Edgewood General Sewer Plan

Prepared for

City of Edgewood
Edgewood, Washington

Prepared by

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CERTIFICATE OF ENGINEER

The technical material and data contained in this Executive Summary and Appendix K were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below. The Certificate of Engineer for the 2004 General Sewer Plan is on the page before Chapter 1. Chapter 4, "Financial Analysis," was prepared by FCS Group, Inc. Appendix F, City of Edgewood Sewer Standards, was prepared by the City of Edgewood and Lakehaven Utility District.

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KEY TERMS

BANs	Bond Anticipation Notes
BOD	biochemical oxygen demand
ccf	hundred cubic feet
CDBG	Community Development Block Grant
CERB	Community Economic Revitalization Board
CIAC	Contribution in-aid-of Construction
City	City of Edgewood
CTP	Central Treatment Plant
DNS	Determination of Nonsignificance
Ecology	Washington State Department of Ecology
EDA	Economic Development Administration
EDU	Equivalent Dwelling Unit
ERU	Equivalent Residential Unit
Feasibility Study	*Edgewood Sewer Feasibility Study*
FTE	full-time equivalent employee
GFC	General Facilities Charge
G.O. bonds	general obligation bonds
gpcd	gallons per capita per day
gpm	gallons per minute
GSP	General Sewer Plan
HUD	U.S. Department of Housing and Urban Development
LID	Local Improvement District
LUD	Lakehaven Utility District
Mgd	million gallons per day

KEY TERMS (Continued)

O&M	operation and maintenance
Orange Book	*Criteria for Sewage Works Design*, Washington State Department of Ecology
PWTF	Public Works Trust Fund
RCW	Revised Code of Washington
SEPA	State Environmental Policy Act
SRF	State Revolving Fund
SSMH	sanitary sewer manhole
Task Force	Ad Hoc Meridian Avenue Corridor Task Force
TPCHD	Tacoma – Pierce County Health Department
TSS	total suspended solids
ULID	Utility Local Improvement District
WWTP	wastewater treatment plant

EXECUTIVE SUMMARY

INTRODUCTION

Background

A draft General Sewer Plan (GSP) was prepared for the City of Edgewood (City) and submitted to the Washington State Department of Ecology (Ecology) in August 2004 for review. The Draft GSP presented various alternatives regarding sewer alignments, wastewater treatment providers, and opinions of probable construction cost. This final GSP has been prepared to address Ecology's comments on the draft GSP, reflect changes in the Phase I service area boundary, and document the selected wastewater treatment provider.

Currently, the majority of sanitary sewage within the City is treated by septic tanks and drain fields for residences or businesses. Private sewer disposal systems are required to be designed in accordance with Tacoma – Pierce County Health Department (TPCHD) standards. Approval by TPCHD is required prior to connecting new or existing buildings to a private sewer disposal system. While septic systems are usually adequate for existing residential areas with low development intensity and suitable soils, the lack of a sewer system limits opportunities to meet objectives of the Comprehensive Plan and compliance with growth management. Without a sewer system, the City will not be able to meet its population densities required by the Growth Management Act. The Draft GSP was prepared to develop a proposed sanitary sewer system for the Phase I Core service area, which includes the core development area along the SR 161/Meridian corridor.

The Draft GSP identified three phases for providing sanitary sewer service within the City limits. The Phase I service area included parcels along the SR 161/Meridian corridor and along 24th Street East to serve the parcels most likely to undergo more intensive development and requiring sewer service before other areas within the City. Design for the Phase I service area would begin after adoption of the GSP, and all connections would be completed within 20 years after adoption of the GSP. Based on the recommended alternative in the Draft GSP, the Phase I Area would have discharged to the City of Fife sewer system with flows conveyed to the City of Tacoma's Central Treatment Plant for treatment and disposal. The Phase II service area included areas east, west, and south of the Phase I area, and sewer service would be provided no earlier than 20 years, but no later than 50 years, after adoption of the GSP. Sewer service for the Phase III service area would be provided beyond 50 years after adoption of the GSP. The sanitary sewer system proposed in the Draft GSP would serve both Phases I and II.

The Final GSP presented herein includes a similar three-phase approach with the same timelines indicated in the Draft GSP. Figure ES-3 presents the three sewer system phases for implementation of the Final GSP. The Phase I sanitary sewer system would provide service for those portions of Phase II identified in the Final GSP.

Subsequent to Ecology's review, the boundary between Phases I and II was slightly modified and zoning has changed. Flow rate and loading calculations have been updated for the Final GSP. In addition, the City has created a sanitary sewer utility (Title 11 EMC), adopted a sewer ordinance (Chapter 13.15 EMC), and executed an interlocal agreement with Lakehaven Utility District (LUD), the preferred wastewater treatment provider.

Purpose

In accordance with Chapter 90.48.110 of the Revised Code of Washington (RCW), a GSP must be completed and approved by Ecology before design and construction of sanitary sewer facilities can begin. The Final GSP has been prepared to:

- Address Ecology's comments dated September 14, 2004. See Ecology Comments (page ES-21) for a summary of how Ecology's comments have been addressed.
- Update flow rate, BOD loading, and TSS loading calculations for Phases I and II based upon the revised boundary between Phases I and II and zoning changes.
- Update the sanitary sewer system alignment.
- Update opinions of probable construction costs.
- Update example funding calculations.

The Final GSP only covers providing sewer service to the Phase I Core Area consistent with the agreement between the City and LUD. In accordance with the Phase I timeline, this area will be sewered within 20 years of approval of the Final GSP. The Final GSP will need to be amended in the future to address the Phase I Non-Core West or East areas. In accordance with the Phase I timeline, these areas will be sewered within 20 years of approval of this Final GSP. The Final GSP will need to be amended to include a sanitary sewer system to serve these non-core areas, as well as an agreement with the wastewater treatment provider(s) and incorporation of their design and construction standards. If LUD agrees to accept flows from any areas outside of the Phase I Core Area, the agreement will need to be modified as well as amending the Final GSP.

The Phase I Core Area sewer system is designed to convey a portion of the sewer flows from selected Phase II Areas that could readily contribute to the Phase I Core system. See Figure ES-3.

Unchanged, Revised, and New Documentation

The planning information used to prepare this Final GSP for the revised Phase I and II areas is discussed in the following sections.

- ES-1 Background and Planning Information
- ES-2 Sewer Service Alternatives
- ES-3 Summary of Recommended Alternative
- ES-4 Financial Analysis
- ES-5 Sewer Development Standards
- ES-6 SEPA Compliance

- ES-7 Implementation
- ES-8 Ecology Comments

The Final GSP includes the following information from the Draft GSP, which has been copied unchanged as it provides the basis of the Draft GSP and may be useful in preparing a future GSP Amendment for Phase I Non-Core West and East areas and the westerly and southerly portions of Phase II.

- Chapter 1, Background and Planning Information. See Figure 1-3 for the location of the City relative to the LUD Lakota Wastewater Treatment Plant.
- Chapter 2, Sewer Service Alternatives.
- Chapter 3, Recommended Alternative. This chapter has been superseded by the Final GSP Section ES-3.
- Chapter 4, Financial Analysis.
- Chapter 5, Sewer Development Standards.
- Chapter 6, SEPA Compliance.
- Chapter 7, Implementation.
- Appendix A, City of Edgewood Existing Potable Water Facilities.
- Appendix B, Planning Basins, Population, and Flow Projection.
- Appendix C, Phase IA Information.
- Appendix D, Feasibility Study Construction and Project Cost Estimates.
- Appendix E, Recommended Alternative Construction and Project Cost Estimates.
- Appendix G, City of Fife Technical Memorandum Related to Sanitary Sewer Upgrades.
- Appendix H, Draft Interlocal Agreement with City of Fife.
- Appendix I, Operation and Maintenance Cost Estimates for Connection to City of Fife.

The following appendices have been updated for this Final GSP to address Ecology's review comments.

- Appendix F, City of Edgewood / Lakehaven Utility District Sewer Standards.
- Appendix J, Sewer Ordinance and Code.

Updated calculations for the Phase I Core sanitary sewer system are included in the following new appendix.

- Appendix K, Calculations and Cost Opinion for Connection to Lakehaven Utility District.

Letters from Pierce County and the City of Puyallup regarding service area boundaries are included in the following new appendix.

- Appendix L, Service Area Boundary Letters.

ES-1 BACKGROUND AND PLANNING INFORMATION

Service Area

Service areas for the Final GSP have been delineated by the City and have changed from the delineation in the Draft GSP. The delineation was revised for some parcels so that the full parcel was included rather than a portion. For the Draft GSP, only portions of some of the parcels were included because the phase boundary followed the zoning designation. The phasing delineation was also revised so that the two areas on the extreme east and west limit of the City, previously in Phase II, are included in the Phase I Non-Core Area.

The selected portions of Phase II were included in the flow rate and loading calculations for the Phase I Core system along SR 161/Meridian (see Figure ES-3). The selected Phase II areas were included because these portions of Phase II may be more readily served by gravity systems connecting to the Phase I Core system without long pressure mains to the east or west side of the City. Lift stations for Phase II areas will need to be evaluated in the future when such areas require service.

Figure ES-1, Zoning, shows the City's current zoning. The zoning designations were used to determine residential development densities and factors associated with commercial, town center, town center overlay, and multi-use residential zones. Figure ES-2, Phase I Core Area, shows the area to be served by LUD. Figure ES-3, Sewer Planning Areas and Land Use Map, shows the Phase I, II, and III service areas and the Phase II area included in the Phase I Core Area system calculations. Figure ES-4, Project Area Vicinity Map, shows the connection point to the LUD system and the vicinity of the Lakota Wastewater Treatment Plant. On the west side of SR 161/Meridian north of 36th Street East, there are two parcels included in Phase I in Figure ES-3 but not shown in Figure ES-2. Also, there is a "T" shaped parcel east of SR 161/Meridian south of 24th Street East that is included in Phase I in Figure ES-3 but not shown in Figure ES-2. These areas have been included in the Phase I Core system calculations and were included in the resolution adopted by the City Council that established the Phase I and II service area boundaries. The City is coordinating with LUD to have these three parcels added to the agreement.

The overall service area presented in the Draft GSP for Phases I and II has not changed. However, the Phase II service area has decreased due to the increase in size of the Phase I Core and Non-Core areas. The Draft GSP was based on 218.68 acres and 1,117.29 acres for Phase I and Phase II, respectively, for a total of 1,335.97 acres. The revised Phase I Core and Non-Core areas, as delineated by the City, include 342.19 acres. The Phase II Area decreased to 993.77 acres.

Table ES-1 lists the areas by zoning for Phase I and how the areas have changed from the Draft to Final GSP. Table ES-2 identifies how the remaining 993.77 acres was reallocated in Phase II. Of the remaining 993.77 acres, only 322.47 acres in Phase II were assumed to discharge in the future to the Phase I Core Area system. Because of topography and spatial separation, other portions of Phase II were not included in the Phase I Core sewer system.

Figure ES-1 Zoning

Figure ES-2 Phase I Core Area

Figure ES-3 Sewer Planning Areas and Land Use Map

Figure ES-4 Project Area Vicinity Map

Table ES-1. Changes in Phase I Service Area (acres)

Zoning	Draft GSP	Core	Non-Core West	Non-Core East	Total Final GSP	Change
BP	22.74	17.58	0	0	17.58	-5.16
C, I	29.94	35.99	0	4.02	40.01	10.07
MR-L	0	0	46.10	0	46.10	46.10
MR-M	30.30	37.32	0	0	37.32	7.02
MUR	24.24	33.27	13.86	0	47.13	22.89
P	34.79	30.30	0	0	30.30	-4.49
SF-H	24.40	35.93	0	0	35.93	11.53
SF-L, SF-M	0	19.84	0	0	19.84	19.84
TC, TCO	52.27	67.98	0	0	67.98	15.71
Total:	**218.68**	**278.21**	**59.96**	**4.02**	**342.19**	**123.53**

Table ES-2. Reallocation of Acreage for Phase II Service Area

Zoning[a]	Draft GSP (acres)	Final GSP (acres)	Comments
BP	0.00	0.00	Assumes no BP in Phase II, similar to Draft GSP
C, I	11.87	1.80	Phase II reduced to maintain same total for this zoning as Phases I and II in Draft GSP
MR-L	31.81	0.00	Phase II reduced to maintain same total for this zoning as Phases I and II in Draft GSP
MR-M	25.07	18.05	Phase II reduced to maintain same total for this zoning as Phases I and II in Draft GSP
MUR	0.00	0.00	Assumes no MUR in Phase II, similar to Draft GSP
P	47.10	51.59	Phase II increased to maintain same total for this zoning as Phases I and II in Draft GSP
SF-H	0.00	0.00	Assumes no SF-H in Phase II, similar to Draft GSP
SF-L, SF-M	1001.44	922.33	Assumes a reduction in SF-L, SF-M to maintain overall total acreage as in August 2004 Draft GSP
TC, TCO	0.00	0.00	Assumes no TC in Phase II, similar to August 2004 Draft GSP, or TCO.
Total:	**1,117.29**	**993.77**	

[a] See Figure ES-1 for zoning designations.

Flow Rate Projections

After the Phase I Core and Non-Core areas were delineated by the City, the City then determined developable areas. The total parcel area was reduced by critical areas and their buffers. Critical areas include wetlands, steep or moderate slopes, frequently flooded areas, and rivers. Critical areas were determined by the City based on GIS mapping. Projected flow rates were then calculated for the remaining developable area based on zoning. Table ES-3 summarizes the factors used for the flow rate calculations.

Table ES-3. Flow Rate Calculation Factors

Zoning[a,b]	Population Density[c]	Flow Factor[d]	Household Size[e]	Average Daily Residential Flow[f]	Commercial/ Industrial Flow[g]
BP	0	1.0	2.54	100	3,000
C	8	0.5	2.54	100	3,000
SF-L	3	1.0	2.54	100	0
SF-M	3	1.0	2.54	100	0
SF-H	5	1.0	2.54	100	0
MR-M	8	0.5	2.54	100	2,500
MUR	6	0.5	2.54	100	2,500
P	0	0.0	0.0	100	0
TC	10	0.5	2.54	100	3,000
TCO	16	0.5	2.54	100	3,000

[a] Zoning listed only for Phase I Core area and the assumed contributing portion of Phase II.

[b] Typical values. See Appendix K for variations at specific parcels.

[c] Dwelling units per acre.

[d] Used to calculate equivalent residential units.

[e] Persons/dwelling unit.

[f] Gallons/person/day. Flow rate per Washington State Department of Ecology Criteria for Sewage Works Design.

[g] Gallons/acre/day. Flow rates per August 2004 GSP.

The Phase I Core Area was divided into three subareas for the flow rate calculations. The subareas were used to estimate flow rates for the gravity sewer, pump stations, and force mains located within the Phase I Core system. Flow rates will need to be reviewed and updated during final design of pump stations and pipe systems due to potential changes based on land uses actually proposed through the permit process. Allowable land use is highly variable as allowed by the City's zoning. Consequently, flow rates at some sites may be less than those projected in the calculations in Appendix K, whereas flow rates from other sites may be higher. The factors in Table ES-3 assume that the actual land use and corresponding flow rates will be averaged out throughout the designated zoning and permitted development.

Table ES-4 summarizes the flow rates from the Phase I Core and contributing Phase II Areas. Flow rates in Table ES-4 were used for sizing calculations for the Phase I Core system.

Table ES-5 summarizes the flow rates from the Phase I Non-Core areas. The Final GSP will need to be amended for providing sewer service to these two areas.

Table ES-4. Summary of Phase I Core and Select Phase II Areas and Flow Rates

Location	Phase I Core			Select Phase II to Phase I Core[a]			Total		
	Area (acres)	Total Average Flow (mgd)	Total Peak Flow[b] (mgd)	Area (acres)	Total Average Flow (mgd)	Total Peak Flow[b] (mgd)	Area (acres)	Total Average Flow (mgd)	Total Peak Flow[b] (mgd)
North of 16th Street East	77.20	0.190	0.683	78.02	0.049	0.193	155.22	0.239	0.876
Central Area, between 16th Street East and 24th Street East	82.69	0.130	0.483	100.13	0.064	0.249	182.82	0.194	0.732
South Area, South of 24th Street East	118.33	0.254	0.889	144.32	0.103	0.389	262.65	0.357	1.278
Total:	**278.23**	**0.573**	**2.055**	**322.47**	**0.216**	**0.831**	**600.69**	**0.790**	**2.886**

[a] Flows for this portion of Phase II Area included in sizing of Phase I Core system.

[b] Peaking factor based on (18+SQRT[Total Avg. Flow x 10])/(4+SQRT[Total Avg. Flow x 10]) x Total Avg. Flow, per Ecology's *Criteria for Sewage Works Design*.

Table ES-5. Summary of Phase I Non-Core Areas and Flow Rates

	Area (acres)	Total Average Flow (mgd)	Total Peak Flow (mgd)
Phase I Non-Core, West	59.96	0.109	0.411
Phase I Non-Core, East	4.02	0.010	0.043

Pump Stations

The Phase I Core Area sewer system has been designed to convey sewage flows via gravity where practicable. However, pump stations are proposed at certain locations to prevent excessive trenching depths or sewer construction via tunneling. The surface area of the Phase I Core Area sewer system has five low points based on contour mapping provided by the City and based on contour maps published by the United States Geological Survey. For the Final GSP, pump stations will be needed near the following locations. Actual locations will need to be determined based on property acquisition and field survey performed for future design. The pump stations are listed in the order that flow is contributed to the system. General pump station locations are shown in Figures ES-4 and K-1.

- Pump Station 2: Located near the vicinity of SR 161/Meridian and 36th Street.
- Pump Station 3: Located near 24th Street approximately 1,300 feet west of SR 161/Meridian.
- Pump Station 4: Located near Jovita Boulevard near boundary of Phase I Core Area.
- Pump Station 1A: Located near SR 161/Meridian approximately 1,700 feet north of 16th Street.
- Pump Station 1B: Located near SR 161/Meridian near the north city limit boundary.

Pump Station 2 would serve the area near the south end of the Phase I Core sewer system. For purposes of estimating costs for Pump Station 2, a duplex fixed-speed submersible pump station in a precast wet well structure is assumed. Property acquisition costs are based on an assumed site footprint of 40 feet by 40 feet. Pump Station 2 would discharge into a gravity system along SR 161/Meridian, which subsequently discharges into Pump Station 3.

Pump Station 3 would serve areas along SR 161/Meridian south of 24th Street and areas along 24th Street. For purposes of estimating costs for Pump Station 3, a triplex fixed-speed submersible pump station in a precast wet well structure is assumed. Property acquisition costs are based on an assumed site footprint of 65 feet by 75 feet. Pump Station 3 would discharge into a gravity system along SR 161/Meridian, which subsequently discharges into Pump Station 1A.

Pump Station 4 would serve the northeasterly portion of the Phase I Core Area in the vicinity of Jovita Boulevard. For purposes of estimating costs for Pump Station 4, a triplex fixed-speed submersible pump station in a precast wet well structure is assumed. Property acquisition costs are based on an assumed site footprint of 65 feet by 75 feet. Pump Station 4 would discharge into a gravity system along SR 161/Meridian, which subsequently discharges into Pump Station 1A.

Pump Stations 1A and 1B would convey sewer flows from the entire Phase I Core sewer system. Pump Station 1A would pump Phase I Core sewer system flows to the north to a gravity system. Pump Station 1B, located near the north city limit boundary, would then re-pump the sewage flows to the LUD connection point in 19th Way. Pump Station 1B is included because sanitary flows cannot be readily pumped from Pump Station 1A all the way to the LUD connection point due to the elevation differences and pipe lengths. Flow rates from Pump Stations 1A and 1B would be similar because there are no flows contributing to the system on the discharge side of Pump Station 1A. For purposes of estimating costs for Pump Stations 1A and 1B, a triplex variable-speed submersible pump station in a precast wet well structure is assumed. Property acquisition costs are based on an assumed site footprint of 85 feet by 85 feet. During future design phases, the discharge elevation of Pump Station 1B will need to be determined based on project survey and the elevation of the force main where it discharges into the gravity system north of

28th Avenue South. The pump station discharge elevation will need to be below the force main discharge elevation to prevent accumulation of an air column within the force main which would tend to generate excessive odor issues and make the station hydraulically inefficient.

If the Phase I Core System is not constructed and implemented for the entire Phase I Core Area in a single stage, two parallel force mains will likely be required for the discharge from Pump Stations 1A and 1B. A portion of the Phase I Core system may be constructed before other portions of the system. Based on the flow rates calculated for the assumed interim area, the flow rates from the pump stations are too low to provide adequate velocities in the discharge lines. The Final GSP is based on parallel 6-inch and 10-inch diameter force mains. The 6-inch force main will be used to convey flows from the interim Phase I Core Area. The 10-inch force main will be used to provide additional capacity as future portions of the Phase I Core Area are served and the system is expanded. The Final GSP is based on both force mains being constructed under a single contract to avoid excavation within SR 161/Meridian for two different construction contracts. The design of Pump Stations 1A and 1B for an interim configuration will need to include a pump cycle control to provide adequate flushing velocities in the 6-inch-diameter force main. The design would also need to accommodate future pumps that provide the required pump capacity for the ultimate configuration.

Alternatives to Pump Station 1B were considered but determined to not be feasible based on information currently available for the level of design for the Final GSP. The elevations along the sewer system alignment and the sewer length between Pump Station 1A and the connection point to the LUD system preclude the use of a siphon because of hydraulic risks and odor control requirements.

In addition to the above elements, pump station costs for each of the pump stations also assume that the following will be included:

- Block building for housing telemetry, controls, and chemical injection equipment.
- Telemetry for signals to LUD.
- Chemical injection for odor control.
- Standby generator.

Table ES-6 (page ES-10) summarizes the data for the Phase I Core system pump stations. Pump Stations 1A and 1B would be required for an interim Phase I Core system that extends south to 24th Street.

See Figure ES-4 for the location of the Phase I Core system pump stations.

Loading

Projected biochemical oxygen demand (BOD) and total suspended solids (TSS) loadings were calculated for the Phase I Core and Non-Core areas and the Phase II areas. Factors used for the BOD and TSS loading calculations are summarize in Table ES-7 (page ES-10).

Table ES-8 (page ES-11) summarizes the projected BOD and TSS loading calculated for each of the revised service areas.

Table ES-6. Pump Station Summary

	Pump Station						
	1A	1A	1B	1B	2	3	4
	Interim[a]	Added Capacity for Ultimate System	Interim[a]	Added Capacity for Ultimate System			
Average Daily Flow (gpm) Phase I[b]	28	–	28	–	–	–	–
Peak Flow Rate (gpm) Phase I	101	–	101	–	–	–	–
Average Daily Flow (gpm) Phase I and II[b,c]	–	527	–	527	45	227	75
Peak Flow Rate (gpm) Phase I and II[c]	–	1,905	–	1,905	173	1,097	271
Number of Pumps	2	1 (3 total)	2	1 (3 total)	2	3	3
Variable or Fixed Speed	Variable	Variable	Variable	Variable	Fixed	Fixed	Fixed
Discharge Force Main Diameter (inches)	6	10	6	10	4	10	10
Pump Head (feet)[d]	20 (90 ultimate)	90	20 (140 ultimate)	140	90	40	200

[a] For potential developer extension scenario for development of approximately 30 percent of Phase I Core, between 16th Street and 24th Street, east of SR 161/Meridian.

[b] Average Daily Flow based on reducing the Peak Flow Rate by the peaking factors for the Phase I Core Area and the selected Phase II Areas included in the Phase I Core system sizing. Peaking factor for Phase I Core Area is 3.6066. Peaking factor for selected Phase II Area is 3.8725.

[c] For selected portions of Phase II.

[d] Pump head subject to change depending on flow rate, force main diameter, force main length, type of pipe, and elevations.

Table ES-7. Summary of BOD and TSS Loading Factors

Parameter	Unit	Quantity
BOD Per Capita Waste Load[a]	pound/day/person	0.20
TSS Per Capita Waste Load[a]	pound/day/person	0.20
Nonresidential Average Dry Weather Flow[b]	million gallons/day	85% of Nonresidential Average Annual Flow
Nonresidential Equivalent Residential Population[c]	person	Nonresidential Average Dry Weather Flow, gallons/day, divided by 85

[a] Based on August 2004 Draft GSP.

[b] 85% of Average Annual Flow per August 2004 Draft GSP.

[c] Division by 85 per August 2004 Draft GSP.

Table ES-8. Summary of BOD and TSS Loading By Phase and Sub-Basin

Sub-Basin	Residential Population[a]	Residential Average Annual Flow[a] (mgd)	Nonresidential Average Annual Flow[a] (mgd)	Nonresidential Average Dry Weather Flow[b] (mgd)	Equivalent Residential Population for Nonresidential Area[c]	Total Equivalent Population Residential and Nonresidential[d]	Projected Average Waste Load (BOD and TSS)[e] (lbs/day)	Projected Average Flow (mgd)
To Lakehaven Utility District and Phase I Core System:								
Phase I Core[f]	2,752	0.275	0.298	0.253	2,978	5,730	1,146	0.573
Assumed Future to Lakehaven Utility District and Phase I Core System:								
Selected Phase II to Phase I Core System[g]	2,146	0.215	0	0	0	2,146	429	0.215
Total to Lakehaven Utility District, with agreement modification and GSP Amendment:	4,899	0.490	0.298	0.253	2,978	7,877	1,575	0.788
Future; Purveyor and System to be Determined Through GSP Amendment:								
Phase I Non-Core – West[f]	340	0.034	0.075	0.064	750	1,089	218	0.109
Phase I Non-Core – East[f]	41	0.004	0.006	0.005	60	101	20	0.010
Remainder of Phase II[h]	5,083	0.508	0.025	0.021	248	5,331	1,066	0.533
Total:	**10,363**	**1.036**	**0.404**	**0.343**	**4,036**	**14,399**	**2,880**	**1.440**

[a] Based on revised population, area, and flow rate calculations for updated zoning and Phase I boundary revisions.

[b] 85 percent of Average Annual Flow per August 2004 Draft GSP.

[c] Nonresidential Average Dry Weather Flow x 1,000,000/85.

[d] Residential plus Equivalent Residential Population.

[e] Total Equivalent Population x Per Capita Waste Load; based on 0.20 pounds per person per day per August 2004 Draft GSP.

[f] Based on spreadsheet "Final Calcs for Final GSP.xls\Phase I", Appendix K.

[g] Based on spreadsheet "Final Calcs for Final GSP.xls\Phase II to Core" , Appendix K.

[h] Based on spreadsheet "Final Calcs for Final GSP.xls\Phase II Totals", Appendix K.

ES-2 SEWER SERVICE ALTERNATIVES

Alternatives that have been previously considered are discussed in Chapters 1 through 7, which have been copied from the Draft GSP. The Final GSP is based on wastewater treatment being provided for the Phase I Core service area by Lakehaven Utility District (LUD) in accordance with the service area identified in the agreement and shown in Figure ES-2. Wastewater treatment providers, discharge locations, and sewer systems for the Phase I Non-Core, Phase II, and Phase III areas will need to be determined and documented in an amendment to the Final GSP.

Although the Phase I core system design includes capacity for selected portions of the Phase II Area, the agreement with LUD will need to be modified prior to the connection of the selected portions of Phase II to the Phase I core system.

ES-3 SUMMARY OF RECOMMENDED ALTERNATIVE

Based on the agreement between the City and LUD, sanitary sewer flows from the Phase I Core Area will be conveyed to the existing LUD manhole in 19th Way South. From this existing manhole, sanitary sewer flows are conveyed through the existing LUD system to the Lakota Wastewater Treatment Plant for treatment and disposal. The Phase I Core sewer system components as designed for the Final GSP include the following:

- Approximately 7,500 feet of 8–inch-diameter gravity flow sewer pipe.
- Approximately 7,450 feet of 12–inch-diameter gravity flow sewer pipe.
- Approximately 5,900 feet of 15–inch-diameter gravity flow sewer pipe.
- Approximately 11,800 feet of 6-inch side sewer laterals.
- Approximately 1,300 feet of 4–inch-diameter sewer force main.
- Approximately 6,450 feet of 6–inch-diameter sewer force main.
- Approximately 7,650 feet of 10–inch-diameter sanitary sewer force main.
- Five sewage pump stations with a combined ultimate peak flow pumping capacity of 8.0 mgd.

The cost opinion for the overall Phase I Core sewer system includes the following:

Construction	$14,044,000
Contingency (40%)	5,617,000
Sales Tax	1,730,000
Subtotal:	**$21,391,000**
Property Acquisition	1,145,000
Engineering	2,139,000
Construction Management	3,209,000
Legal and Administration	2,139,000
Total:	**$30,023,000**

ES-4 FINANCIAL ANALYSIS

The cost opinions prepared for the Draft GSP have been updated to reflect the changes in the Phase I Core service area and the Phase I Core system. A cost opinion was prepared for both the interim and ultimate Phase I Core system. The interim Phase I Core system cost opinion includes the elements that would be constructed within SR 161/Meridian in an effort to avoid two different sewer construction contracts. The funding mechanism for the Phase I Core interim system would likely be through a developer extension agreement. The remainder of the Phase I Core system would be funded through one or more Local Improvement Districts (LIDs). A detailed financial analysis will be required during future design phases regardless of the funding mechanism or the number of LIDs.

Table ES-9 summarizes the updated cost opinion for the LID scenario for the ultimate Phase I Core system with an assessment per 1,000 square feet of buildable area. Table ES-9 illustrates the range of costs that may be encountered and one potential assessment method. Actual assessments would be determined as part of the financial analysis to be performed in conjunction with future design phases. Table ES-9 is based on constructing the Phase I Core system with capacity to serve the selected portions of Phase II but excludes Phase II from the chargeable area.

Table ES-9. Local Improvement District Assessment Example

	Item	Cost Opinion[a]	Low End[b]	High End[c]
I.	Project Costs[d]; ultimate system sized for Phase I Core area and selected portions of Phase II; for system within Phase I	$30,023,000	$18,014,000	$33,025,000
II.	Payment for improvements to LUD system[f]	–	–	–
III.	Connection Charge to LUD[g]	–	–	–
	Total Cost:	**$30,023,000**	**$18,014,000**	**$33,025,000**
	Phase I Chargeable Area[e] (acres):	278.23	278.23	278.23
	Chargeable Area, 1,000 square feet:	12,120	12,120	12,120
	Assessment per 1,000 square feet:	$2,477	$1,486	$2,725

[a] See Appendix K for cost opinions.

[b] Low end = 60% of Cost Opinion.

[c] High end = 110% of Cost Opinion.

[d] Project costs include construction ($21,391,100) and non-construction ($8,631,600) costs. Non-construction costs include sales tax, contingency, land acquisition, engineering, administration, legal, and administration. Does not include system components for the selected portions of Phase II that would be required to connect Phase II to the Phase I Core system.

[e] Chargeable Area = Net Buildable Area used for Flow Rate and Loading Calculations. Excludes Phase II area.

[f] There are no LUD system improvements identified in the interlocal agreement that need to be paid for. See the agreement in Appendix H.

[g] To be addressed in the future. Connection charges are permitted but not specifically quantified in the interlocal agreement. See the agreement in appendix H.

Table ES-10 presents a general facility charge approach for funding implementation of the ultimate Phase I Core system. Similar to Table ES-9, the project cost is for the Phase I system sized to serve the selected portions of Phase II but does not include any system components within Phase II. Because Table ES-10 includes the entire Phase I Core system, it does not include any reduction or Contribution in-aid-of Construction (CIAC) for any interim Phase I Core system.

Table ES-10. General Facility Charge Calculation Example for Phase I Core

	Item	Cost Opinion[a]	Low End[b]	High End[c]
I.	**Cost of Existing Facilities**	**–**	**–**	**–**
	Utility Plant-in-Service	–	–	–
	Plus: Construction Work in Progress	–	–	–
	Less: Contributions in-Aid-of Construction	–	–	–
	Net Utility Plant	–	–	–
	Plus: Accumulated Interest on Non-Contributed Plant	–	–	–
	Net Allocable Existing Sewer Plant-in-Service Cost of Capital:	**–**	**–**	**–**
II.	**Cost of Future Facilities/Improvements**			
	Cost of Planned Future Facilities	$30,022,700	$18,013,600	$33,025,000
	Less: Developer/CIAC	–	–	–
	Less: Grant Funding	–	–	–
	Net Allocable Planned Future Facilities:	**$30,022,700**	**$18,013,600**	**$33,025,000**
III.	**Total Allocable Costs**			
	Total Allocable Existing Plant	–	–	–
	Total Allocable Planned Future Facilities	$30,022,700	$18,013,600	$33,025,000
	Total Allocable Costs:	**$30,022,700**	**$18,013,600**	**$33,025,000**
IV.	**Capacity Analysis in Equivalent Dwelling Units (EDUs)[4]**			
	Current System Capacity – EDUs	–	–	–
	Increase in Capacity with Improvements – EDUs[d,e]	2,256	2,256	2,256
	Total Estimated Equivalent Residential Unit (ERU) Capacity with Improvements at 100% Capacity:	**2,256**	**2,256**	**2,256**
V.	**Calculated General Facilities Charge[f]**			
	([Existing Plant plus Non-Capacity Future Costs]/ Total Capacity) plus (Future Capacity Costs/Growth):	**$13,308**	**$7,985**	**$14,639**

[a] Project costs include construction, sales tax, contingency, land acquisition, engineering, administration, legal, and administration. Does not include Phase II system components outside of Phase I that would be required to serve Phase II. See Appendix K for cost opinions.

[b] Low End = 60% of Cost Opinion.

[c] High End = 110% of Cost Opinion.

[d] One Equivalent Dwelling Unit (EDU) = 254 gallons per day based on flow projections.

[e] EDUs are for Phase I only. Based on Phase I Core average daily flow.

[f] Existing facilities plus non-growth capital projects are divided by the total number of system EDUs, thus sharing expense proportionately among current and future customers ($0/2,126 = $0). Growth-related capita is necessary to serve growth only, and thus the sole responsibility of growth ($30,022,700/2,126 = $14,122 per ERU).

Cost opinions were prepared for three different construction stages of the Phase I Core system. The three areas are summarized below. Future financial analyses may consider different staging limits, different numbers of stages, and construction costs at the time of the financial analyses.

- Phase I Core – Interim: This portion includes the system along SR 161/Meridian from 24th Street to the LUD connection point. The Interim system includes components within SR 161/Meridian that will serve the north portion of the City to prevent multiple sewer construction projects within SR 161/Meridian. The Interim system includes Pump Stations 1A and 1B, one jack and bore crossing under SR 161, and overlaying two lanes of SR 161.

- Phase I Core – South: This portion includes the system along SR 161/Meridian south of 24th Street and the components within 24th Street east and west of SR 161/Meridian. The South system includes Pump Stations 2 and 3. The cost opinion for the South system does not include any jack and bore crossings of SR 161/Meridian or overlay of SR 161.

- Phase I Core – North: This portion includes the remaining Phase I Core system components north of 24th Street outside of SR 161/Meridian. The North system includes Pump Station 4. The cost opinion for the North system does not include any jack and bore crossings of SR 161/Meridian or overlay of SR 161.

Table ES-11 summarizes the cost opinions for these three construction stages.

Table ES-11. Cost Opinion for Phase I Core System Constructed in Three Stages

Item	Interim[a]	South[b]	North[c]	Total
Construction	$8,310,800	$4,361,600	$1,371,200	$14,043,600
Contingency (40%)	$3,324,300	$1,744,600	$548,500	$5,617,400
Sales Tax (8.8%)	$1,023,900	$537,300	$168,900	$1,730,100
Subtotal (Construction):	**$12,659,000**	**$6,643,500**	**$2,088,600**	**$21,391,100**
Right-of-Way	$123,400	$267,200	$753,900	$1,144,500
Engineering (10%)	$1,265,900	$664,400	$208,900	$2,139,200
Construction Management (15%)	$1,898,900	$996,500	$313,300	$3,208,700
Legal and Administration (10%)	$1,265,900	$664,400	$208,900	$2,139,200
Subtotal (Other Project Costs):	**$4,554,100**	**$2,592,500**	**$1,485,000**	**$8,631,600**
Total:	**$17,213,100**	**$9,236,000**	**$3,573,600**	**$30,022,700**

[a] Based on spreadsheet "Final Cost Opinion for Final GSP.xls\Phase I Core Interim" in Appendix K.

[b] Based on spreadsheet "Final Cost Opinion for Final GSP.xls\South System" in Appendix K.

[c] Based on spreadsheet "Final Cost Opinion for Final GSP.xls\North System" in Appendix K.

See Chapter 4 for further information regarding funding options. Chapter 4 also contains financial analyses for the alternatives considered for the Draft GSP.

ES-5 SEWER DEVELOPMENT STANDARDS

At a minimum, the sanitary sewer system will conform to City and LUD standards as documented in Appendix F. Conformance with LUD standards is required due to the maintenance agreement between the City and LUD. If the City needs to modify any of the standards, approval will be required by LUD.

Design reviews for conformance with LUD standards will be required for any portion of the Phase I Core system, whether the system is built under a single construction contract as part of a Local Improvement District (LID) or whether a portion of the system is constructed by a developer extension or an LID. Based on the agreement between the City and LUD, plan review and approval by LUD is required in conjunction with City review.

ES-6 SEPA COMPLIANCE

The City issued a Determination of Nonsignificance (DNS) for the GSP on April 16, 2007. The deadline for comments is May 11, 2007. The SEPA Determination will be finalized after that time. The SEPA checklist documents that construction permits will be required from the City and LUD. The SEPA checklist also documents that impacts to environmentally sensitive areas, if any, will be addressed during construction permitting. The SEPA checklist also documents that Ecology approval of the GSP is required. There are no mitigation measures in the DNS that impact the final GSP.

In addition to permits by the City and LUD, permits and/or franchise agreements may also be required by WSDOT, the City of Federal Way, City of Milton, and King County. Permit requirements will be determined in future design phases.

ES-7 IMPLEMENTATION

Implementation of this Final GSP is contingent upon the availability and timing of funding. Funding mechanisms that are most likely to occur are developer extension agreements, formation of Local Improvement District(s) (LIDs), loans, and/or grants (if available). Potential funding mechanisms are discussed in Chapter 4.

Currently, a developer extension is being considered as a potential mechanism for implementing a portion of the Phase I Core area. The developer extension would serve properties on the east side of SR 161/Meridian between approximately 18th Street Court East and 24th Street East. The system would be constructed from approximately 24th Street East to the LUD connection point on 19th Way South. Although the lots to be served through the developer extension would be a relatively small percentage of the Phase I Core area, the entire Phase I Core system within SR 161/Meridian would need to be constructed to avoid multiple construction stages within the roadway. SR 161/Meridian was recently widened, and it is unlikely that WSDOT would permit two construction stages and pavement cutting for two different construction contracts or for staged systems. The system installed as part of the developer extension would need to provide capacity for all the Phase I Core area and the selected portions of Phase II. Design of the pump station along SR 161/Meridian would need to account for interim and future flows, associated wet well volumes, and pump modifications. Design, capacity and funding issues will need to be addressed as part of the developer extension.

If the developer extension is constructed, it is anticipated that one or more LIDs would be used to fund the remainder of the Phase I Core area system. For example, an LID may be formed to serve the area north of the initial development with a separate LID formed later to serve the area south of the initial development.

Construction of the Phase I Core system will be through agreements with the City. The City will enter into agreements with LUD for construction administration.

Based on current information, implementation of this Final GSP would include the following major steps. Timeframes are approximate and are subject to change.

- Ecology approval of the Final GSP: Anticipated by Third Quarter 2007.
- Developer Extension Agreement and Design: Second Quarter 2007 through First Quarter 2008.
- Construction of Developer Extension: First through Fourth Quarter 2008.
- Submit Grant and/or Loan Applications: To be determined.

- Phase I Core Area LID(s) and Phase I Non-Core: Service available 2008 and completed before 2027.

- Phase II: Service available after 2027 and before 2057.

- Phase III: Not included in GSP; beyond the 50-year planning period.

Along with the major steps identified above, it will be important for the City to keep the citizens, particularly property owners in the Phase I Core area, informed of the project status and allow them to play a part in the implementation process. This can be accomplished through a number of workshops and open houses before and after each of the key milestones identified above.

ES-8 ECOLOGY COMMENTS

Table ES-12 summarizes Ecology's comments based upon the Draft GSP submittal and the responses to the comments as addressed in the Final GSP.

Table ES-12. Responses to Ecology Comments

Comment Number	Comment	Response
1	There needs to be a more detailed discussion of the purpose and need for the general sewer plan and the sewering of Edgewood in Section 1.1.	Additional discussion provided in Executive Summary Section ES-1.
2	As well as size and direction of flow, the layout maps need to indicate flow and slope of the trunk sewers.	Added on updated Figure K-1.
3	The method used to determine future population trends needs to be described along with its concurrence with local or regional planning agencies.	The Draft and Final GSP are based on build-out within the allowable zoning. This provides a somewhat higher population than that provided for Growth Management reports. This was clarified and resolved with Ecology in October 2004. No further action is required.
4	A final signed interlocal agreement with the City of Fife and possibly Tacoma needs to be submitted.	A copy of the signed interlocal agreement with Lakehaven Utility District is included in Appendix H.
5	All the appropriate sewer ordinances need to be approved and submitted.	The sewer ordinance is included in Appendix J.
6	The state environmental policy act requirements need to be completed.	The SEPA determination is discussed in Executive Summary Section ES-6.
–	Provide engineering report.	An engineering report is not required based on correspondence with Ecology in September 2004. Design standards are included in Appendix F.

1. BACKGROUND AND PLANNING INFORMATION

1.1 PURPOSE AND AUTHORIZATION

This General Sewer Plan (GSP) has been prepared in accordance with WAC 173-240-050. This GSP includes sufficient preliminary engineering and planning information and design aspects to verify the economic and technical feasibility of constructing and operating a sanitary sewer conveyance system by the City of Edgewood. In order to be approved by Ecology, the GSP must be sufficiently complete to allow the development of engineering reports without substantial alterations to the basic concepts and intent of the GSP. Approval of the GSP by Ecology will allow the City of Edgewood to move forward with the creation of a sewer utility.

Preparation of this GSP is based on the following documents that were used as references:

- *City of Edgewood Comprehensive Plan*, Final Draft, January 2001.
- *Edgewood Feasibility Study*, Parametrix, Inc., March 2002.
- City of Edgewood, Ad-Hoc Meridian Corridor Task Force, Presentation of Sewer Alternatives, December 2002.

1.2 LOCATION AND POPULATION

The city of Edgewood is located in northern Pierce County, just north of the city of Puyallup (see Figure 1-1). Edgewood borders the cities of Sumner and Pacific to the east, the city of Puyallup to the south, the cities of Milton and Fife to the west, and unincorporated King County to the north. Eighty percent of the city is located on what is referred to as North Hill, with twenty percent in the Puyallup Valley. In addition, parts of Edgewood are within the boundaries of the Puyallup Indian Reservation.

Edgewood is a small-town residential community with an approximate population of 9,405 according to the Washington State Office of Financial Management's 2003 estimate. Over 80 percent of the existing dwellings are single-family homes. Commercial development is concentrated along Meridian Avenue in the west-central part of the city. The majority of the businesses in Edgewood are small, with few employees. Population characteristics are discussed in detail in Section 1.5.

1.3 LAND USE AND AREA CHARACTERISTICS

Edgewood is located in the Puyallup River, White River, and Hylebos Creek watersheds. The city's natural environment will play an important role in determining how and where future development occurs.

The topography within the city is characterized by rolling hills with slopes measuring between 0 to 8 percent with scattered depressions and potholes. A prominent slope, which forms a portion of the Puyallup and White River Valley walls, characterizes the southern and eastern edges of the city. Elevations within the city begin at 20 feet above sea level and rise to approximately 500 feet above mean sea level in the southeast corner of the city. The city has a maritime climate typical of western Washington. Winters are wet and mild; summers are relatively cool and dry. Precipitation averages 38.3 inches per year and annual temperature averages 50.8°F. The majority of the precipitation occurs from October to March.

Figure 1-1 Edgewood Vicinity Map

The city has several water bodies within its borders, a majority of which are fed by stormwater runoff. Lake Chalet is located in a depression in west-central Edgewood and often floods adjacent areas. Surprise Lake is located in the neighboring city of Milton, but an outlet creek enters Edgewood. In addition, several topographic depressions, locally known as "potholes," dot the landscape. The largest of these are the Edgewood Bowl, 114th Avenue Pothole, the 122nd Avenue Pothole, and the 108th Avenue Pothole. Four perennial creeks, Jovita Creek, Surprise Lake Creek, Simons Creek, and Wapato Creek, flow through the city. The location of these water bodies is shown on Figure 1-2.

1.4 EXISTING INFRASTRUCTURE

The majority of the residences and businesses in Edgewood discharge sewage to septic tanks. The Cherrywood Manor mobile home park operates a self-contained package sewer treatment plant for approximately 84 residences and discharges to Wapato Creek. There are two sewer lines along the Meridian Avenue corridor that are connected to the City of Milton conveyance system. One of the existing sewers serves a retail store on the corner of Eighth Street and Meridian Avenue. The other extends from Taylor Way to Northwood Elementary School. These sewer lines are part of Pierce County's sanitary sewer system. Wastewater collected within this area is treated at the City of Tacoma's Central Treatment Plant (CTP). Since Edgewood does not have a sewer system, no existing infiltration and inflow problems exist. Figure 1-2 presents the location of these facilities.

Potential purveyors of wastewater treatment services include the following nearby treatment plants:

- Lakehaven Utilities District: Lakota Wastewater Treatment Plant (WWTP).
- City of Tacoma CTP.
- Pierce County: Chambers Creek WWTP.
- City of Puyallup WWTP.
- City of Sumner WWTP.

Figure 1-3 presents the location of these treatment plants relative to Edgewood.

Appendix A presents a map showing the location of the existing potable water facilities within Edgewood. Group A and Group B wells located within city limits are shown on Figure 1-2.

Four water utilities serve Edgewood: the Mountain View-Edgewood Water Company, the City of Milton, Lakehaven Utility District, and the DeChaux Water Company. Of these, the Mountain View-Edgewood Water Company serves the largest number of residents and businesses within Edgewood. The Company's service area constitutes approximately 80 percent of the areas within Edgewood city limits. The Mountain View-Edgewood Water Company facilities include two reservoirs, eight pumphouses, 300 fire hydrants, and three pressure-reducing stations. The Mountain View-Edgewood Water Company maintains three storage reservoirs, two located in the southeast part of the city with a combined capacity of 1.175 million gallons and one located in the northern portion of the city with a capacity of 1 million gallons.

Figure 1-2 Existing Infrastructure and Water Bodies

Figure 1-3 Locations of Potential Sanitary Sewer Purveyors

The City of Milton provides water service to households and businesses in the northern and northwestern portion of Edgewood. The City of Milton draws its water from several underground aquifers located in this area and has a total of seven wells for water supply. Five of the wells are active and two are inactive. The City of Milton water facilities in Edgewood include a 2-million-gallon reservoir and one pump station.

The Lakehaven Utility District serves only a small number of Edgewood residents adjacent to the Pierce/King County boundary. The Lakehaven Utility District maintains approximately 400 miles of water main, with only approximately 10,560 feet of water main within Edgewood. The district's primary source of water is groundwater; however, the district also maintains interties with adjacent purveyors such as the City of Tacoma.

The DeChaux Water Company serves small areas within the city. Additionally, a number of private wells scattered throughout the service areas supply small residences. Edgewood complies with cross connection controls with respect to installation of all water mains and sewers.

1.5 POPULATION AND FLOW PROJECTIONS

1.5.1 Sewer Planning Area and Planning Basins

The Edgewood sewer service area has been divided into three phases based on when sanitary sewer service will be provided. Phase I will be sewered within 20 years, Phase II areas will be sewered within 50 years, and Phase III areas will not be sewered over the 50-year planning period. The sewer service areas have been further divided into 18 basins based on priority of service, land use designation, and existing topographic conditions. Basins 1 through 5 are contained in Phase I, Basins 6 through 17 are contained in Phase II, and Basin 18 represents the Phase III area in its entirety.

Figure 1-4 presents a map showing the planned phases of service and land use within Edgewood. Figure 1-5 shows the individual planning basins and the average annual and peak flows that are estimated to be generated in each basin. Appendix B presents a more detailed map of the basins, along with the subbasins within these planning basins that were used for estimating the population to be served and the resulting wastewater flows. Also included in Appendix B is a spreadsheet containing the calculations of projected populations and flow rates.

1.5.2 Population Projections

Edgewood currently has approximately 9,405 residents within 8.9 square miles, based on the Washington State Office of Financial Management's estimate for 2003. The 2000 Census reported a population of 9,029 people for Edgewood. Population projections for individual basins are presented in Table 1-1 (page 1-9) and are based on land use designations identified in the Edgewood Comprehensive Plan and the acreage per basin. These population projections were prepared by the City in May 2003 and are used in this GSP to estimate wastewater flow rates.

Figure 1-4 City of Edgewood Sewer Planning Areas and Land Use Map

Figure 1-5 City of Edgewood Sewer Planning Basins

Table 1-1. Equivalent Population Projections

Subbasin Number	Subbasin Name	Population (2020)
Phase I		
1	Meridian Avenue North I	32
2	Meridian Avenue North 2	405
3	Town Center North	757
4	Town Center South	477
5	Meridian Avenue South	100
	Subtotal	**1,771**
Phase II		
6	Jovita Gateway	28
7	Puyallup Valley	755
8	Meridian Avenue North East	449
9	Town Center North East	391
10	Town Center North West	500
11	Town Center South East	512
12	Town Center South West	352
13	Meridian Avenue South East	112
14	Meridian Avenue South West	649
15	Meridian Avenue South Southeast	1,043
16	Sumner Heights	1,638
17	West Edgewood	1,564
	Subtotal	**7,993**
Phase III		
18	Entire Subbasin	4,780
	Total Projected Population	**14,344**

1.5.3 Wastewater Flow Projections

Average residential wastewater flow projections are based on an average daily flow of 100 gallons/per capita/per day, as recommended in Ecology's 1998 *Criteria for Sewage Works Design* (the Orange Book). Commercial, mixed use, and industrial flows were calculated using average sewage flows per acre, based on land use: 3,000 gallons per acre for commercial areas, 2,500 gallons per acre for mixed use areas, and 2,000 gallons per acre for industrial areas. Peak flows for each basin were calculated based on a ratio of peak flow to average flow as outlined in Ecology's *Criteria for Sewage Works Design* (see projected flow calculations in Appendix B). Table 1-2 presents the projected sewage flows for Phases I and II within the next 50 years.

Table 1-2. Projected Flows

Subbasin Number	Subbasin Name	Average Flow (mgd[a])	Peak Flow[b] (mgd)
Phase I			
1	Meridian Avenue North I	0.08	
2	Meridian Avenue North 2	0.10	
3	Town Center North	0.16	
4	Town Center South	0.09	
5	Meridian Avenue South	0.03	
	Average Flow Subtotal	**0.45**	**1.48**
Phase II			
6	Jovita Gateway	0.01	
7	Puyallup Valley	0.08	
8	Meridian Avenue North East	0.04	
9	Town Center North East	0.04	
10	Town Center North West	0.05	
11	Town Center South East	0.05	
12	Town Center South West	0.04	
13	Meridian Avenue South East	0.01	
14	Meridian Avenue South West	0.06	
15	Meridian Avenue South Southeast	0.11	
16	Sumner Heights	0.18	
17	West Edgewood	0.22	
	Average Flow Subtotal	**0.89**	**2.68**
	Service Area Flow, Total	**1.34**	**3.79[c]**

[a] mgd = million gallons per day.

[b] Peak flow is based on an accepted ratio between average and peak flow (Ecology, 1998, *Criteria for Sewage Works Design*), Qpeak = (18+SQRT [Qavg x 10]) / (4+SQRT [Qavg x 10]) x Qavg). Therefore, total peak flow is not represented by summing the peak flows for each subbasin but by calculating the peak from the sum of the average flows.

[c] Peak flow for total service area is less than the sum of the peak flows because the model assumes that as flow and population increase, the ratio of peak flow to average flow (Qpeak/Qavg) decreases.

2. SEWER SERVICE ALTERNATIVES

This chapter presents a description of the alternative sewer and treatment configurations that have been considered to serve the City of Edgewood, and the process that has been used to select the recommended alternative. Four different alternatives were identified and evaluated as part of this planning effort.

These alternatives were first identified in the *Edgewood Sewer Feasibility Study* (Feasibility Study) (Parametrix, Inc., March 2002). This study presented an analysis of the City of Edgewood planning area to project future population patterns and to estimate the corresponding wastewater flow rates.

Potential treatment purveyors were identified in the Feasibility Study. Preliminary contacts were made with these purveyors to determine their willingness and ability to accept and treat wastewater from Edgewood and the costs that would be associated with this service.

As described in the previous chapter, the Feasibility Study determined that development of the Edgewood sewer system would be developed in phases, with Phase I development occurring along the Meridian Avenue corridor initially and Phase II development occurring in areas surrounding the Meridian Avenue corridor over a 50-year period. Development of sewers in the remaining Phase III areas would not occur over the 50-year planning horizon. Figure 1-4 identifies the phases of sewer development that are proposed for Edgewood in the Feasibility Study.

The Feasibility Study did not make a recommendation of a recommended alternative and a State Environmental Policy Act (SEPA) determination was not prepared for the study. Preliminary construction and cost estimates were prepared, but questions related to the costs of service from the potential purveyors were not completely resolved. Project costs were estimated to be between $26.5 and $32.2 million (2002 dollars), depending on the alternative that was selected. The Feasibility Study reviewed options for the funding of the construction of the sewer system and determined that a number of funding sources would be required because there is not a single mechanism or funding source available that could cover the entire project cost.

Cost estimates that are presented in the following chapter, which describes the recommended alternative in detail, are substantially lower than those presented in the Feasibility Study and described in this chapter. This difference is due to refinements that have been made in the proposed sewer system configuration (reducing the number of pump stations required, the length of pipeline to be installed, and the size of some of the pipelines), and preparing cost estimates to a greater level of detail.

After the Feasibility Study was completed, the City formed the Ad Hoc Meridian Corridor Task Force (Task Force) to further develop the alternatives identified in the Feasibility Study. The Task Force's report (Ad Hoc Meridian Task Force, December 2002) identified properties whose owners desired to obtain sewer service in the immediate future. These properties are all located in the Phase I development area, and the Task Force's report identified the initial sewer service development to serve these properties as Phase IA. Phase IA properties are identified on Figure 1-5 and are described in detail in Appendix C.

The Task Force's report reviewed the potential methods of funding development of the sewer system. The Task Force's report established a schedule for the development of the sewer utility, with the development of this GSP being the first step in that process. The anticipated schedule for this project is described in Chapter 7.

2.1 PLANNING BASINS

The City's sewer service area has been divided into 18 basins based on topography and the phase of the sewer system development when the areas would be served. Figure 1-5 shows basins and projected average and maximum flows from each basin (see Table 1-2). Figure 1-5 shows that Phase I development along the Meridian Avenue corridor would produce an average flow of 0.45 mgd with Phase II sewers producing an additional 0.89 mgd. Construction of the Phase I sewers would take place over the next 20 years, and Phase II sewers would be constructed over the next 50 years. The calculations and tables used to arrive at these design values are presented in Appendix B. The ten properties whose owners wish to obtain service in the immediate future (Phase IA), as identified by the Ad Hoc Task Force, are located in either Basin 2 or Basin 3, both of which would be sewered as part of Phase I.

2.2 COLLECTION SYSTEM ALTERNATIVES

Four collection system configuration alternatives for the Edgewood sewer system are presented in this section. These alternatives were first identified in the Feasibility Study and developed further in the Task Force report. After these four alternatives are described, an evaluation of the alternatives will be presented and the recommended alternative will be identified. The next chapter of this GSP will further refine the recommended alternative.

Although only conveyance within the Phase I area is discussed here, preliminary conveyance and pump station sizing calculations assume that Phase II flows will be routed through the Phase I conveyance system to the treatment purveyors when Phase II areas are served. The alternatives described here were developed assuming that the Sumner Heights area of Edgewood (Basin 16, Phase II) will discharge to the Sumner WWTP regardless of the alternative that is selected.

The estimated capital costs prepared for these alternatives are only for the construction of the Phase I sewers, which are the only ones that will be built within the next 20 years. Phase II sewer construction will take place between 20 and 50 years after construction of Phase I begins. It is anticipated that Phase III areas will not be sewered during the 50-year planning period. Prior to providing service to Phase II, an amendment to the GSP will be necessary. This amendment would identify the specific major improvements required within the Phase II service area to provide sewers to the properties located therein.

The cost estimates presented in this section are conceptual and were prepared to compare the alternatives considered. Conceptual cost estimates are prepared with an expected accuracy of +50 percent (actual cost would be 50 percent less than estimated) to -30 percent (actual cost would be 30 percent greater than estimated). The cost estimate for the alternative selected as the recommended alternative will be further refined in the following chapter to a planning level of accuracy of +40 percent to -10 percent.

This section describes the alternatives presented and evaluated in the Feasibility Study. However, these alternatives have been modified to reflect continuing negotiations that have taken place with potential purveyors of wastewater conveyance and treatment services. The alternatives presented in the Feasibility Study assume that flows would be routed to the Pierce County collection system through Milton for treatment at either the City of Tacoma's CTP or Pierce County's Chambers Creek WWTP. As this GSP was prepared, negotiations with the City of Tacoma led to the conclusion that routing sewage flows to the City of Fife's conveyance system for treatment at Tacoma's CTP would be more economical than routing flows to Pierce County's system.

Table 2-1 presents a comparison of the alternatives evaluated in the Feasibility Study and this GSP. For the purpose of preparing a feasibility analysis and conceptual level cost estimates, alternatives that entail routing flows to either 1) Pierce County facilities or 2) City of Fife and Tacoma facilities are essentially the same. Conceptual level construction and project cost estimates that were prepared in the Feasibility Study for alternatives that would have routed flows to Pierce County facilities are used in this GSP to evaluate alternatives that now result in flows being routed to Fife and Tacoma.

Table 2-1. Comparison of Feasibility Study and General Sewer Plan Alternatives

Feasibility Study Alternative	General Sewer Plan Alternative
Alternative 1 – Lakehaven	**Alternative 1 – Lakehaven**
Phase I: Lakehaven	Phase I: Lakehaven
Phase II: Lakehaven, Puyallup, Sumner	Phase II: Lakehaven, Puyallup, Sumner
Alternative 2 – Pierce County	**Alternative 2 – Tacoma**
Phase I: Pierce County	Phase I – Tacoma
Phase II: Pierce County, Puyallup, Sumner	Phase II – Tacoma, Sumner
Alternative 3 – Lakehaven/Puyallup	**Alternative 3 – Lakehaven /Puyallup**
Phase I – Lakehaven, Puyallup	Phase I – Lakehaven, Puyallup
Phase II – Lakehaven, Puyallup, Sumner	Phase II - Lakehaven, Puyallup, Sumner
Alternative 4 – Pierce County/Puyallup	**Alternative 4 – Tacoma/Puyallup**
Phase I – Pierce County, Puyallup	Phase I – Tacoma, Puyallup
Phase II – Pierce County, Puyallup, Sumner	Phase II – Tacoma, Puyallup, Sumner

2.2.1 Alternative 1 (Lakehaven)

- Phase I flows to Lakehaven Utilities District.
- Phase II flows to Lakehaven, Puyallup, and Sumner.

In this alternative, Phase I flows would be routed to Lakehaven Utilities District. Portions of Phase II flows would be routed to Lakehaven, Puyallup, and Sumner (Basin 16).

The configuration of sewers in this alternative is presented in Figure 2-1. The Edgewood collection system would connect to an existing Lakehaven pump station located at Meridian Avenue and 19th Way South. The Phase II connection to Puyallup would be made at an existing pump station at Meridian Avenue and North Levee Road. The Phase II connection to the Sumner sewer system for Basin 16 would be made at Valley Avenue East. (Note: The City of Sumner does not yet have sewer service in this area but future sewers are shown in the Draft Sumner General Sewer Plan [Parametrix, May 2000]. Costs for Phase II sewer service will need to be negotiated with the City of Sumner in the future to make sure that the sizing of these sewers will accommodate Edgewood flows and that treatment capacity is available at the Sumner WWTP.)

Figure 2-1 Conveyance Alternative 1

A total of approximately 0.45 mgd would be routed to Lakehaven from the Phase I basins, on an average flow basis. When Phase II was completed, an additional 0.24 mgd would be routed to Lakehaven, with 0.47 mgd of the Phase II flow being routed to Puyallup and 0.18 mgd from Basin 16 routed to Sumner. Average and peak flows that would be routed to each treatment purveyor for each phase of construction are presented in Table 2-2.

This alternative calls for flows from Basins 7, 14, 15, and 17 to be routed to Puyallup as part of the Phase II system. The topography of the area will require that much of this area be served by pump stations and force mains rather than gravity sewers. If this alternative is selected as the recommended alternative, careful consideration will need to be given to the costs and benefits associated with providing these areas with sewer service during Phase II.

Table 2-2. Flows[a] to Treatment Purveyors – Alternative 1 (Lakehaven)

Location	Lakehaven[b]		Puyallup[c]		Sumner[d]		Total	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Phase I Areas	0.45	1.48					0.45	
Phase II Areas	0.24	0.85	0.47	1.54	0.18	0.65	0.89	
Totals	**0.69**		**0.47**		**0.18**		**1.34**	**3.79**

[a] All flows in mgd. Flows from individual basins are presented in Appendix B.

[b] Lakehaven Phase I Basins = 1, 2, 3, 4, 5.
Lakehaven Phase II Basins = 6, 8, 9, 10, 11, 12, 13.

[c] Puyallup Phase II Basins = 7, 14, 15, 17.

[d] Sumner Phase II Basins = 16.

Seven pump stations would be required to serve the Edgewood Phase I area under this alternative. Additional pump stations would likely be required to serve individual residential and commercial developments.

The costs associated with Alternative 1 include the design and installation of approximately 30,000 linear feet of gravity sewer main, 15,000 linear feet of pressure sewer main, and seven pump stations. The total estimated project cost for this alternative is approximately $32,200,000. Construction and project cost estimates for this alternative are presented in Appendix D.

2.2.2 Alternative 2 (Tacoma)

- Phase I flows to Tacoma (via Fife).
- Phase II flows to Tacoma and Sumner.

In this alternative Phase I flows would be routed to the City of Fife conveyance system with discharge to the Tacoma CTP. Phase II flows would be routed to the same point except for Basin 16 flows, which would be routed to the Sumner WWTP.

The configuration of sewers in this alternative is presented in Figure 2-2. The Edgewood collection system would connect to the Fife sewer system at a gravity sewer near the intersection of 25th Street East and Freeman Road East. This proposed connection is described further in Section 3.2. The Phase II connection to the Sumner sewer system for Basin 16 would be made at Valley Avenue East.

Approximately 0.45 mgd would be routed to the Tacoma CTP from the Phase I basins on an average flow basis. When Phase II was completed, an additional 0.71 mgd would be routed to Tacoma, with the remaining 0.18 mgd of Phase II flow from Basin 16 being routed to Sumner. Average and peak flows that would be routed to each treatment purveyor for each phase of construction are presented in Table 2-3.

Table 2-3. Flows[a] to Treatment Purveyors – Alternative 2 (Tacoma)

Location	Tacoma[b]		Sumner[c]		Total	
	Average	Peak	Average	Peak	Average	Peak
Phase I Areas	0.45	1.48			0.45	
Phase II Areas	0.71	2.20	0.18	0.65	0.89	
Totals	**1.16**		**0.18**		**1.34**	**3.79**

[a] All flows in mgd. Flows from individual basins are presented in Appendix B.

[b] Tacoma Phase I Basins = 1, 2, 3, 4, 5.
Tacoma Phase II Basins = 6–15, 17.

[c] Sumner Phase II Basins = 16.

Based on the alignments described in the Feasibility Study, six pump stations would be required to service the Edgewood Phase I sewer area in this alternative. As discussed below, this alternative was selected as the recommended alternative and refinements to this configuration resulted in the number of pump stations being reduced from six to three. Additional pump stations would likely be required to serve individual residential and commercial developments.

Alternative 2 calls for flows from Basins 7, 14, 15, and 17 to be routed to Tacoma as part of the Phase II system. The topography of the area will require that much of this be served by pump stations and force mains rather than gravity sewers. If this alternative is selected as the recommended alternative, the costs and benefits associated with providing these areas with sewer service during Phase II will need to be evaluated.

The costs for Alternative 2 include approximately 35,000 linear feet of gravity sewer line, 8,500 linear feet of pressure sewer line, and six pump stations. The total estimated project cost for Alternative 2 is approximately $27,400,000. (Note: The alignment shown in Figure 3-1 for this alternative is different than that shown for Alternative 2 in the Feasibility Study. Here, the connection to the City of Tacoma system is shown in the vicinity of 25th Street East and Freeman Road. In the Feasibility Study, the connection to the Pierce County conveyance system was shown as being located between Milton Way and I-5. At a conceptual planning level, these alignments are not substantially different and cost estimates have not been changed to reflect this change. The estimated costs for this alternative will be revised in Chapter 3, where the recommended alternative is described in detail.)

Figure 2-2 Conveyance Alternative 2

2.2.3 Alternative 3 (Lakehaven/Puyallup)

- Phase I flows to Lakehaven and Puyallup.
- Phase II flows to Lakehaven, Puyallup, and Sumner.

In Alternative 3, Phase I flows would be split between Lakehaven Utilities District and the City of Puyallup. This alternative was considered because portions of the Edgewood topography slope to the south towards the City of Puyallup and some flows could potentially be routed to the Puyallup WWTP by gravity, thereby decreasing the flow needing to be pumped north to Lakehaven. Compared to Alternative 1, this alternative would allow Basins 7, 14, and 15 to be served more readily during Phase II. The topography of Basin 17 would still require that flows from this area be pumped to the Phase I conveyance system.

The configuration of the sewer system for this alternative is presented in Figure 2-3. The Edgewood collection system would be connected to the Lakehaven system at an existing pump station located at Meridian Avenue and 19th Way South. Connection to the Puyallup system would be made at an existing pump station located at Meridian Avenue and North Levee Road. The Phase II connection to the Sumner sewer system for Basin 16 would be made at Valley Avenue East.

At the completion of Phase I, approximately 0.33 mgd would be pumped to Lakehaven, on an average flow basis, and 0.12 mgd would be routed to Puyallup. When Phase II was completed, an additional 0.14 mgd would be routed to Lakehaven, with 0.57 mgd of the Phase II flow being routed to Puyallup and 0.18 mgd from Basin 16 routed to Sumner. Average and peak flows that would be routed to each treatment purveyor for each phase of construction are presented in Table 2-4.

Table 2-4. Flows[a] to Treatment Purveyors – Alternative 3 (Lakehaven/Puyallup)

Location	Lakehaven[b]		Puyallup[c]		Sumner[d]		Total	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Phase I Areas	0.33	1.12	0.12	0.45			0.45	
Phase II Areas	0.14	0.52	0.57	1.82	0.18	0.65	0.89	
Totals	**0.47**		**0.69**		**0.18**		**1.34**	**3.79**

[a] All flows in mgd. Flows from individual basins are presented in Appendix B.

[b] Lakehaven Phase I Basins = 1, 2, 3.
Lakehaven Phase II Basins = 6, 8, 9, 10.

[c] Puyallup Phase I Basins = 4, 5.
Puyallup Phase II Basins = 7, 11, 12, 13, 14, 15, 17.

[d] Sumner Phase II Basins = 16.

Six pump stations would be required for this alternative, one less than for Alternative 1. Additional pump stations would likely be required to serve individual residential and commercial developments. Routing some flow to the south would result in several of the pump stations being smaller than what is required for Alternative 1.

Figure 2-3 Conveyance Alternative 3

The total estimated project cost for Alternative 3 presented in the Feasibility Study is approximately $30,500,000, which includes the design and installation of approximately 37,500 linear feet of gravity sewer pipe, 13,500 linear feet of pressure sewer line, and six pump stations.

2.2.4 Alternative 4 (Tacoma/Puyallup)

- Phase I flows to Tacoma and Puyallup.
- Phase II flows to Tacoma, Puyallup, and Sumner.

Alternative 4 would route sewage from the northern portion of Edgewood to the City of Fife conveyance system for treatment at the Tacoma CTP. Flows from the southern portion of Edgewood would be routed to the City of Puyallup. Basin 16 flows would be routed to the City of Sumner as part of Phase II. Compared to Alternative 2, this alternative would allow Basins 7, 14, and 15 to be served more readily during Phase II.

The configuration of sewers in this alternative is presented in Figure 2-4. The connection to the Fife sewer system would be at a gravity sewer at the intersection of 25th Street East and Freeman Road East. This proposed connection is described further in Section 3.2. Connection to the Puyallup system would be made at an existing pump station located at Meridian Avenue and North Levee Road. The Phase II connection to the Sumner sewer system for Basin 16 would be made at Valley Avenue East.

At the completion of Phase I, approximately 0.33 mgd would be routed to Tacoma on an average flow basis, and 0.12 mgd would be routed to Puyallup. When Phase II was completed, an additional 0.40 mgd would be routed to Tacoma, with 0.31 mgd of the Phase II flow being routed to Puyallup and 0.18 mgd from Basin 16 routed to Sumner. Average and peak flows that would be routed to each treatment purveyor for each phase of construction are presented in Table 2-5.

Table 2-5. Flows[a] to Treatment Purveyors – Alternative 4 (Tacoma/Puyallup)

Location	Tacoma[b]		Puyallup[c]		Sumner[d]		Total	
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Phase I Areas	0.33	1.12	0.12	0.45			0.45	
Phase II Areas	0.40	1.33	0.31	1.06	0.18	0.65	0.89	
Totals	**0.73**		**0.43**		**0.18**		**1.34**	**3.79**

[a] All flows in mgd. Flows from individual basins are presented in Appendix B.

[b] Tacoma Phase I Basins = 1, 2, 3.
Tacoma Phase II Basins = 6, 8, 9, 10, 12, 17.

[c] Puyallup Phase I Basins = 4, 5.
Puyallup Phase II Basins = 7, 11, 13, 14, 15.

[d] Sumner Phase II Basins = 16.

Six pump stations would be required for Phase I of this alternative. Additional pump stations would likely be required to serve individual residential and commercial developments. Routing some flow to the south would result in several of the pump stations being sized smaller than what is required for Alternative 2.

Figure 2-4 Conveyance Alternative 4

The estimated costs for Alternative 4 include the design and installation of approximately 43,000 linear feet of gravity sewer line, 6,500 linear feet of pressure sewer line, and five pump stations. The total estimated project cost for this alternative is approximately $26,500,000. (Note: The alignment shown in Figure 2-4 for this alternative is different from that shown for Alternative 4 in the Feasibility Study. Here, the connection to the City of Tacoma system is shown in the vicinity of 25th Street East and Freeman Road. In the Feasibility Study, the connection to the Pierce County conveyance system was shown as being located between Milton Way and I-5. At a conceptual planning level, these alignments are not substantially different and cost estimates have not been changed to reflect this change.)

2.3 COMPARISON OF ALTERNATIVES

The Feasibility Study presented estimated project (capital) costs and annual operation and maintenance (O&M) costs for each alternative. The O&M costs were estimated to account for maintenance labor, power, chemical costs for odor control, and equipment repair costs. Table 2-6 presents the conceptual level project and O&M cost estimates for each alternative, as developed in the Feasibility Study.

Table 2-6. Conceptual Level Project and O&M Costs for Sewer System Alternatives[a]

Alternative	Estimated Project Cost	Estimated Annual O&M Cost
Alternative 1 – Lakehaven	$32,300,000	$640,000
Alternative 2 – Tacoma	$27,400,000	$500,000
Alternative 3 – Lakehaven/Puyallup	$30,500,000	$530,000
Alternative 4 – Tacoma/Puyallup	$26,500,000	$430,000

[a] Costs presented in 2002 Feasibility Study. In the Feasibility Study, Alternatives 2 and 4 were based on routing flows to Pierce County rather than Tacoma. At the conceptual planning level, costs for routing flows to Tacoma will be similar to those estimated previously for Pierce County alternatives and have not been revised.

Evaluation of these alternatives with City staff and the public led to Alternative 2 (Tacoma) being selected as the recommended alternative for the following reasons:

- Alternative 2 has the second lowest estimated cost of the four alternatives that were identified.
- Routing flow to the west takes better advantage of the topography in the area, with much of the flow being able to flow to Fife by gravity without the need for multiple pump stations for the entire flow.
- At the completion of Phase II, sewage would only be discharged to two treatment purveyors rather than three as in the case for the other three alternatives. This would simplify billing and record-keeping procedures and reduce the number of different rates that residents of the City of Edgewood potentially could be paying for sewer service.

As discussed above, the project costs presented in this section are conceptual-level estimates. The next section of this GSP will develop the recommended alternative in additional detail and present planning-level cost estimates for the construction of the new sanitary sewer system, the upgrade of the City of Fife's system to accommodate the additional flow from Edgewood, and the cost of treatment at the City of Tacoma's CTP facility.

3. RECOMMENDED ALTERNATIVE

This section presents a detailed description of the recommended alternative for the configuration of the City of Edgewood sewer system. As described in the previous section, the recommended alternative was determined to be the routing of all Phase I flows to the Tacoma CTP via the City of Fife's sewer system. The sewer system configuration that is proposed to accomplish this is described in this section, and detailed planning-level cost estimates are presented. Cost estimates will include the construction and project costs for the sewer system itself, costs to be paid to the City of Fife to upgrade their sewer system to receive and convey sewage flows, costs to secure treatment capacity from the City of Tacoma, and ongoing costs to pay for the operation and maintenance of the sewer system.

3.1 PROPOSED SEWER SYSTEM CONFIGURATION

For the purposes of this description the proposed sewer system has been divided into three sections: North Edgewood, West Edgewood, and South Edgewood. A map of Edgewood, the division of the sewer system into these three areas, and the proposed alignment for the new sewer system is presented in Figure 3-1. Schematic layout drawings of the proposed sewer system are presented in Figure 3-2 (North Edgewood and South Edgewood) and Figure 3-3 (West Edgewood).

3.1.1 North Edgewood

The North Edgewood sewer system extends from the northern city limit (on Military Road) to the intersection of 24th Street East and Meridian Avenue. This section of the sewer system would serve all of the Phase IA properties and Phase I Basins 1, 2, and 3. As the Phase II areas were developed, this area of the sewer system would also serve basins 6, 8, and 9. A cost estimate for the North Edgewood sewer system, as described in this section, is presented in Appendix E1.

The northernmost section of sewer would be a 4-inch force main, approximately 1,160 feet long, extending along Military Road and Meridian Avenue. This is the only area of the Phase I planning area where the existing topography dictates the need for grinder pumps on individual properties. A standard detail and specification for grinder pump stations are included in the proposed sewer standards (Chapter 5 and Appendix F. Flow from the 4-inch force main would discharge to the gravity system north of Jovita Boulevard; and this flow, along with additional gravity flow collected along the Meridian Avenue corridor, would discharge to Sanitary Sewer Manhole (SSMH) 053, located between Eighth Street East and 13th Street East (see Figures 3-1, 3-2, and 3-3 for the location of individual manholes described in this section). This manhole would also collect gravity flow from the south and direct it to the adjacent Pump Station No. 1.

Comment [pjp1]: The callout for these 3 figures is manually numbered; be sure to update if there are changes in figure numbering.

Design criteria for Pump Station No. 1 are presented in Table 3-1. For the purposes of estimating pump station costs, a triplex submersible pump station in a cast-in-place vault is assumed. The pump station would be rated for a Phase I flow of 1.04 mgd (peak flow from Basins 1 and 2, and 67 percent of the peak flow from Basin 3) and sized so that larger pumps could be installed in the future to accommodate Phase II flow of 1.35 mgd (Basins 6 and 8, and 67 percent of Basin 9). A detailed cost estimate for the pump station is presented in Appendix E4.

Figure 3-1 Proposed Sanitary Sewer System

Figure 3-2 Sanitary Sewer Alignment Preferred Alternative Schematic (North Edgewood and South Edgewood)

Figure 3-3 Sanitary Sewer Alignment Preferred Alternative Schematic (West Edgewood)

Table 3-1. Pump Station No. 1 Design Criteria

Criterion	Design
Average Flow (Phase I)	0.29 mgd
Peak Flow (Phase I)	1.04 mgd[a]
Average Flow (Phase II)	0.37 mgd
Peak Flow (Phase II)	1.35 mgd[b]
Number of Pumps	3
Flow	0.52 mgd, each (Phase I)
Discharge Pressure	50 feet (Phase I)
Motor Horsepower	10 HP, each

[a] Flow from Basins 1, 2, and 3.

[b] Flow from Basins 1, 2, 3, 6, and 8, and 67 percent of Basin 9.

Pump Station No. 1 would discharge to an 8-inch force main which would transport flow to SSMH 042. At this point, a 12-inch gravity line would convey flows further south along Meridian Avenue to SSMH 022 at the southern boundary of the North Edgewood sewer system.

3.1.2 South Edgewood

The South Edgewood sewer system would convey flows from the south end of the Phase I service area, at the intersection of 36th Street East and Meridian Avenue, to the point of connection to the North Edgewood system, at 24th Street East and Meridian Avenue. This section of the sewer system would serve Phase I Basins 4 and 5, and Phase II Basins 11, 13, 14, and 15. A cost for the South Edgewood sewer system, as described in this section, is presented in Appendix E2.

Topography at the south end of the Phase I area will require a pump station (Pump Station No. 2) to pump Basin 5 flows from 36th Street East and Meridian Avenue to SSMH 032 at 32nd Street East and Meridian Avenue. Design criteria for Pump Station No. 2 are presented in Table 3-2. For the purposes of estimating pump station costs, a duplex submersible pump station in a precast manhole wet well is assumed. The pump station would be rated for a Phase I flow of 0.11 mgd (all of the peak flow from Basin 5). When Phase II areas were served, this pump station would be upgraded or reconstructed to accommodate a peak flow of 0.62 mgd (additional peak flow from Basins 13 and 14, and from half of Basin 15). A detailed cost estimate for the pump station is presented in Appendix E4.

Pump Station No. 2 would discharge to a 4-inch force main. From SSMH 032, flow would be routed north along Meridian Avenue. In order to avoid an extremely deep trench section of at least 20 feet at the intersection of 24th Street East and Meridian Avenue, the gravity sewer would be routed west and then north around the intersection (see Figure 3-1). This alignment would require obtaining an easement from the landowner, Timberland Savings Bank, to construct the sewer through these commercially-zoned lots. The flow from South Edgewood would discharge to the West Edgewood sewer at SSMH 021 in 24th Street East.

Table 3-2. Pump Station No. 2 Design Criteria

Criterion	Design
Average Flow (Phase I)	0.03 mgd
Peak Flow (Phase I)	0.11 mgd[a]
Average Flow (Phase II)	0.16 mgd
Peak Flow (Phase II)	0.62 mgd[b]
Number of Pumps	2
Flow	0.11 mgd, each (Phase I)
Discharge Pressure	40 feet (Phase I)
Motor Horsepower	2 HP, each

[a] Flow from Basin 5.

[b] Flow from Basins 5, 13, and 14, and 50 percent of Basin 15.

3.1.3 West Edgewood

The West Edgewood sewer system would receive flows from the North and South Edgewood systems along with additional Phase I flows from portions of Basins 3 and 4. As the Phase II areas are developed, this section of the sewer system will also serve Basins 10, 12, and 17. When Basin 7 is connected to the sewer system as part of Phase II, flows would likely be routed along Freeman Road to connect to the West Edgewood sewer system at the Edgewood city limits. All other sewage flows from the City of Edgewood would be routed to the City of Fife sewer system via the West Edgewood sewer system with the exception of those from Basin 16 (Phase II) that would flow to the City of Sumner.

Flows from the North and South Edgewood sewer systems would be connected to the West Edgewood system along 24th Street East (see Figure 3-1). These flows would be routed west along 24th Street East to Pump Station No. 3, located in the vicinity of 98th Court East. This pump station would also collect flows from further west along 24th Street East to 94th Avenue East.

Design criteria for Pump Station No. 3 are presented in Table 3-3. For the purposes of estimating pump station costs, a triplex submersible pump station in a cast-in-place wet well structure is assumed. The pump station would be sized to pump all Phase I flows with space available for additional pumps that would be capable of pumping all of the Phase II flows with the exception of flows from Basins 7, 16, and 17.

Table 3-3. Pump Station No. 3 Design Criteria

Criterion	Design
Average Flow (Phase I)	0.45 mgd
Peak Flow (Phase I)	1.48 mgd[a]
Average Flow (Phase II)	0.86 mgd
Peak Flow (Phase II)	2.05 mgd[b]
Number of Pumps	3
Flow	0.75 mgd, each (Phase I)
Discharge Pressure	125 feet (Phase I)
Motor Horsepower	60 HP, each

[a] Flow from all Phase I basins

[b] Flow from Phase I basins and Phase II basins except for Basins 7, 16, and 17

Pump Station No. 3 would discharge to a 10-inch force main that would be routed west along 24th Street East, south along 94th Avenue East, west along 32nd Street East, and then back north along 86th Avenue East. The total length of the force main would be approximately 8,200 feet. The force main would discharge to a manhole located in the vicinity of 86th Street East and 29th Street Court East (see Figure 3-1). From this point, a 15-inch gravity sewer would convey flows to the city limits at the intersection of 25th Street East and Freeman Road. At this point the City of Edgewood sewer would be connected to the City of Fife's collection system, as discussed in Section 3.2, below.

The long force main from Pump Station No. 3 is required to convey flows over the hilly topography in the area while minimizing the number of pump stations. Where the force main passes through Phase I basins along 24th Street East , an 8-inch gravity sewer running from west to east would collect flows and route them back to the pump station to eliminate the need for pump stations to connect individual properties to the force main. Depending on the topography, pump stations may be required on individual lots or groups of lots to reach this gravity line, particularly in Basin 4.

The route of the force main south along 94th Avenue East and then back north to 25th Street East is required to keep the sewer system in existing roadways and established rights-of-way. A more direct route to the connection to the Fife sewer system west of Freeman Road would be directly west from the intersection of 24th Street East and 94th Avenue East, but this would require an overland route across topography that likely would require construction of an inverted siphon or a pipe bridge. It is recommended that this alternative be examined in detail during the design of the sewer system as an alternative to what is proposed in this GSP. The proposed route described in this GSP was selected because it presents the fewest issues with respect to constructibility and impacts on undeveloped areas of the city.

3.2 CONNECTION TO CITY OF FIFE COLLECTION AND CONVEYANCE SYSTEM

City of Edgewood engineers have met with City of Fife staff on several occasions to discuss the feasibility of connecting the new Edgewood sewer system to the City of Fife's sanitary sewer collection and conveyance system. Based on these discussions, the City of Fife prepared an evaluation of their existing system to identify new facilities that would need to be constructed and areas that would need to be upgraded to receive these flows.

The City of Fife's sanitary sewer system discharges to the City of Tacoma along Pacific Highway near the Puyallup River. From this point, flows are conveyed to Tacoma's CTP, which is located along the Puyallup River near Commencement Bay (see Figure 1-3). Connection to Fife's collection and conveyance system will require payment to Fife for the upgrade of their system and monthly charges for the use of that system. Monthly charges will also need to be paid to the City of Tacoma for the wastewater treatment provided at the CTP. This section describes the proposed connection to the Fife sanitary sewer system and the estimated initial (capital) cost that will be incurred for this service. The following section presents a discussion of the anticipated costs for the provision of wastewater treatment service by the City of Tacoma.

Appendix G presents a technical memorandum (Tetra Tech/KCM, Inc., December 2002) prepared for the City of Fife describing alternative means of connecting the Edgewood sewer system to the City of Fife's system. As described in this memorandum, and as described above, the Edgewood system would cross the city limit boundary between Fife and Edgewood at 25th Street East and Freeman Road. From this point, an 18-inch gravity sewer would be extended through an easement to 70th Avenue East, a distance of approximately 3,150 feet. Fife currently has plans to construct a 10-inch gravity sewer along this route in the future. Connection of the Edgewood sewer system at this point will require that the pipeline be increased in size from 10 inches to 18 inches.

From the point of connection to the Fife system on 70th Avenue East, the technical memorandum evaluated two alternatives. The more economical alternative was determined to be routing flow to Fife's Pump Station No. 13 and then upgrading conveyance facilities downstream of that pump station. Figure 3-4 presents a schematic of the portions of the Fife conveyance system that would be impacted by the Edgewood flows and the improvements that would be required to accommodate these flows. These improvements are summarized as follows:

1. Upgrade Pump Station No. 13 to a capacity of 2.26 mgd. Fife currently plans to increase the capacity of this pump station to 0.76 mgd. Connection of the Edgewood sanitary sewer system would require that the size of this pump station be increased to accommodate the additional peak Phase I flow from Edgewood of 1.48 mgd.

2. Construct a new Pump Station No. 8 with a capacity of 4.8 mgd. Fife already has plans to construct this pump station at a capacity of 3.3 mgd.

3. Increase the capacities of Pump Stations No. 6 and No. 5 to 9.5 mgd and 10.7 mgd, respectively. Fife already has plans to increase the capacities of these pump stations to 8.0 mgd and 9.2 mgd, respectively.

4. Construct 3,150 feet of 18-inch gravity sanitary sewer from 25th Street East and Freeman Road to 70th Avenue East, as described above.

5. Construct 1,120 feet of 18-inch gravity sanitary sewer in 70th Avenue East from 25th Street East to Pump Station No. 13. This pipe would extend the gravity sewer, described above, that would extend from the intersection of 25th Street East and Freeman Road to 70th Avenue East. This pipe will parallel an existing 10-inch gravity sewer that is already in place. The sizing of this pipe needs to be confirmed with Fife. If the 10-inch pipe will remain in service, a new gravity sewer that is smaller than 18 inch diameter may be feasible.

6. Construct 650 feet of 10-inch force main from Pump Station No. 13 to the intersection of 20th Street East and 70th Avenue East in Fife. A 6-inch force main was recently constructed along this route, but a larger pipe is required to accommodate flows from Edgewood.

7. Construct 2,800 feet of 24-inch gravity sanitary sewer in 20th Street East from 70th Avenue East to Pump Station No. 8. This pipe will replace an existing gravity sewer. The possibility of constructing a gravity sewer that parallels the existing sewer should be evaluated with the City of Fife as an alternative to replacing the existing sewer. Cost estimates presented in this GSP are based on the more conservative assumption that the existing sewer will have to be replaced.

The total estimated cost for all of the improvements that will be required to the Fife sanitary sewer system to allow it to receive flows from Edgewood is approximately $4,020,000 (2002 dollars). The technical memorandum escalated these costs to 2007 dollars based on the assumption that the middle of the construction period for the improvements would occur in that year. Depending on the rate at which the Edgewood sewer system is constructed and the Phase I areas are developed, the schedule for the construction of the Fife sewer improvements may be substantially different from this. Close coordination with the City of Fife will be required to ensure that facilities are being constructed when they are required so that adequate capacity for the Edgewood flows is always available.

Figure 3-4 Required Upgrades to City of Fife Sanitary Sewer System to Accommodate Flows from Edgewood

3.3 WASTEWATER TREATMENT AT CITY OF TACOMA'S CENTRAL TREATMENT PLANT

Connection of the Edgewood collection system to the Fife conveyance system will result in wastewater being routed to the City of Tacoma's CTP for treatment and disposal. This plant is currently in the process of being upgraded to achieve a maximum monthly treatment capacity of 60 mgd. The Facilities Plan for the upgrade of the CTP identified additional service areas beyond the plant's current service area that could potentially be served once the plant capacity is increased. One of the potential new service areas identified in the Facilities Plan was the City of Edgewood (Parametrix, 2002).

The cities of Edgewood and Tacoma are currently in negotiations to determine the fair cost for the provision of wastewater treatment service at the CTP. The formula for determining this cost will likely be based on the anticipated flow and biochemical oxygen demand (BOD) and total suspended solids (TSS) loadings discharged from Edgewood. Flow and loading estimates for the Phase I service area are presented in the following sections.

3.3.1 Projected Flow

Preliminary discussions with City of Tacoma staff have indicated that the cost of service will be based on the average dry weather flow discharged from the City of Edgewood. (The dry weather months are defined in the CTP Facilities Plan as the period between May and October.) Estimates of projected wastewater flows previously presented in this GSP have been based on average annual and peak wet weather flows.

The CTP Facilities Plan does not present a calculation to project average dry weather flow, but it does present a calculation for maximum monthly dry weather flow, with a per capita flow of 90 gallons per person per day being assumed. Communications with City of Tacoma staff have indicated that they will likely be estimating per capita flows for the average dry weather flow condition using a criterion of 85 gallons per capita per day (gpcd).

Chapter 2 of this GSP presents a calculation of projected flows from the Phase I and Phase II service areas. These calculations are based on the residential population served and also the acreage of commercial- and industrial-zoned property that will be served. Average annual flows for nonresidential connections are estimated using factors of 2,000 gallons per acre per day for industrial property, 2,500 gallons per acre per day for mixed use property, and 3,000 gallons per acre per day for commercial property. Since these criteria are used to estimate the average annual flow, a smaller factor should be used to estimate the average dry weather flow. As described above, the per capita flow factor for estimating the average dry weather flow is 85 gpcd, compared to the average annual flow factor of 100 gpcd (85 percent of the average annual flow).

Table 3-4 summarizes the wastewater flow design criteria presented previously in this GSP and the average month dry weather flow design criteria that are calculated assuming that this flow will be 85 percent of the average annual flow.

Table 3-4. Projected Wastewater Flows for Estimating Costs for Wastewater Treatment

	Phase I	Phases I and II[a]
Population Served	1,771	7,793
Average Dry Weather Flow (mgd)		
Residential	0.15	0.83
Nonresidential	0.23	0.31
Total	**0.38**	**1.14**
Average Annual Flow (mgd)[b]		
Residential	0.18	0.97
Nonresidential	0.27	0.37
Total	**0.45**	**1.34**
Peak Flow (mgd)	1.48	3.79

[a] Basin 16 (Sumner Heights) of the Phase II area will be routed to the City of Sumner, rather than to Tacoma.

[b] See Table 1-2.

3.3.2 BOD and TSS Loading

The other factor that the City of Tacoma will use to determine the cost of wastewater treatment service is the mass load of BOD and TSS discharged to the CTP. The CTP Facilities Plan uses a factor of 0.2 pounds per capita per day to estimate the average annual per capita residential waste load contribution, as recommended in Ecology's Orange Book. In order to estimate the total waste load that will be discharged from the Edgewood sewer system, the calculation needs to include flows discharged from both residential and nonresidential sources.

There are no major industrial dischargers currently located within the proposed service area. Furthermore, no major industrial dischargers to the system are expected to locate in the City of Edgewood for the foreseeable future. Therefore, wastewater characteristics from nonresidential connections are anticipated to be similar to domestic (residential) wastewater.

Projected flows from nonresidential property are calculated based on per acre criteria that include an allowance for infiltration and inflow. For the purposes of estimating waste loads from nonresidential property, the average dry weather flows presented in Table 3-4 above are used. For the Phase I service area, an average dry weather nonresidential flow of 0.23 mgd is calculated. At a per capita flow of 85 gallons per day for residential connections, this estimated nonresidential flow is equivalent to a connected population of 2,700 people. Similarly, for Phase II, an equivalent connected population of 3,650 people is calculated for an average dry weather flow of 0.31 mgd. Table 3-5 presents estimated BOD and TSS loads for Phase I and Phase II conditions.

These projections are based on the assumption that wastewater discharged from nonresidential sources will be similar, in terms of waste loading, to residential wastewater. Agreements that are negotiated with the City of Tacoma and Fife for wastewater treatment service should include provisions for periodic wastewater sampling and flow monitoring to confirm actual waste loads and adjustments in the cost of treatment, as appropriate.

Table 3-5. Projected Waste Loads

	Phase I	Phases I and II[a]
Per Capita Waste Load (BOD and TSS) = 0.2 lbs/capita/day		
Residential Population	1,771	7,793
Nonresidential Average Dry Weather Flow, mgd	0.23	0.31
Equivalent Residential Population, based on 85 gpcd	2,700	3,650
Total Equivalent Population	4,471	11,443
Projected Average Annual Waste Load (BOD and TSS), lbs/day	894	2,289

[a] Basin 16 (Sumner Heights) of the Phase II area will be routed to the City of Sumner, rather than to Tacoma.

3.4 INTERLOCAL AGREEMENTS FOR WASTEWATER CONVEYANCE AND TREATMENT

Comment [nkd2]: This line spacing, to include before spacing on the bullets, Table 3-6, and Section 3.4 have be adjusted to try to get everything on this page to alleviate having to put Table 3-6 after Table 3-7.

Currently there is a draft interlocal agreement with the City of Fife (Appendix H). This draft agreement allows the City of Edgewood to be a "wholesale" sewer customer of the City of Fife. Based on this agreement, no additional interlocal agreement would be needed with the City of Tacoma. Depending on the final negotiations, the City of Edgewood would either have the one agreement with Fife or separate agreements with Fife and Tacoma. If there are separate agreements, the agreement with Fife would be for "wheeling" Edgewood sewage through their system to Tacoma, and the Tacoma agreement would be for treatment of said sewage. Until final negotiations are complete, actual charges and fees will not be known for certain. It is anticipated that the negotiations will be completed soon after the completion of the General Sewer Plan.

3.5 ESTIMATE OF INITIAL COSTS

This section presents a summary of the estimated costs expected to be incurred by the City of Edgewood to implement the sanitary sewer service system proposed in this GSP. The following costs are discussed:

- Capital and project costs for the construction of the proposed sewer system.
- Costs for the construction of improvements to the Fife sewer system to accommodate connection of the Edgewood sewer system.
- Connection charges that Fife and Tacoma may impose (depending on final agreements).

3.5.1 Construction Cost Estimates

Table 3-6 presents the estimated construction and project costs for the construction of each section of the proposed sewer system described in Section 3.1. Table 3-7 presents an itemized cost estimate for the entire project. Appendix E presents cost estimates for the individual sections of the proposed sewer system. (Cost estimates presented in this chapter are based on 2003 dollars and an Engineering News Record Construction Cost Index of 7647.)

Table 3-6. Cost Estimates[a] for Proposed Sewer System

Area	Construction Cost	Project Cost
North Edgewood	$3,460,000	$4,680,000
South Edgewood	$2,370,000	$3,200,000
West Edgewood	$4,080,000	$5,510,000
Totals	**$9,910,000**	**$13,390,000**

[a] Planning level cost estimate, expected to be accurate to within +40 percent and -10 percent.

Table 3-7. Recommended Alternative – Detailed Cost Estimate

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2nd Page to Table 3-7

The total estimated project cost for the construction of the proposed City of Edgewood sewer system is $13,390,000. This project cost estimate includes costs for engineering, construction management, and contract administration. The estimated construction cost for the proposed sewer system is $9,910,000. These are planning-level cost estimates and include a 30 percent contingency factor. Planning-level cost estimates are prepared to be accurate within a range of +40 percent (actual costs may be 40 percent less than the estimate) to –10 percent (actual costs may be 10 percent more than the estimate). As the project is better defined and the design is completed, uncertainty and contingencies in the cost estimates will be reduced.

These cost estimates are based on the assumptions that the entire project will be constructed by a single contractor and that all sewers, with the exception of a section of the South Edgewood system at 24th Street East and Meridian Avenue, as described in Section 3.1.2, will be installed in the shoulders of streets in public right-of-way. Cost estimates include shoulder and pavement restoration. Cost estimates for the pump stations include an allowance for land acquisition, but these costs will need to be refined when the pump station sites are identified.

Future planning for the implementation of this GSP needs to consider possible coordination of the sewer system construction with the widening of Meridian Avenue that is planned by the Washington State Department of Transportation. If this occurs, costs for items such as traffic control, demolition, and restoration may be reduced. However, the estimates presented in this GSP are based on the assumption that sewer construction will take place before Meridian Avenue is widened.

3.5.2 Cost for Improvements to City of Fife Sewer System

Section 3.2 presents a description of improvements to the City of Fife's sewer system that will be required to increase that system's capacity to accommodate flows from Edgewood. A cost of approximately $4,020,000 has been estimated to complete this work.

3.5.3 Tacoma and Fife Connection Charges

At the time of publishing this document, a draft interlocal agreement had been developed by the City of Fife (Appendix H). This agreement allows the City of Edgewood to connect to the Fife sewer system as a "wholesale" customer. Upfront costs have been deferred to a monthly surcharge. This surcharge will be used to pay for improvements to the Fife sewer system, described above, required to serve the City of Edgewood. As a customer of the City of Fife, the City of Edgewood would not have to pay separate connection charges to the City of Tacoma for treatment. The City of Edgewood will need to negotiate with Fife concerning the agreement and associated fees/charges and should leave its options open, including having a separate agreement with Tacoma.

3.5.4 Capital Cost Summary

Table 3-8 presents a summary of the estimated initial costs that will be incurred by the City of Edgewood to complete the proposed sewer system and begin operations. This estimate does not include costs required for the establishment of the utility, such as legal and financial counsel costs.

Table 3-8. Initial Costs for City of Edgewood Sewer System

Item	Cost
Project Cost for Sewer System Construction	$13,390,000
Improvements to Fife Sewer System	Included in rates (base plus surcharge)
Connection Charge to Tacoma	Included in rates (base plus surcharge)
Connection Charge to Fife	Included in rates (base plus surcharge)
Total	**$13,390,000**

3.6 ESTIMATE OF ONGOING COSTS

This section presents a discussion of estimated monthly O&M and administration costs that will need to be paid to support the City's new sanitary sewer utility. This section also discusses anticipated costs for wastewater treatment service at the City of Tacoma's CTP and fees that will need to be paid to the City of Fife for the City of Edgewood's share of O&M costs for Fife's collection and conveyance system. These costs will be the basis for the determination of the monthly rate required to support the sanitary sewer utility. A detailed discussion of the calculation of the monthly sewer charge is presented in Chapter 4.

3.6.1 Operation and Maintenance Costs

When construction is complete, the proposed sewer system will consist of approximately 20,000 feet of gravity sanitary sewer pipe, 14,000 feet of sanitary sewer force main, and three pump stations. As a comparison, the City of Sumner's collection system consists of approximately 47,500 feet of sewer lines (both gravity and force main) and 12 pump stations. For 2003, the City of Sumner budgeted approximately $550,000 for the operation, maintenance, and administration of the City's sanitary sewer system (not including costs for O&M of the City's treatment plant).

Annual O&M costs for administration, maintenance labor, power, and materials for the proposed sewer system are estimated to be in the range of $275,000 to $300,000 per year. Appendix I presents a worksheet estimating these annual O&M costs. The estimated O&M labor costs include two full-time equivalent employees (FTEs) as maintenance workers. In comparison, the City of Sumner Sewer utility employs approximately four FTEs as maintenance workers.

In addition to maintenance labor, establishment and operation of a new sewer utility will require additional administrative staff. The annual O&M cost estimate includes the equivalent of an additional 1.5 FTEs for utility administration labor and material. Labor costs in this estimate are calculated at a rate of $25 per hour, including wages and benefits.

3.6.2 Costs for Wastewater Treatment Service

The draft interlocal agreement (Appendix H) with Fife includes treatment service as part of the monthly rate paid to Fife. Depending on the final negotiations with Fife, the City of Edgewood may not need to have a separate agreement with Tacoma for treatment service.

3.6.3 Costs for Wastewater Conveyance by City of Fife

The draft interlocal agreement (Appendix H) with Fife defines two costs for the monthly rate: base charge plus a surcharge. The base charge is defined as the lowest retail rate, which is currently $6.40 per hundred cubic feet (ccf) and an undefined surcharge. The surcharge is to pay for improvements to the Fife sewer system required to serve the City of Edgewood (Appendix G). The surcharge is likely to be approximately $5 per month per equivalent residential unit (projected amount from financial consultant). Final amounts, including potential contract operations, will need to be negotiated with the City of Fife.

4. FINANCIAL ANALYSIS

The purpose of this financial chapter is to provide a preliminary long-range plan that will guide the City of Edgewood in funding necessary capital projects and estimated ongoing operating and maintenance identified in Chapter 3 (Recommended Alternative) of this General Sewer Plan. As noted below, construction of a sanitary sewer system is a significant financial expenditure for the City and its constituents. The City has multiple funding options available to partly mitigate both short-term and total financial impacts. However, before the proposed sewage transmission system is completed, it will be necessary for the City to establish a sewer utility, authorized in RCW 35.67.020, and develop rates that equitably distribute costs among system users.

The proposed sewer system is projected to cost around $13.39 million dollars. This Phase I transmission system is necessary to serve 1,957 Equivalent Dwelling Units (EDUs) in the Phase I corridor. This estimate does not include purveyor costs necessary to make available or construct the capacity required to treat the City's effluent.

This chapter is organized as follows:

- Funding Options:
  - Developer Extensions and Latecomer Agreements.
  - Assistance Programs and Grants.
  - General Obligation and Revenue Bonds.
  - Local Improvement Districts (LIDs).
  - General Facilities Charges (GFCs) (connection charges).
- Potential Utility Rates and Rate Structures.
- Conclusion.

4.1 FUNDING OPTIONS

The planned sewage transmission system, necessary to serve both current and some future needs, is a significant financial expenditure for the City. The City might have several funding options available to mitigate this impact, however, including outright grants and/or developer donations.

4.1.1 Developer Extensions and Latecomer Agreements

Cities may require new development to construct infrastructure necessary to serve growth (RCW 35.91.020). While this infrastructure is usually an extension to an existing system, the statutes do not preclude the City from requiring developers to construct a new facility as a condition of permitting. Furthermore, the City may require developers to oversize mains and pumps beyond that which would otherwise be necessary to meet the needs of their own specific development. In so doing, the developer could be partly reimbursed by any latecomers wishing to connect to the system. This payment would be made directly to the developer donating the facility, less any administration fees incurred by the City.

Developer extensions are commonly used to build necessary infrastructure. However, because of the magnitude of costs for the proposed system, it is doubtful that a single developer will have the financial capacity to fund such a project or ever realize a return on his/her investment. This may or may not be true of a group of developers or a larger construction firm. However, the development community might be unwilling to shoulder the full financial burden or risk, particularly beyond the area directly adjacent to the improved property. If this inability or unwillingness exists, the City might wish to consider dividing the burden. Oversizing of pipes to meet future needs can be financed through grants, if available, or long-term bonds (as long as there is an annual source of stable revenue to repay the debt).

4.1.2 Assistance Programs and Grants

Federal and state grant programs, once readily available for financial assistance, were mostly eliminated or replaced by low-cost loan programs. The remaining miscellaneous grant programs are generally limited in application, lightly funded, and heavily subscribed. Nonetheless, the economic benefit of a grant, if applicable, and low-interest loans makes the effort of applying worthwhile.

Common special programs identified as potential funding sources are summarized in the following subsections.

4.1.2.1 Public Works Trust Fund

The Public Works Trust Fund (PWTF) is a low-cost revolving loan program established to provide financial assistance to local governments for public works projects. Eligible projects include repair, replacement, rehabilitation, reconstruction, or improvement of public works systems to meet current standards for existing users. With recent revisions to the program, growth-related projects consistent with 20-year projected needs are now eligible.

The applicant must be a local government, such as a city, county, or special purpose district, and have an "approved" long-term plan for financing its public works needs. Local governments must compete for PWTF dollars since more funds are requested each year than are available. The Public Works Board evaluates each application and transmits a prioritized list of projects to the legislature. The legislature then indicates its approval by passing an appropriation from the Public Works Assistance Account to cover the cost of the approved loans. Once the Governor has signed the appropriations bill into law, the local governments receiving the loans are offered a formal loan agreement with the appropriate interest rate and term, as determined by the Public Works Board.

PWTF loans are available at interest rates of 0.5 percent, 1 percent, and 2 percent, with the lower interest rates given to applicants who pay a larger share of the total project costs. Loan applicants must pay 5 percent of the project cost to qualify for a 2 percent loan, 10 percent for a 1 percent loan, and 15 percent for a 0.5 percent loan. The useful life of the project determines the loan term, up to a maximum of 20 years.

The maximum loan amount is $10 million per jurisdiction per biennium.

4.1.2.2 Community Economic Revitalization Board (CERB)

Managed by the Department of Community Trade and Economic Development, CERB is strategically focused to help business and industry create and retain jobs in partnership with local communities. The primary focus of the CERB program is to provide low-interest loans or, in unique circumstances, grants to

local governments to help finance the construction of public facility projects necessitated by private sector development. Job creation and/or retention are the primary goals of the CERB program.

Washington State counties, cities, towns, port districts, special purpose districts, and municipal corporations may apply for CERB funding. Eligible public facilities include bridges, roads, domestic and industrial water, sanitary sewer, storm sewer, railroad spurs, electricity, natural gas, buildings or structures, and port facilities. CERB funds public infrastructure that will result in specific private development or expansions in manufacturing, production, food processing, assembly, warehousing, industrial distribution, recycling facilities, or businesses that substantially support the trading of goods and services outside of the state's borders. Applications must include evidence that a private development or expansion is ready to occur and will only occur if CERB funds are provided. Applicants must demonstrate that no other timely sources of funds are available at reasonably similar rates.

Interest rates generally match the most current rate of Washington State bonds but do not exceed 10 percent. The maximum loan amount is $1 million per project, and 80 percent of the CERB request or $300,000, whichever is the lesser amount, for a grant (there is a local match target of 25 percent).

The funding program is very specific in focus. Presently, CERB might not be an applicable nor viable financing option for the City.

4.1.2.3 Community Development Block Grant (CDBG) Program

A federal government program administered by the U.S. Department of Housing and Urban Development (HUD), the CDBG program provides grants and loans for infrastructure improvements, including sewer projects, for business development that creates or retains jobs for low and moderate-income residents. The CDBG program was first introduced in 1974, providing a flexible source of annual grant funds for local governments nationwide.

All cities and towns are eligible. Funding is available for projects (1) benefiting low- and moderate-income families; (2) eliminating slums or blight; or (3) intended to meet other urgent community development needs. These projects can include economic development projects or wastewater treatment systems.

4.1.2.4 Washington State Department of Ecology (Ecology) Water Quality Financial Assistance Program

Ecology administers the following grant and loan programs:

- The *Centennial Clean Water Fund* provides grants and low-interest loans to construct wastewater treatment facilities and fund-related activities to reduce nonpoint sources of water pollution.

- The *State Revolving Fund (SRF) Loans* provide low-interest loans to construct wastewater treatment facilities and related activities, or to reduce nonpoint sources of water pollution.

- The *Section 319 Nonpoint Sources Grants Program* provides grants to reduce nonpoint sources of water pollution.

While most of the funding goes to wastewater programs, projects such as development and implementation of groundwater and wellhead protection programs are included. All Ecology loans require a facilities plan, which is more comprehensive than an engineering plan. This is an added expense. There is only one application for all three loan and grant programs.

The following interest rates would apply:

- 0- to 5-year term: Fiscal Year 2004 interest rate is 0.5 percent.
- 6- to 20-year term: Fiscal Year 2004 interest rate is 1.5 percent.

Grants for nonpoint stormwater source activities are available for up to 50 percent of eligible project costs. Grants for constructing point source wastewater facilities are available only in financial hardship cases.

Ecology considers hardship cases when capital projects require user fees to exceed 1.5 percent of the local area median household income. This is of particular interest to the City. For Edgewood to qualify, monthly rates must exceed approximately $67 dollars per month, based on Ecology local income projections. Centennial Grants are available up to $5 million or 50 percent of the total project cost, whichever is lower. However, Ecology will first attempt to bring rates below the 1.5 percent ceiling by lowering interest rates, to as low as 0 percent, and extending the repayment period.

4.1.2.5 Economic Development Administration (EDA) Grant Funding

The Economic Development Administration provides federal grant funding for projects that support long-term economic development in areas experiencing substantial economic distress through the creation, expansion, or retention of permanent, private-sector jobs that help raise income levels. An economic development project is defined as “any public capital investment that constructs a public facility such as a road in industrial areas, bridge, water and sewer line, dock facility, etc.” Eligible activities include the acquisition, rehabilitation, design and engineering, or improvement of public land or publicly owned and operated development facilities, including machinery and equipment. Although there might be exceptions, the amount of federal grant funds provided is around $1.0 million to $3.0 million per request and cannot exceed 50 percent of the total project cost.

Each of these programs might offer potential opportunities for below-market interest debt for project funding, as compared to more traditional general obligation or revenue bond funding. However, as noted above, many of the loan programs offer limited benefit in terms of interest rates, while potentially introducing additional costs to comply. An exception to this is the PWTF program, which offers low interest rates without onerous qualification requirements. The Centennial and SRF programs could potentially offer the greatest financial support to the City. Regardless, the City would need to fund applicable matching requirements.

4.1.3 Issuing Debt

Absent assisted funding and low-cost loan programs, the City will be forced to rely on conventional municipal bond debt to finance the construction of its proposed capital program. There are some benefits to this form of financing. First, as with all debt, debt service spreads capital costs over the term of the bonds. At present, the City is not in a financial position to pay for needed capital improvements with fund reserves or taxes. Further, bonds implement a level of equity by dissipating the burden among current and future customers. Finally, bonds allow flexibility that the aforementioned assisted programs do not provide through repayment options.

Municipal bond issues may be structured all or in part as a term bond, which requires only interest payments for a number of years, with "balloon payments" of principal at specific points in the amortization schedule. Balloon payments can have both positive and negative consequences. "Near loading" of debt principal may result in higher interest costs. Further, if developer financing does not occur, balloon payments and term bonds may leave the City with large liabilities in the future years without adequate reserves to call bonds. However, such a structured debt may still be appealing to the City if it projects the immediate infusion of funds with growth.

Municipal bonds have several disadvantages. General obligation (G.O.) and revenue bonds often have higher interest rates than assisted programs. Use of revenue bonds would also require the City to exceed otherwise sufficient utility rate revenues in order to meet coverage requirements. One viable option might include issuing tax-backed G.O. bonds to finance a significant portion of the project, repaying the debt with rate revenues. In any case, the City should only issue debt in the absence of outside assistance.

4.1.3.1 Revenue Bonds

Revenue bonds are, by definition, backed by the revenue of a utility or enterprise fund. Because the payment stream is less secured than tax-backed bonds, revenue bonds carry higher interest rates than G.O. bonds. This differential, however, may be minimal. There are also tax-backed or revenue-backed G.O. bonds discussed later.

Revenue bonds are perhaps the most common source of funding for construction of major utility projects. To issue revenue bonds, the City will be required to commit to certain security conditions related to repayment, specifically, reserve and coverage requirements for annual rate revenues. These conditions are included in the bond resolution to be adopted by the City and essentially impose certain conservative financial practices on the City as a way of making the bonds more secure.

The reserve requirement commits the City to maintain a bond reserve that could be used to meet payments if the utility is incapable of doing so. This reserve is often set at the least of (a) 10 percent of the issue price of all new and outstanding parity bonds, (b) maximum annual debt service on all new and outstanding parity bonds, and (c) 1.25 times average annual debt service on all new and outstanding parity bonds. The reserve requirement is dictated by the terms of the bond resolution. Since the reserve can be invested and earn interest, the net cost of providing the reserve is relatively small. The City has the option of borrowing the reserve requirement as part of the total loan amount, or can fund it over a 5-year period through rates and interest earnings.

Revenue bond coverage is a legal requirement binding a utility to demonstrate that annual revenues exceed expenses by a multiple of the debt service payment. This factor is usually at least 1.25, and is higher for agencies with unrated bonds or low bond ratings. Revenue bond coverage factors can require higher utility rates than otherwise necessary, in order to meet the coverage target. However, the scope of the coverage test is very specific, as defined in the bond resolution, and generally limited. The requirement only considers operating expenses. Capital outlays, replacement funding, or any other expenses that could otherwise be delayed if necessary to meet debt service payments are excluded from the coverage test. Further, the coverage test usually only includes revenue bond debt service or other debt issued on par with the revenue bonds. Thus, other loans or obligations, such as the aforementioned assistance loans, would generally be held as subordinate and excluded from the test.

Coverage tests might impose unrealistic requirements on any utility established by the City. Within the near term, a utility will have only a limited customer base to support expenditure needs. While

maintenance expenses on a new system are comparatively minimal, and purveyor treatment costs should be commensurate with flow, debt service coverage could impose draconian financial requirements on this limited customer base. Revenue bond coverage is an annual test, with no consideration of fund reserves or assessment prepays, and usually excludes General Facilities Charge (GFC) revenues. Consequently, even if the utility has the necessary debt service payment available, coverage requirements will necessitate rate increases.

Coverage requirement rate impacts can be somewhat assuaged if the City is able to secure 5- and 10-year calls. Consequently, any accumulated assessment reserves or other available fund reserves may be used to pay off all or some of the outstanding principal.

4.1.3.2 General Obligation Bonds

General obligation bonds (G.O. bonds) offer attractive conditions relative to revenue bonds. G.O. bonds are issued against the City's general fund and taxing authority. RCW 39.36.020 authorizes the City to issue councilmanic debt up to 1.5 percent of the value of taxable property located within the City's jurisdiction, and 2.5 percent with three-fifths approval at election. Councilmanic debt may be issued without a public vote. As reported in the City's 2004 budget, the assessed value of all property within the city limits is over $750 million, allowing for $11.25 million in councilmanic debt and $18.75 million in voted debt.

G.O. bonds offer slightly lower interest rates than revenue bonds, being backed by the City's tax base. From the investor's perspective, tax backed debt is more secure. These bonds also carry no additional coverage requirement, allowing the City to collect revenues necessary to meet annual debt service with no additional financial consequences.

G.O. bonds can be politically unpalatable if the municipality's constituency does not support the project purpose. The three-fifths majority vote required to secure up to 2.5 percent of the taxable property is often difficult to obtain, particularly in light of the current economic conditions. Furthermore, the City may not wish to exhaust its full debt capacity, reserving some for other capital projects.

G.O. bonds, while issued against the taxing authority of the City, may be repaid by utility rate revenues. This arrangement takes advantage of the more favorable terms while still requiring system users to repay the debt. The general fund would ultimately remain responsible for debt repayment should rate revenues prove insufficient.

4.1.3.3 Bond Anticipation Notes

If the City believes it will be fully reimbursed for all capital expenditures by the end of facility construction, it may wish to consider issuing Bond Anticipation Notes (BANs). BANs are short-term financing instruments usually issued for a 2-year period to finance planning and design, or in expectation of near-term reimbursement. BANs require interest-only payments over the term of the issue. The principal is paid back in full on the termination date or rolled into a long-term debt issue.

BANs might provide a short-term financing mechanism for the City if it truly believes it will be fully reimbursed by the end of the instrument term. As with G.O. and revenue bonds, BANs carry issuance costs of 1.5 to 2 percent of the borrowed amount. Rolling the full construction costs into long-term debt will result in double issuance costs. Consequently, BANs may have limited benefit and, regardless, must be repaid.

4.1.4 Local Improvement Districts and General Facilities Charges

The construction cost of a new sewer transmission system is well beyond the limitations of general fund resources. The City is consequently dependent on other forms of revenue to finance this project. The RCW provides several means of funding such an investment, including formation of an LID and imposition of GFCs.

4.1.4.1 Local Improvement District

The City could consider trying to create an LID or Utility Local Improvement District (ULID) as a means of recovering the capital investment made on behalf of its constituents. RCW 35.43 specifically authorizes a municipality to impose assessments against a property specifically benefiting from local improvements. ULIDs additionally pledge utility revenues for the repayment of bonds.

LIDs are a means of instituting equity. The RCW states that the amount assessed must be proportionate with benefit received. Moreover, the assessment may not exceed the increase in the fair market value gained with the improvement.

Several assessment calculation methods are available. However, any method selected must meet the special benefit and fair market value tests identified above. Further, the City must necessarily be concerned with imposing draconian financial constraints on low-income families, including seniors. RCW 35.43.250 and 35.54.100 allow a 4-year deferral for economically disadvantaged households. RCW 84.38 permits indefinite deferral for qualified low-income seniors. Assessments are liens against property, making deferrals payable at the time of transfer of ownership.

LIDs are created as a means of paying back G.O. debt, while ULIDs are established to pay the debt service on revenue bonds. ULIDs are often useful instruments in spite of associated coverage requirements. Revenue bonds debt service and applicable coverage would have to be collected through rates.

4.1.4.2 LID Calculation

In Table 4-1, a sample LID assessment has been calculated using gross assumptions about chargeable area.

Table 4-1. Local Improvement District Assessment Example

Item	Estimate	Low End	High End
I. Project Costs[a]			
North Edgewood	$ 4,680,000	$2,808,000	$ 5,148,000
South Edgewood	3,200,000	1,920,000	3,520,000
West Edgewood	5,510,000	3,306,000	6,061,000
Subtotal	$13,390,000	$8,034,000	$14,729,000
II. Payment for Improvements to Fife Sewer System	–	–	–
III. Connection Charge to Tacoma	–	–	–
IV Connection Charge to Fife	–	–	–
Total Cost	$13,390,000	$8,034,000	$14,729,000
Chargeable Area (1,000 square feet)	9,952	9,952	9,952
Estimated Assessment (per 1,000 square feet)	$1,345	$807	$1,480

[a] See Table 3-6 on page 3-12.

Please note that actual assessments may differ substantially due to the limitations in property value increases with sewer availability. Payments to Fife and Tacoma have not been included based on the draft interlocal agreement with the City of Fife. This interlocal agreement calls for improvement costs to be paid by a monthly rate surcharge. Treatment costs from Tacoma are also included in the Fife monthly rate as defined in the draft agreement.

4.1.4.3 General Facilities Charges

RCW 35.92.025 explicitly authorizes municipalities "to charge property owners seeking to connect to the water or sewage system of the city or town as a condition to granting the right to so connect." A general facilities charge or "connection charge" is assigned to new or existing development wishing to connect to the system after the municipality has taken ownership of the facility. This connection charge serves two primary purposes, (1) reimbursement of investment made in the existing system, and (2) financing of facility expansion to meet growth needs.

Allowing new development to connect to the sewer system without paying "a fair share" of the facility cost dilutes the investment made by existing customers through rates, LIDs, and GFCs. Furthermore, deficiencies created by under-collection become the burden of the utility as a whole, requiring existing customers to subsidize new development. When built, the sewer transmission system will be oversized to accommodate Phase II residents as well as growth. Ostensibly, Phase II members will pay for their share of the system costs through an LID, as Phase I participants will have done. However, as growth occurs new customers must also pay the appropriate portion of the system costs. Any costs incurred to physically connect are additive to the imposed GFC.

4.1.4.4 GFC Calculation

The sample GFC has been calculated as follows:

- *Cost of Existing Facilities* – Washington State allows cities to impose a GFC on all new development as a condition of connecting to the existing system. The cost of the original investment made by the City and any utility ratepayers may include the construction cost of the system, plus 10 years of interest at a rate commensurate with the rate given at the time of construction. The total facilities costs should be net of any grants or cost of developer donated facilities and net of LID and ULID assessments, unless there is a provision to collect the GFC and pay it to the property owners who had "overpaid" for capacity. Net facilities costs are divided by total current and future serviceable units as projected by the sewer system plan.

  It is assumed that the existing sewer transmission system has been donated as a condition of development. Thus, there is no net value of the existing system that may be charged to new development.

- *Cost of Future Facilities/Improvements* – Washington's statutes do not preclude cities from including future planned facilities within their GFC calculations. As the system is expanded to accommodate growth, future users requiring this capacity must pay a share of the costs to be incurred on their behalf. As with the existing facilities, these costs should be net of grants or donations. Because these costs are incurred solely to provide capacity for future customers, these customers may bear the full financial burden. Consequently, the costs of future facilities are divided by the total number of *new* serviceable units created by the facility expansion.

  It is assumed that the proposed transmission system represents an expansion to the existing system. Thus, this cost could be divided by the total number of serviceable units after construction, net of any customers already sewered within the city limits.

A summary of the GFC calculation is presented in Table 4-2.

Table 4-2. General Facilities Charge Calculation Summary

	Item	Amount
I.	**Cost of Existing Facilities**	
	Utility Plant-in-Service	$ –
	plus: Construction Work in Progress	–
	less: Contributions in-aid-of Construction	–
	Net Utility Plant	–
	plus: Accumulated Interest on Non-Contributed Plant	–
	Net Allocable Existing Sewer Plant-in-Service Cost of Capital	$ –
II.	**Cost of Future Facilities/Improvements**	
	Cost of Planned Future Facilities	$13,390,000
	less: Developer/CIAC	–
	less: Grant Funding	–
	Net Allocable Planned Future Facilities	$13,390,000
III.	**Total Allocable Costs**	
	Total Allocable Existing Plant	$ –
	Total Planned Future Facilities	13,390,000
	Total Allocable Costs	$13,390,000
IV.	**Capacity Analysis in Equivalent Dwelling Units (EDUs)[a]**	
	Current System Capacity – EDUs	–
	Increase in Capacity with Improvements – EDUs	1,957
	Total Estimated Equivalent Residential Unit (ERU) Capacity with Improvements at 100% Capacity	1,957
V.	**Calculated General Facilities Charge[b]**	
	(Existing Plant + Non-Capacity Future Costs)/Total Capacity + (Future Capacity Costs/Growth)	$6,844

a One Equivalent Dwelling Unit (EDU) equals 230 gallons per day based on flow projections.

b Existing facilities plus non-growth capital projects are divided by the total number of system EDUs, thus sharing expense proportionately among current and future customers ($0/1,957 = $0). Growth-related capital is necessary to serve growth only, and thus the sole responsibility of growth ($13,390,000/1,957 = $6,844 per ERU).

General facilities charges are intended to reflect a proportional share of the system costs and therefore shall be applied based on potential demand. This potential demand or volume may best be reflected by water meter size. Quite simply, the bigger the meter size, the greater the potential volume.

The American Water Works Association publishes meter equivalency factors based on meter sizes and potential volumes. For example, a 3/4″ by 3/4″ meter allows one-and-one-half times the flow of a 5/8″ by 3/4″ (typical residential) meter. Consequently, a new development customer wishing to connect to the system using a 3/4″ by 3/4″ meter could be charged 1.5 times the City's base GFC.

Table 4-3 shows the potential general facilities charge for the Phase 1 build-out.

Table 4-3. General Facilities Charge for Phase 1

Item	Estimate	Low End	High End
Capital Costs			
North Edgewood Projects	$ 4,680,000	$ 2,808,000	$ 5,148,000
South Edgewood Projects	3,200,000	1,920,000	3,520,000
West Edgewood Projects	5,510,000	3,306,000	6,061,000
Total Capital Cost	$13,390,000	$8,034,000	$14,729,000
Payment for Fife Sewer System Improvements	–	–	–
Total Cost	**$13,390,000**	**$8,034,000**	**$14,729,000**
Number of EDUs[a]	1,957	1,957	
Potential GFC	$6,844	$4,106	$7,528

Note: This form of revenue is, at best, unstable and cannot be solely relied upon to pay debt service.

[a] One equivalent dwelling unit (EDU) equals 230 gallons per day based on flow projections.

4.1.4.5 Purveyor General Facilities Charges

Beyond any GFC imposed by the City, residents may be subject to treatment purveyor imposed GFCs. As with the City's system, potential purveyors have oversized their existing facilities to accommodate growth, including outside service area treatment. New customers must in turn pay a proportionate share of that investment. This connection charge would be additive to any imposed by the City. This would depend on the agreement(s) that the City will need to enter into to provide conveyance and treatment service.

4.1.4.6 Existing Customers

It is important to note that any existing customers already sewered as a condition of development may not be assessed or charged a GFC. These customers have paid for the existing system and any relevant purveyor GFCs. Thus, expansion of the system or construction of a new system to accommodate growth should become the sole burden of new customers. Any expansion or upgrade attributable to an existing customer must be reflected in sewer service rates.

4.1.4.7 Short-Term Limitations to GFCs

Finally, GFC revenues are collected over time as growth occurs. Due to fluctuations in growth, GFC revenues are sometimes haphazard and should not necessarily be considered a reliable revenue source, particularly to meet debt service payments. For this reason, most revenue bond resolutions to do not include GFC revenues in the coverage requirement test. The City has a near-term financial need that GFCs cannot meet. Rather, GFCs provide supplementary revenue that can be used for future capital needs and to make debt-service payments in lieu of other revenues as long as debt-service coverage is met each year.

4.1.5 Sewer Utility and Proposed Sewer Rates

RCW 35.67 authorizes a city to construct and operate a sanitary sewer system and collect necessary rates. There are several components to the City's sewer rate, including administrative costs, purveyor

(treatment) costs, operation and maintenance of transmission mains, and any outstanding debt service or debt coverage requirements.

Based on the neighboring City of Sumner's collection system assets and O&M budget, Edgewood's annual O&M costs for administration, maintenance labor, power, and materials for the proposed sewer system are estimated to be in the range of $275,000 and $300,000 per year.

In addition to O&M costs, the City of Edgewood will also pay purveyor costs. The City of Fife has indicated its preference for an arrangement whereby Edgewood would become a full-service customer, with Fife arranging for wastewater treatment with Tacoma.

It follows that if the City of Edgewood chooses to be a full-service customer of the City of Fife, then Edgewood's rates would be based on payments to the City of Fife (potentially Fife's lowest retail sewer rate, plus a surcharge to cover the cost of capital improvements needed in the City of Fife's sewer system to serve Edgewood) plus its own O&M costs. The cost of treatment would presumably be embedded in payments to the City of Fife, and there would not be a separate payment to Tacoma. The estimated monthly charge per equivalent dwelling unit for Phase 1A customers is estimated to be around $168–$173 (see Table 4-4 below).

In light of these results, the City may wish to explore contracting with the City of Fife to provide ongoing system maintenance as a way to potentially reduce costs to Edgewood customers.

Table 4-4. Projected Monthly Charge per Equivalent Dwelling (Phase 1A)

Item	Low End	High End
Edgewood Annual O&M Expense	$275,000	$300,000
Estimated Potential Number of EDUs	475	475
Monthly O&M Rate per EDU[a]	**$48.25**	**$52.63**
City of Fife's Lowest Retail Volume Rate (per ccf)	$6.40	$6.40
Projected Flow[b]		
Projected Monthly Flow (gallons per day)	109,250	109,250
Projected Monthly Flow (ccf)	4,443	4,443
Estimated Monthly Volume Payments to Fife	$28,432	$28,432
Estimated Potential Number of EDUs	475	475
City of Fife Monthly Charge per EDU[c]	**$59.86**	**$59.86**
Monthly Surcharge (City of Fife)[d]	$28,801	$28,801
Estimated Potential Number of EDUs	475	475
City of Fife Monthly Surcharge per EDU[e]	**$60.63**	**$60.63**
TOTAL MONTHLY CHARGE PER EDU	**$168.74**	**$173.12**

[a] Monthly O&M rate per EDU = (O&M expense ÷ Number of EDUs) ÷ 12 months.

[b] Based on the assumption that one EDU equals 230 gallons per day.

[c] Monthly charge per EDU = (Estimated monthly volume payments ÷ Number of EDUs).

[d] Estimated total project cost of $4,020,000 is amortized using 6.00% annual interest rate over 20 years.

[e] Monthly surcharge per EDU = (Monthly surcharge ÷ Number of EDUs).

4.2 CONCLUSION

To reduce the cost to be borne by initial connections and, ultimately, ratepayers, the City would be wise to pursue any and all available grants and loan assistance programs. Assisted loans offer low interest rates and no additional debt service coverage requirements. Within the constraints discussed previously, other capital costs should be recovered through the creation of an LID or ULID. Those wishing to connect to the system after it has been LID financed would be subject to a general facilities charge or developer latecomer's agreement, whichever is appropriate. The City will still need to create a sewer utility to fund its ongoing operational needs.

The City has several options to ensure that later connections outside of the LID area would not be rewarded for their decision not to participate in the LID, as follows:

- Establishing Zone A and Zone B assessment zones of benefit. Zone A would include those properties that will connect initially and the assessments would include the cost of general and local facilities. Zone B assessments would include the costs of general facilities only, leaving those customers to pay for local facilities costs at the time of connection. This should result in a higher net cost for customers in Zone B.

- Using a one-zone LID approach and developing a GFC for subsequent connections outside the LID area. The City could maximize the GFC by aggressively defining the cost of general facilities (verses local facilities) within the LID area. A maximized GFC, when combined with the local facilities costs that must still be paid by later connecting customers (outside the LID), would result in total costs that should exceed the assessments paid inside the LID area.

- Charging a fee-in-lieu-of assessment to later connecting customers that, by definition, is at least as much as what the assessment would have been if the connecting customer participated in the LID. A potential problem with this alternative is the difficulty of finding a way to effectively "reimburse" those who have or will pay assessments other than through generally lower rates.

- Reallocating the funding of capital improvements so that less is funded by the LID and more is funded by (future) rates. This would reduce the assessments but would increase the rates and, more importantly, GFCs to a level that could substantially exceed the assessments. However, if development does not occur as expected outside of the LID, ratepayers would carry the long-term burden of facilities funding as well as the short-term burden.

- Creating a distinction in the (future) rate structure so that those who connect later, and who have not paid an assessment, pay higher monthly rates. Although this is legal and equitable, developers do not necessarily care about rates once they have developed, so the incentive to participate in the LID would be questionable.

The City will need to re-evaluate the long-range financial plan after final agreements (Fife and potentially Tacoma) are in place and final numbers have been negotiated. The number of initial customers will have a major impact on the ability to both construct the initial sewer system and create a reasonable monthly user rate. It will be in the best interests of the City to have as many customers as possible within the Phase I area to minimize the fees on the ratepayers.

5. SEWER DEVELOPMENT STANDARDS

5.1 PROVISION FOR TREATMENT

The City shall be responsible for ensuring sewer ordinances adequately address the prevention of unwanted materials being discharged to the public sewer system.

No oil, grease, sand, or liquid waste containing grease or flammable material or other harmful ingredients in excessive amounts shall be discharged to the public sewer without installation of an approved pretreatment process.

The City shall require grease-generating establishments to correctly install, operate, and maintain properly-sized and designed grease interceptors to control disposal of animal fats and vegetable oils preventing sewage backups. All commercial buildings with a kitchen and/or cafeteria shall be required to install grease interceptors.

The City shall require all facilities where there is a potential for discharge of oily contaminated waters, including underground parking structures and gas stations, to install, operate, and maintain oil/water separators to treat oily wastewater prior to discharge to the sanitary sewer.

5.2 PRETREATMENT PROGRAM

Currently, no industrial facilities are operated within the City of Edgewood, and no industrial facilities are anticipated to be connected to the proposed sewer system. The City of Edgewood shall establish a policy of identifying major industrial dischargers to the sewer system if industrial facilities are constructed and connected to the proposed sewer system. This program will need to be coordinated with the City of Tacoma's Pretreatment Program to ensure that standards are consistent between jurisdictions.

5.3 SEWER STANDARDS

Appendix F presents proposed sewer standards for the City of Edgewood. These standards include policies, material specifications, and standard details for the construction of sanitary sewer facilities within Edgewood.

5.4 SEWER ORDINANCE

Preparation and adoption of a sewer ordinance for the City of Edgewood will require coordination with Tacoma and Fife to make sure that Edgewood's ordinance is consistent with those cities' requirements for issues related to pretreatment and wastewater characteristics. A draft sewer ordinance and associated code has been included in Appendix J. This is a draft ordinance/code, and will be subject to review and revisions from the City Council. The draft was prepared based on nearby jurisdictions and then modified for the City of Edgewood.

6. SEPA COMPLIANCE

SEPA documentation is currently being prepared (August 2004) and will be forwarded to Ecology when completed.

7. IMPLEMENTATION

It appears that the City of Edgewood will need to move forward with its sewer program using a combination of loans, grants (if available), and a ULID. There appears to be significant interest in a ULID based on input from major property owners and their representative.

Given current information, the implementation plan would include the following major steps:

- Adoption of Sewer Plan – Third quarter 2004.
- Prepare and Adopt Ordinance – Fourth quarter 2004.
- Design and Permits – First Quarter 2005.
- Construction Begins – Second Quarter 2005.
- Begin Sewer Service – Fourth Quarter 2005.

Along with the major steps identified above, it will be important for the City to keep the citizens, particularly property owners in Phase I, informed and allow them to play a part in the implementation process. This can be accomplished through a number of workshops and open houses before and after each of the key milestones identified above.

APPENDIX A

City of Edgewood Existing Potable Water Facilities

APPENDIX B

Planning Basins, Population, and Flow Projections

APPENDIX C

Phase IA Information

APPENDIX D

Feasibility Study
Construction and Project Cost Estimates

APPENDIX E

Recommended Alternative
Construction and Project Cost Estimates

APPENDIX E1

North Edgewood

APPENDIX E2

South Edgewood

APPENDIX E3

West Edgewood

APPENDIX E4

Pump Station Cost Estimates

APPENDIX F

City of Edgewood Sewer Standards
(Revised April 2007)

APPENDIX G

City of Fife Technical Memorandum Related to Sanitary Sewer Upgrades

APPENDIX H

Interlocal Agreement with Lakehaven Utility District

APPENDIX I

Operation and Maintenance Cost Estimates
(For Connection to City of Fife)

APPENDIX J

Sewer Ordinances and Code
(Revised April 2007)

APPENDIX K

Calculations and Cost Opinions for Connection to Lakehaven Utility District (New Appendix for Revised April 2007 GSP)

APPENDIX L

Service Area Boundary Letters