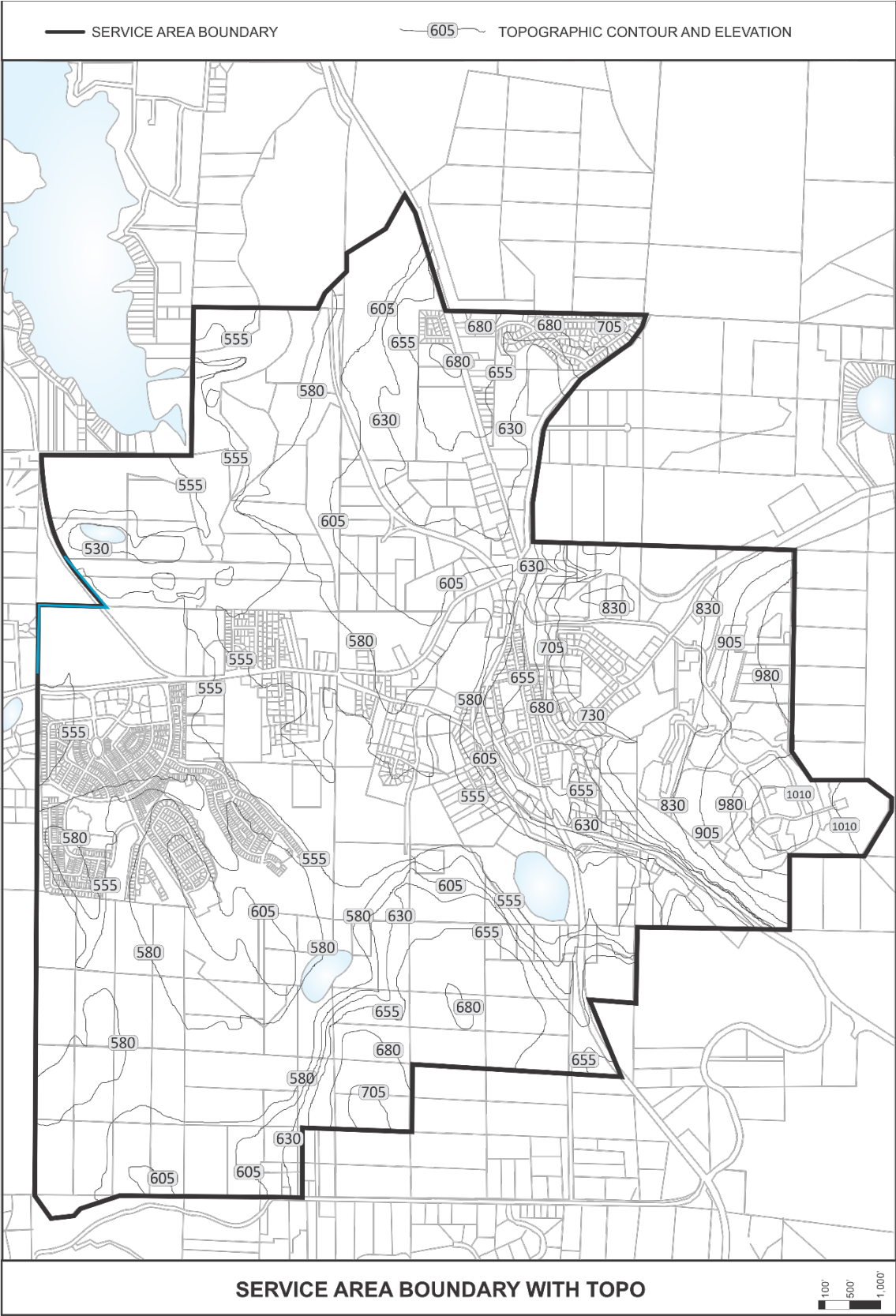


Figure 8: Service Area Topography



ADJACENT SYSTEMS AND PLANNING POLICIES

2

2. ADJACENT SYSTEMS AND PLANNING POLICIES

The City's program to deliver wastewater to our customers has been developed over many years in the context of various agreements, plans, and policies that address water supply and land use in the City service area. This chapter describes key agreements and plans and summarizes the City's sewer service policies.

PLANNING CONTEXT AND RELATED PLANS

Land use planning and the provision of water and sanitary sewer services are closely connected. In many parts of the world, wastewater treatment is a rare commodity that impacts a community's overall health, education, and economic growth. Through appropriate, timely, and coordinated efforts, the City and other regional agencies can ensure the provision of wastewater collection and conveyance for the projected population.

Washington State has established requirements for the contents of a General Sewer Plan under the Washington Administrative Code (WAC) 173-240-050. WAC 173-240-050(3)(e) requires wastewater collection and treatment providers to demonstrate that the system will be able to address present and future wastewater needs in a manner that demonstrates the "concurrence of any applicable local or regional planning agencies." In practice, the City must ensure that enough capacity is provided for areas of expected growth in a timely manner through adequate planning.

Washington State has also established goals and requirements in relation to the 1990 Growth Management Act (GMA), under Revised Code of Washington (RCW) Chapter 36.70A. Three goals of the GMA directly impact system planning in the City:

- a. Consistency between land use and utility plans.
- b. Focus growth in urban areas to reduce sprawl, and
- c. Ensure adequate public facilities and services are available or provided at the time of development (known as "concurrency") to ensure health, safety, and high quality of life.

The GMA further prohibits development when public facilities and services cannot be provided or maintained at an acceptable level of service (RCW 36.70A.100).

All the City's service area is within the GMA. Urban growth is limited beyond this boundary by restrictions on provision of sanitary sewer service, ensuring that higher-density growth is in areas already served or readily served by public facilities and services adequate for such development.

To complete such coordination, the City's Plan must be consistent with King County's land use planning efforts. As a County with a history of continuous growth, King County's efforts must in turn be consistent with the GMA. The County incorporates population projections developed by the Puget Sound Regional Council (PSRC) into its own planning efforts. PSRC is an association of cities, towns, counties, ports, and state agencies responsible for developing regional comprehensive plans and population forecasts.

Recent analyses by the PSRC do not include the Master Plan Developments that are approved and under construction within the City. As a result, the PSRC population projections do not match the expected

growth rates projected by City staff. For the remainder of this General Sewer Plan, the City's own population projections will be used, not the projections from PSRC. Staff believes this plan is consistent with the state requirements for coordination, even though the population projections in this Plan do not match the PSRC data. For a more complete discussion of this topic refer to the City Comprehensive Plan.

RELATED AGREEMENTS

KING COUNTY WASTEWATER TREATMENT DIVISION

The City of Black Diamond entered into an agreement with King County WTD (then known as Metro) on September 12, 1990, to provide for regional conveyance and treatment of all sewage from Black Diamond after the failure of the City's treatment plant that discharged into the Rock Creek core wetland complex. The abandonment of the City sewage treatment plant and connection to the King County regional sewer system was funded by a DOE grant and an EPA grant. The agreement specifies that the City owns and King County operates, maintains, repairs, replaces, and improves as needed the Black Diamond Pump Station at Jones Lake and the force main to Lake Sawyer Road SE and the sewage trunk line that runs from the City to the Soos Creek Sewer District System. The City's agreement with King County runs until July 2036. A copy of the interagency agreement between the City and King County WTD and amendments thereto is included in Appendix K – King County Metro Agreement for Disposal.

SOOS CREEK WATER & SEWER DISTRICT

The City of Black Diamond entered into an interagency agreement with the Soos Creek Water and Sewer District on September 5, 1990, to relay Black Diamond sewage to the King County Wastewater Division facilities, and it was later amended on April 21, 1999. The agreement and the amended agreement are included in Appendix L – Soos Creek Agreement for the Conveyance of Sewage.

The agreement was entered into after the failure of the City's treatment plant and the agreement outlines that the Soos Creek Water and Sewer District will provide for the conveyance of Black Diamond Wastewater Flows through District facilities to the King County regional collection facilities.

KING COUNTY / SOOS CREEK AGREEMENT

In 2006, King County entered into an agreement with the Soos Creek Water and Sewer District, assuming Black Diamond's obligations to Soos Creek Water and Sewer District, for wheeling of sewage through the Soos Creek system (Appendix L – Soos Creek Agreement for the Conveyance of Sewage). In July of 2010, King County did in fact assume the Black Diamond obligations to Soos Creek for sewage conveyance. With King County taking over Black Diamond's obligations to the Soos Creek Sewer District for the conveyance of Black Diamond Flows to County facilities in July 2010, the implications of Black Diamond's agreement with Soos Creek are largely irrelevant. As a housekeeping and clarity measure, the City will amend its agreements with King County and Soos Creek to reflect the current operation, practice, and agreement between Black Diamond and Soos Creek Water and Sewer District.

POLICIES

The City has sewer policies, documented by Council resolutions and the adoption of this General Sewer Plan, covering a variety of topics. The policies include topics such as:

1. Customer Service
2. Planning
3. Service Area
4. Financial

- 5. Facility
- 6. Operations

The applicable policies are listed below: Highlighted policies represent new or revised policies not found in the previous General Sewer Plan.

Customer Service Policies

- 1. 1 Sewer facilities and sewer service shall be consistent with the concepts in the General Sewer Plan – 2023.
- 1. 2 All new development and all redevelopment within the sewer service area must connect to a sanitary sewer that is owned by the City.
- 1. 3 The City shall actively act and promote the connection of all properties to the public sanitary sewer system.
- 1. 4 Public sewer service shall not occur in Rural Areas or in Natural Resource Areas.
- 1. 5 Sanitary Sewers and all their appurtenances shall be constructed, or deferred through a suitable bond, prior to Final Plat approval. Occupancy shall be deferred until the sewers are complete, tested, accepted, and operational.
- 1. 6 Any lot within 300' of a sanitary sewer must connect to that sewer.
- 1. 7 The City, at the discretion of the Public Works Director, may defer improvements necessary to provide sanitary sewer service to existing customers as long as there is surety for future connection and the interim sanitary sewer service is at least as safe and reliable as the public sewer system.
- 1. 8 After connection to a public sewer system, any previous private facilities shall be permanently abandoned and filled with suitable material.

Planning Policies

- 2. 1 Sewer facilities shall be consistent with the growth and development concepts in the Land Use Element of the Comprehensive Plan and any approved Master Planned Development Ordinances.
- 2. 2 Sanitary sewer standards shall be applied uniformly throughout the City.
- 2. 3 Sewer system improvements supporting areas of the City projected to experience high levels of growth (MPDs for example) shall be prioritized to ensure that service is concurrent with growth.
- 2. 4 Timely and orderly sewer system extensions should be provided within the City's existing and future service area to meet public health objectives.
- 2. 5 Implementation and coordination of programs for the improvement, phasing, and financing of sewer infrastructure should be developed consistent with the Land Use Element of the Comprehensive Plan.
- 2. 6 Approval of development should be conditioned on the availability of adequate sewer service and should not result in a decrease in existing levels of service for existing development.
- 2. 7 All new development shall be required to pay their share of the impacts or construction costs (or both) for the necessary improvements (to meet code, standards, and policy).

2. 8 Sewer service should be expanded so that current levels of service are maintained through the buildout of the adopted land use.
2. 9 Continue coordination with King County Waste Treatment Division and Ecology for the adoption and implementation of I/I reduction programs. Any capacity that is generated from I/I reduction, which is achieved through the rehabilitation or improvement of facilities, is the sole property of the City and may be used in lieu of facility improvements at the discretion of the Public Works Director.
2. 10 Facilities should be planned and sized to serve the natural drainage basins to minimize the need for pumping and inter-basin transfers (a “gap” in development is not an adequate basis for pumping facilities or under-sized facilities).
2. 11 Projected sewage flows from development shall be calculated based on adopted land use plans and policies. Oversizing may be approved when the cost and impact (including O&M) of the oversized facility are borne by the developer and the excess capacity is deeded to the City.
2. 12 Trunk mains (shown in **Figure 5: Pipelines and Major Sewer Facilities**) may be oversized from that needed to support current or pending development based on anticipated saturation flows in the Land Use Element of the Comprehensive Plan. The City may elect to participate in funding the oversized portion of the facility. When the City does not participate in the oversizing costs the developer may oversize the facility and request a Latecomer’s Agreement from the City. Local collection pipelines may not be oversized but will be sized to support the existing development.
2. 13 Any treated wastewater that is legally allowed to be used as reclaimed water under state or local laws or standards that originates from Black Diamond shall be the property of the City. The City may use any reclaimed water for stream flow enhancement, irrigation in public spaces (parks, rights-of-way), or groundwater injection at its discretion.

Service Area Policies:

3. 1 Ensure the availability of an adequate level of sewer service through system planning that is consistent with the Land Use Element of the Comprehensive Plan.
3. 2 As the in-city service provider, the City shall be the focal point for all service discussions even those regulations that do not originate in the city (County, state, federal). No sewer service shall be planned or extended without the involvement and approval of the Public Works Director.
3. 3 When areas outside the city are annexed, they must be provided with an adequate level of sanitary sewer service. The city will not serve annexed areas with substandard service.
3. 4 Areas annexed with existing sewer service must meet the City’s sanitary service objectives. Upgrades that are necessary to meet this objective shall be done by others prior to annexation but not via an LID.
3. 5 All new development and all redevelopments shall be served by public sewers (unless the application of this policy on an individual single-family lot would deny all reasonable use of the lot). Any exemptions granted under this provision must be maintained by the lot owner (King County Comp Plan Policy F-255).
3. 6 Different per-Unit Flow rates may be used for planning and design purposes for areas that have been demonstrated, through an appropriate engineering study, to have different, repeatable, and predictable flow rates.

Financial Policies:

4. 1 The Wastewater Utility shall be operated as an enterprise utility (financially self-supporting).
4. 2 The Wastewater Utility shall use rate-setting policies consistent with standards applied by the American Public Works Association.
4. 3 The Wastewater Utility shall use cost-based rates and additional charges that recover the current, historical, and future costs associated with operating and maintaining the sewer system.
4. 4 The City will develop rates and fees that equitably distribute customer costs commensurate with the benefit.
4. 5 A portion of the income from rates shall be used to fund Capital projects and cover any debt costs.
4. 6 New customers that connect to or use any portion of the existing system shall be charged a connection fee that covers a portion of the costs of the existing system and contributes to Capital Projects (a development that is regulated by a Development Agreement may be exempt from these fees under the Development Agreement).
4. 7 Customer connections that require extraordinary facilities or features shall pay an equitable share of those extraordinary costs. Income from these fees shall be used to fund O&M.
4. 8 The Utility shall maintain information systems and records to ensure conformance with the policies and fees charged.
4. 9 Customer charges and rates shall be sufficient to cover the operating costs of the utility, to fund a share of the projected Capital expenses. O&M costs shall be covered 100% by rates. Capital expenses or expense financing shall be covered 50% by rates, minimum.
4. 10 A working Capital Reserve shall be maintained to cover emergencies, bad debts, and fluctuations in cash flow and shall be maintained at \$200,000.
4. 11 Utility rates shall be the same for each customer class (residential, commercial, industrial) regardless of geographic location inside the City.
4. 12 Capital Facility Charges shall be charged on an ERU basis as follows: 1 single-family unit= 1 ERU, 1 multi-family unit = 0.67 ERU, 1 Accessory Dwelling Unit = 0.67 ERU, 1,200 sf of commercial space = 1 ERU.
4. 13 Single-family rates shall be the same regardless of the housing type or the housing size. Commercial rates include a capacity charge based on water usage.

Facility Policies:

5. 1 New utilities shall be located in rights-of-way and established utility corridors where possible.
5. 2 All public lift stations shall have SCADA connections consistent with the then-current SCADA system.
5. 3 Private sewer facilities shall be constructed to the same standards as public facilities and all design standards shall be compliant with the Black Diamond Engineering Design and Construction Standards.

5. 4	Private sewer facilities (pipelines and pumping facilities) are only allowed if they are located on the property they serve and they may not serve multiple units.
5. 5	No sewer service shall be provided until the appropriate sewer collection pipelines are extended across or through the full width of the property to the adjacent property.
5. 6	Property owners that oversize their facility to serve other properties may request a Latecomer's Agreement from the City.
5. 7	FOG facilities (fats, oils, grease) shall be provided for all restaurants, garages, and gas stations or on any new commercial properties where the zoning would allow a future conversion to those uses.
5. 8	The Public Works Director may allow deviations from the standards when it would be in the best interest of the public to allow such deviations.
5. 9	Sanitary sewer pipes shall be designed with a 1.50 factor of safety to accommodate changes in land use and deviations in calculating or anticipating saturation land uses and sewer flows.
5. 10	Lift Stations shall be designed with a 1.25 factor of safety to accommodate changes in land use and deviations in calculating or anticipating saturation land uses and sewer flows.
5. 11	No property shall be served by City sewer unless the main is extended to the extreme boundary limit of said property (<u>through</u> the owner's lot <u>to</u> the adjacent lot).
5. 12	Sewer pipes may be installed at less than 0.5% slope only under consultation with the Public Works Director who may impose special and unique construction or testing requirements to enable the flat sewer without incurring excessive O&M costs.

Operations Policies:

6. 1	System repairs and replacements shall consider, and be coordinated with, other symbiotic projects when possible. This includes safety-related activities and projects that improve environmental benefits to the community.
6. 2	The City will strive to provide a safe and efficient space for all utility staff to work and operate.
6. 3	The Wastewater Utility will develop and maintain a preventive maintenance schedule for all City wastewater facilities and equipment. The Council will support funding that allows the maintenance schedule to be realized.
6. 4	The City will execute its required maintenance and repairs in a manner that minimizes safety risks and provides a uniform level of service to the customers. This may include the need to use overtime or contract labor.
6. 5	Written O&M records shall be maintained for all equipment and facilities.
6. 6	The property owner shall maintain the side sewer from the point of connection at the structure to the wastewater main including the side sewer and sewer stub (within the right-of-way). The owner will maintain and repair any blockages.
6. 7	A Vulnerability Analysis has been performed for each basin and shall be maintained and updated by staff. Improvements and additions to the system shall not be approved or completed in a manner that diminishes the resiliency of the basin.

- 6.8 The Council shall support the funding of the wastewater utility at a level necessary to maintain adequately trained staff and to meet the Level of Service goals.
- 6.9 The utility shall strive to adopt and maintain service schedules and operations tasks that result in fewer than 3 collection system failures per 100 miles of pipe.
- 6.10 The utility shall strive to spend at least 75% of their maintenance hours and planned (preventative) maintenance.

PLANNING DATA AND DEMAND FORECASTS

3

3. PLANNING DATA AND DEMAND FORECASTS

In the wastewater service industry, forecasting demand as accurately as possible is central to the cost-effective, sustainable management of the wastewater collection system. A reliable forecast can help ensure that the City provides enough collection and conveyance capacity for residential, non-residential, and municipal uses while still allowing for growth and development. Using timely, accurate information also reduces the risk of under or over-investing in wastewater system infrastructure.

The purpose of this chapter is to explain what wastewater demand forecasting is, why forecasting is important, and how the demand forecast for the City is prepared. This chapter also examines existing wastewater flow data, future population and employment data, and other factors which affect demand.

PURPOSE OF DEMAND FORECASTING

To plan for future wastewater collection and conveyance capacity needs and their impact on the existing system, the City must determine how much wastewater is expected to enter the system. The City does this by evaluating the expected potable water demand against existing and projected sewer connections, rates of inflow (from stormwater) and infiltration (from groundwater) and estimated indoor vs. outdoor water use by customer category. The breakdown of water demand by customer category is also important for assessing the quality of water returning to the collection system; for example, the waste from a dental office or pharmaceutical manufacturer will be very different from residential wastewater. The resulting demand forecast informs decisions to upgrade or replace infrastructure as well as revenue forecasts for budgeting and setting rates. **Table 5:** Purpose of Demand Forecasting, provides an overview of how demand forecasting supports decision-making over the 20-year planning period and beyond.

Table 5: Purpose of Demand Forecasting

FORECAST TYPE	TIME FRAME	PURPOSE
<i>Long Term</i>	<i>Decades</i>	<i>Future infrastructure sizing and capacity requirements.</i>
<i>Medium Term</i>	<i>Years</i>	<i>Determining system improvements. Infrastructure sizing and capacity.</i>
<i>Short Term</i>	<i>Months</i>	<i>Evaluating system condition. Forecasting revenue. Setting wastewater rates.</i>
<i>Daily</i>	<i>Days</i>	<i>Managing system operations and optimizing pumping at lift stations.</i>

More specifically, long-term forecasting aids planning for the collection and conveyance capacity needed 20-30 years from now, beyond the current planning period. Medium-term forecasts identify necessary system improvements to meet foreseeable changes, such as an increase in growth due to a change in land use zoning. In the short term, the City is able to use known costs to set rates that are adequate to continue

maintenance, operation, and capital improvements. On a daily basis, accurate forecasting can assist with operations, ensuring that the lift stations are operating safely and efficiently.

DEMOGRAPHIC DATA AND PROJECTIONS – WAC 173-240-050(3)(e)

Current and future population and employment projections for areas that include the sewer service area have been independently developed by the PSRC, the County, and the City Planning Department. The PSRC and County projections are used for planning efforts that impact regional growth, such as the sizing of the interceptor pipeline in Lake Sawyer Road. The City is not obligated to use the PSRC or County planning data; however, to develop the most accurate projections for modeling and capital project identification, all three planning projections were evaluated for viability.

Puget Sound Regional Council (PSRC) Land Use Target Forecast

In 2014, PSRC projected that Black Diamond would have 9,159 residents, 3,643 households, and 2,073 jobs in 2035. The PSRC forecasts are not consistent with the anticipated growth from the two approved master planned developments (Lawson Hills and the Villages) and the buildable land potential in the Rock Creek Basin. Based on the permitted densities and the approved Development Agreements for these master planned developments, and zoning in the Rock Creek Basin, the wastewater utility is planning for an additional 9,746 new housing projects by the year 2040. Because of this, the City is not consistent with King County's growth targets and the Regional Growth Strategy.

The City is working with PSRC to reconcile the differences in forecasting for the approved developments which will add 6,050 housing units and approximately one million square feet of commercial and employment uses to the existing 2,644 housing units and 597 jobs.

King County Land Use Capacity

In December 2021, King County published and adopted the "Urban Growth Capacity Report". While much of this document deals with the ability of various urban areas in the County to accept development targets, the report also identifies the target growth rates for the urban areas, including Black Diamond.

The County's 2021 Urban Growth Capacity Report examines existing uses on a parcel-by-parcel basis to identify suitable land to accommodate the PSRCs population and employment targets. These targets are developed in close coordination with local planning agencies. This evaluation utilizes actual development densities, unbuildable land (e.g., water bodies, wetlands, steep slopes, utility easements), zoning, and future land use designations, resulting in accurate maximum housing and employment capacities by parcel.

The report identifies that in 2018 the City had 1,735 Equivalent Residential Units (ERU), which compares well with the City's actual planning data of 1,842 ERU. We believe these two data sets are within the expected allowable deviation based on the methods used to calculate ERU and for the purposes of this plan are considered the same value. The report also identifies that the build-out capacity, using the current zoning and buildable areas, is 8,434 ERU. This does not compare favorably with the wastewater utilities growth estimates of 13,215 ERUs in 2040 using the allowable development entitlement in the approved Ten Trails and Lawson Hills MPDs and existing zoning outside the MPDs.

The demographic data presented below is used for both the Water and Sewer Comprehensive Plans. The population and other numbers differ between plans, however, due to differences in the service areas. As a result, the served population is less than the total population for both utilities. The use of the same base

data set means that both plans are consistent for demographic and demand projections. The information summarized in this chapter is for the entire sewer service area.

Service Area and Demographic Category	2019 Population	Base Year Population (2023)	Planning Year (2030)	Planning Year 2035	Planning Year 2040
<i>Population</i>	4,525	4,668	4,929	5,124	5,327
<i>Employment</i>	591	597	659	693	728
<i>Subtotal</i>	5,116	5,265	5,588	5,817	6,055

House Bill HB 1110 will allow Multi-Family housing on most lots in Black Diamond. This revision does not have a material impact on population projections, however, because almost all of the growth in the City is expected to occur in the existing or future MPDs and these already allow multi-family construction.

Wastewater Use Trends

This section describes water use over time by City customers who have both water and wastewater service. The per capita usage rates are used to inform the wastewater demand forecast for customers who self-provide water (via a private well) or other sources.

RETAIL WASTEWATER CUSTOMERS

Table 6: Wastewater Service Connections, provides the number of retail wastewater connections served directly by the City. At the end of 2022, the City served a total of 1,975 residential equivalent housing units.

Table 6: Wastewater Service Connections

Customer Category	2019	2020	2021	2022
<i>Residential Subtotal</i>	718	996	1376	1920
<i>Non-Residential Subtotal</i>	50	45	47	55
<i>Total</i>	768	1,041	1,423	1,975

LARGEST WASTEWATER CUSTOMERS

Water sales within the City increase upward beginning in June, generally peaking in August, and tapering back down to winter levels in October. Thus, most of these purchases can be attributed to outdoor use, and thus do not significantly contribute to wastewater flows. We examined residential and commercial water sales in an effort to determine if any customers were significant enough (in terms of water demand) to warrant a separate investigation into that customer's wastewater use patterns. We concluded that there were no residential or commercial customers that had significant water sales and that would justify an examination of their potential Sewer impacts.

Table 7: Largest Water Customers, (2019 - 2022) provides the consumption data for the City's twenty (20) largest retail Water customers. None of these customers consume enough water to require detailed analysis or special consideration in the demand forecast.

Table 7: Largest Water Customers

Current Rank	Customer Name	Customer Type	Water Consumption
			Annual (cf)
0	Jenson	Residential	79,658
2	Enumclaw School District	Commercial	32,887
3	Banchero	Residential	25,330
4	Young	Residential	24,721
5	Nichols	Residential	17,316
6	Hemminger	Residential	14,799
7	Black Diamond Police	Commercial	12,864
8	Mauerman	Residential	9,930

Industrial Customers – WAC 173-240-050(3)(d)(i)

Industrial users include all of the City’s non-residential customers – single- and multi-commercial, hotel/motel, and municipal users. The City is required to track industrial users which have the potential to affect the sewer collection or conveyance systems. Of the City’s 50 non-residential connections in 2019, none are considered significant industrial users (see **Table 8: Industrial Customers**).

Table 8: Industrial Customers

Name	Location	Drains To:
Enumclaw School District	Baker Street	Jones Lake Basin
Black Diamond Police	Lawson Street	Jones Lake Basin
Enumclaw School District	First Ave	Jones lake Basin

Development Activity

The annual rate of increase in the number of wastewater accounts roughly coincides with the number of side sewer permits issued. Population and customer increases are largely the result of development activity in the City, and this is heavily influenced by the Ten Trails and Lawson Development Agreements, both are approved MPD projects. We have estimated future growth in the city using estimates of development activity, both from the MPD projects and from in-fill and redevelopment. In order to identify the broadest range of impacts and opportunities we have estimated both a high-growth rate and a low-growth rate for future development. Growth, as shown in Tables 10 and 11, is estimated using the following information:

- Actual customer counts were used for the years 2019 through 2022,
- Customer counts for 2023 were extrapolated using data from the MDRT based on actual growth for the first half of 2023 and extrapolating those unit counts to the end of 2023,
- High growth for 2024 and later is based on unit takedown estimates provided by Oakpointe. These estimates were modified (adjusted down) for 2024 and 2025 using the platted lots that are

currently available for buildings. The MDRT believes the estimated takedown rates from Oakpointe are aggressive and there are not sufficient lots available in the next two-year period to meet the estimated (Oakpointe) takedown targets.

- Low growth rates are based on estimates from the MDRT based on historical growth rates for MPD projects in other jurisdictions (excluding data from 2019 through 2022) adjusted to reflect soft market conditions and MPD size. These generated unit takedown rates that are less than half of the growth rate observed from 2019 through 2022. Data from 2019 through 2022 was excluded because these years included high housing demands coupled with low interest rates, a situation that is unlikely to occur in the near future.
- Development in the Lawson Hills project was modified from data provided by Oakpointe due to an expectation from the MDRT that development in that MPD will be delayed two to three years from the schedule provided by Oakpointe.
- Growth estimates within the Rock Creek Basin includes 220,000 sf of potential industrial expansion. In order to provide conservative planning information any industrial expansion is anticipated to generate sewage at a rate of 1 ERU/1,200 sf of development.

Table 9: Projected MPD Development Growth (by Year)

Year	Ten Trails (high)	Ten Trails (low)	Lawson (high)	Lawson (low)
2019	165	165	8	8
2020	403	403	8	8
2021	753	753	8	8
2022	942	942	8	8
2023	1,022	957	8	8
2024	1,102	972	8	8
2025	1,292	1,002	8	8
2026	1,955	1,032	42	25
2027	2,225	1,092	125	62
2028	2,495	1,152	249	114
2029	2,765	1,212	373	166
2030	3,035	1,272	477	218
2031	3,305	1,332	567	270
2032	3,575	1,392	657	322
2033	3,845	1,452	747	374
2034	4,115	1,512	837	423
2035	4,385	1,572	927	458
2036	4,560	1,632	1,017	493
2037	4,630	1,692	1,107	528
2038	4,700	1,752	1,197	563
2039	4,770	1,812	1,258	598
2040	4,800	1,872	1,258	633
Total	4,800	1,872	1,258	633

WASTEWATER USE FACTORS AND EQUIVALENT RESIDENTIAL UNITS (ERUS)

Wastewater Use Factors are the amounts of water assigned per unit of a particular customer class based on historic use. Use factors have been declining over time due to more efficient appliances, improved construction codes and plumbing fixtures, less landscaping and increased use of native or drought-resistant vegetation, and a strong regional conservation program. These numbers are analyzed against the projected land uses provided by King County to contribute to the development of the demand forecast. Water Use Factors assist in the calculation of Equivalent Residential Units (ERUs). ERUs are one method for representing all types of water use as the equivalent number of single-family households. This allows simple comparison across uses of the impact on the water and sewer system. The City traditionally uses a 5-year average of Gallons per Day (GPD) used by a single-family residence as the ERU value for the utility.

For flow forecasting purposes in the Jones Lake Basin, one Wastewater ERU is equal to the 5-year average for 2019-2022 of use, or 187 GPD, based on summertime usage. This value does not include Infiltration and Inflow which has generally been defined as 700 gallons per day per developed acre. In addition, this value must be modified for peak flow using the Ecology “Orange Book” peaking factor (generally 2.5 for the Jones Lake Basin).

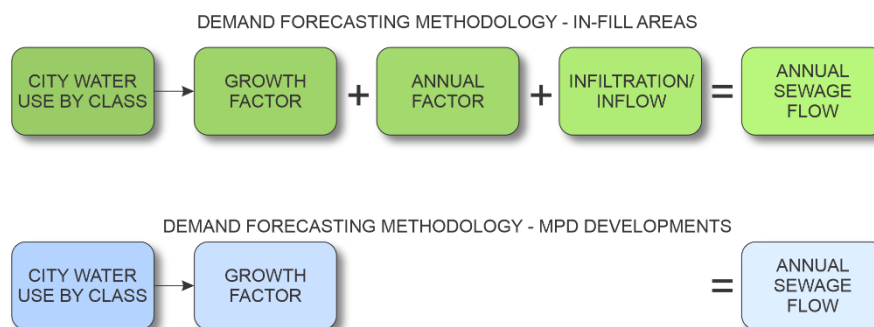
However, development in the Ten Trails MPD has shown a significantly different wastewater use factor. This is largely attributed to the aggressive design standards that are applied in the MPD Developments (regulations embedded in the Development Agreement), small lot sizes with little or no irrigation demand, and new houses with contemporary plumbing fixtures. The MPD units show a repeatable pattern of wastewater use without any significant summer/winter deviation indicating that there is virtually no infiltration and inflow in the MPD neighborhoods. A detailed analysis of these flow patterns is included in Appendix M.

For flow forecasting purposes in the MPDs, Peak Wet Weather Flow is 175 gallons per day per ERU (0.121 GPM/ERU) and this includes I/I. Peak Instantaneous flow is 265 gallons per day per ERU (0.184 GPM/ERU) and this includes I/I.

Flow per ERU is useful for evaluating a system as a measure of conservation and maintenance efforts over time. However, the quantity of sewage associated with an ERU is both system-specific and point-in-time specific; flow per ERU for one system does not readily apply to another system with different demographics or water use patterns. In addition, as demonstrated by the use patterns in the Ten Trails MPD, use can vary geographically within the system.

Reducing the amount of wastewater represented by an ERU can thus be significant, especially in a system such as the City's with demonstrably different ages, as the utility can use the difference to meet growing demand without potentially requiring expensive improvements or expansion to the system. The ability to delay or downsize large capital projects is of benefit to the City, its ratepayers, and its wastewater partners.

The methodology used to develop the flow forecast differs from past years in that we are using actual measured use patterns for the MPDs that are significantly different from those for the infill areas of the City. This is due to the unique geography associated with the Ten Trails and Lawson Hills Developments wherein the entire utility system, from house to off-site interceptor, is new and provided by the Developer with the development. In-fill development must frequently use existing piping systems which have been shown to have different (higher) use patterns with peaking factors based on the time of year and significant Infiltration and Inflow.



Based on these criteria, the projected utility growth in ERUs, by basin, is shown in **Table 10: Projected Growth in ERUs (high growth scenario)** and **Table 11: Projected Growth in ERUs (low growth scenario)**.

Table 10: Projected Growth in ERUs (high growth scenario)

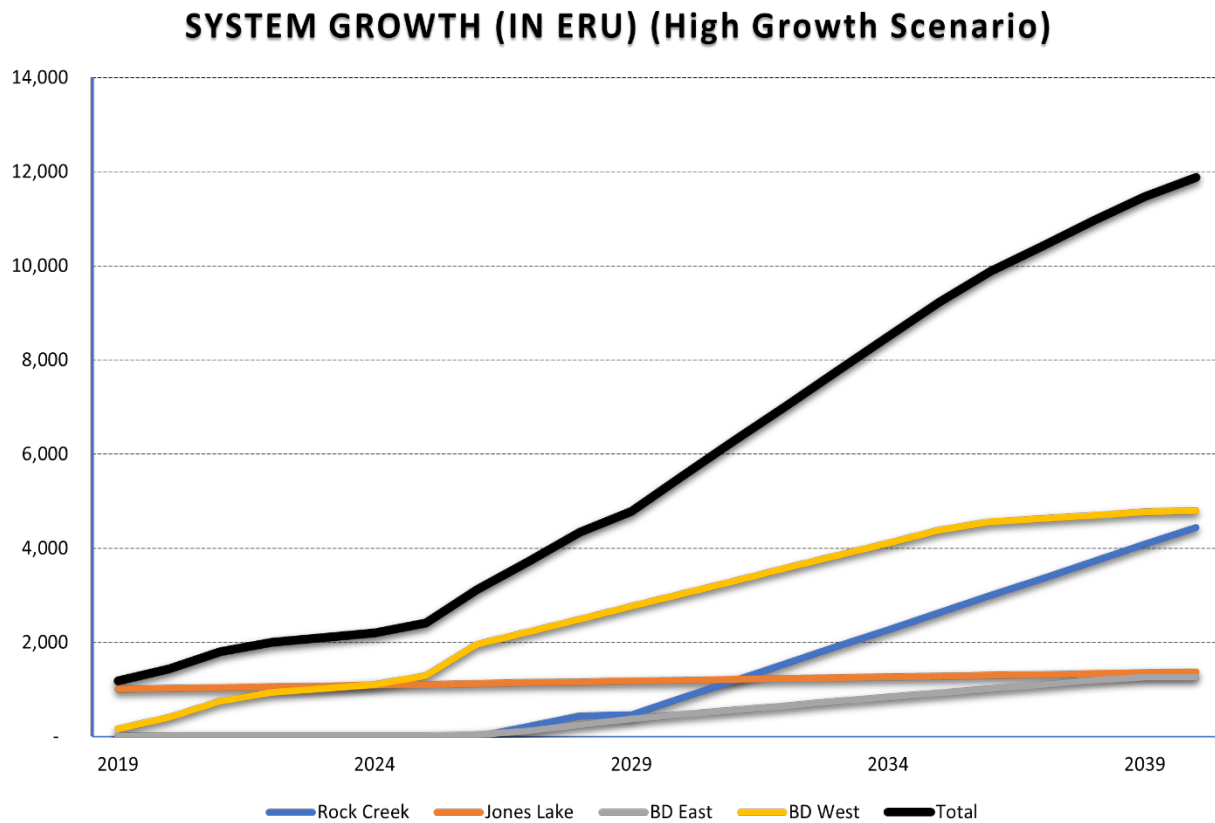
Year	Jones Lake	BD West	BD East	Rock Creek	Total
2019	1,006	165	8	-	1,179
2020	1,024	403	8	-	1,435
2021	1,041	753	8	-	1,802
2022	1,059	942	8	-	2,009
2023	1,076	1,022	8	-	2,106
2024	1,094	1,102	8	-	2,204
2025	1,111	1,292	8	-	2,411
2026	1,129	1,955	42	-	3,126
2027	1,146	2,225	125	220	3,716
2028	1,164	2,495	249	440	4,348
2029	1,181	2,765	373	465	4,784
2030	1,199	3,035	477	827	5,538
2031	1,216	3,305	567	1,189	6,277
2032	1,234	3,575	657	1,551	7,017
2033	1,251	3,845	747	1,913	7,756
2034	1,269	4,115	837	2,275	8,496
2035	1,286	4,385	927	2,637	9,235
2036	1,304	4,560	1,017	2,999	9,880
2037	1,321	4,630	1,107	3,361	10,419
2038	1,339	4,700	1,197	3,723	10,959
2039	1,356	4,770	1,258	4,085	11,469
2040	1,374	4,800	1,258	4,447	11,879

Table 11: Projected Growth in ERUs (low growth scenario)

Year	Jones Lake	BD West	BD East	Rock Creek	Total
2019	1,006	165	8	-	1,179
2020	1,018	403	8	-	1,429
2021	1,030	753	8	-	1,791
2022	1,042	942	8	-	1,992
2023	1,054	957	8	-	2,019
2024	1,066	972	8	-	2,046
2025	1,078	1,002	8	-	2,088
2026	1,090	1,032	25	-	2,147
2027	1,102	1,092	62	22	2,278
2028	1,114	1,152	114	44	2,424
2029	1,126	1,212	166	76	2,580
2030	1,138	1,272	218	268	2,896
2031	1,150	1,332	270	460	3,212
2032	1,162	1,392	322	652	3,528
2033	1,174	1,452	374	844	3,844
2034	1,186	1,512	423	1,036	4,157
2035	1,198	1,572	458	1,228	4,456
2036	1,210	1,632	493	1,420	4,755
2037	1,222	1,692	528	1,612	5,054
2038	1,234	1,752	563	1,804	5,353
2039	1,246	1,812	598	1,996	5,652
2040	1,258	1,872	633	2,188	5,951

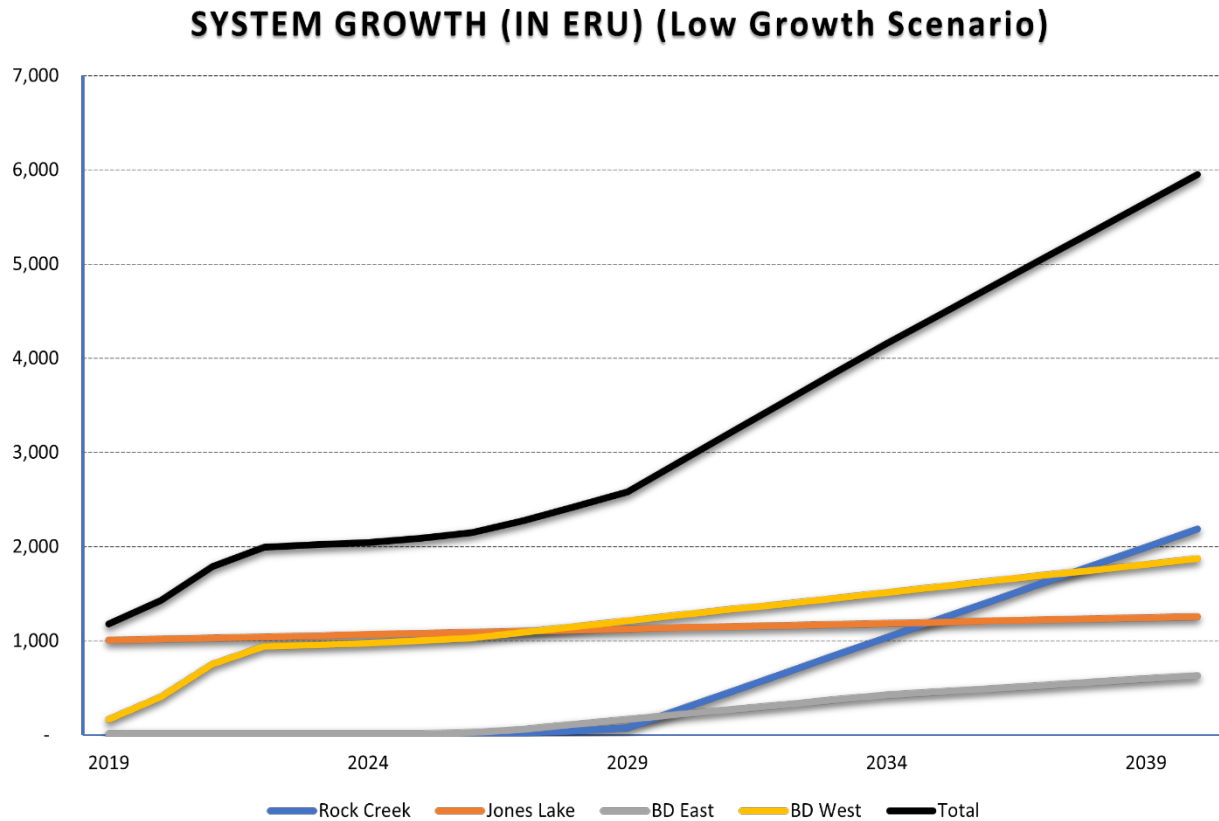
System growth in Equivalent Residential Units for the High Growth Scenario is shown graphically in **Figure 9: System Growth in ERU (high growth scenario)**.

Figure 9: System Growth in ERU (high growth scenario)



System growth in Equivalent Residential Units for the low growth scenario is shown graphically in Figure 10: System Growth in ERU (low growth scenario).

Figure 10: System Growth in ERU (low growth scenario)

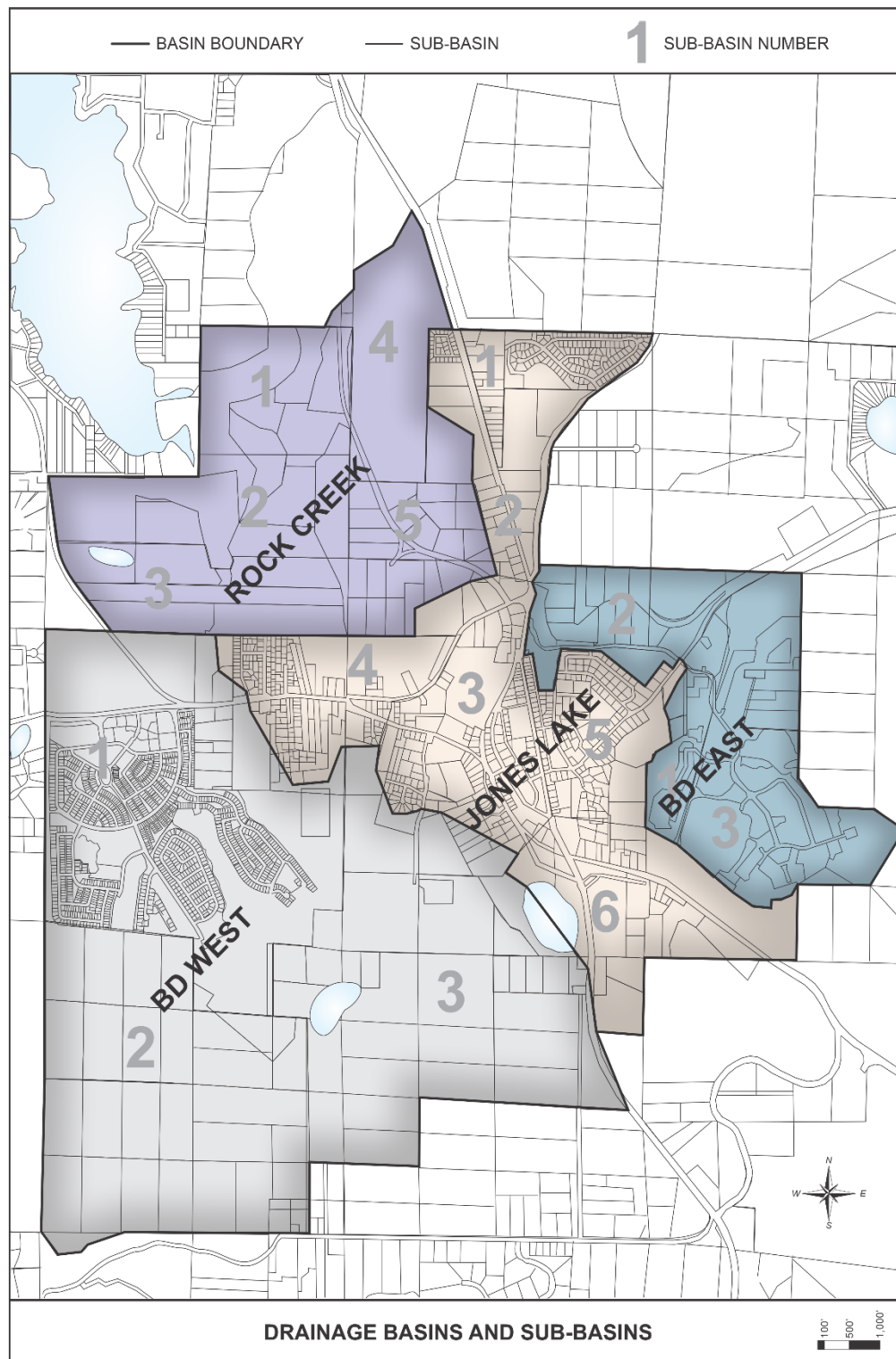


BASIN PLANNING AREAS

All the sewage collected in Black Diamond is discharged to the King County-maintained regional facilities at the Jones Lake Pump Station or delivered to the Interceptor on Lake Sawyer Road. The Ten Trails MPD Development flows directly to the Interceptor, all other sewage flows to the Jones Lake Lift Station.

The basin planning areas are shown in **Figure 11: Sewage Basins**.

Figure 11: Sewage Basins



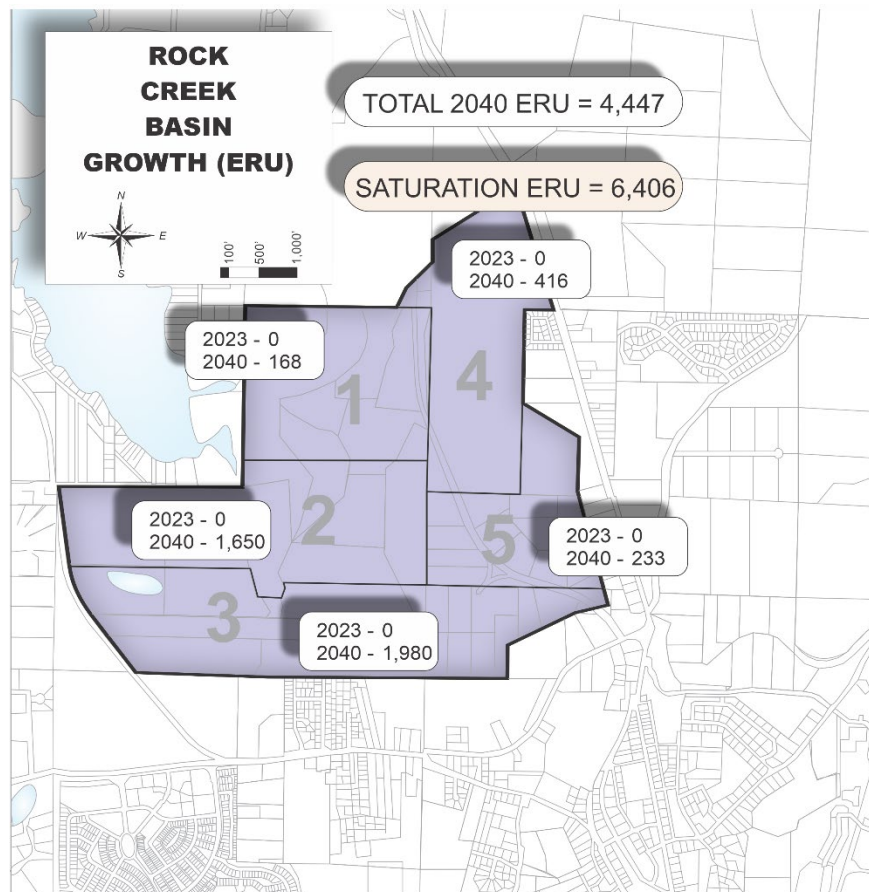
ROCK CREEK BASIN

The Rock Creek Basin is approximately 750 acres in size and is currently not served by a public sewer system. Most of the basin is an active gravel mine and gravel processing operation. Eventually, the gravel mine area is expected to develop, and some discussions have been initiated with Developers interested in pursuing another Master Planned Development. In accordance with existing policy, sewer planning and sewer capacity for this area are currently based on existing zoning which is a mix of medium-density residential (8 DU/ac) and industrial/commercial. It should be noted that if this area is developed under a Master Plan Development, sewer flows will increase dramatically over the planned flows in this General Plan.

The existing Lawson Hills MPD and the Villages MPD include an area at the northern terminus of this basin with development entitlement for 220,000 square feet of retail and commercial development and 233 multi-family residential units. Sewage from this area is likely to be conveyed to the south boundary of the basin and then flow west to a new lift station that will be needed to pump the sewage to the Lake Sawyer Interceptor. Growth in the Basin is shown in **Figure 12: Rock Creek Basin ERU Growth**.

Planning in this basin should use the Average Wet Weather flow criteria of 187 gpd/eru with an additional I/I assumption of 700 gpd/acre and a 2.5 peaking factor.

Figure 12: Rock Creek Basin ERU Growth



Population growth (in ERUs) in the Rock Creek Basin is expected to develop as shown in **Table 12**: Rock Creek Basin Growth (in ERU) below. This basin is not expected to fully develop or build out over the 2040 planning period.

Table 12: Rock Creek Basin Growth (in ERU)

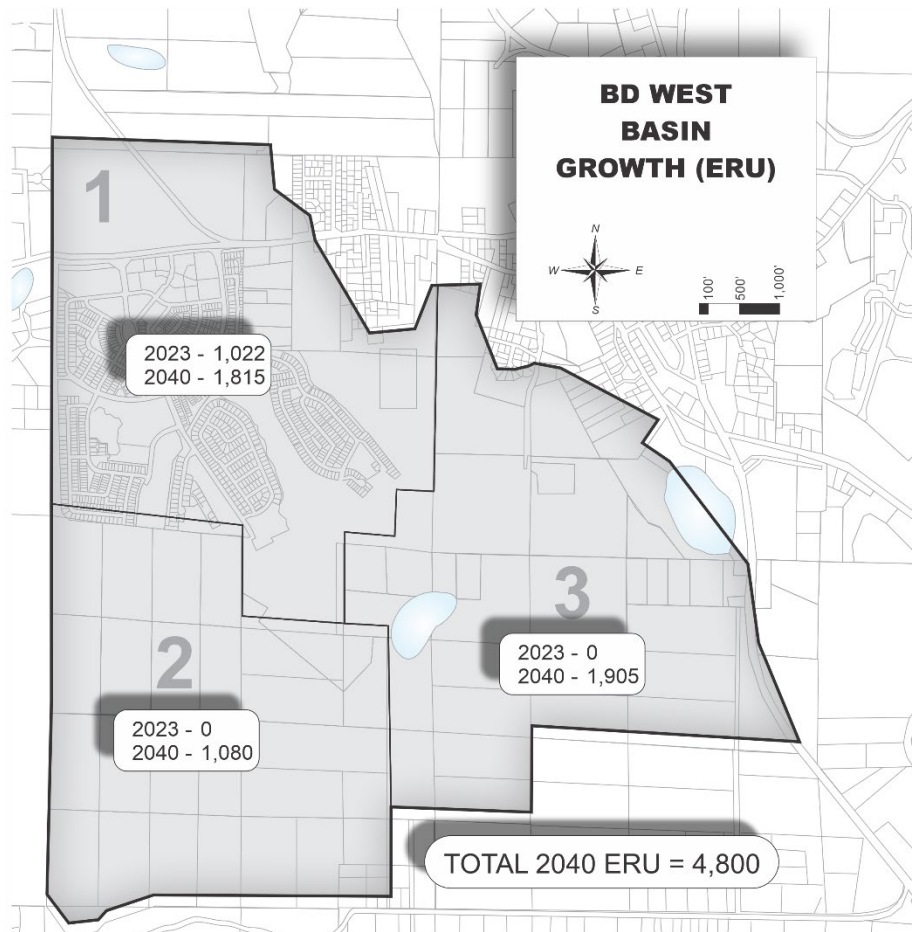
Year	1	2	3	4	5	Total
2023						-
2024						-
2025						-
2026						-
2027	-	-	-	-	-	-
2028	-	-	-	-	-	-
2029	-	-	-	-	-	-
2030	-	-	-	-	-	-
2031	12	-	-	208	-	220
2032	24	-	-	416	-	440
2033	36	-	-	416	13	465
2034	48	150	180	416	33	827
2035	60	300	360	416	53	1,189
2036	72	450	540	416	73	1,551
2037	84	600	720	416	93	1,913
2038	96	750	900	416	113	2,275
2039	108	900	1,080	416	133	2,637
2040	120	1,050	1,260	416	153	2,999
Saturation	320	3,000	2,340	416	330	6,406

WEST BLACK DIAMOND BASIN

The West Black Diamond Basin is being developed under the Ten Trails Development Agreement and all of the needed sewage collection and conveyance facilities will be constructed by the Developer under the terms of the Ten Trails Development Agreement. The basin is approximately 1,625 acres in size. Sewage from this area flows to the southwest where it is pumped from a lift station, through a force main, to the Interceptor in Lake Sawyer Road.

Planning in this basin should use the Peak Wet Weather Flow criteria of 175 gpd/eru (which includes I&I) and Peak Instantaneous Flow of 265 gpd/eru (which includes I&I). Growth is shown in **Figure 13: West Black Diamond Basin ERU Growth**.

Figure 13: West Black Diamond Basin ERU Growth



Growth (in ERUs) in the West Black Diamond Basin is expected to develop as shown in **Table 13**: Growth in the West BD Sub-Basins (in ERU) below. This basin is expected to fully develop, primarily with small-scale in-fill development, over the 2040 planning period.

Table 13: Growth in the West BD Sub-Basins (in ERU)

Year	1	2	3	Total
2019	165	-	-	165
2020	403	-	-	403
2021	753	-	-	753
2022	942	-	-	942
2023	1,022	-	-	1,022
2024	1,102	-	-	1,102
2025	1,222	70	-	1,292
2026	1,815	140	-	1,955
2027	1,815	210	200	2,225
2028	1,815	280	400	2,495
2029	1,815	350	600	2,765
2030	1,815	420	800	3,035
2031	1,815	490	1,000	3,305
2032	1,815	560	1,200	3,575
2033	1,815	630	1,400	3,845
2034	1,815	700	1,600	4,115
2035	1,815	770	1,800	4,385
2036	1,815	840	1,905	4,560
2037	1,815	910	1,905	4,630
2038	1,815	980	1,905	4,700
2039	1,815	1,050	1,905	4,770
2040	1,815	1,080	1,905	4,800
Saturation	1,815	1,080	1,905	4,800

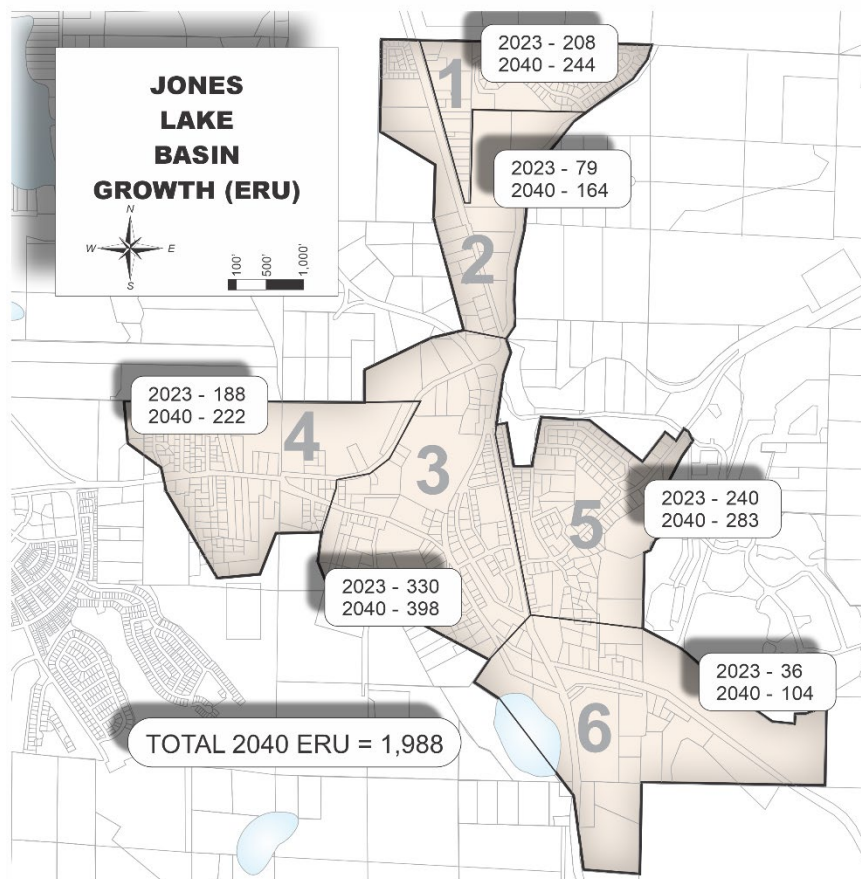
JONES LAKE BASIN

The Jones Lake Basin is approximately 898 acres and includes most of the historical areas of the City. Most of the development in this basin will be in-fill residential projects (much of the developable land in the Jones Lake Basin will be preserved through the Transfer of Development Rights program that allowed entitlement in Ten Trails and Lawson Hills).

The Jones Lake basin flows south to the Jones Lake Pump Station which is partially located within a wetland. The existing sewer collection system in the Jones Lake Basin has excess capacity. Growth in the Basin is shown in **Figure 14: Jones Lake Basin ERU Growth**.

Planning in this basin should use the Average Wet Weather flow criteria of 187 gpd/eru with an additional I/I assumption of 700 gpd/acre and a 2.5 factor for Peak Wet Weather Flow.

Figure 14: Jones Lake Basin ERU Growth



Growth (in ERUs) in the Jones Lake Basin is expected to develop as shown in **Table 14**: Jones Lake Sub-Basin Growth (in ERU) below. This basin is expected to fully develop, primarily with small-scale in-fill development, over the 2040 planning period.

Table 14: Jones Lake Sub-Basin Growth (in ERU)

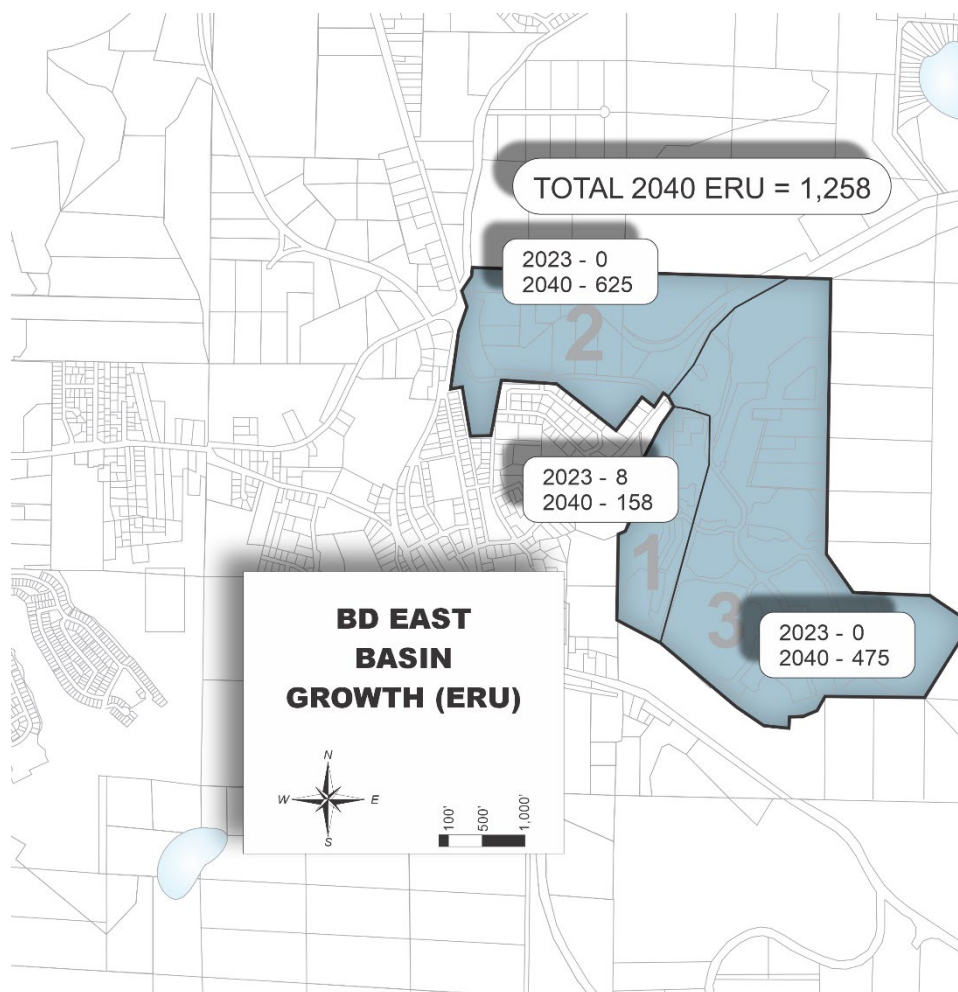
Year	1	2	3	4	5	6	Total
2019	202	59	314	180	230	20	1,006
2020	204	64	318	182	233	24	1,026
2021	206	69	322	184	235	28	1,045
2022	208	74	326	186	238	32	1,065
2023	210	79	330	188	240	36	1,084
2024	212	84	334	190	243	40	1,104
2025	214	89	338	192	245	44	1,123
2026	216	94	342	194	248	48	1,143
2027	218	99	346	196	250	52	1,162
2028	220	104	350	198	253	56	1,182
2029	222	109	354	200	255	60	1,201
2030	224	114	358	202	258	64	1,221
2031	226	119	362	204	260	68	1,240
2032	228	124	366	206	263	72	1,260
2033	230	129	370	208	265	76	1,279
2034	232	134	374	210	268	80	1,299
2035	234	139	378	212	270	84	1,318
2036	236	144	382	214	273	88	1,338
2037	238	149	386	216	275	92	1,357
2038	240	154	390	218	278	96	1,377
2039	242	159	394	220	280	100	1,396
2040	244	164	398	222	283	104	1,416
Saturation	336	184	592	345	427	104	1,988

EAST BLACK DIAMOND BASIN

The East Black Diamond basin is largely undeveloped but will be developed under the Lawson Hills MPD Development Agreement. An existing gravity sewer collector is available at the western boundary of this area and that sewer extends to the Jones Lake Lift Station. In addition, basin flows could be conveyed directly to the Lake Sawyer interceptor if this facility is available when this Basin is developed. The East Black Diamond basin is 432 acres. Growth in the Basin is shown in **Figure 15: East Black Diamond Basin ERU**.

Planning in this basin should use the Peak Wet Weather Flow criteria of 175 gpd/eru (including I&I) and Peak Instantaneous Flow criteria of 265 gpd/eru (including I&I).

Figure 15: East Black Diamond Basin ERU



Growth (in ERUs) in the BD East Basin is expected to develop as shown in **Table 15: BD East Sub-Basin Growth (in ERU)** below. This basin is expected to fully develop, primarily with MPD development, over the 2040 planning period. These values are based on data provided by the current developer, Oakpointe.

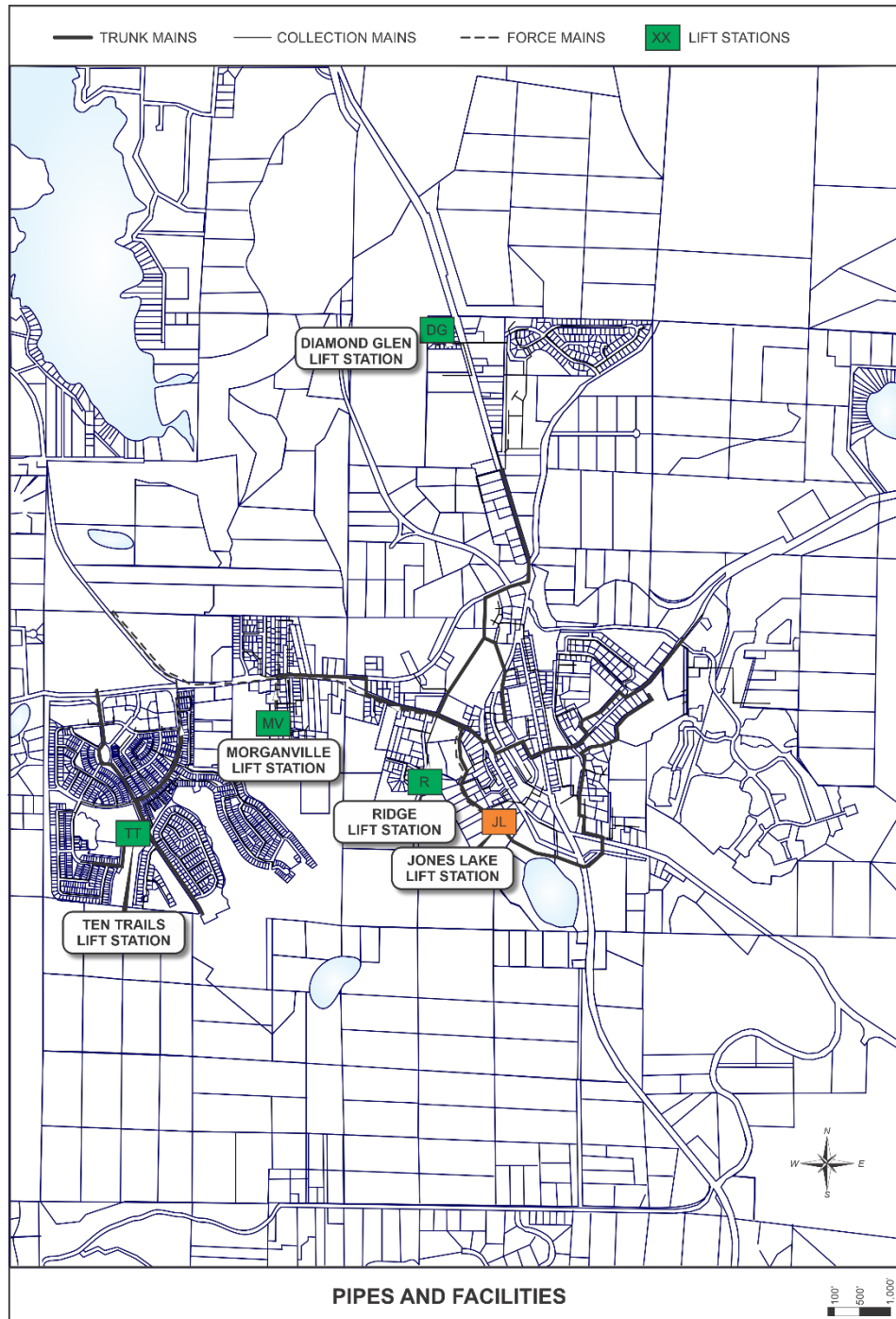
Table 15: BD East Sub-Basin Growth (in ERU)

Year	1	2	3	Total
2019	8	-	-	8
2020	8	-	-	8
2021	8	-	-	8
2022	8	-	-	8
2023	8	-	-	8
2024	8	-	-	8
2025	8	-	-	8
2026	42	-	-	42
2027	76	49	-	125
2028	110	98	41	249
2029	144	147	82	373
2030	158	196	123	477
2031	158	245	164	567
2032	158	294	205	657
2033	158	343	246	747
2034	158	392	287	837
2035	158	441	328	927
2036	158	490	369	1,017
2037	158	539	410	1,107
2038	158	588	451	1,197
2039	158	625	475	1,258
2040	158	625	475	1,258
Saturation	158	625	475	1,258

MAJOR FACILITIES

The existing major facilities are shown in **Figure 16: Major Facilities**.

Figure 16: Major Facilities



PLANNING AND FORECASTING CONCLUSIONS

The following significant conclusions can be drawn from the planning data and demand forecast:

1. Historical growth has been very slow except for the last four years. Growth in the Master Planned Developments has, and will continue to have, a large impact on growth and sewer flows.
2. Additional development within the existing sewer areas (Jones Lake Basin) will mostly consist of low to moderate in-fill on undeveloped lots or redeveloped lots.
3. Additional development in the Ten Trails and Lawson Hills developments will add a significant increase in sewage flows to the overall system. Most of these flows, and all this infrastructure, will be accommodated within the MPDs with new pipes and pumping systems.
4. Additional development in the Palmer Pit area (the Rock Creek Basin) will add a significant increase in sewage flows to the overall system. Most of these flows, and all this infrastructure, will be accommodated within the basin with new pipes and pumping systems provided by developers.
5. The new MPD-built piping systems are virtually leak-free, and there is little to no infiltration and inflow. Traditional (and historic) sewage flow assumptions in these areas will result in overly conservative design criteria. A new planning standard is proposed for these areas (Average Wet Weather flow of 175 gpd/eru, and a Peak Instantaneous Flow of 265 gpd/eru (I&I Included)).
6. The old-town piping systems (Jones Lake Basin) have Infiltration and Inflow that matches regional use patterns. In these areas, the historic design criteria of 187 gpd/eru, plus a 2.5 peaking factor, plus 700 gpd/acre should be used for Peak Wet Weather Flow planning and design criteria.

SYSTEM ANALYSIS

4

4. SYSTEM ANALYSIS

A system analysis evaluates the ability of the wastewater system facilities to meet current and projected customer demands including administration, collection, conveyance, and pumping. The Washington State Department of Ecology (DOE) establishes guidelines for wastewater system facilities design. Different hydraulic loading considerations include average base flows (regular wastewater discharge by customers), and peak flows (the base flow plus peaking flows including infiltration and inflow (I&I)). The purpose of this chapter is to:

1. Determine whether the adequate collection, conveyance, and pumping facilities are available to meet projected demands (the City does not have treatment requirements),
2. Identify any system facility deficiencies.

This chapter will explain some of the criteria, analyses, and conclusions for each of these items.

SYSTEM OVERVIEW – WAC 173-240-050(3)(d)

As discussed in Chapter 1 - System Description, the City's retail wastewater service boundary covers approximately six square miles spanning from Covington to the Green River in South King County. Black Diamond's wastewater system currently has four basins served by five lift stations and approximately 31 miles of pipe. The following sections describe major system components in association with the basin or portion of the wastewater system they serve.

Four approaches will be taken regarding the evaluation of the useful life of the infrastructure for the wastewater system. As the impacts of these four approaches relate to the level of service provided to the customers and the risks assumed in the operation of the wastewater system, the Council will set a policy regarding the preferred approach. These approaches will generally consist of:

- Capital funding transfers from the Operating Fund at historical levels,
- Replacing a uniform percentage of the wastewater system infrastructure each year proportional to the expected service life,
- Replacing the wastewater system infrastructure at the predicted end of the useful life,
- Replacing the wastewater system infrastructure based on asset management strategies temporarily modified by CIP delivery capacity.

The useful life of the various components of the wastewater system infrastructure will be set for the initial evaluation of the system. Service life expectations will be refined in the future based on actual condition investigation. In general, the initial planning level service life for components used is:

Table 16 - Recommended Facility Replacement Schedule

COMPONENT	INCREASED MONITORING	USEFUL LIFE FOR PLANNING
Pipe:		
Concrete	35 years	50 years
Cast Iron	35 years	50 years
Ductile Iron	40 years	60 years
HDPE	40 years	60 years
PVC (Gravity)	50 years	75 years
PVC (Force Main)	50 years	75 years
Manholes:		
Concrete	35 years	50 years
Lift Station Wet Well	25 years	40 years
Equipment:		
Electrical Gear	15 years	20 years
Pumps and Motors	15 years	20 years
SCADA	7 years	10 years
Grinder Pumps	10 years	15 years

For the purposes of replacement analysis, trunk lines were combined with collection mains to identify a hypothetical replacement schedule based on the year the asset was installed. The recommended replacement schedule of the conveyance facilities is depicted in **Table 17: Sewer Main Replacement Cost Allocation** (gravity and force mains) This analysis includes the replacement of the sewer mains at the end of their useful life and does not include any pipes identified for replacement or repair because of capacity, maintenance, risk, or damage concerns. The improvements in Figure 27: Capital Improvement Plan include those identified in the 2013 General Sewer Plan.

Table 17: Sewer Main Replacement Cost Allocation (gravity and force mains)

BASIN	Average Age of Infrastructure	Replacement Cost of Infrastructure (rounded)	Cost/year for Remaining Life (rounded)
Rock Creek	0	0*	\$0
Jones Lake	43	\$118,000,000	\$3,700,000
BD East	0	0*	\$0
BD West	3	\$30,000,000	\$416,000
Total		\$148,000,000.00	\$4,116,000.00

* These basins do not currently have sewer mains or facilities.

The costs depicted in **Table 17: Sewer Main Replacement Cost Allocation** (gravity and force mains) show an average annual expenditure of approximately \$4,100,000 per year to replace the infrastructure prior to the end of its planned useful life (75 years for pipelines). Ideally, planning efforts should attempt to reduce the number of pipes that must be upgraded in size prior to the end of their useful life. However,

changing usage, demographics, land use patterns, and zoning can always change the planned projects, and it must be assumed that some level of upgrade will continue to be required. For the purposes of planning, it is assumed that pipeline replacements will begin in 2028, and the next five years will be used to prepare the utility to operate and manage a significantly larger and more complex utility. Chapter 10, the Capital Improvement Program Chapter, uses this as the basis for budgeting.

WASTEWATER TREATMENT - KING COUNTY

Treatment and disposal of 100% of the City's wastewater flows are performed by the King County Department of Natural Resources – Wastewater Treatment Division (King County) under contract (copies of the contracts are included in Appendix K). Treatment occurs at the King County Renton Treatment Plant in Renton. The City's wastewater is conveyed to King County for treatment via the Lake Sawyer Interceptor which originates in Lake Sawyer Road and is wheeled through Soos Creek by the Soos Creek Water and Sewer District. The applicable treatment and wheeling agreements are included in Appendix L and M.

Under the Treatment services agreement with King County, King County will provide facilities for the conveyance, treatment and disposal of all wastewaters generated within Black Diamond. King County's Treatment Facilities are planned and operated under their own General Sewer Plan and Black Diamond has, by Agreement, tendered all responsibility for planning, design and operation to King County.

The current agreement with King County does not provide an upper limit on the quantity of wastewater that can be discharged to King County for treatment. King County is required to build additional facilities in the future to serve the growing demand within Black Diamond and those facilities are currently in the planning phase (refer to King County for additional details). In the event that sufficient capacity is not available when it is needed, The City will work with King County and any affected Developers to identify a suitable treatment or conveyance solution.

WASTEWATER CONVEYANCE CAPACITY EVALUATION

The City wastewater system has a backbone of larger sewer lines categorized as "Trunk" sewer mains. The trunk sewer mains consist of 10" and larger pipes.

The trunk sewer lines in the City are listed and illustrated by basin in Chapter 1 - System Description. The City identified improvements in the 2013 General Sewer Plan based on flow projections that potentially overstated the flows per Equivalent Residential Unit and I&I. The City recently finished a monitoring program to validate the previous modeling assumptions before moving forward with the improvements outlined in the 2013 plan that were intended to address future capacity limitations. The results of the monitoring program are included in **Appendix M: MPD Unit Flow Analysis**.

Jones Lake Basin

Sewage within the Jones Lake Basin is collected via gravity pipelines and three lift stations and discharged to the Jones Lake Lift Station (where it is pumped to King County facilities in Lake Sawyer Road). This basin is largely developed with a minor expectation of in-fill development on miscellaneous vacant lots and some redevelopment. There is little opportunity for new roadways and new sewers within this basin. As such, most sewage, including additional flows from in-fill and redevelopment, will use the existing sewer pipes. Some pipes will need to be replaced due to age and some will need to be replaced due to capacity limitations and these projects are summarized in Chapter 10.

The Jones Lake Lift Station is located adjacent to Jones Lake and is within the flood plain of that lake. Periodic flooding inundates the lift station site and floods the influent manhole, compromising peak pumping capacity from the Lift Station.

This basin is expected to reach saturation development within the 2040 planning period and ultimately will serve 1,986 ERU.

Rock Creek Basin

The Rock Creek Basin is undeveloped and is currently operated as an active gravel quarry by the Palmer Coking Coal Company. The underlying zoning for this basin is 8 du/acre and Palmer has indicated that mining operations will likely be terminated during the term of this General Plan and that the area will develop with a combination of residential projects and commercial expansion.

Sewage from this area will likely flow to the south and west of the basin (due to natural topographic relief), however, there are some significant challenges in planning and designing sewer service for this area. The topography is relatively flat, and the area is expansive; gravity sewer service has the potential to result in either flat sewers or deep sewers, neither of which are easy nor inexpensive to maintain for the City. In addition, Rock Creek at the western edge of the basin forms a natural barrier to gravity sewer service, and it is likely that a Lift Station will be needed to solve the problem of flat sewers and conflicts with the Creek geometry.

A roadway planned at the basin's southern boundary (Pipeline road) is currently being designed and is expected to be built and in service within the next two years. It is anticipated that this roadway will serve as the corridor for gravity service from the Rock Creek Basin and also as the corridor for an interceptor pipe for the Lawson Hills Development (which is too big to be accommodated in the Jones Lake Lift Station). In other words, the Rock Creek Basin must contribute wheeling capacity for the Lawson Hills Development (BD East Basin).

For the purposes of planning, development in this basin has been assumed to start beginning in 2025. Palmer Coking Coal has indicated that they may continue to quarry until 2013; however, we are using an aggressive estimate of potential basin development so that the off-site facilities necessary for basin service will be available when needed.

This basin is not expected to reach saturation development within the 2040 planning period and will ultimately serve 6,406 ERU.

BD West Basin

The entire BD West Basin is currently being developed under the Ten Trails Master Planned Development Agreement. All wastewater facilities (collection system, interceptors, lift stations, and forces mains) are being provided by the Master Developer, Oakpointe. All planning considerations and design standards are included in the Ten Trails Development Agreement.

This basin is expected to reach saturation development within the 2040 planning period and ultimately will serve 4,800 ERU.

Currently, all sewage is collected and conveyed to the Ten Trails Lift Station which is located adjacent to the regional stormwater pond in Phase 1A of the development. This station is equipped with on-site emergency power generation, variable frequency drives (which can match the pumping rate to the influent rate) and flow-metering equipment. As flow rates increase in the BD West Basin, the pumps may

need to be replaced with higher capacity units. Any replacement or upgraded equipment will be provided by Developers in conjunction with Platting activities under the Ten Trails Development Agreement.

Development within Phase 2 on the Ten Trails development will discharge to a new pump station that will likely be located as shown in **Figure 19** - BD West Basin CIP. This new pump station will be designed with variable speed pumping capability (to accommodate build-out in the Basin without low-flow pumping problems), rag remediation equipment, and on-site power generation. The Lift Station will also be equipped with emergency bypass storage to allow some attenuation of high flows. The permanent facility will also be interlocked with the Jones Lake Pump Station so that the station can be allowed to operate during the times when the Jones Lake Station is not operating. This will allow additional flowrate flexibility for operation and maintenance staff. These improvements will be provided by the Developer under the terms of the Development Agreement and as a condition of Plat activities. It may be possible to replace the Phase 1 Lift Station with the Phase 2 Lift Station and retire the Phase 1 Lift Station after Phase 2 construction. This will be analyzed in conjunction with the Phase 2 Lift Station design.

Both BD West lift stations (the existing Phase 1 Lift Station and the Phase 2 Lift Station) pump through a force main to a point of discharge to the King County Interceptor pipe in Lake Sawyer Road.

BD East Basin

The BD East Basin is largely undeveloped and is expected to be developed under the Lawson Hills MPD Development Agreement. All wastewater facilities (collection system and interceptor pipes) are being provided by the Master Developer, Oakpointe. All planning considerations and design standards are included in the Lawson Hills Development Agreement.

This basin is expected to reach saturation development within the 2040 planning period and ultimately will serve 1,258 ERU.

This Basin is characterized by steep terrain and is underlain by historical mine workings. As a part of the Development Agreement requirements, subsurface explorations are required to verify the location of the previous mining shafts and the development and utility locations (and configuration) adjusted accordingly. That work is currently underway.

In addition, this Basin is characterized by bedrock near the ground surface, and special construction and dewatering design requirements may be necessary to complete construction.

The discharge location for sewage from this basin is dependent upon the timing of the construction of Pipeline Road.

If Pipeline Road is complete before basin development, then this Basin will discharge directly to the King County interceptor in Lake Sawyer Road. It is expected that this Basin will discharge into an interceptor pipe that traverses the Rock Creek Basin (presumably following the southern boundary of that basin). That pipe might be pressurized or gravity-flow at the developer's discretion. In addition, flows from this Basin might discharge directly to the King County Interceptor or they might discharge to a new lift station located in the Palmer Gravel quarry near Rock Creek. This final design configuration will be based on the opportunities available for combining BD East Basin facilities with the Rock Creek Basin facilities.

If Pipeline Road is not complete or available for construction of an interceptor pipe, then sewage from the BD East Basin will discharge to the Jones Lake Lift Station through a combination of new and existing piping. Some existing piping may need to be replaced or oversized based on capacity or condition. If this discharge location option is selected, then King County will likely need to upgrade the capacity of the Lift Station.

CONVEYANCE SYSTEM INFLOW AND INFILTRATION

During the 2013 Comprehensive Plan development, a peak Inflow and Infiltration (I/I) rate of 1,400 gallons per acre per day was utilized. The sewer model was then calibrated for both dry winter weather and wet winter weather data. The model results correlated well for the dry winter weather flows; however, the model results for wet weather flow were higher than measured, and this was attributed to several I/I reduction projects completed by the City since the 2013 plan completion. As discussed in other areas of the plan, the model developed and calibrated during the 2013 process is still the most current model. This model appears to be reasonably conservative.

Development and sewage flows in the Ten Trails MPD have been carefully monitored and the BD West Basin flows are significantly different from the flow observed in the Jones Lake Basin. Flows in the MPD are substantially less (per ERU) with virtually no I/I and no wet weather peaks. The details of this analysis and these conclusions are included in Appendix M. For planning purposes, we will assume that all future large-scale developments (Ten Trails, Lawson Hills, Rock Creek Basin) will follow the trends observed in the Ten Trails development, namely Peak Wet Weather flows of 175 gpd/eru (including I&I) with a Peak Instantaneous Flow of 265 gpd/eru. (details of this analysis can be found in Appendix M). Flows in the older Jones Lake Basin will continue to use the previous planning criteria of 187 gpd/eru, with a peaking factor of 2.5 based on the Ecology Orange Book and 700 gpd/acre of I/I.

LIFT STATION EVALUATION

There are six public pump stations within the City of Black Diamond, summarized in **Table 18: Lift Station Summary**, that serve properties that are too low in elevation to be served by typical gravity sewers. The location of these pump stations is shown in **Figure 16: Major Facilities**.

Table 18: Lift Station Summary

PUMP STATION	CONSTRUCTED	PUMPS	CAPACITY
Ridge Pump Station	1993	1.5hp/1.5hp	105 gpm
Diamond Glen	1981	1.5hp/1.5hp	94 gpm
Morganville	1980	20hp/20hp	313 gpm
Jones Lake	1992	50hp/50hp	1,180 gpm
Lawson STEP	UNK	0.5 hp	20 gpm
Ten Trails	2019	25hp/25hp	208 gpm ¹

All stations are currently equipped with a minimum of two pumping units, each capable of meeting peak flows with one of the pumps out of service. Some stations are not equipped with on-site back-up power supply; however, all stations are equipped with the capability to be operated from the City's portable power generators.

A detailed investigation of the condition of each of the pump stations is beyond the scope of this General Plan; however, a detailed investigation should be performed and is recommended in the Capital Improvement Plan. At a minimum, the City should acquire and stock a replacement pump and motor for each station so that repairs can be performed as needed without the need to wait for new equipment to

¹ Interim capacity pending approval by King County for capacity increase. 1,200 gpm possible with alternative pump equipment.

be ordered. In addition, each station should have backup power capability or a separate mobile, yet dedicated, emergency power supply generator.

Recent operating experience at the Ten Trails Lift Station shows that sewer systems serving urban village-type developments may experience rag problems that are significant enough to present operational problems and frequent pump failures. All future lift stations should be designed with separate chopper-style preconditioning systems to minimize the ragging problem.

INDIVIDUAL GRINDER PUMPS AND PRESSURE SEWERS

There are currently approximately 13 individual Grinder type septic tank effluent pumps that pump into small-diameter pressure sewer force mains before discharging into the City's gravity sanitary sewer system. These pressure sewers use septic tank effluent pumps to discharge into the gravity sewer collections system while solids are allowed to settle in a septic tank. These arrangements are used to serve individual collections which are otherwise too low in elevation or remote to be connected to the City's gravity collection system. The City is responsible for maintaining these pumps and septic tanks, and the septic tanks are pumped approximately every four years. The City discourages the use of Grinder Pumps, but where necessary, the City allows and maintains the units.

ODOR AND CORROSION

The City's sewer collection system has not had a significant odor problem in the past. The pump stations will tend to turn slightly anaerobic in the late summer and generate a small amount of hydrogen sulfide gas. The City has not received any complaints, but occasionally odors have been noticed on the sidewalk near the intersection of Abrams and Morgan Street in the late summer (but only when the Abrams pump station happens to be running). The City is not planning any odor control projects at this time.

Most of the City's grinder pumps discharge into Manhole 90 and Manhole 92. These manholes show some signs of corrosion and are currently monitored for degradation. We do not anticipate that there will be a need for mitigating actions on these two manholes in the next six years. The manholes that accept discharges from pump stations are also in reasonably good condition.

COLLECTION SYSTEM EVALUATION

A hydraulic model of the Black Diamond sewer system was developed in conjunction with the 2013 update to the General Sewer Plan. The model was initially developed by Pacific West Engineering using GIS-based manhole and invert information, existing as-built data, and field investigations. System flows were assigned and modeled using a typical diurnal curve and the model criteria are shown in **Table 19: Model Criteria**. Flows were distributed based on the projected ERUs from Chapter 3.

Table 19: Model Criteria

SYSTEM ELEMENT	ASSUMPTION
<i>Gravity Pipes</i>	Manning's $n=0.013$ (for PVC and RCP and DI) Minimum Velocity = 2.0 fps $d/D = 0.80$ Pipe details taken from as-built records

<i>Manholes</i>	Rim elevations from GPS readings or digitized contours Inverts from as-built records
<i>Force Mains</i>	Hazen & Williams C=100

Figure 17: Existing Trunk Line Capacity shows the main sewer trunk lines of the City’s existing sewer collection system and the sub-basins they serve. The limiting section of each trunk line was identified and labeled. All the trunk lines of the existing sewer collection system have sufficient capacity to serve the infill and redevelopment potential within the Jones Lake Basin.

In analyzing the existing collection system (in the Jones Lake Basin), it is important to use an accurate diurnal curve representing average and peak flows throughout the day. For modeling in the Jones Lake Basin, we used a curve that is representative of urban bedroom communities with very little commercial development. This resulted in Average Wet Weather Flows of 187 gpd/eru with a 2.5 peaking factor (for the Jones Lake Basin).

The Rock Creek, BD East, and BD West Basins are modeled using a Peak Wet Weather flow of 175 gpd/eru with Peak Instantaneous Flow of 265 gpd/eru (and no additional inflow or infiltration). These values have been extensively evaluated for the basins that will be developed under MPD Development Agreements (see Appendix M).

The Model for the Jones Lake Basin is owned and maintained by the City (in SewerCAD) and the planning and design for the other basins will be the responsibility of the Developer under the terms of the Development Agreement. When the design of the sewer support facilities for those Basins is complete, the SewerCAD model for those basins will be conveyed to the city for integration into the Jones Lake Basin model.

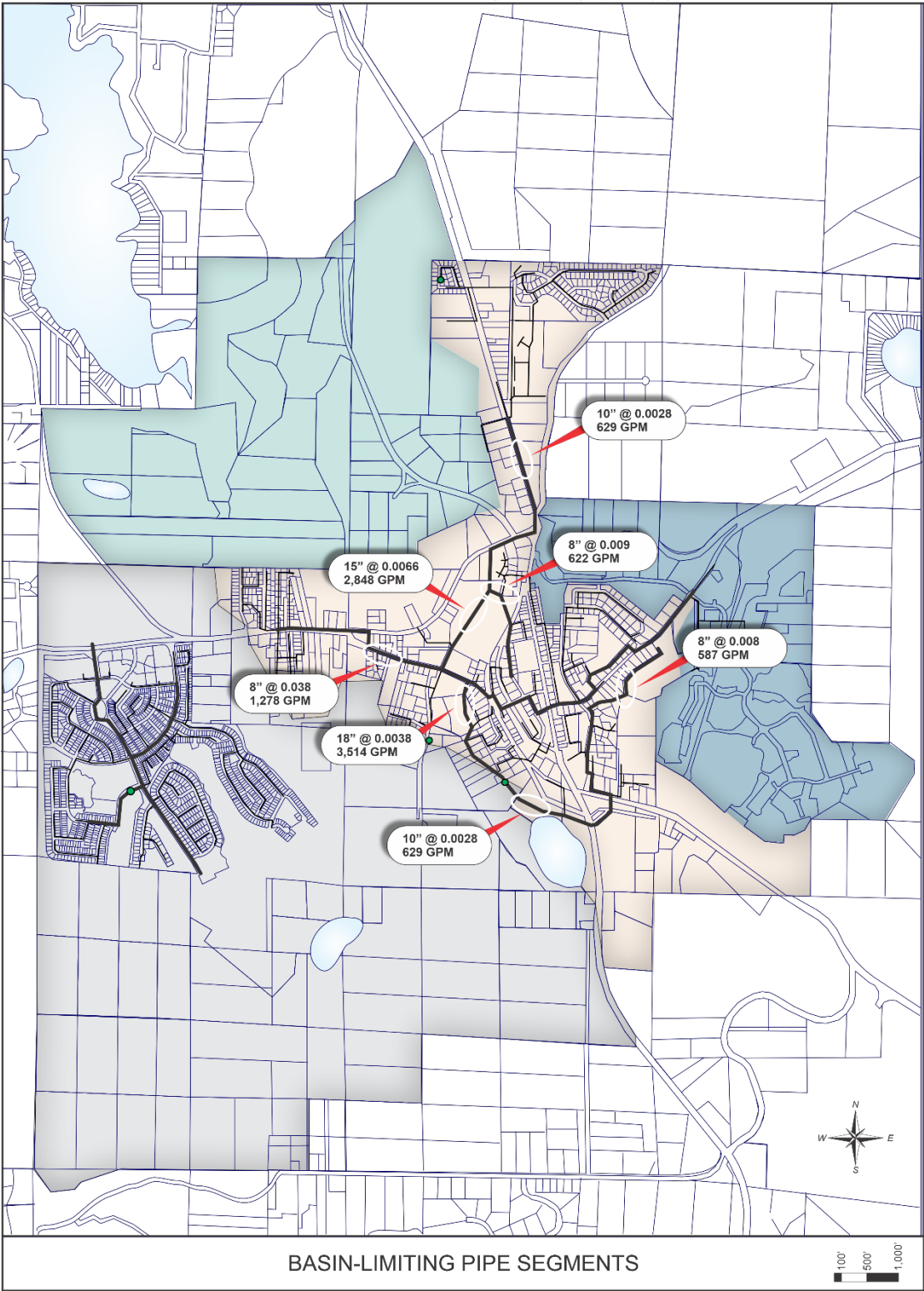
Two types of flow are simulated in the sewer model – average day flow for both dry weather conditions and wet weather conditions. Inflow and Infiltration flows were distributed throughout the system in terms of gallons per acre per day. Flows were distributed throughout the existing Jones Lake Basin based on actual demands from water billing records and unit counts from aerial photos. Flows were then refined and calibrated to match actual measured flow data at the Jones Lake Pump Station.

The sewer system capacity analysis demonstrates that the existing Jones Lake Basin system has sufficient capacity to handle the current Jones Lake Basin flow conditions. Additionally, the main trunk lines of the existing Jones Lake Basin sewer collection system also have more than enough excess capacity to handle all of the in-fill and redevelopment potential within the Jones Lake Basin.

There is not enough capacity in the Jones Lake Trunk Lines, however, to accommodate all of the development in the BD East Basin, and some upgrades will be necessary to accommodate any additional flows from that development.

Figure 17: Existing Trunk Line Capacity

Calculations based on the on-line calculator at:
<http://www.hawsedc.com/engcalcs/Manning-Pipe-Flow.php>



COLLECTION SYSTEM LATERALS

The City has over 1,800 retail wastewater customers. The current mapping system does not contain a complete listing of all installed laterals serving these customers. The Black Diamond wastewater system contains single-connection laterals, shared laterals, as well as some “dry” or installed but not currently connected laterals of both varieties.

Laterals are typically treated as appurtenances to the larger conveyance sewer lines. Sewer laterals beyond the right-of-way are located on private property and are privately owned and maintained. There currently is no specific program to monitor and upgrade sewer laterals other than replacing sewer laterals on the public side in conjunction with already scheduled collection projects.

Should future investigations identify any benefits of assistance programs for side sewer repairs, a program would be explored at that time. Currently, lateral improvements will be included in the cost of work on the adjacent main or trunk; and the level of work, replacement, repair, or re-use will be determined by the circumstances of each project.

SUPPORT INFRASTRUCTURE

For the purpose of the Capital Improvement planning process, City assets that are not discussed as a direct part of the wastewater system in the preceding sections but are necessary for the proper functioning of the sanitary wastewater utility are included in this section. This includes such assets as:

- Maintenance and Operation buildings
- Significant equipment, such as Vactor trucks and bypass pumps
- Administration building
- Communication and Data Management systems such as:
 - SCADA systems
 - Phone systems
 - GIS systems
 - Billing systems
 - CMMS systems
 - Vehicles

Support Infrastructure Life Cycle Considerations

The costs for the upkeep and replacement of the support infrastructure and assets must be considered when establishing a financial plan for the utility. Known large items may be included as direct line items in the Capital Improvement Plan. Also, under consideration is the establishment of a separate Equipment Reserve and Replacement (ER&R) fund to address these assets. Until such time as an ER&R fund is established, allowances will be placed in the Capital Improvement for these assets. This will help prepare a better financial model when evaluating the options facing the City. This approach is temporary and will likely be revised in the future.

A specific deficiency has been identified in the SCADA communication system. The sewer system is currently integrated into the SCADA system for alarms only. However, the capability to remotely control and optimize the sewer lift station operations may be a valuable tool and result in improved levels of service at a reduced cost. An evaluation and potential systemwide upgrade are included in this Capital

Improvement Plan. Needs have also been identified for improved GPS Systems, improved GIS Systems, Contract Management Systems, and an Integrated Enterprise-wide Software Solution.

The personnel chapter as well as future growth indicates that staffing levels will continue to increase; however, city buildings are at or possibly slightly over capacity. A space needs study has been identified as becoming necessary once the expectations for the future are established. For planning purposes, it is further anticipated that additional square footage of office space, maintenance shops, and garages will be necessary. Given a roughly 200% increase in infrastructure and increasing maintenance and replacement needs over the 2040 planning period, a rough figure of 50% expansion will be used for planning until a space needs study is completed.

ITEM	VALUE	LIFE	Reserve and Replacement Allowance (rounded)
SCADA Hardware/Software	\$250,000	7 years	\$36,000
Business Hardware Software	\$75,000	10 years	\$7,500
Licensed Vehicles	\$150,000	10 years	\$15,000
Construction Equipment	\$350,000	15 years	\$23,000

Emergency Power Evaluation and Administration Generator

A combined project between the water and sewer systems, an evaluation of all emergency power throughout the City including current needs, future needs, and available resources will be conducted.

Remote Site Communication Evaluation and Replacement

A combined project between the water and sewer systems, the existing legacy communications, radios, and R/F equipment used between the remote sites and the main operations center (and staff) should be evaluated and recommendations developed for future communication between the remote sites and the main office.

Lift Station Lighting, Security, and Paving Improvements

Addressing common lighting, security, and paving needs at multiple lift stations.

Wireless Optimized VPN

Evaluation of a wireless optimized VPN solution allowing mobile devices to remain connected to the City network with little or no user intervention which would provide significant productivity improvements for mobile users.

Enterprise GIS

Move to an enterprise GeoDatabase GIS solution which will provide needed strategic asset planning, customer service, and asset management that are unable to be performed currently.

Electronic Content Management System

Provide a centralized records repository for storage and management of electronic records and email to improve efficiency for records retrieval, reduce the risk for compliance with public records requests, centralize the location of records, allow application of records retention schedules to electronic records and email, provide an efficient method for appropriate destruction of electronic records per records retention schedules, and manage draft and final copies of records as appropriate.

Capital Tools

In an effort to keep crews properly outfitted with tools necessary to their daily tasks, the purchase of miscellaneous small tools is necessary. These have been included as a capital need under the heading “Equipment Acquisition” in the Capital Improvement Plan and may include:

- Miscellaneous Hand Tools
- Pneumatic Piercing Tool
- Air Compressor
- SSPH Slip-in Pre-Mix Heater for Asphalt
- Sewer Mainline Point Repair System

Spare Lift Station Motors

In an effort to be more proactive in lift station maintenance, this would include the purchase of a spare pump and motor in the event of failure at each lift station. Each lift station is different and has its own unique requirements and circumstances. As such, each of the spare lift station pumps and motors should be specific to their respective lift station.

Facilities Security Upgrade

This project will bring the City up to date on access control to all facilities. The City will receive a patented key-way system that ensures that no person can make a spare key to enter any facilities. Using a system similar to the NexGen XT System, the City will not only be able to control who has access to each facility, but it will also enable the City to see when a person enters a facility, helping to keep facilities secure.

Vehicles

In an effort to provide adequate transportation equipment for daily operations, the following vehicles have been proposed and included as a capital need:

- Pickup Truck for each new hire
- Vactor Truck
- Lead Truck (Ford F550) or equivalent)

Department Staffing Upgrades

The addition of additional staff in the Public Works Department is to improve workloads and create better coverage. See Chapter 8.

RECLAIMED WATER USE

The sewage produced in the City is sent to King County for treatment. Therefore, Reclaimed Water Use opportunities would be associated with those treatment facilities and have not been further analyzed in this plan.

Recent technological improvements, however, may make it feasible to treat wastewater in small-scale facilities at an economical price. This could potentially reduce the reliance on King County for treatment, lower utility costs, and provide a source for reclaimed water. Policies have already been included in this plan identifying the potential for the use and ownership of reclaimed water. Future plat planning, especially for large-scale developments and MPDs should consider the ability to put reclaimed water to beneficial use and provide facilities to catalyze those opportunities when they are available.

SUMMARY OF EXISTING DEFICIENCIES

The following deficiencies have been identified in the existing system and utility. The proposed remediations and mitigations for these deficiencies are included in Chapter 10.

1. The Utility does not have a viable fund or procedure for replacing assets on a programmed, proactive basis.
2. The Jones Lake Lift Station capacity is compromised by periodic flooding at the lift station site.
3. Several public collection system pipes in the northern portion of the Basin are located on land without an easement or title.
4. The BD West basin does not currently have sufficient capacity to support the full buildout of the basin. This will require the addition and relocation of pumping facilities.
5. The City does not stock replacement pumps and motors for the City's most critical lift stations.
6. The City does not currently have the capability to provide standby power to all of the Lift Stations simultaneously.
7. The existing lift stations are not capable of remote control through the City's SCADA system.
8. Given the size of the utility systems, the City does not have sufficient operating staff.
9. The existing O&M and SCADA communication systems are at the end of their useful life and do not provide sufficient emergency preparedness and reliability.
10. The existing Lift Stations do not have standardized emergency access, lighting, and security configurations. In addition, O&M staff cannot use mobile and remote-enabled devices to access the existing electronic infrastructure without potentially compromising SCADA and Enterprise System security.
11. The sewer utility does not have an electronic record-keeping system nor a viable GIS system and access to timely and accurate information is compromised.

FACILITIES DESIGN AND CONSTRUCTION STANDARDS

5

5. CITY FACILITIES DESIGN AND CONSTRUCTION STANDARDS

Sewer Planning and Design Standards

The City has adopted sewer planning and design standards in an attempt to create a sanitary sewer system that is reliable, safe and affordable. These standards are applied to all developments in the City unless a specific standard has been revised through the adoption of a Development Agreement. The uniform application of standards ensures equity and predictability in the sewer utility. A complete copy of the Standards is included for reference in **Appendix N – Sewer Planning and Design Standards**.

It is the intent of the City that the planning and design standards meet the applicable requirements of the Ecology “Orange Book” and will be updated as necessary to comply with Ecology Standards.

Standards may be revised or modified by the Public Works Director to fit individual or unique situations when the revision provides an equivalent or better level of service, safety, and reliability.

Chapter 13 of the Black Diamond City Code and the Black Diamond Wastewater Comprehensive Plan are the basis for the Standards.

The standards do not include design of special facilities, such as Pump Stations, Grinder Pumps or Sewage Lift Stations. These special facilities require unique design requirements and will be subject to the standards set forth in the Washington State Department of Ecology (DOE) Criteria for Sewage Works Design Manual (Orange Book) and individual review by the City.

Although the standards are intended to apply to physical development within the City, the standards may not apply for all situations in which they may be modified by the Public Works Director.

MAINTENANCE AND OPERATIONS

6

6. MAINTENANCE AND OPERATIONS

GENERAL

The purpose of the maintenance and operations chapter is to describe existing programs at the City used to inspect, operate, maintain, repair, replace, and sustain the wastewater collection and conveyance facilities; and to evaluate the potential impact of future desired programs and known challenges. The chapter will examine five program areas: maintenance and operations, facilities, prevention programs, recordkeeping, and regulatory requirements. As these programs are developed, upgraded, and expanded to meet growing demand, our staff and Council will need to evaluate the need for additional staff.

The City needs staff that are well trained and well compensated. This minimizes staff turnover, which reduces costs and improves level of service. As a part of our planning and preparing to meet the needs of a larger and more complex utility, we propose to increase our staff training budget from \$8,000/yr to \$15,000/ yr. This is included in the Financial Plan.

Infrastructure Maintenance Programs

The installation, maintenance, and operation of wastewater collection and conveyance facilities require significant investment by our community. In order to ensure that the City's system meets the needs of our current customers while preparing for the future, the City maintains its facilities on a regular schedule to ensure reliable service, maximize the useful life of its assets, and keep rates stable.

The following subsections describe the major programs used by the City to ensure a sustainable, affordable wastewater system.

Large Equipment Capability

The City currently lacks the large equipment needed to provide proper emergency maintenance and repairs for the collection system. When this equipment is needed, it is currently rented or provided by contractors, both of which increase costs and delay return to service times. We have identified the following large equipment needs and these are included in the Capital Improvement Plan with major purchases phased in over a five-year period.

1. Vactor Truck,
2. Jet-Rodder Vehicle,
3. Pickup Trucks for new hires,
4. Pickup Truck (F-550 type) for on-call staff and emergency response

Collection System Repair and Replacement

The collection system repair and replacement program is responsible for gravity sewer mains, force mains, lamp holes, and manholes found throughout the four drainage basins. Our wastewater collection staff performs the following functions:

- Assessing and repairing lamp holes and manholes,
- Inspecting trunk lines and interceptors,
- Performing routine flushing of sewer mains (particularly for locations with flat slopes and excessive fats, oils, and grease buildup),
- Repair of sewer main leaks,
- Replacement of sewer facilities.

Part of an effective preventative maintenance program is to track the condition of system assets over time. This helps prolong the life of the sewer collection system by preventing small issues from becoming larger, making the repairs more costly or requiring facility replacement.

As the wastewater collection system grows and ages, the need for increased maintenance and operation and additional staffing is likely. Staff have assessed the levels of service needed for routine cleaning and maintenance including the following:

- Camera and CCTV equipment
- Confined Space equipment (blowers, sniffers, tripods, harnesses)
- Trench boxes
- Crane Lifts for Maintenance Trucks

This equipment is included in the Capital Improvement Plan phased in over a multi-year period.

Performance Indicator: Sewer System Integrity

This measures the number of flow restrictions caused by pipe failure, blockages, pipe deterioration or root intrusion within the City-owned sewer system per 100 miles of sewer main with the goal of three or less sewer collection system failures per 100 Miles of Sewer Main per Year.

Performance Goal:

Three or fewer collection system failures per year per 100 miles of pipe.

LIFT STATIONS

The lift station maintenance and operation program is responsible for preventative maintenance, repair, and operation of the City's lift stations. Lift stations exist where topography does not currently allow for gravity flow to treatment facilities. Our staff is responsible for inspecting, cleaning, and maintaining the stations regularly, including:

- Wet wells and priming systems,
- Physical sites,

- Standby generator testing,
- SCADA/control system,
- Bypass connections.

Our staff works with the neighboring property owners to ensure they are aware of known upcoming repairs.

The City has updated the design standard for our lift stations to help reduce the frequency of cleaning and maintenance. While the City tries to use gravity flow methods instead of lift stations where possible, additional Lift Stations will be needed to serve the north triangle of the Lawson Hills MPD and the Palmer Pit development area. We are also planning to redirect flows in the northeastern corner of the City, which currently flows to the Jones Lake Lift Station.

In addition, staff work to discourage grinder pumps or small-scale Lift Stations serving small areas or individual plats.

AFTER-HOURS STAFFING

It is a priority of the City to provide high-quality, reliable service to our customers at all times. This requires ensuring that all O&M infrastructure is functioning at all hours of the day through an after-hours program, where City staff are on call and available to respond 24 hours a day, seven days a week. Duty personnel are readily available to our customers to solve problems over the phone; as well as respond in person as needed to such emergencies as overflows, backups, locate requests, and lift station malfunctions. The staff is also responsible for monitoring system alarms and lift station failures through the SCADA system. Duty staff has the capability to both call out additional staff and coordinate with other agencies when needed.

PREVENTATIVE MAINTENANCE AND MONITORING PROGRAMS

Preventative maintenance and monitoring programs are a priority that benefits our customers. By consistently monitoring and evaluating the system, the City ensures that facilities last for their expected life and provide maximum value to our customers. This section outlines the programs used to regularly assess and monitor the sewer collection system.

Performance Goal:

Spend 75% or more of sewer system maintenance hours on planned (preventative) maintenance.

CLOSED CIRCUIT TELEVISION (CCTV) INSPECTION

A Closed-Circuit Television monitoring program is needed to visually inspect the interior of sewer pipes for:

- Excessive I/I
- Defects, cracks, and breaks,

- Overutilization of pipe capacity,
- Cross-bores, root intrusion, and other debris,
- To verify the system record drawings.

City staff do not currently have CCTV inspection capability, but it is a necessity to meet our level of service goals. Currently, all CCTV requirements are provided by contractors which delays return to service times and increases costs. The City also uses CCTV inspection before and after construction projects to ensure that sewer mains are not damaged and to identify areas where rehabilitation is a viable option instead of replacement.

The equipment necessary to allow City staff to provide CCTV capabilities is included in the Capital Improvement Plan.

FLOW MONITORING

A Flow monitoring program is needed wherein a series of sensors are placed in selected manholes throughout the City to measure the quantity of wastewater passing through over time. This data is valuable for:

- Advance warning of pipe capacity issues,
- Verifying system demand forecast models,
- Evaluating the necessity of proposed capital improvement projects,
- Identifying areas with excessive inflow and infiltration (I and I),
- Measuring flows to Lift Station facilities.

The City does not currently have a flow monitoring program, nor do they have the equipment to implement a program. The equipment and staff necessary to design and implement a flow monitoring program is included in the Capital Improvement Plan.

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) PROGRAM

SCADA is an automated operating system tool that allows City personnel to remotely view the performance of equipment at City lift stations and at select locations in the collection system. It records data for trend analysis and provides an overview of the entire system allowing our staff to monitor and manage system processes.

The City staff is focused on managing and upgrading the current SCADA system to improve the longevity of its components. Our staff is responsible for the operation and maintenance of the system, servers, and all related equipment. The development of an annual preventative maintenance program is also a priority.

Major challenges for the SCADA program are to ensure that staffing levels are adequate for fulfilling and updating preventative maintenance programs, and that the unique technical skills of those who work on the system are developed in our current workforce.

In general, SCADA for the sewer system is different than SCADA for the water system. Whereas water system facilities are remotely controlled, lift stations are more reliable when they are locally controlled. In this case, SCADA is primarily used to log operating information and not for remote control. In the City's

system, SCADA will be used to interlock the existing Jones Lake Lift Station with the proposed Ten Trails Regional Lift Station so that each station can be optimized to pump into the downstream interceptor pipe (owned by King County) without overflow or inundation.

A program to include remote monitoring and control optimization is included in the Capital Improvement Plan.

SECURITY

Security of the City's facilities falls into three primary categories: physical security, active security, and preventative security. The City regularly inspects its satellite facilities and renovates existing facilities to restrict and monitor unauthorized access. As part of the emergency planning process, the City plans to regularly update its various vulnerability assessments to evaluate emerging security issues and add needed improvements to the Capital Improvement Program.

Additional information can be found in Chapter 7.

The Capital Improvement Plan includes projects to improve security through lighting, fencing and improved access at the existing Lift Stations.

FACILITY, EQUIPMENT, AND FLEET MAINTENANCE AND INVENTORY

To maximize the performance, safety, value, and availability of needed resources, the City completes preventative maintenance on its buildings, equipment, and vehicles. The City is in need of additional equipment and facilities to properly maintain its inventory of tools, equipment and rolling stock. This includes the following specific projects:

- Covered storage space for equipment and tools,
- Additional office space,
- Storage space for tools and equipment,
- Decant facility for Vactor spoils.

The Capital Improvement Plan includes a study to identify the most effective and efficient way to meet the facility, equipment, fleet maintenance and inventory management needs of the sewer utility. This project should be coordinated with the needs of the other departments (water, stormwater, streets, parks) for shared services. Implementation of the results of the study are not included in this Capital Improvement Plan but will be estimated and prioritized after the study is complete.

FACILITY MAINTENANCE

In order to improve work quality and provide cost-effectiveness to our customers, facility maintenance is primarily conducted by City staff. Our staff is responsible for janitorial services and grounds maintenance, as well as electrical and mechanical maintenance at all City buildings and facilities. The desired effect of City facility maintenance programs is to continue to ensure reliable service to our customers, increase the life of facility components, and present well-kept facilities to our customers and neighbors. In the future,

the City will need to focus on developing preventative maintenance programs and expanding facilities maintenance. As the utility grows, additional staff will be needed to meet our maintenance obligations. Those staff are included in the Capital Improvement Plan.

EQUIPMENT AND FLEET MAINTENANCE

The purpose of the equipment and fleet maintenance program is to increase the longevity of mechanical assets, provide diagnosis and repair of equipment malfunctions, and to complete preventative maintenance on City equipment and vehicles. The City's fleet is on a rotational maintenance schedule based on mileage, which is tracked through the fuel management system. Our staff is also responsible for annual emissions testing and for weatherizing vehicles on a biannual basis.

Equipment and fleet maintenance is primarily completed by City staff which maximizes resources by minimizing the costly outsourcing of such maintenance. Equipment and vehicles are replaced as needed. As vehicles are replaced, the City should examine the use of hybrid, electric and biodiesel vehicles in order to lessen the environmental and cost impact of the vehicle miles traveled by City staff.

INVENTORY

In order to effectively complete the maintenance and operation of system infrastructure, the City keeps an inventory of needed parts and equipment in stock. An inventory tracking program is needed to maintain and organize parts and equipment.

Quarterly and annual checks are completed in cooperation with the Finance Department to ensure the accuracy of supplies and accounting. The use of an automated tracking system would enable inventory staff to receive parts and pay vendors in a timely manner which, in turn, helps to improve the City's credit rating and relationship with regular vendors.

An inventory control and management program (software) is included in the Capital Improvement Plan.

RECORDKEEPING AND REPORTING

All organizations rely on information to function effectively. Good recordkeeping includes appropriately recording, storing, and managing records so that information is available when it is needed. It is important to have processes in place that encourage good recordkeeping practices and provide context for the information stored. The City uses several methods to create, share, and store data, including those described below.

MAINTENANCE MANAGEMENT SYSTEM

The City does not currently use a computerized maintenance management system (CMMS) to track the design, installation, maintenance, and replacement of assets. Assets include facilities (i.e., lift stations), buildings, vehicles, large and small equipment, sewer pipes, pumps, and personnel. Automating routine maintenance would significantly help with scheduling staff,

ensuring adequate supplies are available for maintenance work, tracking trends, and improving the City's ability to respond to emergencies.

The Capital Improvement Plan includes the selection and acquisition of a CMMS system for maintenance management.

MAPPING AND GEOGRAPHIC INFORMATION SYSTEM (GIS) PROGRAM

Accurate maps of the sewer system are critical to everyday functions, such as locating facilities and pipes, identifying record drawings, and providing customers with side sewer location and other useful information. The City currently uses a schematic map of City facilities overlaid onto King County parcel data. This map is modified over time to reflect record drawings, new construction, and field corrections.

The City has a GIS system that is currently not used to its full potential due to a lack of staffing. Additional staffing, in part to load and maintain accurate system information, is included in the Capital Improvement Plan.

RECORDKEEPING AND REPORTING

The City strives to comply with all recordkeeping and reporting requirements found in its NPDES permit set by DOE and by the Public Records Act. Currently, records in the City are kept in multiple locations. The City should implement a records management plan and policy which is charged with the oversight of records in the City and with procuring an electronic records management system. As part of this process, staff should evaluate which records can be stored solely in electronic format in order to free up physical space for other uses. It is likely this system will include the other utilities in the City (streets, water, park, stormwater), and any record-keeping system should adequately serve all the various utility needs.

The Capital Improvement Plan includes the acquisition of a new electronic records management system to track all paper and electronic records and improve the City's ability to respond to public records requests. This will require an analysis of the staff, resources, and equipment needed to manage this program, which might not be reflected in the staffing needs of the utility.

REGULATORY ENVIRONMENT

State and federal legislative bodies enact regulations on the wastewater industry in order to promote public health and minimize or eliminate environmental impacts. Compliance with these regulations requires that organizations develop and implement standards that meet or exceed the law. Due to the increasing number of regulations and anticipated future regulations, the City examines the requirements holistically in order to limit duplication of effort. The primary regulations which impact wastewater services are described below.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

Under the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) program regulates point sources that have the potential to discharge pollutants directly into surface water, such as oceans, lakes, rivers, or streams. The majority of the requirements for compliance under

the NPDES permit are administered by King County in conjunction with off-site treatment. We do not expect the city to need additional staff or resources for this program in the near future.

PUGET SOUND WATER QUALITY MANAGEMENT PLAN

The State adopted RCW 90.71 in response to the passage of the Federal Water Pollution Control Act in order to establish the need for a Puget Sound Water Quality Management Plan (PSWQMP). The State and many local jurisdictions were finding a lack of dissolved oxygen in south Puget Sound and Hood Canal, as well as documenting alarming changes to wildlife and habitat in the Puget Sound region.

Currently, all WWTFs in the Puget Sound area are completing baseline studies to assist with the development of this plan.

We do not expect the city to need additional staff or resources for this program in the near future; however, it is likely that sometime in the future this program may affect city staff and resources.

SEWAGE SPILL RESPONSE PLAN

The City takes its responsibility to respond to sewer spills seriously and does so in a manner that protects public health, the environment, and affected customers while meeting the regulatory requirements outlined in the NPDES permit. When the City is notified of spills or overflows during normal work hours, essential personnel are assembled immediately to respond. During non-business hours, on-call personnel follow standard operating procedures.

For collection system overflows in State waters (Lake Sawyer, Jones Lake), the City's reporting protocol includes notifying DOE, DOH Shellfish Program, DFW, King County Surface Water Management and Health District immediately when required. Affected municipalities are notified by the next business day or within 24 hours, whichever comes first.

For spills that affect private property, whether inside a structure or outside, the City's insurance pool is involved to ensure that cleanup occurs as quickly as possible. As spills occur, the City reviews and updates its sewage spill response plans as needed.

The City's Spill Response Plan Includes the Following:

1. Life Safety

The City will accomplish all reasonable achievable tasks to assure the health and safety of City employees and the public.

2. Incident Stabilization

The City will accomplish all reasonably achievable tasks to bring order to and control to the emergency event.

3. Property Preservation

The City will accomplish all reasonably achievable tasks to minimize damage to the City facilities or damage to customer properties that result from the City's sewer systems.

4. Situation Repair

The City will accomplish all reasonably achievable tasks to fix the issue caused by the event.

5. Debrief

The City will accomplish all reasonably achievable tasks to minimize the event from happening again in the future, along with documenting and reporting the event to other agencies as needed.

Potential Future Requirement: Capacity Management, Operations, and Maintenance (CMOM)

The Capacity Management, Operations, and Maintenance (CMOM) program is a framework of best practices for better managing collection systems, investigating areas with potential capacity issues, and responding to sewer spill events. Once adopted by USEPA and implemented by the City, maintenance activities will shift from entirely or partially “reactive” to “predictive.” This often leads to cost savings through avoiding overtime, eliminating emergency construction costs, reducing insurance premiums, and lowering the possibility of legal actions against the City. CMOM principles can also help improve communications with the public, regulators, and other public agencies.

When planning for CMOM, the City will select performance goal targets and design CMOM activities to meet those goals. The framework covers operations and maintenance planning, capacity assessment, capital improvement planning, and financial management planning. Some of the programs currently employed by the City, which align with the CMOM framework include:

- Routine cleaning of pipes,
- Manhole inspection program,
- CCTV inspection program,
- Lift station cleaning program.

While CMOM is not currently required as a part of our NPDES Permit, we anticipate that will change in the future. In order to continue preparing for a future CMOM regulation, the City is working to add formal easement clearing and manhole inspection programs, increase the frequency of CCTV inspection, and train staff on a nationally recognized coding system to allow the import of inspection data into the City’s modeling software.

EMERGENCY PLANNING



7. EMERGENCY PLANNING

GENERAL

The City continuously provides water and wastewater services that are vital for the health and economic viability of the community and for maintaining a high standard of living for our customers. These services are often undervalued or overlooked since they fail so rarely. Significant damage to the system can cause catastrophic immediate health effects in addition to cascading, disruptive impacts to other sectors of the community and economy. Impacts can easily extend well beyond the utility to the closure of schools, businesses, and hospitals.

In order to effectively prepare for an emergency, the City must assume that all of its customers are dependent on its services. In other words, 100% of the City's customers are reliant on the City's water supply and probably do not have alternative sources (such as a well) or an emergency store (approximately one gallon per day per person). The United States Department of Homeland Security (DHS) has designated water and wastewater systems as "critical infrastructure," or systems that are vital to the basic functions of the nation. DHS and the United States Environmental Protection Agency (EPA) work to identify and reduce risks to water and wastewater infrastructure, improve system resiliency, and to develop standards for emergency planning and response.

Complacency on the part of the City can have significant consequences. To maintain reliable service and ensure the safety of City customers, investing in the City's preparation to sustain or quickly reestablish service through all types of emergencies must outweigh the low probability of an event occurring. The City should establish a standing employee committee responsible for developing, implementing, and maintaining the City's emergency preparedness, response, and recovery efforts.

The City completed a comprehensive Risk and Resiliency Assessment and Emergency Response Plan in 2021 in compliance with the 2018 AWIA requirements. This Chapter is not a repeat of that plan, but rather a supplement that compliments that plan and provides a bridge to the competing responsibilities and resource needs of emergency planning.

PREPAREDNESS

There are many different types of emergencies that can affect the City and our ability to provide service to our customers. Earthquakes are of particular concern due to the potential for widespread damage and the high likelihood of major, long-term disruption. Other emergencies, such as severe weather or landslides, can also have a high impact but tend to be localized and manageable under the City's existing capabilities. For the purposes of this chapter, the City's customers include our retail customers as well as those organizations that depend on the City in order for them, in turn, to provide their services in an emergency, such as the fire department, the police department, the Community Center, etc. In turn, the City is equally dependent on King County for wastewater treatment, local agencies for transportation infrastructure, and Puget Sound Energy for power. Preparation for emergencies includes developing and strengthening partnerships with these and other key public agencies to ensure a timely and effective response.

It is clear that the consequences of disruption to the City's system are high, and that destruction or debilitation of the City's infrastructure and facilities will have cascading impacts on emergency services, the economy, public health, as well as to the confidence of the community in the City. The City recognizes that it is not possible to fully eliminate vulnerabilities to its systems or resources, as there are many influences beyond our control. Continuous improvement of the system in response to vulnerability assessments and minor emergencies is critical to maintaining vigilance and ensuring the safety of City customers.

VULNERABILITY ASSESSMENT AND EMERGENCY RESPONSE PLANS

The purpose of a vulnerability assessment is to evaluate the system for potential weaknesses and to identify policies, processes, and corrective actions that can reduce risks to the system.

A vulnerability Assessment, completed in 2020, is included in this plan under a separate cover. These plans are not typically available to the public.

Our vulnerability assessment provides a road map for prioritizing preventative work. The City's goal is to review our vulnerability assessments and emergency plan annually, and to update these documents after every significant event or as the system changes and as required by State or Federal law.

The purpose of an emergency response plan is to describe the actions and resources needed to limit or eliminate the impact of natural disasters or attacks on the system.

An Emergency Response Plan, completed in 2021, is included in this plan under a separate cover. These plans are not typically available to the public.

SYSTEM IMPROVEMENTS

Currently, very little of the City's infrastructure has exceeded its planned operating life or the length of time it was designed to last. Assets have generally been well-maintained over time, which allows the City to proactively plan for replacement prior to failure. As technology improves and more critical infrastructure systems are integrated with one another, the links between them blur traditional forms of securing the City's systems. While these improvements increase the efficiency and strength of the community and economy, they also provide more opportunities for disruption. Infrastructure is an especially easy target because it covers large areas, goes largely unnoticed, and it is difficult to detect intrusion or tampering.

The investigation of asset management methods could greatly assist the City in mitigating or eliminating vulnerabilities throughout the system and limiting the damage during an emergency. Results of the vulnerability assessment should also be added to the regular work program or the Capital Improvement Program (CIP) on an ongoing basis. The City should evaluate various risk assessment methodologies to apply to CIP proposals and assist with prioritizing projects.

Typical preventative system improvements may include:

- Intrusion detection devices,
- Physical barriers and lighting,

- Tamper-proofing of facilities,
- Rekeying of locks and an access policy,
- Continuous updating and protection of computerized or other electronic systems,
- Emergency preparedness and response training,
- Careful use and storage of chemicals,
- Security screening of employees and contractors,
- Power and telecommunications redundancy (i.e., backup generators at remote sites); and
- Regular interaction with other utilities and partner agencies, including local law enforcement and businesses, to build relationships and understanding about the importance of the water and wastewater systems.

Collection systems security devices such as manhole locks, intrusion sensors, or chemical sensors can require significant funding to retrofit or replace the thousands of access points throughout the City. The City should retrofit security devices to those locations where there is reported activity or where routine inspection indicates tampering.

EDUCATION AND TRAINING

As noted in Chapter 8 – Personnel, the City is facing the upcoming retirement of personnel with valuable legacy knowledge and operating experience. Many of these employees have served at the City for well over a decade and have developed considerable expertise and familiarity with the system they helped to design, build, and maintain. Succession planning is crucial for passing on this knowledge in-house and sustaining the City well into the future.

AGENCY COORDINATION

The City does not operate independently – we depend on transportation, telecommunication, energy, manufacturing, and other sectors to provide our services. We rely on King County and Soos Creek to treat our wastewater and on local agencies to keep roads and bridges in good repair. As noted in the introduction to this section, other agencies are equally reliant on the City to provide services. Fire departments and clinics cannot function for long without the City's infrastructure is intact. This interdependency between organizations means that during an emergency we must all work together in close coordination to restore service.

Cooperation between local, state, and federal partner agencies during the planning process is critical for effective response and recovery during an incident. While the City has some existing agreements in place, described in Chapter 2 – Related Plans, Agreements, and Policies, the City plans to expand and improve these partnerships in the future.

COMMUNICATION

Clear, effective communication is a necessary and vital part of preparing for, responding to, and recovering from an emergency. Customers, employees, and other agencies all need to know what to

expect from the City and when service will be available. During an emergency, City staff will need to provide accurate, timely, and consistent messaging that clearly relays information to those who need it. Just as we have a wide variety of customers, we also have a wide variety of emergencies we will need to respond to. Developing potential messages and practicing communication strategies in advance is critical for ensuring the City is as transparent as possible about emergency response and can better meet the needs and expectations of our customers and the public.

The City's existing communication plan includes key contact information for staff, schools, partner agencies, and news organizations; communication policies and protocols; notification procedures; and worksheets for responding to frequently asked questions.

RESPONSE

Local responders are responsible, at a minimum, for the first and final phases of emergency response. In a particularly large regional event, such as an earthquake, the City should expect that it may not receive adequate outside assistance for days, weeks, or possibly even months. Water and wastewater systems are particularly important to recovery efforts after a natural disaster. Full-fledged emergencies are also often overwhelming and chaotic in the first few hours of response.

The City handles minor emergencies every day and has well-practiced processes in place to handle these issues effectively. Swift response times, though beneficial, have an unintended consequence: City customers are accustomed to the near-immediate restoration of service. The longer the City and the region go without a major emergency, the more important it becomes to manage customer expectations and educate the community about how to prepare. The City should establish and maintain a standing committee to plan, evaluate and guide staff in emergency preparation and response.

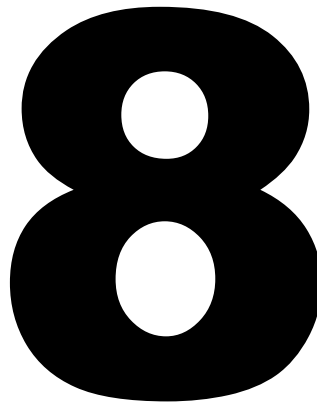
RECOVERY

The recovery phase of an emergency begins once the initial impacts from that emergency are stabilized and City operations begin to return to normal. At this point, the City can begin rebuilding and replacing infrastructure, and most customers have access to water and wastewater services. These services may not yet be available in all homes and businesses, but alternatives are in place until the systems can be fully restored and operational. As with the emergency itself, the recovery phase can last weeks, months, or years, depending on the scope and scale of the incident. The City will need to restore our water and wastewater infrastructure and facilities for the community to fully rebuild and recover.

The City understands that while it is not possible to know the unique circumstances of an emergency in advance, it can anticipate the most likely needs during the recovery process. Recognizing and planning for these needs in advance can help inform the City's strategy during an emergency response and improve the City's ability to act. Recovery planning can also ensure that the City has the resources to rebuild affected portions of the system in a way that mitigates potential hazards and enhances the sustainability of the system.

The City should place a priority on evaluating and updating the recently completed Risk and Resilience Assessment and the Emergency Response Plan so that both documents are current and relevant.

PERSONNEL



8. PERSONNEL

Our employees are a vital resource in accomplishing the mission of the City. They manage the utility billing process and provide customer service, assist developers in following City standards when expanding the systems, ensure that City infrastructure is built and maintained in a reliable and effective manner, and protect the environment by collecting and conveying wastewater in compliance with all required regulations and laws. These are important jobs that have a direct impact on the health of the community. Because the work of City employees is so important, the purpose of organizational staffing and development programs is to recruit, develop, and retain the best available talent. This chapter describes the current workforce and the various efforts the City is undertaking or will be in the future.

THE WORKFORCE

Utility Employees in the City report directly to the Public Works Director or the Major Development Review Team Director, each of whom in turn reports to the Mayor.

Despite population growth (especially within the MPDs), additional regulatory requirements, a significant increase in buried pipelines, infrastructure maintenance needs, and many other factors, the City's sewer workforce has not grown over the past ten years.

The City is committed to increasing efficiencies in the future through process improvement and evaluating the level of success and effectiveness of the current work programs.

STAFFING TURNOVER

The City historically has a low turnover rate, averaging fewer than one employee per year.

Staff with a low turnover rate has many benefits including experience, institutional knowledge, familiarity with the community, and security, and a low turnover should be a City objective. However, longevity and low turnover rates do not come without challenges. If trends continue, the age groups of employees that will see the most growth over the next five years are those in their 20s and 50s. This means the City workforce will have many new, inexperienced employees and some longer-serving, experienced employees who are beginning to think about retirement.

In order to capitalize on the strength of its workforce and prepare for vacancies in key positions, the City plans to implement a succession planning program. Although the City believes that outside competition is vital to success and requires all leadership positions be filled through a recruitment process that includes external candidates, it also believes that developing lines of succession will ensure that our customers and ratepayers will continue to benefit from the skills of the current workforce into the future.

The City should plan to implement a leadership development program to support succession planning efforts. The program includes many goals such as increasing the number of internships offered in the City and providing targeted training and development opportunities to employees. The City believes that developing good leaders will increase innovation, creativity, efficiency, and productivity while improving communication, clarifying the City's mission and vision, and ensuring the organization is prepared for the future, especially as the City grows from a small community to an expanding, vibrant city. The leadership development program should be in line with the City's mission to be a leader in customer service, environmental stewardship, and regulatory compliance. Our customers will benefit from a leadership program, which will support the City's goal of being a desired employer in the region, engage and retain employees, prepare for future job vacancies, break down communication barriers, and improve decision-making at the City.

LEVELS OF SERVICE

The City expects that work program growth will impact the Utility's staffing needs over the coming years. Growth may occur in the following areas:

- Closed Circuit Television (CCTV) Inspection
- Easement Inspection and Maintenance
- Equipment and Fleet Maintenance
- Financial Analysis and Billing
- Management Analysis
- Project Engineering
- Recordkeeping and Reporting
- Supervision and Management
- Supervisory Control and Data Acquisition (SCADA)
- Training Coordination
- Wastewater Collection System Repair and Replacement
- Wastewater Flow Monitoring

Decisions regarding the development or growth of any work program will ultimately be made by the Council after factoring in population growth, community demographics, regulatory requirements, the economy, available budgeted resources, the desires of City customers, and other factors.

SAFETY

The City's safety program applies to all employees of the City as well as vendors, contractors, and visitors. Our safety program has been developed on the principle that all accidents and on-the-job injuries can be prevented through increased awareness and the implementation of sound policies, practices, and procedures. The Council and Mayor's office are charged with providing the safest workplace possible, and all employees are accountable for following all written or unwritten rules, being aware of hazards, and preventing accidents and injuries.

As part of our efforts to keep employees safe, the City has an accident prevention program. The purpose of the program is to outline management and employee responsibilities in regard to safety, the duties and

functions of the safety committee, hazard prevention, and reporting procedures, emergency plans, as well as orientation and training efforts. The City also has programs and procedures in other areas including confined space entry, fire safety, first aid, accident investigations, climbing and lifting, lock-out/tag-out, fall protection, personal protective equipment (PPE), and hazard communication. Employees are provided with training in these areas on a regular basis.

In the event that an on-the-job injury does occur, the City works with the injured employee in order to ensure they return to work as soon as possible. The City should implement a light duty/modified job assignment program that provides doctors with more options to release injured employees back to work.

In the past five years, the City's safety program has had a positive impact on reducing the number of hours employees are injured and away from work.

STAFFING

We have estimated the staffing levels needed to respond to the anticipated and unanticipated work demands in the sewer utility. The following Table lists the work hours required for a variety of Maintenance Worker tasks. The sewer utility currently employs 1.8 FTE and based on this assessment; the sewer utility is marginally understaffed.

Table 20: Sewer Maintenance Worker Hours by Task

TASK	HOURS/DAY	HOURS/WEEK	HOURS/YEAR	TOTAL HOURS
Scheduled				
Check Lift Station	6			1,560
Manage SCADA Data		8		416
Organize Tools and Equipment		4		208
I/I Reduction Program		4		208
Pipe Cleaning/Jetting		8		416
Smoke Testing			96	96
TV Inspections			64	64
Safety Training			64	64
Professional Training			128	128
Manage Crews	2			520
Manage Billing and O&M	2			520
Facility Maintenance		4		208
Manhole and Structure Repair		4		208
Unscheduled				
Customer Requests		8		416
Pipe Repairs		16		832
LS Rag Remediation		8		416
Odor Investigation		1		52
Misc. Construction		8		416
Lift Station Repairs		4		208
Subtotal Man Hours				6,956
FTE (2080 hrs/yr/FTE)				3.3

The Financial Plan includes additional staff phased over an eight-year period. A new position, Sewer Lead, is proposed to be added in 2026 with another FTE (Utility Worker II) added in 2029 and another in 2032.

INFORMATION TECHNOLOGY

9

9. INFORMATION TECHNOLOGY

Effective information technology (IT) solutions help employees accomplish the City’s mission by managing information related to service, infrastructure, and resources. Employees use these tools to maintain the systems that deliver clean water, collect, and treat wastewater, bill for services, communicate with customers, share information, plan for future needs, and maintain compliance with regulations. Since employees are one of the City’s most vital resources, the purpose of the technology program is to enhance their productivity to allow them to focus on efforts that best serve our customers now and in the future. This chapter describes the current program and improvement efforts.

CURRENT STATE

In addition to common productivity tools like spreadsheets and email, the delivery of service to our customers relies on numerous business applications. While it is impractical to list all these applications, several of the software packages most critical to our operations are shown in **Table 21: Current Software Environment**:

Table 21: Current Software Environment

Software Type	Purpose
Maintenance management	Protects the safety and reliability of system infrastructure by managing work orders, preventative maintenance, assets, purchasing, and inventory.
Meter Reading	Keeps the City financially viable by tracking water use and billing customers for services provided.
Utility Billing	Provides the information needed to set rates, track money, and generate reports required for financial monitoring and audits.
SCADA	Supervisory Control and Data Acquisition software operate the equipment that controls water flow, volume, collection, and treatment of water.
Financial Reporting	A tool for managing employee attendance and hours, allowing employees to continue to repair and maintain our system infrastructure, meet customer service needs, and attend to other operational needs.
Timekeeping and Payroll	Pays the employees that deliver our services, keeping them on the job.
GIS (mapping)	Provides the information necessary to locate our assets and infrastructure for repairs, protection, and maintenance.
Project Management	Manages capital and miscellaneous projects.

The City’s current technology portfolio is the result of the historical practice of workgroups selecting the best solution for their desired function. While this often provides the most specialized tools, it also results in trying to manage the same information in several places, resulting in duplicate data entry, data integrity issues, and increased support requirements.

STRATEGIC DIRECTION

To effectively control customer costs and maximize investments, the City should move to a more holistic philosophy where solutions are selected and implemented according to the combined needs of the entire City. The fast rate of technological evolution provides opportunities to continually evaluate, upgrade, or replace technology. Solutions should be selected by balancing requirements with standardization benefits while prioritizing consolidation and integration. To support this approach, the City should mitigate risks by implementing process improvement strategies, improving communication between departments, providing necessary resources, and promoting collaboration, adaptability, and unity of direction. Meeting business needs with the fewest possible solutions, or a single enterprise solution, will improve efficiencies and make our staff and services more competitive.

PLANNED IMPROVEMENTS

Table 22: Recommended IT Improvements, describes IT projects the City should pursue to address identified needs, enhance productivity, control costs, and improve service to our customers.

Table 22: Recommended IT Improvements

Software Type	Purpose
Infrastructure Replacement	Replace aging servers and storage solutions to maintain business operations and meet records retention requirements.
IT Integration	Consolidate and integrate systems to minimize duplicate data entry and maximize data integrity and accessibility.
Records Management	Implement tools that will reduce liability by improving our ability to maintain and manage records and comply with legal retention requirements.
GIS (Geographic Information Systems)	Implement solutions that support industry best practices for providing map information related to our system and locating buried assets.
Website Design	Identify and implement improvements to our website to increase access to information, provide greater options and flexibility to customers to manage their accounts, and promote utility engagement with the community.
Communication/Intranet	Implement solutions that will improve communication and access to information that personnel need to be efficient, safe, and effective.
Asset Management	Implement tools that inform strategic repair and replacement of our assets to support cost-effective services and improve safety.

In accordance with a new strategic direction, IT projects should be managed, governed, and prioritized based on the combined needs of the City through collaboration with all departments and stakeholder representatives. Relationships and impacts between projects are also continually monitored and managed.

The next several years will be a time of change, opportunity, and improvement for IT within the City. The success of these efforts will depend on the participation, cooperation, and inspiration of City employees.

CAPITAL IMPROVEMENT PROGRAM

10

10. CAPITAL IMPROVEMENT PROGRAM

A capital improvement program identifies, prioritizes, budgets, and schedules projects to address system deficiencies and needs. These deficiencies and needs are identified in Chapter 4 of this Plan. The projects proposed in this chapter are intended to resolve the deficiencies and needs and typically address the following situations:

- Recurring maintenance issues or repairs,
- Preventative maintenance issues,
- Capacity improvements to infrastructure for future growth,
- Replacement of infrastructure at the end of useful life, and
- Planning for the replacement of support assets such as software and vehicles.

This chapter will detail the procedure used for establishing a capital improvement program for the City and present the recommended projects.

SYSTEM OVERVIEW – WAC 173-240-050(3)

As discussed in Chapter 1 - System Description and Chapter 4 - System Analysis, the City's retail wastewater service boundary covers approximately six square miles in southeastern King County. The City's wastewater system includes:

1. Approximately 31.2 miles of pipe including conveyance, collection, and force mains,
2. Four basins served by five active lift stations,
3. Support facilities at the City Administrative and Maintenance and Operations sites,
4. A GIS system consisting of hardware and software packages (shared with the water system),
5. A SCADA alarm system shared with the water system, and
6. Five vehicles and pieces of moving equipment used to maintain and support the system (shared with the water system).
7. No wastewater treatment plants (treatment is provided by King County).

CAPITAL IMPROVEMENT PROGRAM DEVELOPMENT

Numerous models were considered for developing a Capital Improvement Program. These models included the following:

1. **Continuation of historical funding** – wherein the CIP is based upon extrapolating historical expenditures and selecting projects that fit within that annual expenditure. This model was rejected because the City has experienced unprecedented growth and historical CIP funding levels are not commensurate with the effort needed to maintain and replace the system nor are they appropriate for the income currently available in the utility,
2. **Replacement of a uniform percentage of infrastructure** – wherein a selected percentage of the infrastructure is replaced every year with the intent to make a full replacement of all infrastructure before the end of its useful life. This model was rejected because so much of the sewer system is the same age (either installed in the '80s or with the MPD developments) that this would involve replacing improvements well before their useful life is exceeded.
3. **Replacement at end of life** – wherein the infrastructure and assets are replaced at the predicted end of their useful life; and

4. **Path Forward CIP** – wherein the wastewater system infrastructure is replaced based on asset management strategies that are modified by the staff’s capacity to deliver CIP projects.

The recommended Capital Improvement Program uses a combination of the third and fourth models, modified to react to the specific strengths and weaknesses of the Black Diamond infrastructure. We will refer to this as the “Preferred CIP Scenario”.

The basic premise behind the Preferred CIP Scenario is replacing infrastructure at the end of its estimated useful life in combination with reacting to its known deficiencies. This requires a detailed tracking of all of the City’s assets to ensure that the necessary infrastructure is replaced when its approximate useful life has been reached (which could be because of age, condition or capacity). Budget decisions (including rates and spending priorities) are directly related to when the existing assets are anticipated to require replacement and the financial plan must be prepared accordingly. As part of a Preferred CIP Scenario, and to track the replacement of infrastructure at the end of useful life, the large majority of city assets (including all pipelines) would need to be documented, and we do not believe that these records exist nor, if they do, are very accurate.

The Preferred CIP Scenario, described above, is a combination of known scheduled projects and upcoming activities at an expected end of useful life for a 75-year period. While this model can be very useful for gauging long-term needs, it does not account for the actual conditions of assets at the end of their useful life and detailed replacement programming. Scenario Four, the “Path Forward” model described above, uses the assumptions and analysis embedded in the Scenario Three model as a baseline but is also an adaptive approach that evaluates assets near the end of their useful life to maximize the use of the asset while reducing operational risks. Some assets will last longer than the predicted useful life; other assets may require replacement prior to the end of their expected useful life. Accounting for these variations can:

- Reduce risk by replacing assets that are deteriorating faster than expected,
- Maximize investments by retaining assets that remain serviceable longer than expected,
- Extend asset useful life and minimize costs with effective rehabilitation,
- Coordinate available staff resources with the asset replacement needs,
- Level staff workload and hiring/firing cycles, and
- Provide the expected level of service to the consumers at the lowest net lifetime costs.

The Preferred CIP Scenario takes maximum advantage of the City’s situation wherein such a large percentage of infrastructure was designed and constructed by Developers in conjunction with large-scale MPD projects.

The City’s 2013 General Sewer Plan (GSP) identified Capital Projects for system extensions by developers, reoccurring maintenance concerns, and capacity limitations based on modeling. In addition to using the results of the previous General Sewer Plan, this CIP program will consider infrastructure useful life and condition assessments to develop future CIP projects. This CIP relies heavily on the improvements identified in the 2013 GSP but recommends investing in a more rigorous asset management approach for the City to further refine CIP project priorities under the “Preferred CIP Model” model.

This CIP also considered input from a wide range of staff and other sources regarding needs that may not be captured by more traditional evaluation approaches used in previous planning efforts.

The CIP is divided into five functional categories for tracking the proposed improvements to the wastewater system including:

1. Jones Lake Basin Improvements
2. BD West Basin Improvements

3. BD East Basin Improvements
4. Rock Creek Basin Improvements
5. System-Wide Improvements

THE BASIS FOR CIP COST ESTIMATES

Planning level construction cost estimates for pipeline projects were based on a review of several recent projects within and around the City. These costs were then compared against other industry sources to develop a set of planning-level cost estimates. These estimates may vary from the other planning estimates when special conditions apply or more detailed cost estimates have been prepared as a part of other efforts. **Table 23** - Pipeline Project Cost by Size and Length shows the planning level cost per lineal foot for pipeline replacement projects.

Table 23 - Pipeline Project Cost by Size and Length

REPLACEMENT DIAMETER	GRAVITY REPLACEMENT COST BY LINEAR FOOT	FORCE MAIN REPLACEMENT COST BY LINEAR FOOT
2.5"	-	\$320
4"	-	\$480
6"	\$600	\$643
8"	\$804	\$643
10"	\$960	\$768
12"	\$1,128	\$902
15"	\$1,200	-
18"	\$1,512	-

Planning level construction cost estimates for non-pipeline improvements were individually estimated. Those estimates should also be considered planning level estimates, which typically are considered to be very general in nature; final project costs are expected to be within a range of -50% to +100% of the planning estimate. All numbers are in 2023 dollars, and inflation has not been included.

None of the planning level construction cost estimates include specialized construction techniques such as the use of trenchless applications, nor do they give consideration for special materials or equipment.

Table 24 - Anticipated Pipeline Replacement Costs shows a summary of the pipeline assets in the System and the anticipated costs to replace the assets prior to the end of their useful life.

Table 24 - Anticipated Pipeline Replacement Costs

Gravity Pipelines							
Pipeline Size (")	Length	Installed	Age	Remaining Life	Value/foot	Replacement Cost	Annual Amortization
6	1,900	1980	43	32	\$804	\$1,527,600	\$47,738
8	68,700	1980	43	32	\$804	\$55,234,800	\$1,726,088
10	5,700	1980	43	32	\$960	5,472,000	\$171,000
12	11,100	1980	43	32	\$1,128	12,520,800	\$391,275

15	26,800	1980	43	32	\$1,200	32,160,000	\$1,005,000
18	2,300	1980	43	32	\$1,512	3,477,600	\$108,675
MPD 8	23,850	2020	3	72	\$804	19,175,400	\$266,325
MPD 12	7,300	2020	3	72	\$1,128	8,234,400	\$114,367
Total	147,650					\$137,802,600	\$3,830,468

Force Main Pipelines							
Pipeline Size (")	Length	Installed	Age	Remaining Life	Value/foot	Replacement Cost	Annual Amortization
2.5	4,300	1980	43	32	\$320	\$1,376,000	\$43,000
4	1,200	1980	43	32	\$480	\$576,000	\$18,000
6	3,300	1980	43	32	\$643	\$2,121,900	\$66,309
10	3,800	1980	43	32	\$768	\$2,918,400	\$91,200
12	700	1980	43	32	\$902	\$631,400	\$19,731
MPD 8	4,000	2020	3	72	\$643	\$2,572,000	\$35,722
Total	17,300					\$10,195,700	\$273,963

THE IMPACTS OF MPD PROJECTS

The City is currently experiencing aggressive growth due to the active construction of the Ten Trails MPD Development. Within a year or two, we expect that the Lawson Hills MPD Development will also be active, and within a year or two after that, the Palmer Quarry Site may be active.

The Ten Trails MPD and the Lawson Hills MPD are both regulated by Development Agreements that were approved by the Council. These agreements include a philosophy that “growth pays for growth” and ALL the infrastructure needed to service the developments are provided by the project developers and contractors. While this concept is not unique, it is unusual for such a large percentage of the sewer system to be constructed this way. Fully three-quarters of the City’s sewer infrastructure will be built by others under the Development Agreement provisions. In addition, most of the system will be “new” and be of the same age.

In most northwest cities, growth has occurred in small-scale developments over a long period of time which resulted in their sewer system facilities being a variety of ages. In Black Diamond, however, much of the sewer system will be the same age, and it will all reach the end of its useful life at nearly the same time. For this reason, it will be important to establish a replacement fund that can react to large-scale swings in the capital replacement needs of the utility.

In addition to much of the system being the same age (and aging at the same rate), most of the assets in the sewer utility have been built and financed by others and will be built and financed by others in the future. For the purposes of the system analysis and for system rate-setting analyses we have assumed that all of the sewer projects within and in support of the MPDs (Ten Trails, Lawson Hills, Palmer Pit) will not need to be financed by the City. The projects are still listed within the CIP, however, so that they can be tracked and eventually maintained like the older, City-funded, portions of town.

VALIDATION OF PREVIOUSLY PROPOSED CAPITAL PROJECTS

Several capital projects were originally identified in the 2013 General Sewer Plan. A number of these projects have been completed in conjunction with the Ten Trails MPD project. A list of previously identified projects which have not been completed also exists. There is some concern that the list of previous Developer projects is no longer timely. Since the preparation of the previous General Sewer Plan, the MPD projects have not developed as quickly as anticipated. The hydraulic model also significantly overstated average usage per customer and infiltration and inflow (I&I) contributions within the MPD development areas. Therefore, prudence suggests that the capacity projects proposed in the previous General Sewer Plan that have not been constructed should be analyzed and verified before significant monies are spent on design or the construction is scheduled.

Planning for these capacity projects should occur after modeling by the developer in conjunction with Land Use and Utility Permits. We fully expect that facility sizes will be reduced, and project schedules will be delayed in comparison with the assumptions made in the 2013 General Sewer Plan. City staff should be prepared to adjust and reschedule projects as necessary to support the development needs of future MPD developments.

VALIDATION OF SYSTEM CAPACITY

The current wastewater hydraulic model was updated during the 2013 General Sewer Plan. As mentioned in the section above, there are differences between existing measured conditions and the assumptions built into the current Public Works hydraulic model. Accurate specific information can greatly increase the precision of a model's predictions for each of the four individual Basins in the system and obtaining wet and dry weather flow information will also help the City estimate I&I at a basin-by-basin level. Calibrating a new model using flow monitoring equipment, flows at lift stations, and flows at the King County Interceptor will improve the confidence in the modeling software and its output regarding capacity deficiencies. Staff is encouraged to look for opportunities to install real-time monitoring equipment in conjunction with the expansion of the sewer system to develop and maintain an accurate model for planning and maintenance purposes.

ASSET MANAGEMENT

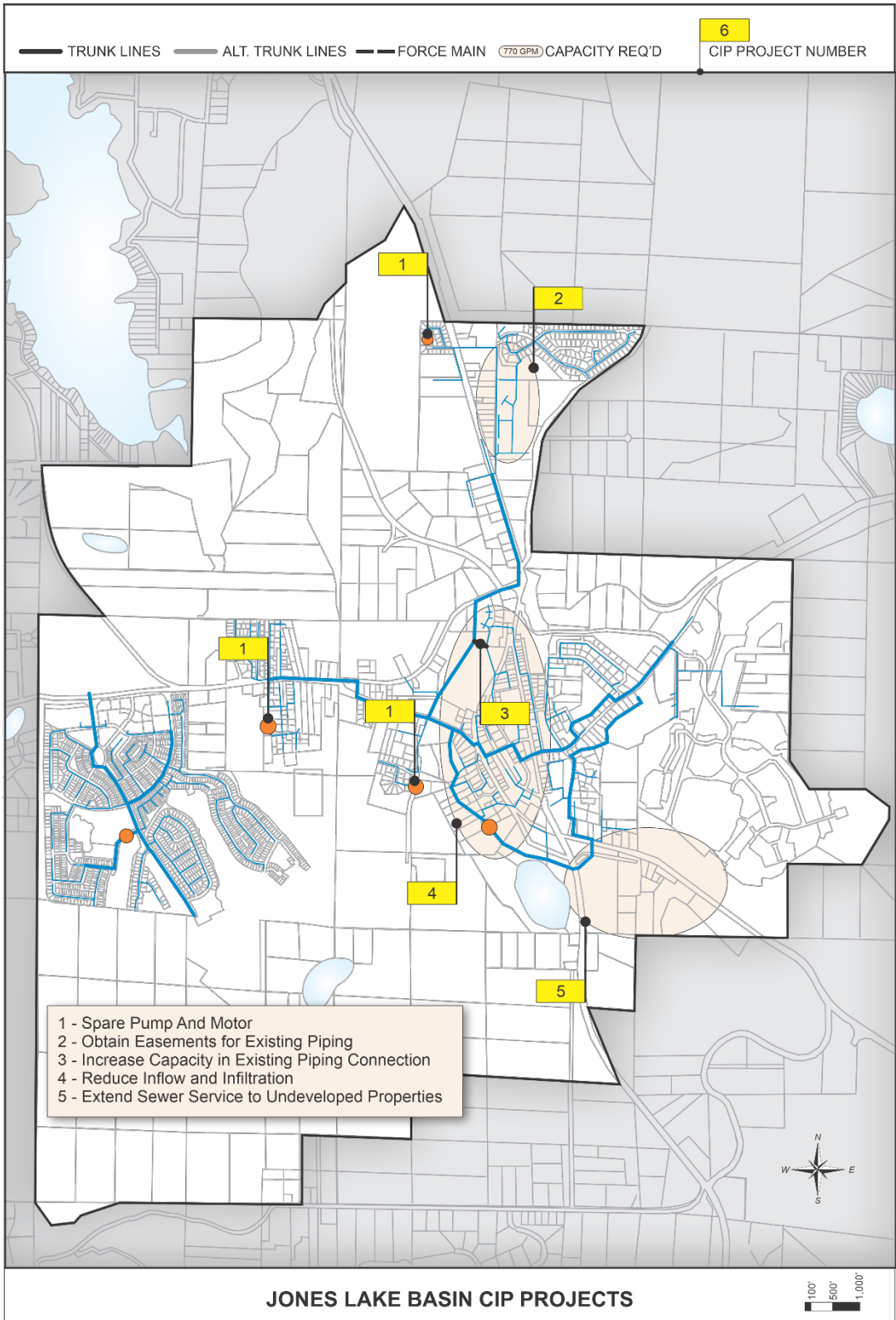
A significant portion of the long-range Capital Improvement Program (CIP) involves replacing system elements as those components wear out at the end of their useful life. However, a blind replacement approach of pipes and facilities at the end of a predicted useful life span would leave the City replacing components before they reach the end of their useful life or responding to the emergency replacement of components that fail before their projected useful life span. This uninformed process would result in either failure causing disruption of service and unacceptable risks or replacing facilities that have many years of service left, leading to unnecessary additional costs. Validation of the proposed replacements is an important part of a responsible approach to the CIP. A new asset management program will allow the City to track, develop, and administer a replacement program with a minimum impact to rates or level of service.

BASIN-SPECIFIC CAPITAL IMPROVEMENT PROJECTS

The following Capital Improvement Projects are intended to accommodate growth, replace aging infrastructure, and improve safety and levels of service in the utility. Each project is shown on the basin map and described in the text.

Jones Lake Basin Improvements

Figure 18 – Jones Lake Basin CIP



CIP 1 - Replacement Pumps and Motors

This project includes acquiring a replacement pump and motor for the Diamond Glen, Morganville, and Ridge lift stations in the collection system. The pump should be replaced with a “chopper-style” pump that can macerate rags and potentially prevent a rag build-up problem in the future at these stations. (note, the new MPD-provided Lift Stations already have rag mitigation equipment installed).

The existing (removed) pump and motor should be rebuilt and shelved for back-up or emergency replacement purposes.

This project also includes the necessary reconnaissance to identify the proper chopper-style pump and motor and to develop a policy and procedure for stocking units in a manner that maintains their operational readiness. (Note: The Ten Trails Lift Station and the Jones Lake Lift Station are not included in this CIP. Ten Trails will be replaced in the next several years by developers, and King County is responsible for maintaining the Jones Lake Lift Station.)

Project Start	2025	Project Completion	2031
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FINANCE	ACTIVITY	BUDGET
2025	Planning and Design	\$20,000
2027	Purchase Diamond Glen	\$15,000
2029	Purchase Morganville	\$45,000
2031	Purchase Ridge	\$15,000
		\$95,000.00
Source of Funds – City Capital Project Fund		

CIP 2 - Collection System Easements

This project includes acquiring easements for the collection system piping that connects the Morgan Creek Development in the northeast portion of the City to the Jones Lake Lift Station. As the mains traverse the Cedarbrook Mobile Home Park, they are located on private property, and the City does not have property ownership or easement rights. This project includes a condition assessment of the piping system and an assessment of the viability to replace and access the existing sewer pipes. Although this CIP assumes that the pipes can remain in service without rehabilitation, that might not be the case after the condition assessment and property negotiations. The budget estimates shown assume the piping system does not need to be replaced.

Project Start	2028	Project Completion	2028
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FINANCE	ACTIVITY	BUDGET
2028	Condition Assessment	\$135,000
		\$135,000.00
Source of Funds – City Capital Project Fund		

CIP 3 - Improve Capacity

This project includes the replacement of an existing section of collection system piping near Diamond Village between Manholes 18 and 162 with a larger pipe. This short section of pipe constraints in-fill development in the lower section of Lawson Hills. For planning purposes, the pipe is assumed to be 12" in diameter and 300 linear feet.

Project Start	2031	Project Completion	2033
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FINANCE	ACTIVITY	BUDGET
2031	Design	\$55,000
2032	Construction	\$170,000
2033	Construction	\$170,000
		\$395,000.00
Source of Funds – City Capital Project Fund		

CIP 4 - Reduce Infiltration and Inflow

This project includes the continuing investigation of inflow and infiltration into the sewer system which is an ongoing project.

Flow monitoring will be needed to determine the significant areas of I & I since a recent investigation does not show that one area of the sewer system is significantly better or worse than another area of the sewer collection system. The control of I & I inflow into the system will stabilize the flows from the older portions of the City's sewer collection system and prevent further degradation of the sewer collection system. There are a variety of rehabilitation/repair techniques that the City may utilize to address the I & I flows into the system, and in this regard, this project identifies an annual, continuing budget for investigation and remediation. Public Works will identify the most effective areas to work on and the most effective mitigation methods annually.

Micro-monitoring is recommended for areas in the Jones Lake Basins where prior flow monitoring indicated significant I/I in the collection system. This involves installing multiple flow monitors where high I/I is observed and breaking larger areas into smaller basins to refine the location of I/I. By micro-monitoring deficiencies identified in the hydraulic model, an isolated location within the area will be identified for remediation. This CIP project includes monitoring (occurs in even years) and remediations (occurs in odd years after a deficiency has been identified). The budget allocation is an estimate of a reasonable allocation of income to maintain a viable and responsible I/I reduction program.

Project Start	On-going	Project Completion	2040
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FINANCE	ACTIVITY	BUDGET
Even years	Flow Monitoring	\$15,000
Odd Years	Remediation	\$25,000
		\$40,000.00 (every two years)
Source of Funds – City Capital Project Fund		

CIP 5 - Extend Service

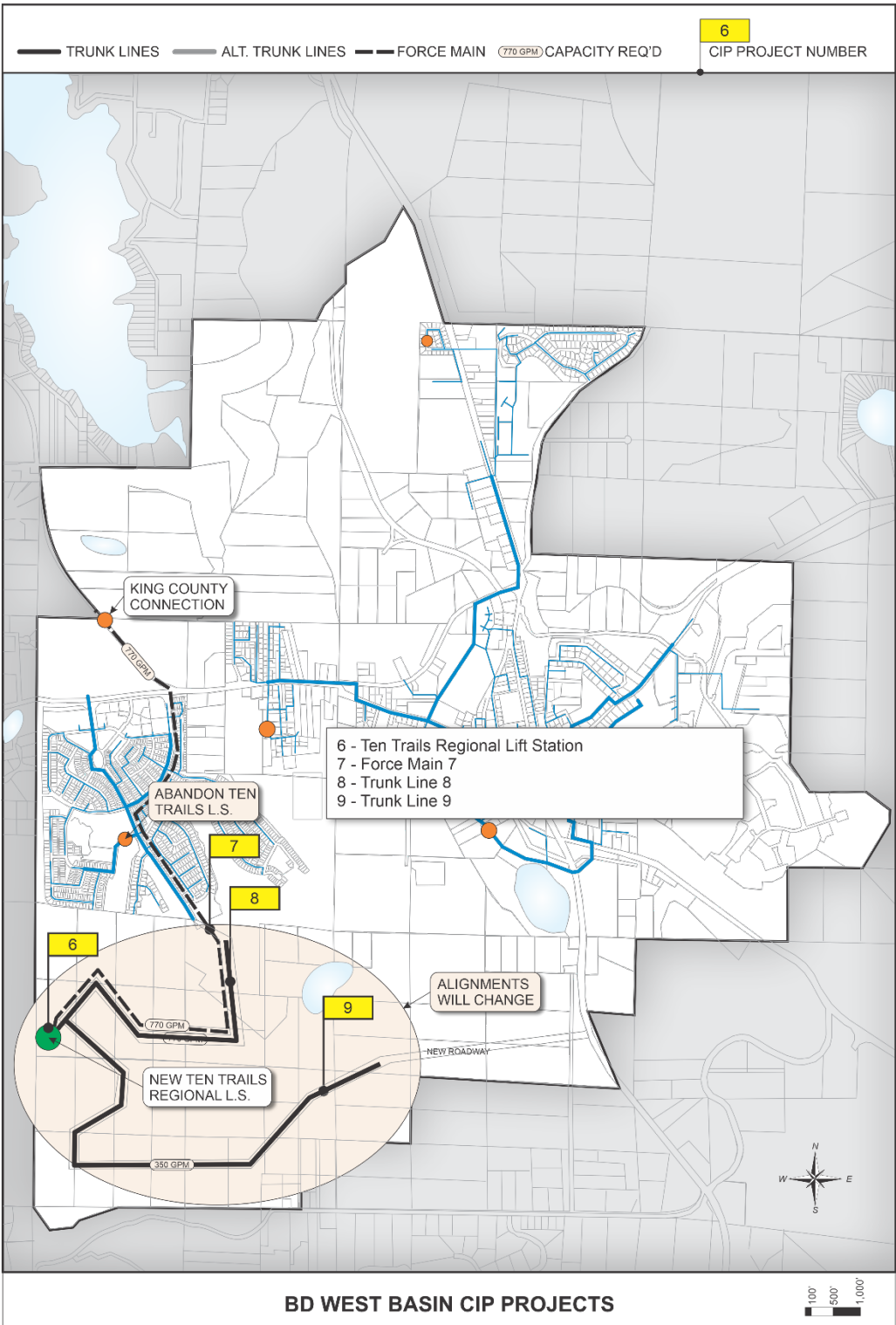
This project includes the extension of collection system piping into the southeast portion of the Jones Lake Basin as this area develops in the future. This area is not a likely candidate for an MPD-style growth project and, therefore, the extension of sewer into this area will likely be the City's responsibility using funds collected from connection fees.

Project Start	UNK	Project Completion	UNK
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FINANCE	ACTIVITY	BUDGET
UNK	Extend sewer collection system	\$5,000,000
		\$5,000,000.00
Source of Funds – Connection Charges/Capital Facility Charges		

Black Diamond West Basin Improvements

Figure 19 - BD West Basin CIP



CIP 6 – Ten Trails Regional Lift Station

This project includes the construction of a new regional-scale lift station to replace the existing Ten Trails Lift Station. This location allows a single lift station to serve all the Ten Trails MPD development. The station will be rated for 800 gpm capacity with an integral flow-equalizing basin that is sized to accommodate 24 hours of peak flow. The station will also include integral rag-control equipment, odor control, security fencing, storage for some park dept equipment, and a remote ops restroom. This facility will be constructed by the Developer in conjunction with housing under the Ten Trails Development Agreement.

Project Start	2024	Project Completion	2025
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FINANCE	ACTIVITY	BUDGET
2024	Planning and Design	\$400,000
2025	Construction	\$2,200,000
		\$2,600,000.00
Source of Funds – Developer Funded		

CIP 7 – Ten Trails Regional Force Main

This project includes the construction of a new force main to connect the Ten Trails Regional Lift Station to the King County Interceptor in Lake Sawyer Road. Some of this force main is complete and operational (serving the existing Ten Trails Interim Lift Station), and this project requires approximately 8,000 feet of force main extension. The force main is expected to be 12” diameter ductile iron. This piping will be constructed by the Developer in conjunction with housing under the Ten Trails Development Agreement.

Project Start	2024	Project Completion	2025
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FINANCE	ACTIVITY	BUDGET
2024	Planning and Design	\$150,000
2025	Construction	\$3,400,000
		\$3,550,000.00
Source of Funds – Developer Funded		

CIP 8 – Ten Trails Trunk Line 8

This project includes the construction of new collection system piping to connect the existing Ten Trails Interim Lift Station to the new Ten Trails Regional Lift Station. This piping will be constructed by the Developer in conjunction with housing under the Ten Trails Development Agreement.

Project Start	2024	Project Completion	2025
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FINANCE	ACTIVITY	BUDGET
2024	Planning and Design	\$250,000
2025	Construction	\$4,000,000
		\$4,250,000.00
Source of Funds – Developer Funded		

CIP 9 – Ten Trails Trunk Line 9

This project includes the construction of new collection system piping to connect the southeast portions of the Ten Trails Development to the new Ten Trails Regional Lift Station. This piping will be constructed by the Developer in conjunction with housing under the Ten Trails Development Agreement.

Project Start	2028	Project Completion	2030
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Design	\$250,000
2029	Construction	\$2,000,000
2030	Construction	\$2,500,000
		\$4,750,000.00
Source of Funds – Developer Funded		

Black Diamond East Basin Improvements

Figure 20 - BD East Alt 1 CIP

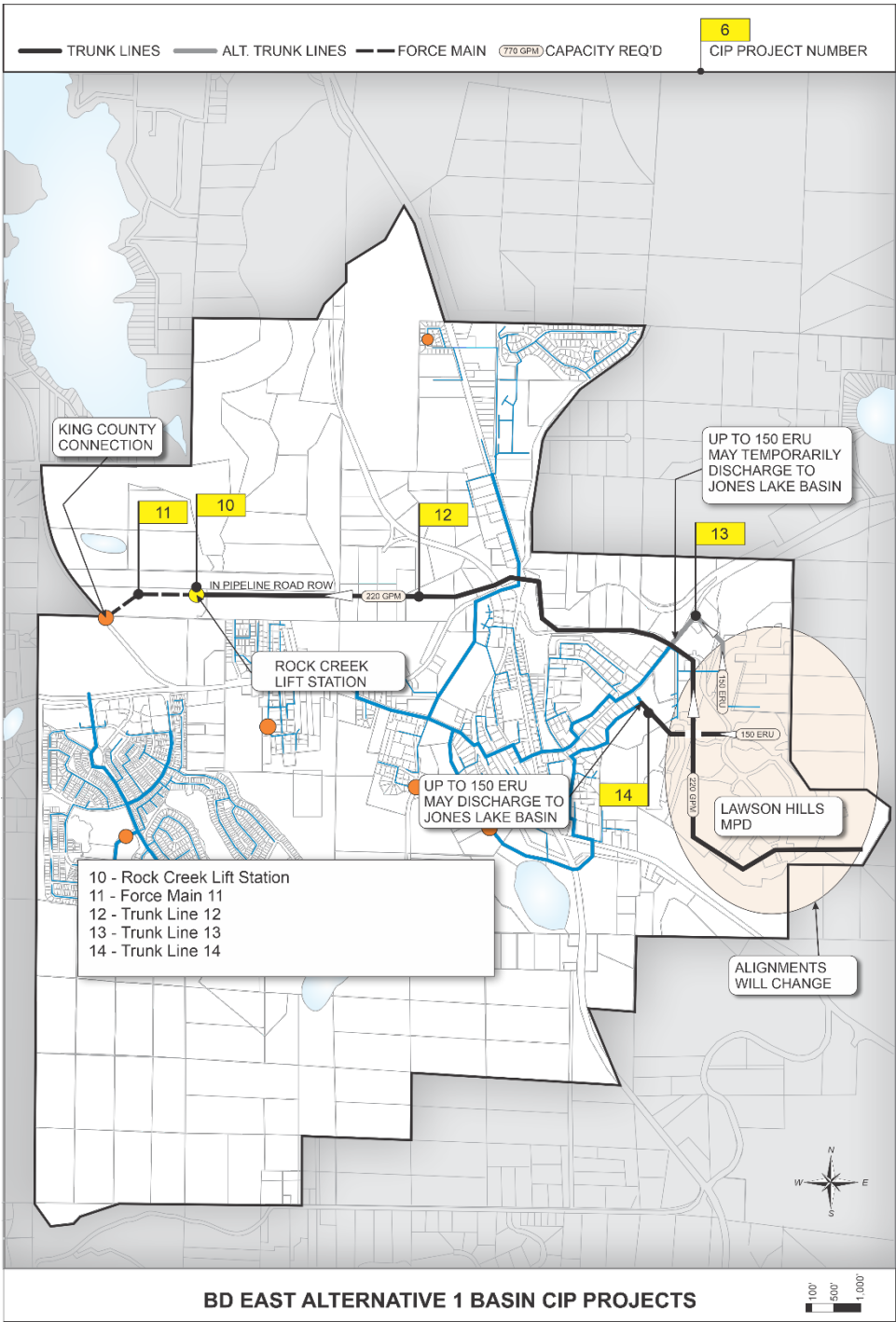
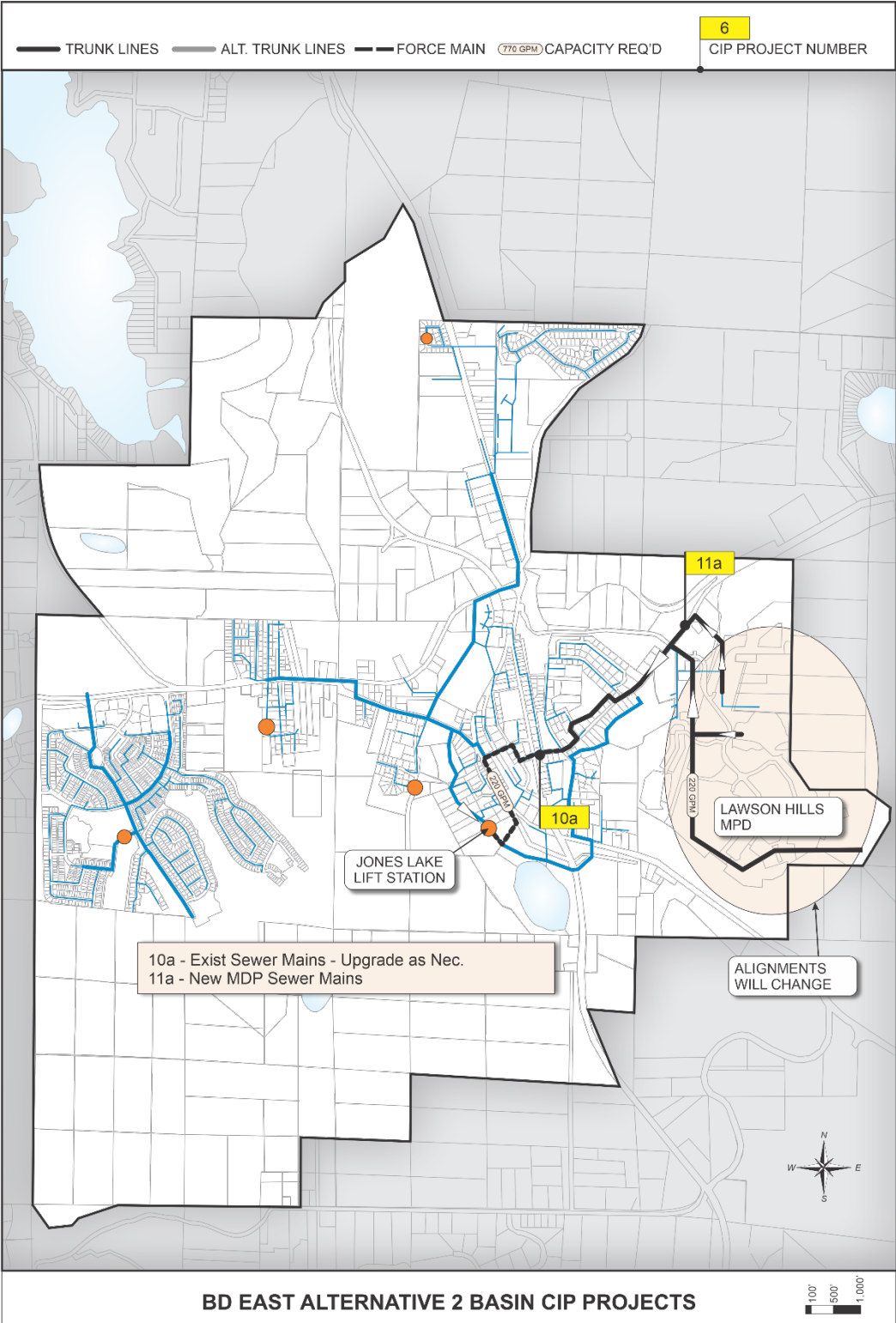


Figure 21 - BD East Alt 2 CIP



CIP 10 – Rock Creek Lift Station

This project includes the construction of a new regional-scale lift station near Rock Creek within the Palmer Quarry area. This location allows a single lift station to serve the Rock Creek Basin and the BD East Basin. This station is likely to be a 1,000-gpm capacity facility (if it serves the flows from both basins) and constructed in conjunction with development under the Lawson Hills Development Agreement. There is a possibility that the pumps and motors that are used for the Ten Trails Regional Lift Station will be the same as those for this station and efforts should be made to use duplicate pumps and motors between the two facilities to minimize spare parts requirements.

Even though this station is funded by the Developer, it can be overlain with a Latecomer's Agreement to equitably distribute the costs among the benefitted parties.

Project Start	2026	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2026	Planning and Design	\$400,000
2027	Construction	\$3,000,000
		\$3,400,000.00
Source of Funds – Developer Funded		

CIP 10a – Upgrade Existing Jones Lake Sewers

This project includes the construction of a new pipeline from the Lawson Hills MPD to the Jones Lake Lift Station as necessary to increase capacity to meet saturation flows from the Lawson MPDs.

These upgrades will be developer funded in conjunction with development in Lawson Hills.

Project Start	2026	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2026	Planning and Design	\$100,000
2027	Construction	\$1,500,000
		\$1,600,000.00
Source of Funds – Developer Funded		

CIP 11 – Force Main 11

This project includes the construction of a new force main to connect the Rock Creek Regional Lift Station to the King County Interceptor in Lake Sawyer Road. The force main is expected to be 12" diameter ductile iron capable of 1,000 gpm flow rates. This piping will be constructed by the Developer in conjunction with housing under the Lawson Hills Development Agreement.

Even though this force main is funded by the Developer, it can be overlain with a Latecomer's Agreement to equitably distribute the costs among the benefitted parties.

Project Start	2026	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2026	Planning and Design	\$150,000
2027	Construction	\$400,000
		\$550,000.00
Source of Funds – Developer Funded		

CIP 11a – New MPD Sewer Mains

This project includes the construction of new collection system piping to connect the Lawson Hills MPD to the Jones Lake Lift Station. This piping will be constructed by the Developer in conjunction with housing under the Lawson Hills Development Agreement.

Project Start	2028	Project Completion	2030
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Design	\$200,000
2029	Construction	\$1,200,000
		\$1,400,000.00
Source of Funds – Developer Funded		

CIP 12 – Trunk Line 12

This project includes the construction of new collection system piping to connect the BD East Basin to the Rock Creek Regional Lift Station. This piping will be constructed by the Developer in conjunction with housing under the Lawson Hills Development Agreement. This pipeline is expected to be approximately 10,000 lineal feet with a capacity of 200 GPM (not including any contributions from the Rock Creek basin).

Even though this force main is funded by the Developer, portions of it can be overlain with a Latecomer's Agreement to equitably distribute the costs among the benefitted parties.

Project Start	2028	Project Completion	2030
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Design	\$400,000
2029	Construction	\$2,000,000
2030	Construction	\$2,500,000
		\$4,750,000.00
Source of Funds – Developer Funded		

CIP 13 – Trunk Line 13

This project includes the construction of new collection system piping to temporarily connect up to 150 ERUs from the BD East Basin to the Jones Lake Lift Station in the event that the Alt. 1 CIP projects are selected but they are not available in time to coincide with house completions. This piping will be constructed by the Developer in conjunction with housing under the Lawson Hills Development Agreement.

This connection is not permanent, and this pipeline must ultimately be redirected to Trunk Line 12 (Rock Creek Lift Station) where there is sufficient capacity for a permanent discharge. In the interim, these 150 ERU are using capacity that is reserved for, and will ultimately be used by, in-fill development projects in the Jones Lake Basin. The “redirection” must be bonded and the Rock Creek discharge completed before 150 ERU are permitted in the Jones Lake Basin. Residential Units that connect to the Trunk Line before it is redirected to the Trunk Line 12 must pay the Sewer General Facility Charges in effect at the time of permitting. These fees are refundable on an ERU for ERU basis when in-fill projects are permitted (and the fee is paid) for Jones Lake in-fill development.

This Trunk Line is expected to be approximately 1,500 feet in length and 8” diameter size.

Project Start	2028	Project Completion	2030
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Design	\$200,000
2029	Construction	\$1,200,000
		\$1,400,000.00
Source of Funds – Developer Funded		

CIP 14 – Trunk Line 14

This project includes the construction of new collection system piping to permanently connect up to 150 ERUs from the BD East Basin to the Jones Lake Lift Station in the event that the Alt 1 CIP projects are selected. This piping will be constructed by the Developer in conjunction with housing under the Lawson Hills Development Agreement.

This connection is permanent, and this pipeline must not serve more than 150 ERU. All Residential units that use this Trunk Line must pay the City's General Sewer Facility Charge.

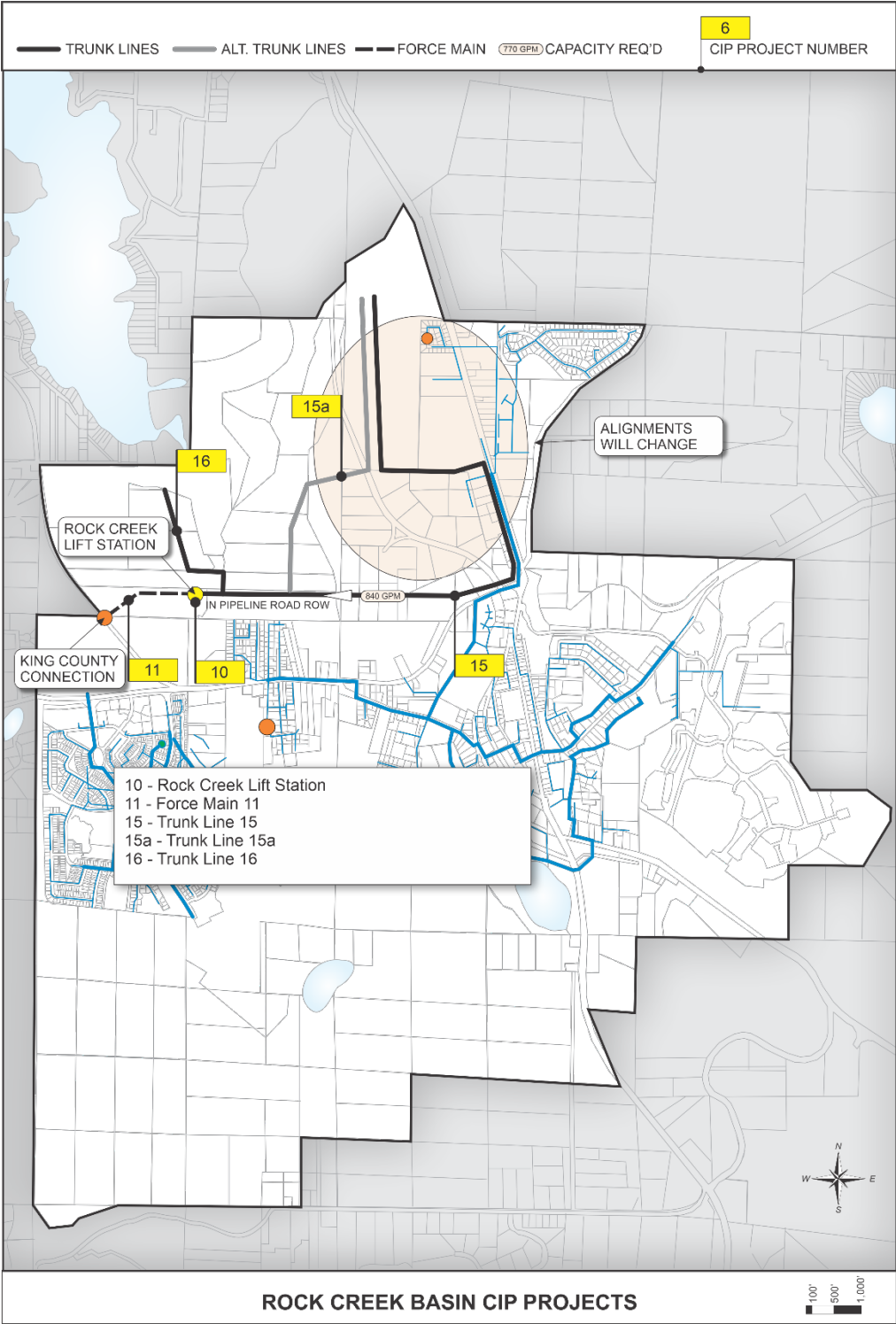
This Trunk Line is expected to be approximately 3,000 feet in length and 8" diameter size.

Project Start	2028	Project Completion	2030
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Design	\$300,000
2029	Construction	\$2,200,000
		\$2,500,000.00
Source of Funds – Developer Funded		

Rock Creek Basin Improvements

Figure 22 - Rock Creek CIP



CIP 15 – Trunk Line 15

This project includes the construction of new collection system piping to connect development within the Rock Creek Basin to the Rock Creek Lift Station. The Developer will construct this piping in conjunction with growth under a new Development Agreement in the Rock Creek Basin area. It is expected that this pipe will need to convey 700 GPM peak capacity. Portions of this pipe may be constructed in conjunction with development in the BD East Basin as both areas can benefit from this alignment. This may involve two or more different developers, and whichever Developer funds the improvement can benefit from a Latecomer Agreement from other benefitted parties.

This Trunk Line is expected to be approximately 13,000 feet in length.

Project Start	unk	Project Completion	unk
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FINANCE	ACTIVITY	BUDGET
UNK	Planning and Design	\$600,000
UNK	Construction	\$12,000,000
		\$12,600,000.00
Source of Funds – Developer Funded		

CIP 15a – Trunk Line 15a

This is the same project described above in CIP 15 using an alternative alignment. The choice of alignments may be selected by the developers with one exception. After the Trunk Line is constructed, it must be used as the primary conveyance across Rock Creek. Subsequent development cannot build a separate Lift Station to avoid Latecomer Fees.

This Trunk Line alignment is expected to be approximately 10,000 feet in length.

Project Start	unk	Project Completion	unk
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FINANCE	ACTIVITY	BUDGET
UNK	Planning and Design	\$600,000
UNK	Construction	\$12,000,000
		\$12,600,000.00
Source of Funds – Developer Funded		

CIP 16 – Trunk Line 16

This project includes the construction of new collection system piping to connect development within the Rock Creek Basin to the Rock Creek Lift Station. The Developer will construct this piping in conjunction with growth under a new Development Agreement in the Rock Creek Basin area. It is expected that this pipe will need to convey 300 GPM peak capacity.

This Trunk Line is expected to be approximately 3,000 feet in length.

Project Start	unk	Project Completion	unk
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FINANCE	ACTIVITY	BUDGET
UNK	Planning and Design	\$300,000
UNK	Construction	\$3,000,000
		\$3,300,000.00
Source of Funds – Developer Funded		

System-Wide Capital Improvement Projects

The following Capital Improvement Projects are intended to improve efficiency, comply with industry best practices, maintain current or better levels of service, and reduce administrative costs in the utility.

CIP 17 – Emergency Power Upgrade Analysis

This project includes an analysis of the vulnerabilities and long-term emergency power supply needs so that each critical facility in the sewer utility (Lift Stations, Maintenance facilities, etc.) can be operated safely and reliably during an extended power failure (like could occur after a Subduction Zone Earthquake). This includes an analysis of emerging technologies including Distributed Energy Resources (DER) in a resilience-first configuration using historical outages as a basis for calculating the return on investment of a variety of power supply and power backup configurations, including traditional backup generators. Using the levelized cost of energy over the life of the critical facilities and incorporating life-cycle energy, reliability, and safety impacts, a report will be prepared that will result in a recommendation for phased upgrades over a ten-year period.

Project Start	2025	Project Completion	2034
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FINANCE	ACTIVITY	BUDGET
2025	Planning and Analysis	\$45,000
2026	Planning and Analysis	\$45,000
2027	Annual Budget Allowance	\$100,000
2029	Annual Budget Allowance	\$100,000
2031	Annual Budget Allowance	\$100,000
2033	Annual Budget Allowance	\$100,000
2034	Annual Budget Allowance	\$100,000
		590,000.00
Source of Funds – Capital Projects Funds		

CIP 18 – Remote Site Communication Evaluation and Upgrades

This project includes an analysis of the most current technologies available with the intent to improve the reliability of mobile communications during an emergency (such as a Subduction Zone Earthquake) while still maintaining a secure, cyber-hygienic environment. The analysis will include staff-to-staff communications, staff-to-administration communications, and City-to-agency communications and will consider the implementation of a wireless VPN for security.

Project Start	2028	Project Completion	2029
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Analysis	\$25,000
2029	System Upgrades	\$50,000
		\$75,000.00
Source of Funds – Capital Projects Funds		

CIP 19 – Lift Station Lighting, Security, and Access Improvements

This project includes an analysis of the current deficiencies at the Lift Stations that prevent or compromise efficient safe and reliable access and maintenance during an extended emergency such as a Subduction Zone Earthquake. The analysis will result in a recommendation for phased improvements to address the deficiencies and provide a uniform level of service and safety and each lift station facility.

Project Start	2028	Project Completion	2031
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FINANCE	ACTIVITY	BUDGET
2028	Planning and Analysis	\$65,000
2029	Lift Station Upgrades	\$175,000
2030	Lift Station Upgrades	\$175,000
2031	Lift Station Upgrades	\$175,000
		\$590,000.00
Source of Funds – Capital Projects Funds		

CIP 20 – Enterprise GIS System

This project includes the acquisition of an Enterprise GIS System to assist staff in managing, locating, tracking, and operating the systems facilities and asset inventory.

Project Start	2026	Project Completion	2026
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FINANCE	ACTIVITY	BUDGET
2026	Purchase Software	\$65,000
		\$65,000.00
Source of Funds – Capital Projects Funds		

CIP 21 – Electronic Content Management System

This project includes the acquisition of an Electronic Content Management System to improve record-keeping, comply with best industry practices and reduce staff costs.

Project Start	2026	Project Completion	2026
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FINANCE	ACTIVITY	BUDGET
2026	Purchase Software	\$35,000
		\$35,000.00
Source of Funds – Capital Projects Funds		

CIP 22 – Earthquake Early Warning

This project includes the acquisition of an Earthquake Early Warning System that will disable and stop all pumping systems after an early warning alarm. This will prevent or minimize damage after a large earthquake like a Subduction Zone Earthquake.

Project Start	2024	Project Completion	2024
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FINANCE	ACTIVITY	BUDGET
2024	Purchase Hardware and Software	\$35,000
		\$35,000.00
Source of Funds – Capital Projects Funds		

CIP 23 – SCADA Upgrades

The existing SCADA system records and stores flow rates and alarms for each lift station, which is then monitored in a supervisory control and data acquisition (SCADA) system. SCADA can then be accessed by the operations and maintenance (O&M) team, as well as engineers, to help the City monitor infrastructure. This system does not, however, control the Lift Stations which occur in decentralized controllers at each lift station site. While this is a reliable control method, it does not allow the pumping systems to be optimized for flow control or power supply management. This project will include the integration of the Lift Stations into the existing water SCADA system so that the automatic control system can be used to optimize lift station operation and reduce operating costs. The existing on-site controllers will be maintained as a backup to the centralized SCADA-optimized control.

Project Start	2025	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2026	Hardware and SCADA System Programming	\$85,000
2027	Hardware and SCADA System Programming	\$85,000
		\$170,000.00
Source of Funds – Capital Projects Funds		

CIP 24 – Pipeline Replacement Program

This is an ongoing set-aside for pipeline replacements as they near the end of their useful life or need capacity upgrades. The amount budgeted represents a modest replacement program based on the fact that most of the sewer utility is new and has been constructed using modern, long-life materials and methods.

Project Start	2030	Project Completion	Ongoing
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FINANCE	ACTIVITY	BUDGET
2030	Capital Set-Aside for Pipeline Replacement	Varies, see Figure 27: Capital Improvement Plan
		Varies, starting 2030
Source of Funds – Capital Projects Funds		

CIP 25 – Equipment Acquisition

This is an ongoing set-aside for acquiring and replacing equipment. This includes small tools and large machinery needed to maintain the current Level of Service.

Project Start	2024	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2024	Capital Set-Aside for Equipment Acquisition	\$5,000
2025	Capital Set-Aside for Equipment Acquisition	\$10,000
2026	Capital Set-Aside for Equipment Acquisition	\$10,000
2027	Capital Set-Aside for Equipment Acquisition	\$10,000
		\$35,000.00
Source of Funds – Capital Projects Funds		

CIP 26 – Not Used**CIP 27 – CCTV Equipment**

This is a one-time expense for equipment to monitor and examine pipelines in-situ.

Project Start	2026	Project Completion	2026
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FINANCE	ACTIVITY	BUDGET
2026	Equipment Purchase	\$10,000
		\$10,000.00
Source of Funds – Capital Projects Funds		

CIP 28 – Confined Space Equipment

This is a one-time expense for equipment to improve safety of confined space access for utility staff.

Project Start	2024	Project Completion	2024
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FINANCE	ACTIVITY	BUDGET
2024	Equipment Purchase	\$10,000/yr
		\$10,000.00
Source of Funds – Capital Projects Funds		

CIP 29 – Trench Protection Equipment

This is a one-time expense for equipment to improve trench safety access for utility staff.

Project Start	2027	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2027	Equipment Purchase	\$10,000/yr
		\$10,000.00
Source of Funds – Capital Projects Funds		

CIP 28 – Confined Space Equipment

This is a one-time expense for equipment to improve safety of confined space access for utility staff.

Project Start	2024	Project Completion	2024
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FINANCE	ACTIVITY	BUDGET
2024	Capital Projects Manager	\$10,000/yr
		\$10,000.00
Source of Funds – Capital Projects Funds		

CIP 30 – Crane Lifts for Trucks

This is a four-year expense to purchase and equip the maintenance trucks with davit-mount cranes to facilitate lift station pump removal.

Project Start	2024	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2024	Equipment Purchase	\$5,000
2025	Equipment Purchase	\$5,000
2026	Equipment Purchase	\$5,000
2027	Equipment Purchase	\$5,000
		\$20,000.00
Source of Funds – Capital Projects Funds		

CIP 31 – Vactor Truck

This is a one-time expense for a Vactor Truck.

Project Start	2028	Project Completion	2028
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FINANCE	ACTIVITY	BUDGET
2028	Equipment Purchase	\$300,000
		\$300,000.00
Source of Funds – Capital Projects Funds		

CIP 32 – Jet-Rodder Equipment

This is a one-time expense for Jet-Rodding equipment to clean sewer lines.

Project Start	2027	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2027	Equipment Purchase	\$35,000
		\$35,000.00
Source of Funds – Capital Projects Funds		

CIP 33 – Facility Study

This is a planning and analysis project to identify the long-term space and equipment needs of the sewer utility.

Project Start	2027	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2027	Planning Consultant	\$35,000
		\$35,000.00
Source of Funds – Capital Projects Funds		

CIP 34 – Morganville Lift Station Analysis

This is a planning and analysis project to identify the most effective long-term operating configuration for the Morganville Lift Station. The analysis will include the advantages and disadvantages of continuing to operate the existing station (with rehabilitation) or to construct a new station on the same or a different site.

Project Start	2026	Project Completion	2027
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FINANCE	ACTIVITY	BUDGET
2026	Planning Consultant	\$30,000
2026	Planning Consultant	\$25,000
		\$55,000.00
Source of Funds – Capital Projects Funds		

CIP 35 – IT Improvements

This includes the purchase of computers and software to maintain currency and effectiveness in the sewer utility. The project includes 415,000 per year for new equipment and upgrades with a 5%/yr escalation factor.

Project Start	2024	Project Completion	On-going
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FINANCE	ACTIVITY	BUDGET
2024	Equipment Purchase	\$15,000/yr + 5%
		\$On-going
Source of Funds – Capital Projects Funds		

FINANCIAL PLAN

11

11. FINANCIAL PLAN

The City has a sound financial program in place to fund maintenance and operations activities and capital improvements. This chapter provides an overview of the financial position of the City's wastewater system and develops a financial plan to implement the programs and improvements identified throughout this Wastewater Comprehensive Plan, including reviews of the sources of funds (revenues) and uses of funds (expenses) for the wastewater system. A financial plan is presented with projected operating and capital costs of the system for a 12-year period from 2023 through 2035. The basis of the operating costs are the 2020 through 2022 budgeted amounts of wastewater system revenues, expenses, and project totals. The capital costs are based on the projections in Chapter 10 – Capital Improvement Program.

The financial functions at the City manage the tension between several competing challenges – providing safe and reliable wastewater service, building, and properly maintaining facilities for wastewater service, and meeting strict regulations for wastewater quality standards – while setting affordable rates and maintaining appropriate levels of reserves for debt obligations, emergencies, and spikes in expenses. The Finance Department strives to use sophisticated tools and innovative ideas to constantly improve the management of these interrelated parts and communicate financial information to internal and external stakeholders.

The Figure below illustrates the many competing factors managed through financial planning in the City.

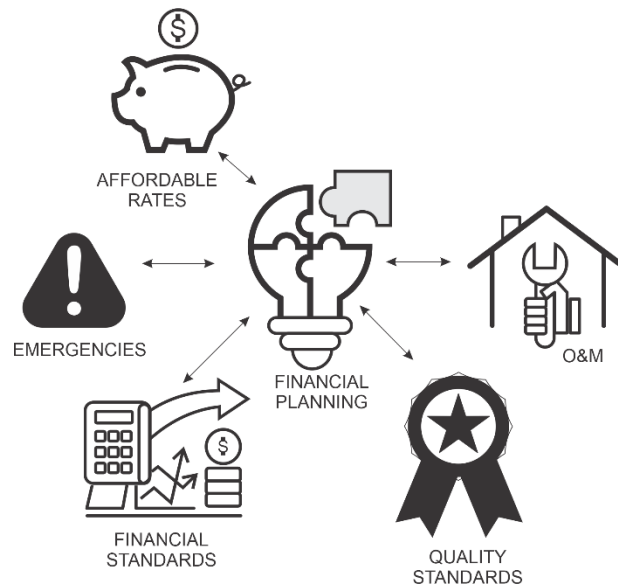


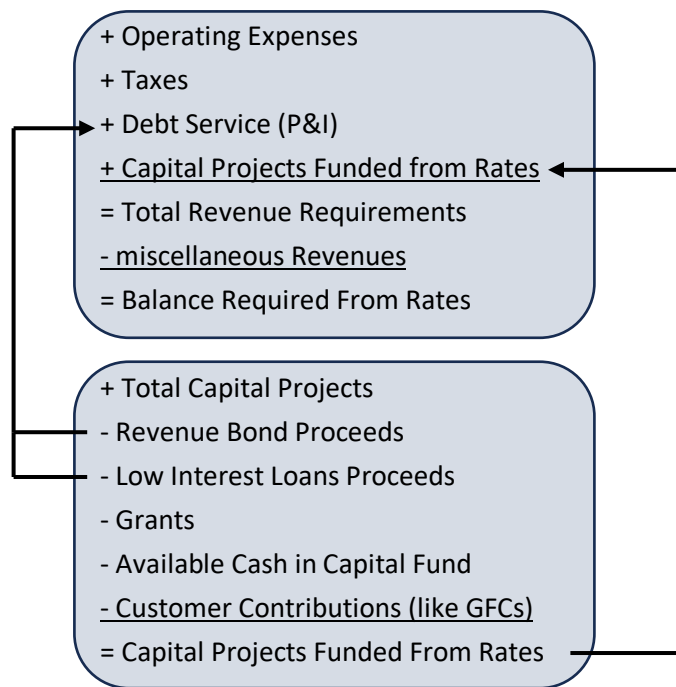
Figure 23: Rate Framework

Figure 23: Rate Framework shows the interrelated framework for rate setting and financial planning in the City.

Past Financial Performance

The past five years of financial information for the wastewater utility were evaluated to gain an understanding of the past performance and current financial status of the utility.

Provided below in **Figure 24: Past Financial Performance**, is a summary of the five-year financial history (2018-2022) for the City's wastewater utility. The City has generally not used bonds or Federal and State subsidized loans as a supplemental source of revenue to meet the funding needs of the utility's capital improvement program.

Figure 24: Past Financial Performance

OPERATING ACTIVITY	2018	2019	2020	2021	2022
Sources of Funds					
Rate Revenue		882,484	929,668	1,145,367	1,449,566
Misc. Revenue		38,291	48,790	366,168	119,807
Total Sources of Funds (Operating)		920,775	978,458	1,511,535	1,569,373
Uses of Funds					
Wages and Benefits		232,154	236,495	261,753	291,479
Office and Operating Supplies		7,390	5,854	4,524	13,593
Services and Charges		139,365	138,933	183,182	247,808
Capital Outlay		2,900	0	0	0
METRO Charges		570,438	636,841	908,920	931,030
Transfer Out for Equipment		10,000	10,000	10,000	10000
Surplus or Deficit to Investment		<41,472>	<49,665>	143,156	75763
Total Uses of Funds		920,775	978,458	1,511,535	1,569,373
CAPITAL ACTIVITY					
Beginning C&I	403,500	311,886	230,437	271,200	325,630
Transfer from Sewer Reserve Fund	15,000	100,000	0	0	15,000
Transfer from Sewer Operating Fund	0	32,800	32,800	34,200	0
Loan Repayment	35,200	0	0	0	0
Connection Charges and Interest	57,000	19,000	21,590	6,000	30,300
Total Sources of Funds (Capital)	510,700	463,686	384,827	311,400	370,930
Expenditures	50,000	120,000	35,000	35,000	50,000
Transfer Out	130,000	130,000	85,000	0	15,000
Total Expenditures	180,000	250,000	120,000	35,000	65,000
Ending Fund Balance	330,700	213,686	164,827	276,400	305,930

Existing Long-Term Debt

The sewer utility has no long-term debt. In addition, no long-term is expected to be needed to fund the operations and capital needs of the utility.

Review of the City's Wastewater Rates

The City conducted a Rate Analysis in 2019, and the current rate and rate structure are reflective of the results of that analysis.

The City currently uses a flat rate for residential sewer charges. At the time of publication, the charges are as follows:

King County METRO Charge (pass-through)	\$52.11
Black Diamond Charge	\$25.00

Commercial accounts are charged an additional \$11.50 per meter and a surcharge of \$7.87 for each CCF above 750 cubic feet of potable water usage.

The Financial Plan assumes that rates will increase, on average, by one-half percent per year. Regionally, this is a low increase and reflects the unique characteristic of the City wherein most of the sewer system is new and was built by developers using developer funding.

Development of the Financial Plan

A financial plan has been developed to address projected revenues and expenses of the wastewater system for 2024 through 2035. The eleven-year financial plan demonstrates the City's ability to meet its operational and capital improvement needs through rate revenues.

In developing the financial forecast, four cost components were reviewed:

1. Operating expenses²
2. Taxes
3. Debt service
4. Capital improvements funded from rates.

The City's adopted 2023 wastewater system budget was used as a starting point for the Financial Plan. Projections for future years were obtained by applying annual escalation factors. The escalation factors ranged from one-half percent to five percent depending on the type of cost being escalated. Wages and Benefits were escalated by 0.5 percent. The basic assumption behind the growth in revenue is that the number of wastewater connections will grow as shown below based on information obtained by the MPD developers for unit takedown rates each year, with no change in water use habits. In other words, growth in demand is driven solely by growth in the number of customers. This assumption is consistent with the long-term regional trend of flat or declining per capita water use. These same values were used for other growth-related factors in the financial plan.

Growth Rate by Year is shown in **Figure 25: Annual Customer Growth Rate (High Growth Model)**.

Figure 25: Annual Customer Growth Rate (High Growth Model)

YEAR	GROWTH RATE (%)	YEAR	GROWTH RATE (%)
2024	4	2032	11
2025	9	2033	10
2026	23	2034	9
2027	16	2035	8
2028	15	2036	7
2029	9	2037	5
2030	14	2038	5
2031	12	2039	4
		2040	3

² including all expenses incurred by the City's main departments: Council members, administrative services, engineering and development, finance, and wastewater maintenance and operations.

The Financial Plan is based on the following Plan assumptions:

1. Population growth, and hence customer growth, is based on data provided by Oakpointe for the Ten Trails and Lawson Hills MPD Developments. Their estimates are based on land development schedules, finished lot sales contracts, and market forecasts for housing unit sales.
2. Permit fees are based on an average using data from the last three years of development in Ten Trails wherein we divided the actual annual permit fee revenue by the number of units developed that year.
3. The residential billing rate is based on the codified residential sewer rate for 1 ERU. We have applied a rate escalation factor of 2.0 percent increase per year. We believe this is a modest and sustainable rate increase as it will likely lag the rate of inflation. In addition, we believe the revenue projects are conservative since we have not included the additional revenue associated with commercial accounts.
4. The METRO billing rate is based on a flat fee of \$52.11/month per customer; however, this fee does not impact the Financial Plan since this is a pass-through charge.
5. Wages, benefits, and office supplies are based on actual expenses in 2022 with a five percent escalation factor. We believe this is a conservative estimate since actual increases have historically been less than five percent. Benefits are assumed at 52% of the direct wages cost.
6. Tax rates are assumed to remain at 3.85 percent for the Utility tax and 1.5 percent for the Excise Tax. Tax rate increases are not included in the plan.

Sources of Revenue

The first component of the financial plan reviews the sources of funds for the wastewater system. There are two primary types of revenues received for operations:

- Rate revenues – received from customers for wastewater service, and
- Miscellaneous revenues – received from wastewater connection fees, investment interest, penalties for late payment, and other similar situations.

Rate revenues are projected to total approximately 96 percent of overall revenues during the planning period (2024 through 2035).

Rate revenues are projected to be \$1.38 million in 2024, including residential and commercial accounts using the High Growth Revenue Model. Annual growth in the number of wastewater connections was projected as shown in **Figure 25: Annual Customer Growth Rate (High Growth Model)**. Due to escalating costs and an assumed increase in capital funding from rates, regular rate adjustments are projected for the planning period at an average of 2 percent per year. The effects can be found in **Figure 26: .** The assumptions in this financial plan result in projected revenue of approximately \$1.38 million in 2023 and \$5.79 million in 2035.

Permit fees, Connection Charges and meter charges constitute most of the miscellaneous revenue, which is projected at roughly \$128,000 in 2024. We do not anticipate significant income from investments over the planned period.

The total revenues available for the operating and capital needs of the wastewater system total approximately \$806,000 in 2024 (less the King County revenue pass-through) and increase to \$4.02 million by 2035, as shown in **Figure 26: Financial Plan**.

Also included in the financial plan is a review of the uses of funds, or expenses, of the utility. Uses of funds include maintenance and operating expenses, taxes, debt service, and capital improvement projects funded from rates. These costs are also summarized in **Figure 26: Financial Plan**.

Operating Expenses

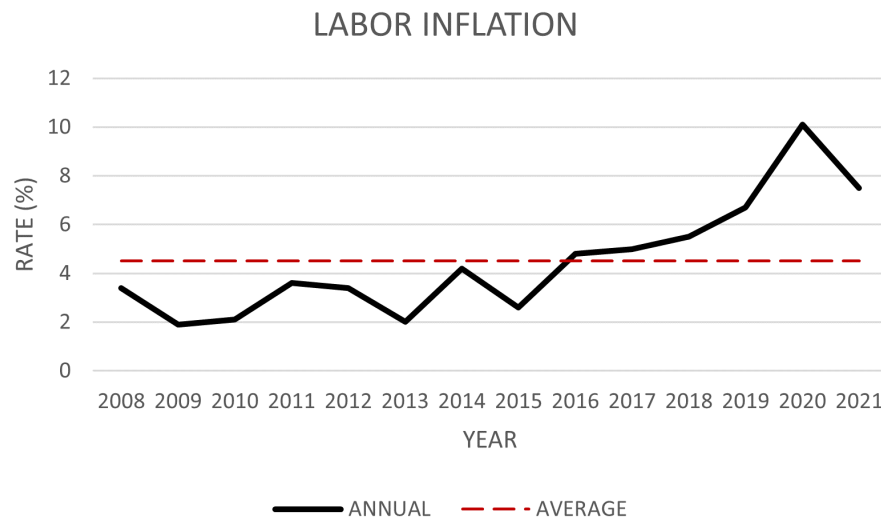
Actual expenses for 2018 through 2023 were used as the basis for the operating expenses of the wastewater system.

Labor rates have increased as shown in **Table 25 - Washington State Annual Labor Rate Increases** (Based on data at <https://lni.wa.gov/insurance/rates-risk-classes/rates-for-workers-compensation/comparison-of-wage-inflation-and-lni-rate-changes-over-time>).

Table 25 - Washington State Annual Labor Rate Increases

YEAR	LABOR INFLATION	YEAR	LABOR INFLATION
2008	3.4	2016	4.8
2009	1.9	2017	5.0
2010	2.1	2018	5.5
2011	3.6	2019	6.7
2012	3.4	2020	10.1
2013	2.0	2021	7.5
2014	4.2		
2015	2.6		

Table 26 - Washington State Annual Labor Rate Increases



The average for the period 2008 through 2021 is 4.5 percent. Escalation factors were applied to the budgeted amounts based on the historical average to obtain projected costs for 2024 through 2040 as follows:

Wages	5% (rounded up)
Benefits	5% (rounded up)
Office Supplies	5% (rounded up)

Operating expenses are projected to range from approximately \$656,000 in 2024 to approximately \$1,900,000 in 2035.

The sewer utility contributes to city administrative costs through the Expenditure Line Item “Services and Charges”. This includes pro-rated costs in the Mayor’s office, the Council, and the Finance Department. We have assumed that the actual expenses incurred in 2022 will continue with a 5%/year increase.

Taxes

In addition to sales taxes paid on purchased goods and services, the wastewater system has two tax obligations. One tax is the state public utility tax calculated as 3.852 percent of the revenues from wastewater collection (not treatment). There is also the B&O excise tax of 1.5 percent on various service fees. The King County pass-through revenue is exempt from taxes. Total taxes for the projected period are shown in **Figure 26**: The projected tax payments for the period assume no tax rate changes over time.

Debt Service

There are currently no outstanding revenue bonds or loans for the sewer utility and therefore no debt service obligations. The financial plan does not require bonding to support the Capital Projects and therefore no loans or bonds are anticipated over the planning period.

Capital Improvement Projects Expenses and Funding

The capital improvement program (CIP) for the utility contains needed infrastructure improvements. The CIP contains several administrative, renewal, replacement, and growth-related projects. Renewal and replacement are, as the name suggests, the replacement of existing facilities and those facilities that have reached the end of their useful lives. Some of the renewal and replacement projects are also major maintenance projects, while some are required due to regulations. Growth-related facilities, on the other hand, are those related to system expansion and new customers and due to the MPDs are largely funded by Developers. This financial plan has incorporated the capital projects outlined in the previous sections of this Plan.

The estimated Capital Project costs are shown in **Figure 27: Capital Improvement Plan**.

Internal Sources of Funds

General Facility Charge (GFC) revenue provides a means of balancing the cost requirements for new utility infrastructure to meet customer growth between existing customers and new customers. This charge is assessed to new customers as they “buy in” to the system. By implementing fair and equitable GFCs, existing customers will not be burdened by the cost of growth as these fees are used to pay for growth-related capital improvements or to offset the debt payments related to the growth-related capital improvements.

Due to the Ten Trails and Lawson Hills MPDs, most growth-related improvements are funded by the developers and not by the City. The Developers are exempt from GFCs since they provide all of the infrastructure needed for their projects and do not rely on City-sponsored improvement projects. We do not expect this situation to change significantly over the planning period.

External Sources of Funds

The City has not historically been aggressive at pursuing loan or grant funds for the Capital Improvement Program (CIP), mostly because growth-related projects have been provided by Developers. While we do not anticipate this changing, the City should monitor future opportunities to obtain these potential funding sources. These funding sources are listed and described below. It is important to note that these sources rarely provide full funding for a construction project. It is also important to note that the State legislature has been diverting some of these funds to support general government functions, and the City cannot rely on them as significant sources of CIP funding. Aside from revenue bonds, the City may be eligible for financing wastewater-related projects through three programs - Centennial Clean Water Fund, Public Works Trust Fund, and the Infrastructure Assistance Coordinating Council. The following is a description of each of these programs.

Centennial Clean Water Fund

The Centennial Clean Water Fund (CCWF) is a state-funded program created by the Washington State Legislature in the 1980s. Managed by the Department of Ecology (Ecology), the CCWF provides grants for wastewater infrastructure and nonpoint source pollution control projects. Ecology occasionally also makes loans using funds from the CCWF.

Ecology also establishes “set asides” and limits on the Centennial funds. One-third of CCWF funds are to be set aside for wastewater facility construction projects in hardship communities (the total amount may not exceed \$5 million for any single project). One-third of the CCWF funds are set aside for nonpoint source pollution control activities projects. The remaining one-third is awarded based on priority ranking.

Public Works Trust Fund

The Public Works Trust Fund (PWTF) is a loan program established by the Washington State Legislature to assist cities, towns, counties, and special purpose districts with funding for different types of public works projects. The projects can include streets, roads, drainage systems, solid waste facilities, water systems, and sanitary sewer systems. The emphasis of allocating funds is based on replacement and/or repair of existing systems. No funds are allocated to install a new system. Rather, funds are granted to rehabilitate or replace an existing system serving an existing population.

At the time of writing, PWTF loans are issued at a maximum term of 30 years. The interest rate ranges from 0.5 percent for a 10-year term to 2.0 percent for a 30-year term. A debt service coverage requirement is not imposed on the PWTF loan.

Infrastructure Assistance Coordinating Council

One key resource in identifying other funding programs is the Infrastructure Assistance Coordinating Council (Council). The Council is comprised of state and local organizations that provide funding for infrastructure repair and development. The purpose of the Council is to assist local governments in coordinating funding efforts for infrastructure improvements. This is an important resource as the Council will be aware of any new funding opportunities that may arise.

Revenue Bonds

Revenue bonds are a potential external source of funding for capital projects. The sale of revenue bonds is the most common source of funds for construction of major utility improvements. Wastewater rates and charges are the main sources of funds for debt service (principal and interest) payments. A determination of the utility’s ability to repay debt is an important consideration. A debt service coverage ratio (total annual revenue, less annual M&O and tax expenses, divided by annual debt service) is calculated and the utility’s finances are reviewed in order to verify payments are feasible. Coverage ratios of 1.25 (25 percent more than the debt payment after all O&M costs and senior debt payments are made) are typical. The financial review for approval of a revenue bond is thorough and generally includes both current and past budgets, financial statements, budgetary practices and policies, and reserve level balances.

Similar to revenue bonds, other bond financing approaches include utility local improvement districts (ULIDs), special assessment districts (SADs) and other funding for projects that serve and benefit a limited-service area within the City's total service area. With such methods, the costs of those improvements are shared only by those customers benefiting from those improvements. While the City does not have outstanding ULIDs, it is unlikely that they will be a useful financing tool over the planning period. The Development Agreements have largely replaced the ULID as the preferred method of local system expansion, especially for growth-related projects.

While the above list of possible loan and other funding opportunities for the City is not exhaustive, it does highlight the most probable outside funding sources available to the City for its capital improvements, if needed.

Summary of Financial Projections

A summary of the financial plan and resulting financial status of the wastewater system is provided in **Figure 26:** and **Figure 27:** Capital Improvement Plan. The following presents the significant conclusions from the Plan:

1. The current utility rates are sufficient to support the proposed administrative, operations, and capital needs of the sewer utility.
2. City sewer rates are expected to increase by 0.5 percent per year to cover the needs of the O&M and Capital programs.
3. The sewer utility is understaffed with an expectation that one FTE will be added in 2026, another in 2029, and another in 2032.
4. Pipeline replacements, which are expected to consume much of the utility income in the future, are not expected to begin until 2030 with modest yearly expenditures through 2035. After 2035, a robust pipeline replacement program will be needed to maintain the reliability and efficiency of the sewer utility.
5. The next five years will include significant capital expenditures to prepare the sewer utility staff to operate a much larger and more complex utility system. Expenditures include investments in administrative software and systems, equipment, and rolling stock.
6. The plan includes liberal estimates of expense increases (increases of five percent per year) and conservative estimates of revenue increases. As such, the Financial Plan should generate positive cash flows and fund balances.
7. Revenue from Capital Facility Charges are not expected from the MPD projects, only in-fill projects in the Jones Lake Subbasin.
8. The plan does not purport to include an analysis of King County Rate impacts over the planning period. Since the King County charges are a pass-through expense, they do not influence the operations or capital planning in the City. They do, however, impact customer views of efficiency and value and should be considered with future rate increases.

Figure 26: Financial Plan

FINANCIAL PLAN																
REVENUE MODEL - HIGH GROWTH	Actual					Budget										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
King County Sewer Revenue	\$ 650,000	\$ 752,226	\$ 950,116	\$ 1,270,000	\$ 1,409,772	\$ 1,384,271	\$ 1,515,275	\$ 1,963,317	\$ 2,333,819	\$ 2,729,960	\$ 3,004,162	\$ 3,476,592	\$ 3,940,266	\$ 4,403,941	\$ 4,867,616	\$ 5,331,291
Black Diamond Sewer Revenue	\$ 240,000	\$ 393,141	\$ 499,456	\$ 625,490	\$ 625,000	\$ 677,392	\$ 756,329	\$ 999,562	\$ 1,211,956	\$ 1,446,026	\$ 1,623,093	\$ 1,915,904	\$ 2,214,858	\$ 2,525,004	\$ 2,846,669	\$ 3,180,191
Permit Fees and Misc Revenue	\$ 43,500	\$ 102,431	\$ 107,355	\$ 87,018	\$ 62,200	\$ 31,343	\$ 69,292	\$ 248,831	\$ 216,056	\$ 242,557	\$ 176,290	\$ 318,919	\$ 328,660	\$ 345,093	\$ 362,348	\$ 380,465
Connection Charge Revenue						\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500	\$ 97,500
Investment Interest		\$ 1,720	\$ 573	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Less King County Sewer Revenue	\$ 650,000	\$ 752,226	\$ 950,116	\$ 1,270,000	\$ 1,409,772	\$ 1,384,271	\$ 1,515,275	\$ 1,963,317	\$ 2,333,819	\$ 2,729,960	\$ 3,004,162	\$ 3,476,592	\$ 3,940,266	\$ 4,403,941	\$ 4,867,616	\$ 5,331,291
Total Sewer Fund Sources	\$ 283,500	\$ 497,292	\$ 607,384	\$ 712,508	\$ 687,200	\$ 806,235	\$ 923,121	\$ 1,345,894	\$ 1,525,512	\$ 1,786,083	\$ 1,896,882	\$ 2,332,324	\$ 2,641,018	\$ 2,967,596	\$ 3,306,517	\$ 3,658,156
REVENUE MODEL - LOW GROWTH	Actual					Budget										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
King County Sewer Revenue	\$ 650,000	\$ 752,226	\$ 950,116	\$ 1,270,000	\$ 1,409,772	\$ 1,338,935	\$ 1,365,199	\$ 1,402,093	\$ 1,484,009	\$ 1,575,306	\$ 1,672,856	\$ 1,870,457	\$ 2,068,058	\$ 2,265,659	\$ 2,463,261	\$ 2,658,986
Black Diamond Sewer Revenue	\$ 240,000	\$ 393,141	\$ 499,456	\$ 625,490	\$ 625,000	\$ 655,207	\$ 681,420	\$ 713,832	\$ 770,648	\$ 834,420	\$ 903,813	\$ 1,030,785	\$ 1,162,474	\$ 1,299,018	\$ 1,440,559	\$ 1,586,123
Permit Fees and Misc Revenue	\$ 43,500	\$ 102,431	\$ 107,355	\$ 87,018	\$ 62,200	\$ 8,505	\$ 13,892	\$ 20,490	\$ 47,769	\$ 55,901	\$ 62,716	\$ 133,393	\$ 140,063	\$ 147,066	\$ 154,419	\$ 160,601
Connection Charge Revenue						\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000
Investment Interest		\$ 1,720	\$ 573	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Less King County Sewer Revenue	\$ 650,000	\$ 752,226	\$ 950,116	\$ 1,270,000	\$ 1,409,772	\$ 1,338,935	\$ 1,365,199	\$ 1,402,093	\$ 1,484,009	\$ 1,575,306	\$ 1,672,856	\$ 1,870,457	\$ 2,068,058	\$ 2,265,659	\$ 2,463,261	\$ 2,658,986
Total Sewer Fund Sources	\$ 283,500	\$ 497,292	\$ 607,384	\$ 712,508	\$ 687,200	\$ 723,712	\$ 755,312	\$ 794,322	\$ 878,418	\$ 950,321	\$ 1,026,529	\$ 1,224,178	\$ 1,362,536	\$ 1,506,084	\$ 1,654,978	\$ 1,806,724
EXPENDITURES	Actual					Budget										
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Wages (Current + 120k/FTE + 5%/yr)				225,622	288,561	302,989	318,139	460,046	483,048	507,200	658,560	691,488	726,063	888,366	932,784	979,424
Benefits ((52% of Wages)				116,230	150,052	157,554	165,432	239,224	251,185	263,744	342,451	359,574	377,553	461,950	485,048	509,300
Office Supplies (+ 5%/yr)				20,406	25,669	26,952	28,300	29,715	31,201	32,761	34,399	36,119	37,925	39,821	41,812	43,903
Utility Tax				48,895	54,276	51,549	52,560	53,981	57,134	60,649	64,405	72,013	79,620	87,228	94,836	102,371
Excise Tax				1,905	2,115	2,008	2,048	2,103	2,226	2,363	2,509	2,806	3,102	3,398	3,695	3,988
Services and Charges (\$115k/yr + 5% incr)				114,659	194,490	115,000	120,750	126,788	133,127	139,783	146,772	154,111	161,817	169,907	178,403	187,323
Subtotal w/o CIP				527,717	715,163	656,054	687,229	911,856	957,921	1,006,501	1,249,097	1,316,111	1,386,079	1,650,671	1,736,577	1,826,309
Available for CIP				184,791	(27,963)	150,181	235,892	434,038	567,591	779,582	647,785	1,016,213	1,254,939	1,316,925	1,569,939	1,831,847
Ave Permit Fee/Unit (5%/yr incr)				\$ 300	\$ 300	\$ 315	\$ 331	\$ 347	\$ 365	\$ 383	\$ 402	\$ 422	\$ 443	\$ 465	\$ 489	\$ 513
City Billing Rate (5%/yr incr)				\$ 25.00	\$ 25.00	\$ 25.50	\$ 26.01	\$ 26.53	\$ 27.06	\$ 27.60	\$ 28.15	\$ 28.72	\$ 29.29	\$ 29.88	\$ 30.47	\$ 31.08
METRO Billing Rate (no incr)				\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11	\$ 52.11
ERU (RCE) - High Growth Scenario	1,179	1,437	1,806	2,015	2,114	2,214	2,423	3,140	3,732	4,366	4,804	5,560	6,301	7,043	7,784	8,526
New Units - High Growth Scenario				209	99	*	210	717	593	634	439	756	742	742	742	742
New Units - Low Growth Scenario				209	99	27	42	59	131	146	156	316	316	316	316	313
ERU (RCE) - Low Growth Scenario	1,179	1,437	1,806	2,015	2,114	2,141	2,183	2,242	2,373	2,519	2,675	2,991	3,307	3,623	3,939	4,252
FTE (Utility Workers)				1.8	2	2	2	3	3	3	4	4	4	5	5	5

Figure 27: Capital Improvement Plan

CAPITAL IMPROVEMENT PROGRAM																
Project	Project Name	Total City Cost	Total Developer Cost	CIP Phasing (2023 Dollars)												
				2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Jones Lake Basin																
CIP-1	Replacement Pumps and Motors	\$ 95,000				\$ 20,000		\$ 15,000		\$ 45,000		\$ 15,000				
CIP-2	Collection System Easements	\$ 135,000							\$ 135,000							
CIP-3	Improve Capacity	\$ 395,000										\$ 55,000	\$ 170,000	\$ 170,000		
CIP-4	Reduce Infiltration and Inflow	\$ 240,000			\$ 15,000	\$ 25,000	\$ 15,000	\$ 25,000	\$ 15,000	\$ 25,000	\$ 15,000	\$ 25,000	\$ 15,000	\$ 25,000	\$ 15,000	\$ 25,000
CIP-5	Extend Service	\$ -														
BD West Basin																
CIP-6	Ten Trails Regional Lift Station		\$ 2,600,000		\$ 400,000	\$ 2,200,000										
CIP-7	Ten Trails Regional Force Main		\$ 3,550,000		\$ 150,000	\$ 3,400,000										
CIP-8	Ten Trails Trunk Line 8		\$ 4,250,000		\$ 250,000	\$ 4,000,000										
CIP-9	Ten Trails Trunk Line 9		\$ 4,750,000						\$ 250,000	\$ 2,000,000	\$ 2,500,000					
Black Diamond East Basin																
CIP-10	Rock Creek Lift Station		\$ 3,400,000				\$ 400,000	\$ 3,000,000								
CIP-11	Force Main 11		\$ 550,000				\$ 150,000	\$ 400,000								
CIP-12	Trunk Line 12		\$ 4,900,000						\$ 400,000	\$ 2,000,000	\$ 2,500,000					
CIP-13	Trunk Line 13		\$ 1,400,000						\$ 200,000	\$ 1,200,000						
CIP-14	Trunk Line 14		\$ 1,100,000						\$ 300,000	\$ 800,000						
CIP 10a	Exist Main Upgrades		\$ 1,200,000				\$ 1,200,000									
CIP 11a	New MPD SewerMains		\$ 1,800,000				\$ 300,000	\$ 1,500,000								
Rock Creek Basin																
CIP-15	Trunk Line 15		\$ 12,600,000									\$ 600,000	\$ 12,000,000			
CIP-15a	Trunk Line 15a													na	na	
CIP-16	Trunk Line 16		\$ 3,300,000											\$ 300,000	\$ 3,000,000	
System Wide Improvements																
CIP-17	Emergency Power Upgrade Analysis	\$ 590,000				\$ 45,000	\$ 45,000	\$ 100,000		\$ 100,000		\$ 100,000		\$ 100,000	\$ 100,000	
CIP-18	Remote Site Communication Eval and Upgrades	\$ 75,000							\$ 25,000	\$ 50,000						
CIP-19	Lift Sta Lighting, Security and Access Improvements	\$ 540,000							\$ 65,000	\$ 125,000	\$ 175,000	\$ 175,000				
CIP-20	Enterprise GIS System	\$ 65,000					\$ 65,000									
CIP-21	Electronic Content Management System	\$ 35,000					\$ 35,000									
CIP-22	Earthquake Early Warning	\$ 35,000						\$ 35,000								
CIP-23	SCADA Upgrades	\$ 170,000					\$ 85,000	\$ 85,000								
CIP-24	Pipeline Replacement Program	\$ 5,750,000									\$ 500,000	\$ 500,000	\$ 750,000	\$ 1,250,000	\$ 1,250,000	\$ 1,500,000
CIP-25	Equipment Acquisition	\$ 35,000			\$ 5,000	\$ 10,000	\$ 10,000	\$ 10,000								
CIP-26	Not Used	\$ -														
CIP 27	CCTV Equipment	\$ 10,000					\$ 10,000									
CIP 28	Confined Space Equipment	\$ 10,000			\$ 10,000											
CIP 29	Trench Protection Equipment	\$ 12,000						\$ 12,000								
CIP 30	Crane Lifts for Trucks	\$ 20,000			\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000								
CIP 31	Vactor Truck	\$ 300,000							\$ 300,000							
CIP 32	Jet Rodder	\$ 35,000						\$ 35,000								
CIP 33	Facility Study	\$ 35,000						\$ 35,000								
CIP 34	Morganville LS Analysis	\$ 55,000					\$ 30,000	\$ 25,000								
CIP-35	IT Improvements	\$ 238,757			\$ 15,000	\$ 15,750	\$ 16,538	\$ 17,364	\$ 18,233	\$ 19,144	\$ 20,101	\$ 21,107	\$ 22,162	\$ 23,270	\$ 24,433	\$ 25,655
	CIP Total (Current Dollars)	\$ 8,875,757	\$ 45,400,000	\$ -	\$ 850,000	\$ 9,720,750	\$ 2,366,538	\$ 5,299,364	\$ 1,708,233	\$ 6,364,144	\$ 5,710,101	\$ 1,491,107	\$ 12,957,162	\$ 1,868,270	\$ 4,389,433	\$ 1,550,655
	CIP Total Capital Funds	8,875,757			50,000	120,750	316,538	399,364	558,233	364,144	710,101	891,107	957,162	1,568,270	1,389,433	1,550,655
	CIP Total Developer Funds		\$ 45,400,000		\$ 800,000	\$ 9,600,000	\$ 2,050,000	\$ 4,900,000	\$ 1,150,000	\$ 6,000,000	\$ 5,000,000	\$ 600,000	\$ 12,000,000	\$ 300,000	\$ 3,000,000	\$ -
	Available from Revenue				\$ 150,181	\$ 235,892	\$ 434,038	\$ 567,591	\$ 779,582	\$ 647,785	\$ 1,016,213	\$ 1,254,939	\$ 1,316,925	\$ 1,736,577	\$ 1,831,847	\$ 2,103,118
	Balance				\$ 100,181	\$ 115,142	\$ 117,501	\$ 168,227	\$ 221,349	\$ 283,641	\$ 306,112	\$ 363,832	\$ 359,764	\$ 168,307	\$ 442,414	\$ 552,463

APPENDICES

APPENDIX A: MAPS

APPENDIX B: CAPITAL IMPROVEMENTS PLAN TECHNICAL MEMORANDUM

APPENDIX C: DEMAND FORECAST TECHNICAL MEMORANDUM

APPENDIX D: NPDES PERMIT

APPENDIX E: PLAN REVIEW COMMENTS

APPENDIX F: SEPA CHECKLIST AND DETERMINATION OF NON-SIGNIFICANCE

APPENDIX G: COUNCIL RESOLUTION

APPENDIX H: AGREEMENTS AND FRANCHISES

APPENDIX I: DEVELOPMENT STANDARDS

APPENDIX J: UTILITY RATE STUDY

APPENDIX K: KING COUNTY METRO AGREEMENT FOR DISPOSAL

APPENDIX L: SOOS CREEK AGREEMENT FOR CONVEYANCE OF SEWAGE

APPENDIX M: UNIT FLOW ANALYSIS

APPENDIX N: PLANNING AND DESIGN STANDARDS