

FINAL REPORT

# System Development Charge Analysis

*Prepared for*

South Suburban Sanitary District

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**ch2m.**<sup>SM</sup>

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# Executive Summary

This report provides a recommendation for system development charges (SDCs) for wastewater collection and treatment facilities for the South Suburban Sanitary District (the District). Through evaluation of existing assets and planned capital improvements, existing and future system capacity, and projected customer growth, system development charges have been calculated for both reimbursement and improvement fees. The analysis follows industry standards practices and complies with Oregon Revised Statutes (ORS 223.297-314).

For collection system facilities, existing asset data was provided by the District and replacement costs were developed, as a means to value the existing system. The replacement costs were calculated as the basis for the reimbursement fee. This approach was considered the most representative valuation of existing assets. The available collection system capacity, and the capacity to be used by growth within the 2035 planning period were estimated and a reimbursement fee calculated representing the value of the existing system to be used by planned growth during the planning period. The District has no planned collection system capacity improvements and therefore no collection system improvement portion of the SDC.

For treatment facilities, existing asset data was provided by the District, and proposed capital improvements are based on the Draft Facilities Plan (District, 2004, updated 2010). The reimbursement share of existing facilities and growth share of proposed facilities were calculated in proportion to system capacity requirements. Significant improvements are planned for the wastewater treatment plant to meet increasingly strict discharge requirements, and the costs for these improvements are equitably shared by existing customers and planned development.

Table ES-1 shows a summary of the SDC fees calculated as part of this study. The total system cost basis for this assessment is approximately \$17.4 million. Projected growth is stated in terms of equivalent dwelling units (EDUs). 1,466 EDUs are projected during the planning period. Dividing the cost basis by the projected EDUs results in a total SDC fee of \$12,060 per EDU.

Table ES-1. Fee Summary

	Cost Basis	EDUs	\$/EDU
<b>Reimbursement Fees</b>			
Treatment Facility	\$349,337	1,446	\$242
Collection System	\$13,412,551	1,446	\$9,276
Subtotal	\$13,761,888		\$9,518
<b>Improvement Fees</b>			
Treatment Facility	\$3,675,976	1,446	\$2,542
Collection System	\$0	1,446	\$0
Subtotal	\$3,675,976		\$2,542
<b>Total</b>	<b>\$17,437,864</b>		<b>\$12,060</b>



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# Acronyms and Abbreviations

BOD	biological oxygen demand
CCI	Construction Cost Index
CH2M	CH2M HILL Engineers, Inc.
DEQ	Oregon Department of Environmental Quality
District	South Suburban Sanitary District
EDU	equivalent dwelling unit
ENR	Engineering News-Record
EPA	U.S. Environmental Protection Agency
gpm	gallon per minute
IDF	inch-diameter per foot
MGD	million gallons per day
NOAA	National Oceanic and Atmospheric Administration
ORS	Oregon Revised Statutes
PWWF	peak wet weather flow
scfm	standard cubic feet per minute
SDC	system development charge
WWTP	wastewater treatment plant



# Introduction

Oregon Revised Statutes (ORS) establishes guidelines for the calculation of system development charges (SDCs). Within these guidelines, local governments have some latitude in selecting technical approaches and establishing policies related to the development and administration of SDCs. A discussion of this legislation follows, along with the recommended methodology for calculating updated wastewater SDCs for the South Suburban Sanitary District (District).

In the 1989 Oregon state legislative session, a bill was passed that created a uniform framework for the imposition of SDCs statewide. This legislation (ORS 223.297-223.314), which became effective on July 1, 1991 (with subsequent amendments), authorizes local governments to assess SDCs for the following types of capital improvements:

- Drainage and flood control
- Water supply, treatment, and distribution
- Wastewater collection, transmission, treatment, and disposal
- Transportation
- Parks and recreation

The legislation provides guidelines on the calculation and modification of SDCs, accounting requirements to track SDC revenues, and the adoption of administrative review procedures. The purpose of ORS 223.297 to 223.314 is to provide a uniform framework for the imposition of SDCs by local governments, to provide equitable funding for orderly growth and development in Oregon's communities, and to establish that the charges may be used only for capital improvements.

## 1.1 System Development Charge Structure

SDCs can be developed around two concepts: (1) a reimbursement fee, and (2) an improvement fee, or a combination of the two. The **reimbursement fee** is based on the costs of capital improvements *already constructed or under construction*. The legislation requires the reimbursement fee to be established or modified by an ordinance or resolution setting forth the methodology used to calculate the charge. This methodology must consider the cost of existing facilities, prior contributions by existing users, gifts or grants from federal or state government or private persons, the value of unused capacity available for future system users, rate-making principles employed to finance the capital improvements, and other relevant factors. The objective of the methodology must be that future system users contribute no more than an equitable share of the capital costs of *existing* facilities. Reimbursement fee revenues are restricted only to capital expenditures for the specific system which they are assessed, including debt service. See Appendix A for a memorandum outlining alternative SDC methodologies and the recommended approach for the District.

The methodology for establishing or modifying an **improvement fee** must be specified in an ordinance or resolution that demonstrates consideration of the *projected costs of capital improvements identified in an adopted plan and list*, that are needed to increase capacity in the system to meet the demands of new development. Revenues generated through improvement fees are dedicated to capacity-increasing capital improvements or the repayment of debt on such improvements. An increase in capacity is established if an improvement increases the level of service provided by existing facilities or provides new facilities.

In many systems, growth needs will be met through a combination of existing available capacity and future capacity-enhancing improvements. Therefore, the law provides for a **combined fee**

(reimbursement plus improvement component). However, when such a fee is developed, the methodology must demonstrate that the charge is not based on providing the same system capacity.

## 1.2 Credits

The legislation requires that a credit be provided against the improvement fee for the construction of “qualified public improvements.” Qualified public improvements are improvements that are required as a condition of development approval, identified in the system’s capital improvement program, and are either as follows:

- 1) Not located on or contiguous to the property being developed; or
- 2) Located in whole or in part, on or contiguous to, property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development project to which the improvement fee is related.

## 1.3 Update and Review

The methodology for establishing or modifying improvement or reimbursement fees shall be available for public inspection. The local government must maintain a list of persons who have made a written request for notification prior to the adoption or amendment of such fees. The legislation includes provisions regarding notification of hearings and filing for reviews. Recent amendments clarified that “periodic application of an adopted specific cost index or... modification to any of the factors related to rate that are incorporated in the established methodology” are not considered “modifications” to the SDC. As such, the local government is not required to adhere to the notification provisions. As a result of 2003 amendments, the criteria for making adjustments to the SDC rate, which do not constitute a change in the methodology, have been further refined as follows:

- “Factors related to the rate” are limited to changes to costs in materials, labor, or real property as applied to projects in the required project list.
- The cost index must consider average change in costs in materials, labor, or real property and must be an index published for purposes other than SDC rate setting.

The notification requirements for changes to the fees that *do* represent a modification to the methodology are 90-day written notice prior to first public hearing, with the SDC methodology available for review 60 days prior to public hearing.

## 1.4 Other Provisions

Other provisions of the legislation require the following:

- Preparation of a capital improvement program or comparable plan (prior to the establishment of a SDC) that includes a list of the improvements that the jurisdiction intends to fund with improvement fee revenues and the estimated timing, cost, and eligible portion of each improvement.
- Deposit of SDC revenues into dedicated accounts and annual accounting of revenues and expenditures, including a list of the amount spent on each project funded, in whole or in part, by SDC revenues.
- Creation of an administrative appeals procedure, in accordance with the legislation, whereby a citizen or other interested party may challenge an expenditure of SDC revenues.

The provisions of the legislation are invalidated if they are construed to impair the local government’s bond obligations or the ability of the local government to issue new bonds or other financing.

# Background Information

The District contracted with CH2M HILL Engineers, Inc. (CH2M) to perform an evaluation of the existing wastewater SDC in order to provide a defensible SDC calculation that meets the requirements of the District's current capital improvement plan, and the ORS (as defined in the previous section). As part of the SDC evaluation, CH2M performed a capacity assessment of the wastewater treatment plant (WWTP) and the collection system. The District owns and operates over 450,000 feet of gravity sewers ranging from 4 to 36 inches and a WWTP. The only pump station in the system is an influent pump station which is located at the treatment plant (remote pump stations at Henley and Texum also exist). Figure 1 (provided at the end of this report) shows the study area which encompasses the District's collection system and WWTP.

## 2.1 Methodology and Basis of Planning

As discussed in Section 1, SDCs may consist of a reimbursement fee, an improvement fee, or a combination of the two. SDC expenditures are limited to capital-related costs; they cannot be used for system operation and maintenance. Reimbursement fees are based on facilities that have already been constructed that provide capacity for new development. Revenue from reimbursement fees may be spent on any capital projects related to the WWTP or collection system, including rehabilitation, replacement, and expansion. Improvement fees are based on planned future capacity-increasing capital improvements for the WWTP or collection system. Revenue from improvement fees must be used only for capacity-increasing improvements needed to serve new development. The value of the District's planned investment in capacity needed to serve growth within the planning period, is referred to as the "cost basis".

This study evaluates the reimbursement and improvement fees for the WWTP and the collection system. The WWTP reimbursement fee is based on recorded costs associated with the WWTP construction and subsequent upgrades. Improvement costs are based on costs identified in the *Draft Facilities Plan* (District, 2004, updated 2010). Further, the District has adopted a Capital Facilities Plan (Resolution No. 171, December 2015) as required by ORS 223.309, and this provides authorization for SDC expenditure.

The collection system reimbursement fee is based on the replacement value of available system capacity, as developed by CH2M. There are no improvement costs for the collection system.



# Wastewater Treatment Plant Facilities

## 3.1 Reimbursement Fee

The District constructed its original treatment facility in 1958, and significant facility upgrades took place in 1968, 1970, and 2001.

The WWTP operates with five major unit processes: Raw Sewage Pump Station, Bar Screens, Aeration Blowers, Stabilization Ponds (Aerators), and Disinfection. There are also two offsite assets owned by the District: Henley Pump Station and the Texum Pump Station. The District provided documentation of the capital costs for construction and major updates to each asset, with the exception of the stabilization ponds. CH2M estimated the value of the ponds with the U.S. Environmental Protection Agency (EPA) *Design Manual for Municipal Wastewater Stabilization Ponds* (1983). The costs for each facility were escalated from the year of construction to November 2015 costs using the *Engineering News-Record* (ENR) Construction Cost Index (CCI) 20-City Average. For facilities older than the ENR CCI record, costs were escalated using the U.S. Bureau of Labor Statistics Consumer Price Index Inflation Calculator.

In 2010, the District updated a portion of the *Draft Facilities Plan* to reflect a lower growth rate adopted in the Klamath County comprehensive plan. This resulted in lower flow projections than the previous facilities plan. The 2015 peak wet weather flow (PWWF) was developed by assuming a linear increase between 2010 and 2035. Based on 2015 discharge monitoring reports, the aerators are understood to be capable of meeting current flows and loads, but do not have capacity for growth. The 2035 projection air demand for future aerator needs is based on the projected biological oxygen demand (BOD).

Table 1 shows the cost basis calculation for the reimbursement fee for each unit process. The Raw Sewage Pump Station and Aerators have no capacity available for growth, resulting in no reimbursement fee costs for those facilities. There is no cost basis for disinfection because that facility will be demolished and rebuilt as part of the proposed facility improvements. The Henley and Texum Pump Stations also have no reimbursement fee cost basis because they serve no growth. Table 2 shows a summary of the reimbursement fee cost basis.

Table 1. Reimbursement Fee Cost Basis Calculation

Unit Process	2015 Basis for Capacity	2015 Capacity	2015 Flow/Load	2035 Basis for Capacity	2035 Capacity	2035 Flow/Load	Reimbursement Fee Cost Basis
Raw Sewage Pump Station	PWWF (MGD)	11	12.3	PWWF (MGD)	21	13.7	0.0%
Bar Screens	PWWF (MGD)	30	12.3	PWWF (MGD)	30	13.7	4.5%
Aeration Blowers	Blower Capacity/ Air Demand (scfm)	7,800	3,000	Blower Capacity/ Air Demand (scfm)	7,800	3,610	7.8%
Aerators	Submerged Aerator Capacity (scfm)	3,000	3,000	Submerged Aerator Capacity (scfm)	3,610	3,610	0.0%
Disinfection	PWWF (MGD)	18.2	12.3	Peak Week Flow (MGD)	10	10	0.0%

MGD = million gallons per day

scfm = standard cubic feet per minute

PWWF = peak wet weather flow

Table 2. Reimbursement Fee Cost Basis Summary

Asset	Cost in 2015 Dollars	Reimbursement Fee Cost Basis	
		%	\$
Raw Sewage Pump Station	\$1,508,970	0.0%	\$0
Bar Screens	\$1,785,379	4.5%	\$80,937
Aeration Blowers	\$3,431,043	7.8%	\$268,400
Aeration	\$16,455,563	0.0%	\$0
Disinfection	\$379,021	0.0%	\$0
Henley	\$2,142,924	0.0%	\$0
Texum	\$65,375	0.0%	\$0
<b>Subtotal</b>	<b>\$25,768,277</b>	<b>-</b>	<b>\$349,337</b>

## 3.2 Improvement Fee

The District has prepared the *Draft Facilities Plan* identifying a preferred alternative for meeting the anticipated total maximum daily load order for the Upper Klamath River. The *Draft Facilities Plan* presented four potential wastewater and biosolid management alternatives. The District confirmed that “Alternative 2 - Reuse of Treated Effluent for Irrigation of Agricultural Land” shall serve as basis of planning. This alternative would allow the District to discontinue discharging to the Klamath River by reusing the plant effluent to irrigate agricultural land. The District identified Alternative 2 as the preferred alternative to use to determine the cost basis for growth. Further, the District has adopted a Capital Facilities Plan (Resolution No. 171, December 2015) as required by ORS 223.309, which provides authorization for SDC development. Even though projected flows and loads were updated in 2010, the sizing and improvements for proposed treatment plant facilities did not change. This SDC study used the sizing and estimated costs provided in the *Draft Facilities Plan*.

The *Draft Facilities Plan* included capital costs for each project element of Alternative 2. Those costs were provided with an ENR CCI of 7,500 and escalated to the November 2015 ENR CCI 20-City Average of 10,092 for this study. The percent markups (18 percent for engineering, 3 percent for administration, and 24 percent for contingencies) remained the same as those used in the *Draft Facilities Plan*.

A number of the project elements of Alternative 2 are not related to capacity. They are driven from a regulatory perspective. For those elements, the cost basis was determined using current and future average wet weather flow and proportion related to current customers and growth.

Additional growth-related improvements will need to be implemented for the aeration system to meet future demand. There is currently sufficient ductile iron and manifolds to supply additional air; however, additional weight air tubing and diffusers will need to be installed. The costs were based on the existing system cost and capacity and scaled to add capacity for the increased demand between 2015 and 2035. Because this aerator improvement is driven by growth, growth will be responsible for 100 percent of the cost. Table 3 provides a summary of the Improvement Fee.

Table 3. Improvement Fee Cost Basis Summary

Project Elements	Cost (\$M)	Cost (\$M)	Improvement Fee Cost Basis	
	2005	2015	%	(\$M)
Raw Sewage PS Upgrade	0.60	0.81	13.6%	0.11
Blower	0.10	0.13	7.8%	0.01
Algae removal	3.40	4.58	5.2%	0.24
Disinfection and Reclaimed Water PS	2.20	2.96	5.2%	0.15
Transmission Main to Reuse Site	5.20	7.00	5.2%	0.36
Irrigation Storage Pond	9.00	12.11	5.2%	0.63
Irrigation PS and Control Building	1.20	1.61	5.2%	0.08
Irrigation Site Piping	2.30	3.09	5.2%	0.16
Irrigation Equipment	3.10	4.17	5.2%	0.22
Misc. Treatment Plant Improvements	1.40	1.88	5.2%	0.10
<b>Alternative 2 Capital Costs Subtotal</b>	<b>28.50</b>	<b>38.35</b>	-	<b>2.05</b>
Engineering (18%)	5.13	6.90	-	0.37
Administration (3%)	0.86	1.15	-	0.06
Contingencies (24%)	6.84	9.20	-	0.49
Pipeline Easements	0.10	0.13	5.2%	0.01
Land Acquisition	8.80	11.84	5.2%	0.61
<b>Alternative 2 Additional Costs Subtotal</b>	<b>21.73</b>	<b>29.23</b>	-	<b>1.54</b>
Aeration Improvements	n/a	0.08	100.0%	0.08
<b>Total</b>	<b>50.23</b>	<b>67.67</b>	-	<b>3.68</b>



# Collection System Facilities

## 4.1 Design Storm

The Oregon Department of Environmental Quality (DEQ) currently regulates sanitary sewer overflows in coordination with National Pollutant Discharge Elimination System (NPDES) permits and according to bacteria specifications of state water quality regulations. Based on DEQ requirements, the design storm selected must have at least a 5-year return interval with a 24-hour precipitation depth. Design storm selection dictates the level of protection from potential overflows that the associated improvements will provide.

The National Climatic Data Center operates a precipitation gage installed at the Crater Lake - Klamath Regional Airport (just south of the District) and provided 14 years of hourly data. An annual series of 24-hour storms was compiled and determined that the 5-year, 24-hour storm would be equal to 1.20 inches of precipitation. The National Oceanic and Atmospheric Administration (NOAA) Atlas predicts that a 5-year, 24-hour storm to be 2 inches (NOAA, 1973). Because the Klamath Airport had only 14 years of data, two other nearby gages (one at Gerber Dam, Oregon and one at Tulelake, California) were identified by the study team for additional analysis. Both of these gages had a longer period of record and an annual series of both datasets confirmed that 1.20 inches of precipitation at Klamath Falls Airport was a reasonable 5-year, 24-hour storm.

### 4.1.1 Flow Generation

The District provided raw flow monitoring data from four locations in the collection system from August 15, 2012 to October 6, 2015. Figure 2 (provided at the end of this report) shows the location of each flow monitor and the corresponding sewershed. Figure 3 shows a graph of the flow monitoring data and the 24-hour rainfall at the Klamath Falls Airport.

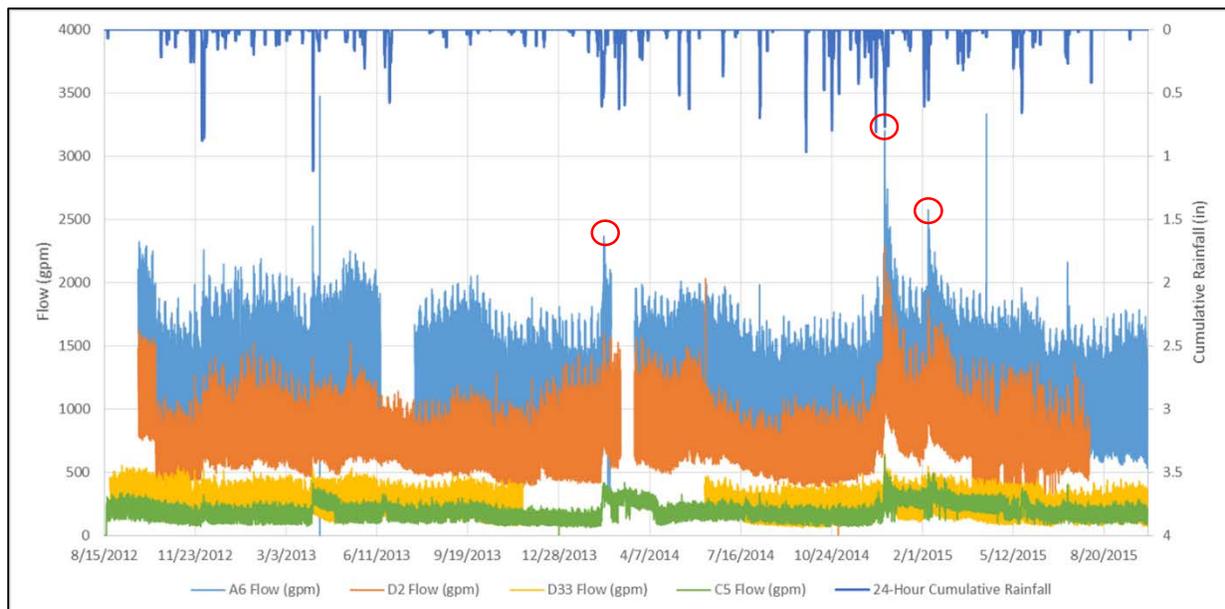


Figure 3. Flow Monitoring Data

During the flow monitoring period, the District never experienced a 5-year, 24-hour precipitation event. There are three events that show significant response in the collection system – one in February 2014, one in December 2014, and one in February 2015 (all circled in Figure 3). A relationship was developed

between these three events and the 24-hour storms that produced them. Using this relationship, 1.20 inches (the 5-year, 24-hour storm) would result in 4,550 gallons per minute (gpm) or 6.55 million gallons per day (MGD) at flow meter A6.

## 4.2 Reimbursement Fee

In order to calculate the capacity used by existing customers, an inch-diameter per foot (IDF) approach was used for pipes 10 inches and larger (EPA, 2014). 8-inch pipes are the minimum pipe size operated by the District and excluded from this analysis. The IDF approach allocated flow to each pipe segment by multiplying the inch diameter of pipe by the length of the pipe segment and divided by the total system upstream of A6.

This fraction represents each pipe's current flow conditions and is an industry approach to flow allocation in a collection system. To calculate the flow in each pipe, the fraction of flow of that pipe is added to all the pipes upstream. Using this analysis, existing customers use 35.24 percent of the collection system's capacity. See Figure 4 for a conceptual example.

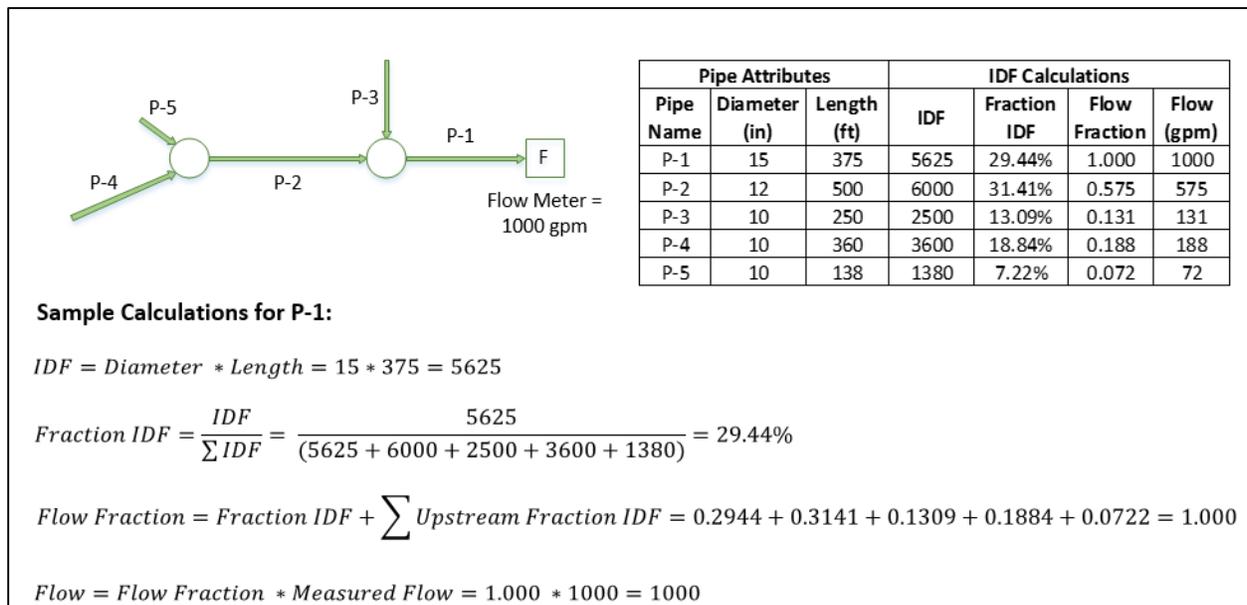


Figure 4. IDF Example Calculations

To calculate potential growth during the planning period, the District provided documentation detailing potential residential developments over the next 20 years (with a map showing the location of each potential development) and commercial flow projections for the entire area. This expected development is based on District knowledge of proposed developments (both those applied for and then not constructed) and parcels that are reasonably expected to develop during the planning period based on population projections. The equivalent dwelling units (EDUs) for each residential development were assigned to a loading manhole and commercial flow was divided to the same loading manholes – assuming that residential and commercial development would take place in the same areas. This collection system analysis resulted in 856 additional EDUs between 2015 and 2035, which differs from the facilities plan analysis for the treatment facility. Based on the *Draft Facilities Plan* projections, approximately 1,446 additional EDUs will be added between 2015 and 2035. To achieve alignment between the collection system and *Draft Facilities Plan* projections, this SDC study adjusted the EDUs provided in the District's potential developments list to match those projections in the *Draft Facility Plan*. It is appropriate for the collections system and WWTP planning approach to be aligned. The District should seek to continue to align these projections in future planning efforts.

In 2006, the District estimated there to be 10,060 EDUs in the system and projected 11,907 EDUs by 2015 (Anderson Perry & Associates, 2006). Using the inch-diameter per length approach for pipe upstream and downstream of A6, it was determined that 91.33 percent of the capacity was upstream of A6; thus, the number of EDUs was scaled accordingly to 10,874 ( $0.9133 \times 11,907 = 10,874$ ), resulting in 0.41 gpm per EDU for the 5-year, 24-hour storm. Future flows per EDU are assumed to follow existing flow allocations per EDU.

For the growth capacity calculation, the additional flow from those developments (based on EDUs and 0.41 gpm per EDU) was added to the corresponding loading manholes. The IDF approach was updated using the additional flows, determining that 8.44 percent of capacity will be used by growth within the planning period. Table 4 shows a summary of the IDF results. The “volume” of the existing collection system occupied by flow during each condition was used as a measure of system capacity, as discrete pipe segment hydraulic capacities would require development of a system-wide hydraulic model which is beyond the scope of this study.

Table 4. Inch-Diameter per Length Summary

Capacity Description	Collection system volume used	Units	Percentage of total system volume
Capacity used in 2015:	270,982	gal	35.24%
Capacity to be used by Growth:	64,928	gal	8.44%
Capacity to be used in 2035:	335,910	gal	43.69%
Total System Capacity:	768,930	gal	

The existing collection system was valued using pipe replacement costs developed by researching industry standards, other projects, and CH2M cost databases.

The District provided documentation of existing collection system facilities that were built by developers and donated to District in accordance with District development policies. These pipes that were donated to the District are not eligible for reimbursement and thus excluded in the valuation. All pipes smaller than 8 inches were also not included. Table 5 provides a summary of the cost per linear foot by depth to replace pipes. Costs include excavation, installation, surface restoration, pipe costs, and manhole costs. The replacement cost for the entire system upstream of A6 exceeds \$158.8 million. Table 6 shows the cost basis for the reimbursement fee for the collection system.

Table 5. Cost of Pipe Replacement per Linear Foot by Depth

Pipe Diameter (inches)	Pipe Depth (feet)			
	0 - 6	6 - 10	10 - 14	14 - 18
8	\$234	\$352	\$491	\$650
10	\$251	\$372	\$514	\$677
12	\$272	\$396	\$541	\$706
15	\$309	\$443	\$596	\$771
16	\$331	\$467	\$623	\$800
18	\$353	\$491	\$649	\$829
21	\$383	\$537	\$711	\$895
24	\$437	\$607	\$797	\$993
27	\$478	\$642	\$824	\$1,026
30	\$510	\$678	\$865	\$1,071
36	\$587	\$773	\$978	\$1,202

Table 6. Collection System Reimbursement Fee Cost Basis

	Replacement Costs	Cost Basis	
		%	\$
Sanitary Sewer Collection System	\$158,842,408	8.44%	\$13,412,551

### 4.3 Improvement Fee

Because the collection system has adequate capacity, there is no improvement fee as part of this SDC analysis.

# Industrial Waste Charges

Industrial wastes have higher than typical waste loads; therefore, these wastes must be considered separately from typical municipal waste for equitable allocation of SDC charges. The recommended methodology for calculating industrial waste charges are as follows:

$$\text{SDC} = (\text{industrial Q/flow per EDU}) \times \$/\text{EDU} \times (\text{flow portion of SDC} + [S \times \text{strength portion of SDC}])$$

Where:

Q = gallons per day of anticipated volume

Flow per EDU = 167 gallons per day

\$/ERU = Current Charge per equivalent residential unit (ERU)

Flow portion of SDC = 97.4% of SDC

Strength portion of SDC = 2.60% of SDC

S = Strength (Organic) Factor (whole number multiplier, see Table 7)

**Table 7. Determination of Strength Factor (S)**

Factor (S)	BOD/ Total Suspended Solids Range (milligrams per liter)*
1	0-200
2	200-500
3	500-800
4+	Continues in 300 milligrams per liter

\*The larger of BOD/TSS values shall be used.

Flow per EDU is 167 gpm, based on 2015 daily monitoring report data. Average annual weather flow was 1.99 MGD. Per estimates from Anderson Perry & Associates (2006), the District served 11,907 EDUs in 2015.

Flow and strength portions of SDC are calculated by determining the proportional amount of the reimbursement and improvements feeds that are governed by flow or load factors. For instance, the aeration process is entirely sized on waste load (pound per day of BOD), while the influent pumping process is entirely sized based upon flow.



# Summary of System Development Charge Fees

Table 8 shows a summary of the SDC fees calculated as part of this capacity assessment. The total cost basis for this assessment is approximately \$17.4 million.

Table 8. Fee Summary

	Cost Basis
<b>Reimbursement Fees</b>	
Treatment Facility	\$349,337
Collection System	\$13,412,551
Subtotal	\$13,761,888
<b>Improvement Fees</b>	
Treatment Facility	\$3,675,976
Collection System	\$0
Subtotal	\$3,675,976
<b>Total</b>	<b>\$17,437,864</b>

A number of alternative methodologies were assessed as part of this study. Those alternatives are detailed in Appendix A. The District elected to use a combined approach that incorporates a system buy-in cost and a capacity expansion cost. This combined approach is designed to recover the cost of the existing available capacity and planned additional capacity costs for growth. The SDC fee per EDU is calculated as \$12,060. That incorporates a \$9,518 reimbursement fee and a \$2,542 improvement fee. See Table 9 for a summary of the calculations.

Table 9. System Development Charge Calculations

	Cost Basis	EDUs	\$/EDU	Flow	Load
<b>Reimbursement Fees</b>					
Treatment Facility	\$349,337	1,446	\$242	\$56	\$186
Collection System	\$13,412,551	1,446	\$9,276	\$9,276	0
Subtotal	\$13,761,888		\$9,518	\$9,332	\$186
<b>Improvement Fees</b>					
Treatment Facility	\$3,675,976	1,446	\$2,542	\$2,416	\$127
Collection System	\$0	1,446	\$0		
Subtotal	\$3,675,976		\$2,542	\$2,416	\$127
<b>Total</b>	<b>\$17,437,864</b>		<b>\$12,060</b>	<b>\$11,747</b>	<b>\$312</b>
				97.4%	2.60%



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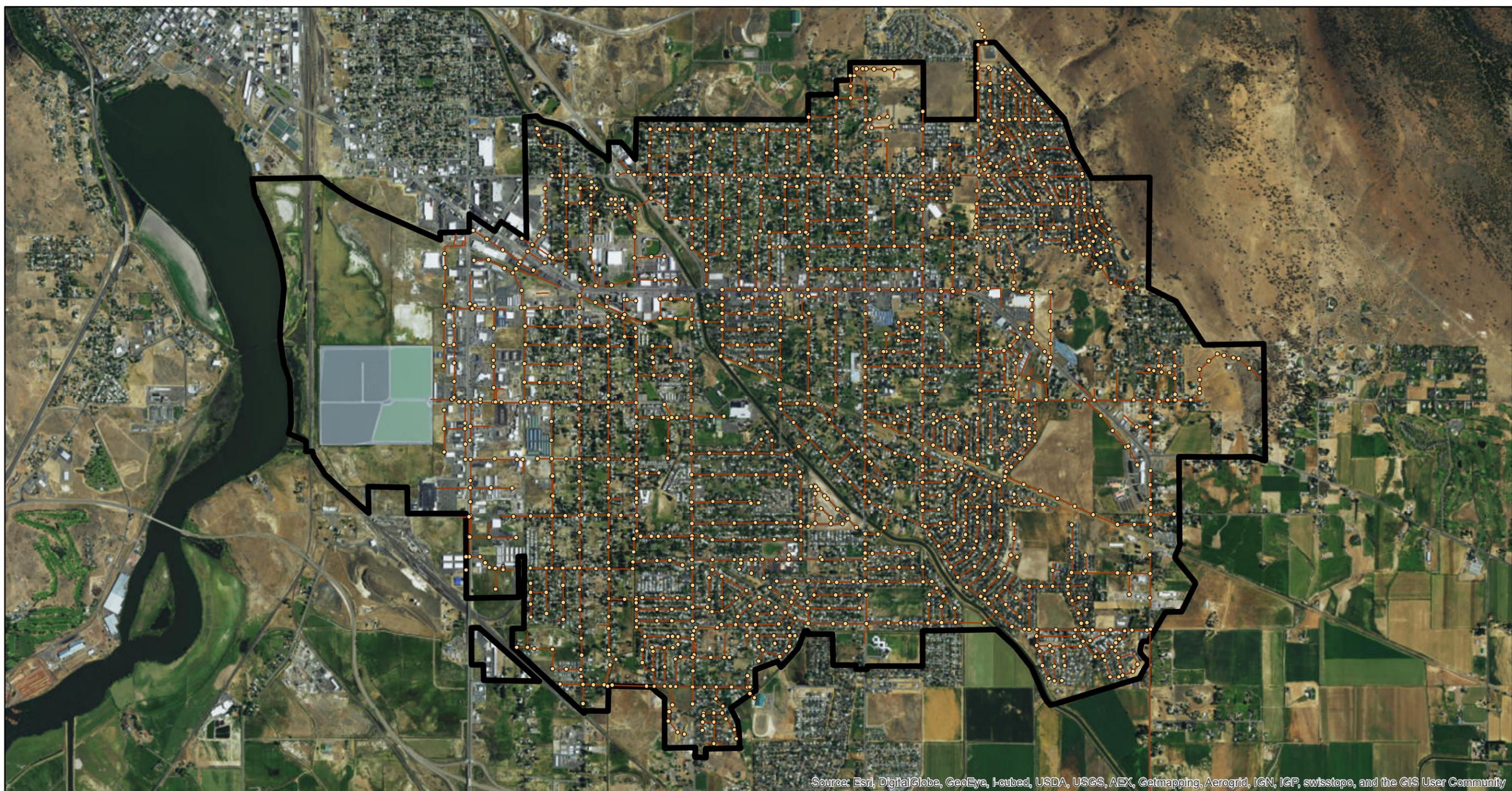
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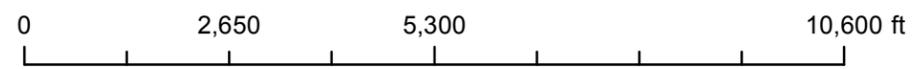
Figures





**Legend**

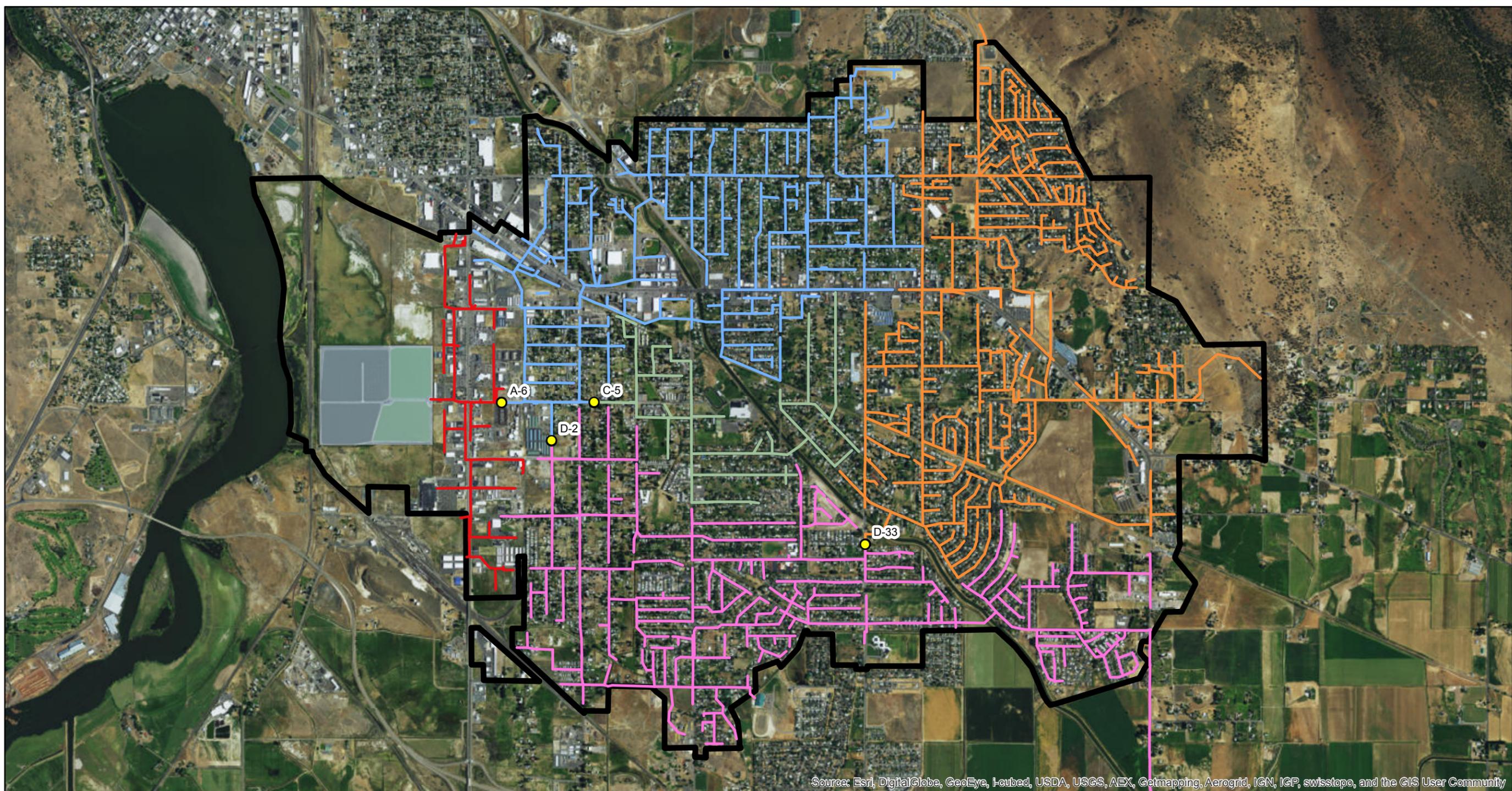
- Manholes
- Gravity Pipes
- Study Area Boundary
- WWTP



**Figure 1 - Study Area**  
SDC Analysis







**Legend**

- |   |  |
|---|--|
|  Study Area Boundary | <b>Sewersheds</b>  |
|  WWTP                |  N. West  |
|  Flow Monitors       |  Central  |
|   |  South    |
|   |  N. East  |
|   |  Washburn |



**Figure 2 - Sewersheds**  
SDC Analysis



Appendix A  
System Development Charge  
Methodology Alternatives





**PREPARED FOR:** Mike Fritschi, South Suburban Sanitary District  
**PREPARED BY:** Deb Galardi, Galardi Rothstein Group  
**SUBJECT:** System Development Charge Methodology Alternatives  
**DATE:** February 11, 2016

## Introduction

Within the framework of Oregon system development charge (SDC) requirements, jurisdictions have latitude in selecting specific methodological approaches related to the calculation of SDCs, based on local funding objectives. Typical evaluation criteria include:

- Revenue adequacy (full recovery of capacity costs attributable to growth within the planning period)
- Equity (i.e., fairness)
- Ease of understanding by customers and other stakeholders
- Ease of implementation (i.e., data requirements, SDC structure complexity, etc.)
- Support of other policy objectives, like economic development

A number of the methodological components are best evaluated in the context of the technical analysis (e.g., capacity definition) – where system design or other criteria will dictate which approaches are most equitable and defensible. Other components (e.g., existing system valuation) may be a function of data availability. This memorandum presents potential methodological alternatives for each element of the SDC methodology, along with a description of the current methodology used by South Suburban Sanitary District (the District). Table 1 summarizes the current and recommended approaches, reflecting a balancing of the District’s various objectives.

## Determination of System Capacity Needs

The first step of the methodology is to evaluate system capacity for purposes of determining the needs of new development and how they will be met. There are two methodological issues related to the capacity analysis:

- SDC Fee Structure
- Capacity Definition

Each is discussed below.

### **SDC Fee Structure**

There are three broadly recognized structures of SDCs:

1. **System Buy-In (or Reimbursement Fee) Approach.** The system buy-in approach is based on existing facilities and costs. Under this approach, new customers are required to “buy in” to existing system facilities, generally at a rate that reflects the prior investment per unit of capacity.
2. **Capacity Expansion (or Improvement Fee) Approach.** While the buy-in approach is characterized as backward-looking (based on historical investments), the capacity expansion approach is very much a forward-looking approach. The basis for the fees under this methodology is the projection of capacity-enhancing capital improvements planned for the system during the planning horizon. The utility’s master plan, facility plan, or other capital plan generally serves as the basis for this information. The projected capacity costs are then divided by the projected growth units over which they will provide service, in order to determine the improvement fee. In some cases (e.g. collection system improvements designed for build-out conditions), the growth units over which costs are spread may extend beyond the capital improvements plan period (which may be only 10 or 20 years). It is important that the unit cost calculations spread costs over full capacity utilization, so that growth within a more limited SDC planning period does not pay for capacity reserved for future development phases.
3. **Combined Approach.** The combined approach is designed to recover both the costs of existing available system capacity and planned additional capacity costs for growth. The buy-in or reimbursement fee component is determined by dividing the value of *available capacity that will serve growth within the planning period*, by the estimated growth units during the planning period. Similarly, the improvement fee component is determined by dividing the value of *future capacity-increasing costs for growth*, by the same growth units. Oregon law requires that when a combined approach is used, the methodology clearly demonstrate that both existing available and new capacity are required to serve the needs of growth within the planning period.

**Existing Methodology:** The District’s existing SDC methodology is based on a combined approach; however, the methodology report does not provide detail on the capacity analysis.

**Discussion:** Oregon law (ORS 223.297 through 223.314) explicitly allows for implementation of a reimbursement fee, an improvement fee, or a combination of the two. However, the law also requires that in cases where a reimbursement fee or combined fee is to be charged, that the methodology demonstrates that the existing system has available capacity to serve growth. Therefore, to be defensible and equitable, the methodology must consider how the capacity needs of growth will be met – through existing facilities, future facilities or a combination of the two – and the fee structure selected accordingly.

The selection of the fee structure is primarily a technical decision that will be informed by information developed for the treatment plant master plan, as well as collection system flow monitoring. From a revenue adequacy and equity perspective, the fees should be structured to recover all of the costs related to growth – whether in the existing facilities, future improvements, or a combination.

## Capacity Definition

The appropriate capacity measures are component-specific, and relate primarily to system sizing criteria. Wastewater systems must be sized to meet customer discharges, under all conditions; therefore, peak flows are important sizing criteria. Wastewater strength parameters may also be used to define capacity for certain types of treatment facilities.

**Existing Methodology:** The District’s existing SDC methodology report does not provide detail on the capacity analysis.

**Discussion:** To be defensible and equitable, the methodology should consider all relevant sizing criteria for the various system components. Using multiple capacity definitions is typically necessary in order to recognize the diversity of sizing criteria among system components or treatment processes. Where considerable diversity exists among wastewater strengths of different customer types, defining capacity and costs for strength parameters may enhance the equity of the methodology, assuming data is available on the relative capacity requirements among users. Potential equity gains need to be weighed against added complexity, administrative and data requirements. The SDC update should evaluate the capacity measures in the context of recent system planning data.

## Development of SDC Cost Basis

The cost basis represents the total costs that the SDCs are intended to recover. The following methodological issues need to be addressed in developing the cost bases:

- Existing System valuation (Reimbursement Fee) – the method for valuing existing facilities with capacity to serve growth.
- Project cost allocation (Improvement fee) – the method for allocating capital improvement projects that serve both existing and future users (i.e., determining growth share).
- Financing Costs – whether historical or future planned financing costs should be included in addition to construction costs.
- Compliance Costs – how costs associated with complying with the SDC statutes are estimated and recovered.

Each is discussed below.

### Existing System Valuation

The most common approaches to valuing the systems for purposes of developing the reimbursement fee cost basis are:

- **Original cost:** The nominal dollar value paid at the time of construction. This valuation ignores depreciation of the assets, inflation that increases the cost of replacing the asset, and technological change that improves efficiency, reduces the cost of constructing replacement assets, or both.
- **Book value:** The accounting value (equal to the original cost less accumulated depreciation) shown in the system’s annual audited financial statements that follow generally accepted accounting principles (GAAP).
- **Replacement cost/appreciated cost:** Asset values established based on what it would cost in current dollars to construct an equivalent set of infrastructure assets subject to current market conditions, regulatory requirements, and technological advances.

- **Replacement cost/appreciated cost less depreciation:** While at the same time asset value is increased to recognize inflation, this method also recognizes potential loss in value due to depreciation.
- **Existing Methodology:** The District’s existing SDC methodology report does not provide detail on the original basis for the reimbursement.

**Discussion:** Oregon SDC law does not prescribe a system valuation option, and all of the approaches are consistent with industry practices, and are used in Oregon. In any of the valuation approaches, it is necessary to reduce total asset value by the portion funded by external sources, like grants or developer contributions.

The selection of a particular valuation approach generally reflects local policy decisions. Book value will generally result in the lowest SDC, compared to the other valuation methods, as it does not recover from new development the costs associated with depreciation, inflation, or interest. Using book value suggests that existing customers should bear the carrying costs of capacity, and as such, may be viewed as less equitable by existing ratepayers who invested in the capacity – in part for the benefit of future growth. Conversely, replacement cost methods result in new customers bearing carrying costs, and will yield the highest fees. Original cost and Replacement Cost Less Depreciation basis often result in similar values.

Data availability may also be a factor in selecting a valuation approach, as the various options require different data to be defensible. Original cost, book value, and appreciated cost approaches require actual construction costs and accumulated depreciation information, while replacement cost methods generally rely on system inventory data and current construction unit costs. The District does not have complete data on original cost and year of installation for all of its facilities.

## **Project Cost Allocation (Growth Share)**

Calculation of the improvement fee begins with a review of the capital improvement plan to determine the costs of providing additional capacity to meet the needs of growth (“growth share”). Some planned projects may provide new facilities that are needed entirely for growth. In this case, the entire project cost may be eligible for inclusion in the improvement fee cost basis. Other projects may provide shared benefits – remedy existing deficiencies and provide additional capacity for growth. In this second case, there are alternatives for how the costs may be allocated between existing and future customers. The primary options are:

- **Capacity utilization:** Project costs are allocated between existing and future customers in proportion to their relative capacity requirements. Under this approach, both existing and future customers pay for capacity at the same average cost per unit – economies of scale are shared among all customers.
- **Incremental cost:** Assigns the economies of scale benefit to either new customers or existing customers. For example, existing customers could be allocated costs equivalent to building a project strictly to remedy the existing system deficiency. The incremental costs to oversize the project would then be allocated to new customers. In this case, new customers are the beneficiaries of the economies of scale – their cost of capacity would reflect a lower cost per unit than existing customers. The reverse approach could also be applied – with new customers paying an amount equal to the cost of building a separate project to provide their capacity needs, with the incremental amount to build a joint project, allocated to existing customers. In this case, existing customers are the beneficiaries of the economies of scale.

- **Parallel projects.** Determines what the costs would be to build two separate projects – one to meet the capacity needs of growth, and the other to address existing customer’s needs. The individual shares would then be determined by dividing the cost of each into the sum of the two projects.

**Existing Methodology:** The District’s existing SDC methodology uses a form of the capacity utilization approach, where project costs are shared proportionately by existing and future customers in proportion to equivalent residential or dwelling units.

**Discussion:** The capacity utilization approach is most common in Oregon; given the focus on respective capacity needs this method is generally viewed as the most defensible under Oregon law. However, in certain cases, the incremental approach may be viewed as more equitable. For example, allowing existing customers to benefit from the economies of scale may be appropriate if existing facilities are being replaced with the sole purpose of providing additional capacity for growth (through the construction of larger facilities). The parallel projects approach is less common owing to the substantial effort that is required to develop multiple cost estimates for each improvement.

## Financing Costs

To the extent that a portion of the capital improvement costs will be financed through long-term debt, financing costs may be an important part of the overall costs of meeting growth’s capacity needs. SDCs may be used to retire growth’s share of debt service, including a portion of financing costs. Financing costs may include interest costs, debt issuance costs, or a combination. Historical financing costs may also be appropriate to consider if existing assets with available capacity were financed.

**Existing Methodology:** The District’s existing SDC methodology does not include future financing costs; existing system valuation details are not available related to the reimbursement fee.

**Discussion:** From an equity perspective, inclusion of financing costs may be important for growth to pay for its full impact on the system. However, the District does not have existing outstanding debt, and accurately projecting future interest costs can be difficult for a long-term capital improvement plan. Furthermore, utility rates often include the costs of financing, so it may not be perceived as equitable to require up-front collection of future financing costs through SDCs.

## Compliance Costs

Jurisdictions are entitled to include in the SDCs, a charge to recover costs associated with complying with the SDC law. Compliance costs generally include costs related to developing the SDC methodology and project list (i.e., a portion of facility planning costs), legal costs, and annual accounting costs. Oregon law requires that if compliance costs are included, the City track revenue and expenditures associated with such charges separately.

**Existing Methodology:** The District’s existing SDC methodology excludes compliance costs.

**Discussion:** Inclusion of compliance costs in the SDC methodology is favorable in terms of revenue adequacy and equity, as the costs are recovered up-front from specific users. To be defensible, the methodology should itemize the costs to be included, and spread those costs over projected new development units. This may be done either through a separate charge, or as a percent of the overall SDC. However, its inclusion of compliance costs in the methodology increases the administrative complexity, as it is important that the District be able to track the revenue from the charges separately, and account for relevant expenditures.

## Development of SDC Schedule

The base SDC is determined by dividing the cost basis by the projected growth units (in aggregate) over the planning period. The resulting system-wide unit cost of capacity is then multiplied by the capacity requirements of each user, as defined by the SDC schedule.

The following methodological issues need to be addressed in developing the SDC schedule:

- Scaling measures – the method for estimating capacity demands for different sizes of developments.
- Strength factors – the method for recognizing potential differences in capacity requirements or costs related to the wastewater strengths.
- Geographic factors – the method for recognizing potential differences in capacity requirements or costs related to the location of development.

Each is discussed below.

### Scaling Measures

At the very least, the fee schedule generally provides one or more scaling measures for assessment of SDCs to different sizes of new connections. The use of scaling measures in assessing SDCs is designed to ensure that customers who are larger -- and require more system capacity -- pay the associated costs. The most common scaling measures for wastewater SDCs include:

- **Water meter size.** Data on historical system flows and metered connections are analyzed to determine the average flow per meter equivalent (either system-wide or by development type). Meter equivalencies may be based on actual flows by meter size or, more often, based on rated hydraulic meter capacity ratios (relative to that of the smallest meter).
- **Plumbing fixture units (PFUs).** An SDC schedule based on plumbing fixture units may be applied system-wide or by development type. In either case, capacity requirements by fixture unit are generally established through fixture unit equivalency tables based on plumbing code.
- **Equivalent dwelling units (EDUs).** A SDC schedule based on EDUs would relate water use attributable to a particular unit of measure for a given development type (e.g., building square footage) to that of a single family dwelling. The estimated flow per unit establishes the relationship between the particular type of business and that of a typical dwelling unit (and therefore the base SDC). The total SDC for each individual development would then be based on the usage (or EDU) relationship, as well as the specific number of units planned (e.g., total square footage).
- **Residential dwelling characteristics (e.g., building square footage, number of rooms, lot size.)** A fee schedule based on specific dwelling unit attributes generally requires data on the correlation of wastewater flow to the specific attribute being considered. Data may be obtained from a local statistical analysis (where winter water usage records would likely need to be supplemented with data on building/lot characteristics from assessment and taxation records or building permits), or from other communities or reference material. For example, census data have been used in conjunction with real estate industry data to establish correlations between dwelling type (e.g., single family or multifamily), size or number of rooms, and persons per household. Then per capita water use estimates may be employed to develop a fee schedule based on rooms or building size.

**Existing Methodology:** The District’s existing SDC methodology uses a combination of EDUs and PFUs for scaling nonresidential development fees, with the exception of major industrial customers who are charged based on estimated wastewater flows and loads.

**Discussion:** It is important to note that all available scaling measures offer limited precision in capturing potential differences in system requirements across customers. For example, there is the potential for differences in demands of customers with the same number of PFUs, as the intensity of use may vary among customers. Nevertheless, standard scaling criteria are required for the majority of new developments, because of the inherent lack of information on customers’ prospective use of system resources at the time of connection. Since there is no viable mechanism by which system use may be predicted in advance – and the use may change over time with changes in occupancy -- standard scaling criteria are employed to achieve reasonable estimates of different users’ requirements for capacity.

Plumbing fixture units are a common method for assessing SDCs for wastewater systems. This approach is fairly easy to understand and may be viewed as equitable given that plumbing fixtures can be correlated to wastewater flows based on industry standards (e.g., plumbing codes). The fact that fixture units allow for greater differentiation of fees within a given water meter size may lead some to view this approach as more equitable than meter size. The District uses this approach for mixed use developments and hotels and motels.

An EDU approach may be the most equitable basis for assessing wastewater SDCs, in theory, as it attempts to recognize greater diversity among development types and sizes of developments. However, it can also require the most rigorous analysis of system usage patterns by development/business type to establish the initial schedule, depending on the number of classes of use to be recognized. The District currently uses this approach for establishing SDCs for the majority of development types.

Differential fees for residential customers is less common owing to the complexity of this approach, and the lack of wastewater flow data for individual customers.

## **Strength Factors**

In addition to customer flow, the type of land use may provide an indication of potential wastewater strength, and is sometimes considered in the development of the fee schedule.

**Existing Methodology:** The District’s existing SDC methodology applies different wastewater strength assumptions to industrial customers only.

**Discussion:** The inclusion of strength factors in the SDC methodology may enhance the overall equity of the charges, assuming data are available to support the respective land use characteristics. As with other methodological elements, the potential equity gains need to be evaluated within the context of the added administrative and data development requirements.

## **Geographic Area**

Fee schedules may also consider the location of the development in computing fees. Location factors may be technically based – in cases where geographic areas exhibit unique costs and or service characteristics. Geographically differentiated SDC schedules may also reflect policy objectives, for example, in the case of greenfield vs. urban development incentives.

**Existing Methodology:** The District’s existing SDC schedule is system-wide, and does not differentiate by geographical area.

**Discussion:** The integrated nature of wastewater systems typically favor development of system-wide fees. Deviations from this approach should be considered within the context of system capital planning. If the planning studies identify unique costs or service requirements for limited service areas, then some differentiation of fees by geographic area may be warranted. Development of geographically-differentiated fees should also consider additional administrative requirements – for example the impact on SDC accounting.

**Table 1***Summary of Wastewater SDC Methodology Options*

<b>Task/Methodological Issue</b>	<b>Options</b>	<b>Current Approach</b>	<b>Relevant Evaluation Criteria</b>	<b>Recommendation</b>
<b>Determination of System Capacity Needs</b>				
SDC Fee Structure	System Buy-In (Reimbursement); Capacity Expansion (Improvement); Combined Approach	Combined approach	Revenue Adequacy, Equity	Combined approach (collection reimbursement; treatment improvement and reimbursement)
Capacity Definition	Average and Peak Wastewater Flows; Wastewater Strengths	Information not available	Defensibility, Equity, Data Availability	Combination of flows and strengths (based on facility design criteria)
<b>Development of SDC Cost Basis</b>				
Existing System Valuation	Book value, original cost, replacement/appreciated cost, replacement/appreciated cost less depreciation	Information not available	Equity, Revenue Adequacy, Data Availability	Replacement/appreciated cost (original cost and year of construction data not available for all assets)
Project Cost Allocation	Capacity utilization, incremental cost, parallel projects	Capacity utilization	Equity, Revenue Adequacy, Defensibility	Capacity utilization (details to be presented in separate memo)
Financing costs	Include or exclude	Not included in improvement fee	Revenue Adequacy, Equity, Data Availability	Exclude (no current debt; future financing through rates)
Compliance costs	Allowed by law, but not required	Not included	Revenue Adequacy, Administrative Simplicity	Exclude (avoid further administrative complexity)
<b>Development of SDC Schedule</b>				
Scaling measures	Water meter size; plumbing fixture units; equivalent dwelling units; other residential characteristics	Combination of EDUs and PFUs	Equity, Defensibility, Administrative Requirements, Data availability	Combination of EDUs and PFUs (update equivalency factors if necessary to reflect current industry standards)
Strength factors	Flow only or combination of flow and strength	Strength factors for Industrial only	Equity, Defensibility, Data availability, Administrative Requirements	Strength factors for industrial only (review and update as needed)
Geographic area	System-wide vs. area-specific	System-wide	Equity, Defensibility, Administrative Requirements	System-wide



Appendix B  
Equivalent Residential Unit  
Valuation Review



# Equivalent Residential Unit Valuation Review

The building type and plumbing fixtures ERU valuations in the District's Ordinance 50 (District, 2012) were reviewed and updated. The building type ERU valuations (Table 1 in Ordinance 50) were compared to selected Oregon agencies and the California Environmental Protection Agency State Water Resources Control Board (California EPA, 1998) flow projections. Based on that comparison, the ERU valuations were adjusted for commercial and office buildings and bars/restaurants/food service areas. See Table 1 for a summary of ERU value per building type.

Plumbing fixtures valuations (Table 2 in Ordinance 50) were compared to the Oregon Plumbing Specialty Code (State of Oregon, 2014). Based on that comparison, none of the ERU values were modified. See Table 2 for a summary of ERU value per plumbing fixture.

**Table 1 - Equivalent Residential Unit (ERU) Value per Building Type**

<b>Building or Addition Type</b>	<b>Unit</b>	<b>ERU per Unit</b>	<b>Min Base ERU</b>
Single Family Residence	Dwelling	1.00	-
Multiple Family Residence	Dwelling	0.65	1.30
Secondary Residential Structure	Dwelling	1.00	-
Mobile Home Space	Trailer/Modular	1.00	-
Commercial & Office Buildings	100 SF	0.05	1.00
Home Business in Primary Residence	Dwelling	0.00	-
Home Business in Secondary Structure	100 SF	0.10	0.50
Bars/Restaurants/Food Service Areas	100 SF	0.30	1.00
Non-commercial/Non-Industrial Complex	See Table 2	-	1.00
Entertainment Facilities	See Table 2	-	1.00
Hospitals	Bed	1.00	1.00
Convalescent Hospitals	Bed	0.50	1.00
Commercial Kitchen/Cafeteria	See Table 2	-	1.00
Residential Care Home (Small)	First 1-6 Beds	-	3.00
Residential Care Home (Large)	per Bed after 6 Beds	0.25	3.25
RV/Septage Dump Station	Tank/Station	3.00	-
Car Wash, Self Service	Bay	1.20	-
Car Wash, Automated/Full Service	Bay	3.0	-
Laundromat/Dry Cleaners	100 SF	0.50	1.00
Hotel/Motel	See Table 2	-	5.00

Table 2 - Equivalent Residential Unit (ERU) Value per Plumbing Fixture

Fixture Type	Unit	ERU per Unit
Bath Tub	Faucet Set	0.10
Bathroom Sink	Faucet Set	0.05
Beauty Sink	Faucet Set	0.10
Combined Bathtub and Shower	Faucet Set	0.15
Dental Unit or Cuspidor	Each	0.10
Dishwasher Connection	Each	0.10
Garbage Disposal	Each	0.10
Drinking Fountain	Head	0.05
Floor Drain	Each	0.05
Fountain w/Drain Connection	Each	0.05
Hot Tub w/Drain Connection	Each	0.15
Kitchen Sink	Faucet Set	0.08
Service Sink	Faucet Set	0.08
Shower Stall	Faucet Set	0.10
Swimming Pool w/Drain Connection	Each	0.50
Toilet	Each	0.33
Urinal	Each	0.15
Urinal, Non-flush	Each	0.05
Washing Machine Drain	Each	0.15

## References

California Environmental Protection Agency (California EPA). 1998. *Revenue Program Guidelines, Policy for Implementing the State Revolving Fund for Construction of Wastewater Treatment Facilities*.

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State of Oregon. 2014. *Plumbing Specialty Code*.