Engineering Report

GOVERNMENT CAMP SANITARY DISTRICT

SEWER SYSTEM FACILITY PLAN UPDATE

Clackamas County, Oregon

December, 2022

FIRWOOD DESIGN GROUP

Oregon
Tina Kotek, Governor

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April 14, 2023

Andrew Tagliafico
Board Chair, Government Camp Sanitary District
85200 E. Highway 26
GOVERNMENT CAMP, OR 97028

RE: Government Camp Sanitary District
File No. 34136/ Permit No. 101541
Clackamas County
Sewer System Facility Plan Update Comments and Approval

Dear Mr. Tagliafico,

I have reviewed the Preliminary Government Camp Sanitary District (District) Sewer System Facility Plan (Plan) dated December 2022 and prepared by Firwood Design Group LLC.

Government Camp has not been growing quickly and build-out is far in the future. Other than a number of maintenance and replacement projects, the wastewater treatment plant is below capacity and will remain so in the 20-year planning window. The Plan wisely recommends investing in the upkeep of the plant to ensure continued reliable treatment.

Granular activated sludge technology is an exciting prospect for enhancing existing equipment capacity. Currently, it is proprietary and expensive. By the time Government Camp is ready to expand the treatment plant, other opportunities for conversion to this technology may be available.

The Facility Plan is approved by DEQ for funding purposes. I look forward to seeing design memorandums regarding improvements or replacement of the Government Camp wastewater treatment plant.

COMMENTS

1. "Sewer Units" is not a normal reference standard far sewage contributing dwelling.EDU or "equivalent dwelling unit" is the standard reference. Replace "Sewer unit" with "EDU" throughout the document.
2. One noticed spelling error on P.19.
3. P.7, table 3: Max day 2018 is incorrect.
4. The attention to I/I reduction is commendable.
5. Page 18, Table 5-06: Slope information would be helpful here.

6. P.19: New development should be able to fund increases in pipe capacity. SDC's should be high enough to substantially offset District investment for new developments. I see this is mentioned later in the Plan.

NEXT STEPS

Make the above corrections. Submit a signed and stamped, final Sewer System Facility Plan to the District and DEQ at the earliest convenience. Please send a pdf version as well.

Regards,

Michael L. Pinney PE
Senior Environmental Engineer NWR-DEQ

CC: Erik Hoovestol PE , 359 E. Historic Columbia River Highway, Troutdale, OR 97060
Curran-McLeod, Inc., 6655 SW Hampton St. Ste.210, Portland OR 97223

Ecc: Tiffany Yelton-Bram, DEQ-NWR
Rebecca Kramer, CWSRF-NWR

GOVERNMENT CAMP SANITARY DISTRICT

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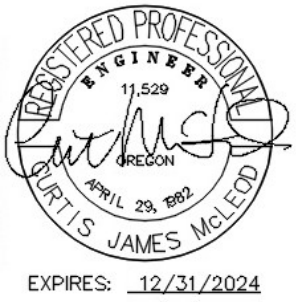
Clackamas County, Oregon

December 2022



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GOVERNMENT CAMP SANITARY DISTRICT
SEWER SYSTEM FACILITY PLAN UPDATE
December 2022

TABLE OF CONTENTS

Additional Figures

Appendices

Government Camp Sanitary District

SANITARY SEWER SYSTEM MASTER PLAN

December 2022

EXECUTIVE SUMMARY

The Wastewater Collection and Treatment facilities for the Government Camp Sanitary District have substantial capacity to accommodate growth well beyond the 20 year planning window. The District curerently serves an estimated 1,035 equivalent sewer units and the current plant capacity is 1,770 units. Current loadings are approximastely 50% of the average annual flow, maximum monthly flow, and peak day flow design capacities of the treatment plant.

Over the past six years, the maximum daily flow has been trending downward due to the District's continued efforts to reduce inflow and infiltration (I/I) in the collection system. In 2016, a maximum day hit 74% of design capacity of the facility. In 2021, the maximum day approached only 50% of design capacity.

Since construction of the sequencing batch reactor, Aqua-Aerobic has developed a process to increase the capacity by as much as 60% without structural modifications. This can provide substantial additional capacity at the plant and could postpone construction of any new structures well beyond the planning window.

As opposed to treatment capacity, operational reliability at the treatment facilty was the primary need for this Facility Plan Update. An analysis of all plant equipment was completed to identify a replacement schedule and quantify the annual budget needed to fund the purchase of new equipment as they reach the end of their service life.

In 2022, process equipment was estimated to total $1,140,000 and the District had accrued approximately $430,000 of deferred equipment replacement costs. The District revenues can support this expense; however, funds were not specifically identified for this purpose. The analysis indicated the District needs to fund the accrued deferred cost and to budget $65,000 annually to support scheduled equipment replacement.

The 1-5 year Capital Improvement Plan anticipates replacing all equipment that is within 5 years of the end of its service life at a cost of $270,600. In addition, operators have identified several operational improvements totaling $272,000, as listed in the Capital Improvement Plan.

The collection system consists of approximately eight miles of piping and over 200 manholes. In 2020 the District collected data including flow mapping, smoke testing, and manhole inventory, and prepared a collection system piping inventory. The results of this evaluation are shown in the following table, indicating that approximately 12% of the collection system, or approximately 4,800 lineal feet, was identified as the highest priority for needed I/I repairs.

Table 5-03. Mainline Inventory by Priority

Categorized by Lining Priority	Footage		
No Priority, PVC	6,565	Ft	16%
No Priority, Recently lined concrete	3,865	Ft	9%
Priority 1 ("Low")	17,713	Ft	43%
Priority 2 ("Medium")	8,384	Ft	20%
Priority 3 ("High")	4,789	Ft	12%
Total	**41,315**	**Ft**	

The manhole inventory identified only four manhole in poor condition and needing repairs in the immediate future. A summary of the manhole conditions is listed in the table below:

Table 5-04. Manhole Inventory by Priority

Categorized by Lining Priority	Quantity	
Good	130	66%
Fair	26	13%
Poor	4	2%
Lined	24	12%
Unable to Quantify	14	7%
Total	**198**	

The Government Camp Sanitary District facilities are in good position to accommodate growth. There are no near-term improvements necessary to increase capacity. Only equipment replacement and a few capital improvements are required to resolve deficiencies and improve operations, and they are listed in the Capital Improvement Plan in the following table:

Table 7-01. GCSD CAPITAL IMPROVEMENT PLAN

No.	Improvement Project	1 – 5 Years	6-20 Years
Treatment Plant Improvements			
T10	SBR 1 Decanter	24,000	
T11	SBR 2 Decanter	24,000	
T15	WAS Pump No. 1	12000	
T16	WAS Pump No. 2	12000	
T17	Fine Bubble Diffusers SBR No. 1	30,000	
T18	Fine Bubble Diffusers SBR No. 2	30,000	
T19	UV Disinfection System Modules	120,000	
T21	Digester Mixer	14,400	
T22	Digester Decant Pump	4,200	
A	Process Water Pump	18,000	
B	SBR Float Replacement (2)	40,000	
C	SBR Diffusers Access System	150,000	
D	Redundant SBR Blower	10,000	
E	Replace WAS Check Valves (2)	4,000	
F	New Chemical Feed System	25,000	
G	Extended Public Safety Power Shutoff PSPS Fuel Trailer System	10,000	
H	300,000 g WAS Storage Tank		$600,000
	WWTP SUBTOTAL	$527,600	$600,000
Collection System Improvements			
C1	Priority 3 Pipeline Deficiencies	430,000	
C2	Manhole Deficiencies – Poor	15,000	
C3	Manhole Deficiencies – Fair		95,000
C4	Priority 2 Pipeline Deficiencies		1,035,000
C5	Priority 1 Pipeline Deficiencies		2,060,000
	I/I SUBTOTAL	$445,000	3,190,000
---	Planning & SDC Updates		10,000
	TOTAL	**$972,600**	**$3,800,000**

The District is in a strong financial position with the current monthly rates and System Development Charges. The District has 432 accounts and invoices for 1,035 EDUs, and currently charges $41 per EDU per month. The District budget can support the $65,000 annual equipment replacement cost fund as well as service a funding program principal balance of $1,000,000 without increasing rates. Annual debt service is estimated at less than $70,000 over a 20-year repayment schedule.

Government Camp Sanitary District

SEWER SYSTEM FACILITY PLAN UPDATE

December 2022

1. INTRODUCTION

The Sanitary District contracted with FIRWOOD DESIGN GROUP and CURRAN-McLEOD, INC., to evaluate the condition and remaining capacity of the collection system and process equipment and systems at the the Wastewater Treatment Facility. The purpose of this study is to identify needed capital improvements and provide a guideline in anticipation of future expansion of the system.

In an overview, the Wastewater Collection and Treatment facilities have substantial capacity to accommodate growth well beyond the 20 year planning window. In addition, newer technologies from Aqua Aerobic, the supplier of the treatment reactors, have developed a process to increase the capacity by as much as 60% without substantial construction. The wastewater facilities and the District's financial situation are well-prepared to accommodate future growth in the community.

2. EXISTING FACILITIES

A. Location

Government Camp is an unincorporated community in Clackamas County, located 60 miles east of Portland, Oregon, on Highway 26 at the base of Mount Hood. It is the only town within 5 miles of Mount Hood and therefore is the de facto "mountain town" or "ski town".

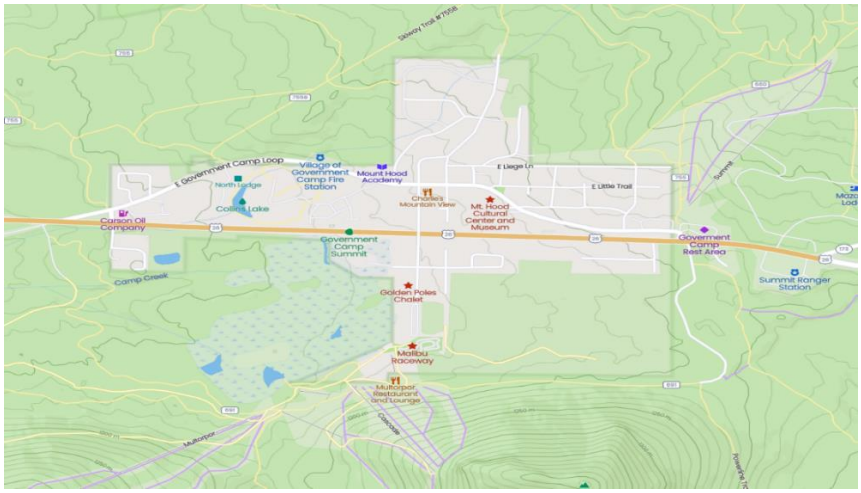


Figure 2-01. Government Camp Sanitary District Map

The Government Camp Sanitary District serves an area of approximately 500 acres of property. Clackamas County Land Use zoning designations in in the area consist of Low Density Residential, Mountain Recreation Resort, Rural Tourist Commercial, and Open Space Management. See Table 2-01.

Figure 2-02. Government Camp SD Wastewater Treatment Facility Aerial

The Wastewater Treatment Facility is located west of the community of Government Camp at 85200 East Highway 26 on the south side of the highway. The treatment facility serves residential and commercial customers. The above aerial view of the treatment facility site was taken during construction of the Surge Tank.

B. History

The Government Camp Sanitary District was formed in 1957 and the District's original treatment plant was constructed in 1958. The original plant consisted of a two-chambered Imhoff tank, a trickling filter, and a chlorine contact chamber. The plant was designed to handle an organic loading of 350 people and a hydraulic loading of 110,000 gallons per day. The treated and disinfected effluent was discharged to Camp Creek.

In 1975, the District modified and expanded the treatment plant in response to the need for additional capacity and the poor performance of the aging treatment facilities. The facility was designed with a summertime capacity of 130,000 gpd and a wintertime capacity of 225,000 gpd. The plant was designed to meet

summertime limits of 10 mg/L for BOD and TSS and wintertime limits of 25 mg/L BOD and TSS.

The plant consisted of a headworks, storage tank, two primary clarifiers, two rotating biological contactors (RBCs), two secondary clarifiers, two polishing filters, a flow measuring flume, a chlorine contact chamber, and a chlorination system along with an aerobic sludge digestion system.

In 2000, the District constructed a new sequencing batch reactor (SBR) wastewater treatment facility to the west of the existing plant. The plant consists of a headworks with duplex screening, a surge basin (constructed in 2018), two sequencing batch reactor basins, an effluent equalization basin, UV disinfection, an aerobic digester, and lime stabilization facilities.

C. Service Population

The Sanitary District currently has 432 accounts with a total of 1,035 Equivalent Dwelling Units (EDU), which includes all residential and commercial developments. There are 16 commercial sewer units, approximately 590 units related to condos, apartments, hotels, and dormitories, and 430 units related to private residences, including single family, duplex, and triplex homes.

The average annual flow in 2020 was 0.121 MGD, which equates to 120 gallons per day per sewer unit.

D. Population Projections and Design Loading Projections

The Sanitary District service population and population forecasts are difficult to estimate due to the transient population and relatively small number of permanent residents. Resident population is currently estimated at 180, which is a decrease of approximately 5% over the past ten years.

To estimate a growth rate, adjoining areas were considered. The nearest Census Designated Place (CDP) is Mount Hood Village, which is a compilation of the multiple communities west of Government Camp, including Brightwood, Welches, Wemme, Zig Zag, and Rhododendron. This CDP current population is based on estimates by the US Census Bureau at approximately 4,600 people, which is 200 less than was recorded in the 2010 census. Portland State University Center for Population Research has projected the population of the unincorporated areas of Clackamas County to reduce by approximately 6 – 7% over the next 40 years.

Government Camp is unique in that it is recognized as an Urban Unincorporated Community and is regulated by the Mount Hood Community Plan. Government Camp includes three zoning designations that can be developed with residential

units, including Hoodland Residential (HR) and Mountain Recreational Resort (MRR) and Rural Tourist Commercial (RTC) as shown in Figure B at the end of this report.

Full buildout potential was estimated in the 2001 Facilities Plan amendment to identify gross land areas and net buildable area:

Table 2-01. Land Use Summary

Zoning	*Gross Area*	*Useable Area*	*Density*	*Units*
Hoodland Residential	214 Ac	117 Ac	4 Units/Ac	468
Mountain Recreational Resort	188 Ac	94 Ac	22 Units/Ac	2,068
Rural Tourist Commercial	46 Ac	17 Ac	50 Units/Ac	850
TOTAL	448 Ac	228 Ac	**TOTAL**	**3,386**

Earlier estimates were based on assumed number of permanent residents, seasonal residents, and daily recreational population, and on an assumed 100 gallons per capita per day (gpcd) flow for all permanent and seasonal residents, and 50 gpcd for daily recreational users. These assumptions are proving to be very high, about two to three times the observed flows.

Buildout flow projections can be estimated; however, this does not address the growth rate. According to the Portland State University Population Research Center, the regional area is projected to reduce in population over the next 40 years. Plant metered flows have not shown a progressive increase over the past five years and 2020 flows were actually 14% less than 2016 flows. This could be due to I/I correction, but also relates to the variable permanent and transient population.

The limiting plant design criteria is the peak day capacity of 500,000 gpd. Records indicate the peak day event over the past five years has been approximately 300,000 gpd, or 60% of the design capacity. The surge tank addition and continued I/I improvements will reduce the impact of peak day events.

In summary, the projected number of sewer units at buildout of the District is estimated to be 3,400 with associated average daily flow of 400,000 gallons per day. The time frame to achieve buildout is an unknown variable and is dependent upon the development of additional housing and recreational facilities. The existing plant capacity can support a 100% growth of the community, and growth of over 300% is required to reach the buildout population. These amounts of growth will take many decades to achieve, well beyond the 20-year planning window.

Provisions have been incorporated into the plant design to simplify expansion efforts. Additionally, new Aerobic Granular Sludge (AGS) technology being developed by Aqua-Aerobic for SBR facilities is able to provide as much as a 60% increase in treatment capacity within existing SBRs. This technology could increase the current peak day capacity from 500,000 gpd to 800,000 gpd with minimal structural modifications. Sludge storage and processing improvements would be the primary need with any plant capacity expansion using AGS.

3. WASTEWATER TREATMENT PLANT EVALUATION

A. Existing Facility Design Criteria

Treatment facility design capacity was obtained from drawing G3 of the KCM, Inc. 2000 plan set and identifies existing and future plant capacity as shown in the following table:

Table 3-01. GCSD WWTP CAPACITY

Design Flow	***Design Capacity (MGD)***			
	Current 2021	***Phase I Expansion***	***Phase II Expansion***	***Phase III Expansion***
Average Annual Flow (AAF)	0.250	0.325	0.500	0.750
Max Month Flow (MMF)	0.325	0.488	0.650	0.975
Max Day Flow (MDF)	0.500	0.750	1.000	1.500
Peak Instantaneous Flow (PIF)	0.695	1.043	1.390	2.085

The current design was based on a service population of 3,246 people with Average Month BOD and TSS loadings 400 lbs/day and Peak Week loadings of 1,000 lbs/day. This was the projected loadings for the year 2015; note that current metered flows for the year 2020 were only 50% of this projected flow.

The 2020 Wastewater Treatment Plant construction drawings included provisions for future expansion, including the addition of four SBRs on the existing site to triple the existing capacity. As noted above, new technology could potentially allow reducing future improvements required to treat future loadings. Also, more current buildout projections are less, at 400,000 gpd average annual flow, as opposed to the projected 1.1 mgd in the prior Facility Plan Amendment.

Sludge storage and sludge processing equipment will be the most pressing issue in the future and will require more storage than the current 228,000 gallon tank can provide. This deficiency would be impacted even more if the District implemented the alternative Aqua-Nereda treatment process which generates larger waste sludge volumes at lower concentrations.

B. Capacity and Performance Analysis

Discharge Monitoring Reports (DMRs) were reviewed to provide information on the wastewater flows to the treatment facility in order to determine the 20-year planning window design criteria. The monthly average Influent flow data from the last 6-years of DMRs is summarized in the following table.

Table 3-02. 2016 – 2021 Average Influent Flow Summary, MGD

Month	***2016***	***2017***	***2018***	***2019***	***2020***	***2021***
January	0.163	0.136	0.163	0.149	0.145	0.169
February	0.192	0.157	0.152	0.128	0.165	0.141
March	0.166	0.194	0.145	0.122	0.119	0.124
April	0.154	0.205	0.137	0.154	0.104	0.127
May	**0.162**	**0.208**	**0.111**	**0.110**	**0.111**	**0.145**
June	**0.133**	**0.165**	**0.121**	**0.116**	**0.117**	**0.120**
July	**0.141**	**0.146**	**0.120**	**0.123**	**0.119**	**0.121**
August	**0.107**	**0.142**	**0.115**	**0.112**	**0.110**	**0.108**
September	**0.092**	**0.107**	**0.095**	**0.093**	**0.079**	**0.095**
October	**0.104**	**0.113**	**0.082**	**0.090**	**0.099**	**0.086**
November	0.108	0.137	0.100	0.078	0.125	0.106
December	0.153	0.156	0.149	0.120	0.157	0.137
ADWF, MGD	0.096	0.112	0.089	0.089	0.087	0.088
AWWF, MGD	0.183	0.199	0.160	0.144	0.154	0.158
Annual Ave, MGD	0.140	0.156	0.124	0.116	0.121	0.123

A comparison of the Annual Average flows for the last six years in the preceding table shows flows have been only approximately 50% of the current design capacity of 0.250 mgd.

The maximum month (MMF) design capacity of the treatment system is 0.325 mgd. MMF flows for the last 5-year have been slightly over 50% of the design capacity.

The following table summarizes the Maximum Daily Flows for the past 6 years:

Table 3-03. 2016 – 2020 Maximum Day Flow Summary, MGD

Month	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*
January	0.273	0.194	0.232	0.276	0.250	0.249
February	0.371	0.232	0.229	0.180	0.309	0.233
March	0.263	0.275	0.187	0.171	0.167	0.161
April	0.195	0.266	0.209	0.234	0.139	0.148
May	0.178	0.279	0.134	0.153	0.152	0.166
June	0.183	0.186	0.158	0.144	0.148	0.142
July	0.256	0.174	0.156	0.148	0.139	0.136
August	0.168	0.204	0.143	0.142	0.167	0.144
September	0.135	0.140	0.135	0.157	0.167	0.141
October	0.156	0.222	0.118	0.152	0.156	0.108
November	0.182	0.265	0.147	0.124	0.162	0.200
December	0.245	0.330	0.288	0.223	0.306	0.197
Max Day	**0.371**	**0.330**	**0.232**	**0.276**	**0.309**	**0.249**

The Maximum Day Flow (MDF) design for the facility is 0.500 mgd. Peak day flows typically have occurred in December, January, and February which coincides with the peak ski season and wet weather infiltration and inflow. Over the last six years the MDF has been trending downward due to the District's efforts to reduce I/I in the collection system. In 2016, a maximum day hit 74% of design capacity. In 2021, the maximum day approached only 50% of design capacity.

It should be noted that influent flows are measured upstream of the surge tank and are now attenuated by operation of the new surge tank during peak day events. As a result, and the inherent design of SBR systems, the peak instantaneous flow is a less significant parameter of concern. The reduction of I/I is still a priority however, to preserve the plant capacity.

C. NPDES Compliance History

The District has always been in substantial compliance with the most recent National Pollutant Discharge Elimination System (NPDES) permit that went into effect September 1, 2015. The District's wastewater treatment facility NPDES permit establishes seasonal effluent discharge limitations for $CBOD_5$ and TSS as shown in the following table.

Table 3-04. NPDES PERMIT BOD & TSS LIMITATIONS

(1) June 1 – October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$	10 mg/L	15 mg/L	21	31	142
TSS	10 mg/L	15 mg/L	21	31	142

(2) November 1 – April 30:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$	25 mg/L	40 mg/L	52	83	104
TSS	30 mg/L	45 mg/L	63	94	125

* Average dry weather design flow to the facility equals 0.25 MGD. Mass load limits are based on the average dry weather design flow.

A summary of the treatment facility's performance meeting $CBOD_5$ and TSS Monthly Average concentration and pound/day effluent limitations for 2020 was obtained from the DMRs and is shown in the following table.

Table 3-05. WWTP 2020 MONTHLY AVERAGE EFFLUENT CBOD & TSS

Month	***Effluent Flow Monthly Average (mgd)***	***$CBOD_5$***		***TSS***	
		mg/L	***Lb/day***	***mg/L***	***Lb/day***
January	0.127	1	<3	1	<3
February	0.145	<3.2	<2.8	<3.0	<2.9
March	0.100	<4	<4	<4	<4
April	0.085	9	8	<6	<5
May	0.097	<2	<2	5	3
June	0.094	5	3	9	6
July	0.102	<3	<2	7	5
August	0.094	2.5	1.6	3.0	*
September	0.079	4.5	2.5	2.5	*
October	0.091	<2.4	<2.1	3.4	2.2
November	0.111	8.5	6.7	<2.4	<2.2
December	0.136	<3.2	<2.8	<3.0	<2.9

The NPDES permit also establishes limitations for E. Coli Bacteria, pH, $CBOD_5$ and TSS Removal Efficiency, and Excess Thermal Load.

Table 3-06. NPDES PERMIT ADDITIONAL LIMITATIONS

Year-round (except as noted)	Limitations
$CBOD_5$ and TSS Removal Efficiency	Shall not be less than 85% monthly average for BOD_5 and 85% monthly for TSS.
Temperature (see Note a.)	The maximum 7 day rolling average excess thermal load (ETL) must not exceed 2.91 million kcal/day.
E. coli Bacteria (see Note b.)	Monthly geometric mean may not exceed 126 organisms per 100 ml. No single sample may exceed 406 organisms per 100 ml.
pH	May not be outside the range of 6.3 to 9.0 S.U.
Notes: a. Temperature impacts evaluated year-round. b. No single *E. coli* sample may exceed 406 organisms per 100 mL; however, DEQ will not cite a violation of this limit if the permittee takes at least 5 consecutive re-samples at 4-hour intervals beginning within 28 hours after the original sample was taken and the geometric mean of the 5 re-samples is less than or equal to 126 E. coli organisms/100 mL.	

A summary of the facility's compliance with these limitations in 2020 is shown in the following table.

Table 3-07. WWTP NPDES PERMIT COMPLIANCE HISTORY

Month	E. coli Bacteria (organisms/100 ml)		pH (SU)		Monthly Avg Removal Efficiency (%)		Excess Thermal Load (kcals/day)
	Monthly Geometric Mean	Single Sample	Min	Max	$CBOD_5$	TSS	Weekly Average
January	0	<1	6.3	6.4	>98	>96	0.00
February	0	<1	6.3	6.7	>98	>98	0.00
March	0	<1	6.4	6.9	>93	>95	0.00
April	0	<1	6.4	6.6	87	>93	0.00
May	1	2	6.4	7.2	>94	94	0.00
June	0	<1	6.5	7.0	91	92	0.00
July	0	<1	6.5	7.0	>97	96	0.83
August	0	1	6.5	7.1	98	*	0.00
September	0	1	5.9	6.7	93	*	0.00
October	0	<1	6.4	6.7	>96	97	0.00
November	0	<1	6.4	6.8	94	>98	0.00
December	0	<1	6.3	6.7	>98	>98	0.00

D. Remaining Treatment Capacity

The District has approximately 185 sewer connections and a permanent population of approximately 180 people. The average dry weather flow for the last 3 years has been relatively steady at 0.087 to 0.089 mgd. This equates to an average wastewater flow of approximately 480 gallons per capita per day. This is an extremely high flow for residential average annual flows and reflects the transient commercial and recreational impact on the system.

The existing treatment facility was designed with an Average Annual Design Flow of 0.250 MGD to serve a population of 3,246 people. Currently the plant loadings are approximately 50% of the design capacity. A gross conclusion could be drawn that even though the permanent population is approximately 180 people, the equivalent service population is approximately 1,600. This equates to 55 gallons per capita per day, which is a very typical number for average dry weather flow.

Regardless of how the equivalent population is derived, the plant has approximately 50% capacity remaining to serve future growth.

E. Condition of Existing Treatment Plant Facilities

On April 21, 2021, CURRAN-McLEOD, INC. participated in an inspection of the Treatment Facility with Firwood Design Group, LLC. Most system components will need to be repaired or replaced over the next 20 years to properly maintain the operation of the facility's unit processes. There are some systems that will need immediate attention, while others can be deferred.

To prioritize these needs, equipment lives have been estimated in 5-year increments. The replacement cost of each major equipment item is estimated in the table below, and an estimate of annual expenses is shown to indicate the funding needed to replace major equipment as they reach the end of their service life. The table is based on estimated 2022 costs.

Table 3.08 EQUIPMENT CONDITION & REPLACEMENT COST

December 2022

	Equipment Item	*Service Life*	*Remaining Life*	*Replacement Cost 2022*	*Consumed Cost*	*Annual Depreciation*
T1	Composite Samplers	15	10	$19,200	$6,400	$1,280
T2	Screens/Compactor #1	20	15	210,000	52,500	10,500
T3	Screens/Compactor #2	20	20	210,000	0	10,500
T4	Soda Ash Feed System	10	10	18,000	0	1,800
T5	Surge Tank Pump No. 1	20	15	9,000	2,250	450
T6	Surge Tank Pump No. 2	20	15	9,000	2,250	450
T7	Surge Tank Diffusers	25	20	24,000	4,800	960
T8	SBR #1 Mixer	15	10	18,000	6,000	1,200
T9	SBR #2 Mixer	15	10	18,000	6,000	1,200
T10	SBR #1 Decanter	15	5	24,000	16,000	1,600
T11	SBR #2 Decanter	15	5	24,000	16,000	1,600
T12	SBR Blower #1	15	15	10,000	0	667
T13	SBR Blower #2	15	15	10,000	0	667
T14	SBR Blower #3	15	15	10,000	0	667
T15	WAS Pump #1	20	0	12,000	12,000	600
T16	WAS Pump #2	20	0	12,000	12,000	600
T17	Fine Bubble Diffusers SBR #1	10	0	30,000	30,000	3,000
T18	Fine Bubble Diffusers SBR #2	10	0	30,000	30,000	3,000
T19	UV Disinfection System	15	0	120,000	120,000	8,000
T20	Digester Blower	15	10	24,000	8,000	1,600
T21	Digester Mixer	15	5	14,400	9,600	960
T22	Digester Decant Pump	20	5	4,200	3,150	210
T23	Digester Coarse Diffusers	25	10	24,000	14,400	960
T24	Wet Sludge Loadout Pump	15	10	4,800	1,600	320
T25	Lime Basin Blower	15	10	24,000	8,000	1,600
T26	Plant Drain Station Pump #1	20	10	7,200	3,600	360
T27	Plant Drain Station Pump #2	20	10	7,200	3,600	360
T28	Screening Water Pump	20	20	18,000	0	900
T29	Hose Bibb/Spray Pump	20	10	18,000	9,000	900
T30	Standby Generator	25	15	78,000	31,200	3,120
T31	SCADA PLC Controls/System	20	15	84,000	21,000	4,200
T32	Well Pump	20	10	3,600	1,800	180
T33	HVAC	20	15	12,000	3,000	600
			TOTAL	**$1,140,600**	**$434,150**	**$65,010**

4. WASTEWATER TREATMENT PLANT CAPITAL IMPROVEMENT PLAN

Expansion of the Wastewater Treatment Plant capacity is entirely dependent upon growth and is not anticipated to be required within the 20-year planning window. The combined Capital Improvement Plan at the end of this report includes a graph to provide the District with a guideline when plant expansion is warranted.

The previous section inventoried all equipment components, their condition, and remaining service life. As equipment reaches its service life, the District needs to be financially prepared to replace the equipment to maintain the plant. In December 2022, the total cost to replace all equipment identified during the inspection totals an estimated $1,140,600, with the current consumed equipment expense of approximately $434,150 to account for accumulated depreciation.

In anticipating equipment replacement to restore the current plant capacity and replace equipment at it reaches the end of its service life, the District needs to fund the consumed equipment expense as well as annually budget the depreciation expense for each inventoried item. After replacing the listed equipment, there remains a deficiency of approximately $185,000 in funding to replace equipment. This can be resolved by either funding the deficiency over the next few years, or it may be feasible to continue using the equipment beyond the estimated remaining service life.

The 1-5 year capital improvement plan in this report anticipates replacing all equipment that is within 5 years of the end of its service life, which totals $270,600. In addition, the operators have identified several required tasks beyond equipment replacement. These additional tasks total $272,000, and are listed in Table 7.01.

5. COLLECTION SYSTEM EVALUATION

A. Introduction

In previous years, collection system maintenance and video inspections have been conducted primarily with the intent of repairing structural deficiencies in preparation for conveyance pipe lining. While the work performed was useful and necessary, the efforts may have not necessarily fit into a cohesive long-term plan.

In 2020, the District authorized Firwood Design Group (FDG) to perform Phase 1 of this Facility Plan. Phase 1 work consisted primarily of information-gathering tasks in preparation for inclusion in this report. These included the following tasks:

- Flow Mapping
- Smoke Testing
- Manhole Inventory
- Pipe Database

The results of these tasks were submitted to the District in December of 2020. A brief summary of each is included in the sections below. Copies of the flow mapping and smoke testing technical memorandums are included in the appendix of this report.

1) *Flow Mapping*

Flow mapping was conducted in 2020 on May 14th and 15th. Flow rates in selected manholes were visually rated to identify areas of town with relatively high rates of infiltration or inflow (I/I). The results indicated that I/I appears to be fairly evenly distributed across the collection system; thus, no specific areas of town to target I/I removal were identified. See technical memo summarizing these results and the methodology to achieve these results in Appendix A.

2) *Smoke Testing*

Smoke Testing was conducted in October of 2020 to identify illicit storm drain connections, such as roof drain lines, driveway drains, catch basins, and area drains. No illicit connections were observed. Several other issues were identified on private sections of the collection system, generally near residential homes. The low number of illicit connections found compared to other municipal sewer systems is likely due to the lack of piped public storm drains and roadways without curbs and gutters in the residential neighborhoods, and also that stormwater run-off on private home sites typically just runs offsite, downhill into adjacent forested land and disposal is not an issue. See technical memo in Appendix A for more information.

3) *Manhole Inventory*

An inventory of the manholes was conducted in 2020. This included a description of the manholes, noting condition and evidence for I/I, and photographs of the surface and inside of each manhole. This information was compiled into a 3-ring notebook and provided to the District to aid operators in locating manholes and identifying issues. This inventory should be updated as repairs are made and new manholes are installed. Additionally, FDG located and surveyed the location of many previously un-surveyed manholes and updated the system map. An updated system map is included at the end of the report in Figure A. See technical memo in Appendix A for more information.

An electronic data base (spreadsheet) was also prepared and submitted to the District. The manhole database is currently being used by FDG to identify priority manhole repairs such as lining and surface repairs for this report as well as annual repair projects.

4) Pipe Database

The district has been performing video inspections and cleaning of the pipelines on a four-year rotation basis, i.e., areas of the system are videotaped every four years. A pipe database using the information provided in the video logs in the form of an Excel spreadsheet has been assembled by FDG. The database includes information on each pipe run including, diameter, length, number of laterals, year videotaped, and significant notes from the video logs. FDG used this information to rate the condition and urgency of repairs on a scale of 0 to 4 for use in developing the capital improvement section of this facility plan. Estimated costs for CIPP lining are also included. See technical memo in Appendix A for more information.

B. Collection System Description

The GCSD collection system consists of close to eight miles of pipelines and nearly 200 manholes.

Table 5-01 presents the summary breakdown of the sewer mains by age, and Table 5-02 presents the break down by material type. The majority of the system (84%) consists of concrete sewer pipe over 40 years old. The use of concrete pipe was discontinued in the 1980s. Much of the older concrete pipe is in surprisingly good condition. The general absence of hydrogen sulfide gas in the system, which deteriorates concrete pipe, has helped extend the life of the concrete pipes.

Table 5-01. System Inventory by Age

Age	Footage		
> 60 Years	24903	Ft	60%
40 - 60 Yrs	10049	Ft	24%
20 - 40 Yrs	1515	Ft	4%
Less than 20 Yrs	4848	Ft	12%
Sum	41315	Total	

Table 5-02. System Inventory by Material

Pipe Material	Footage		
PVC	7458	Ft	18%
Concrete - Unlined	29992	Ft	73%
Concrete - Lined	3865	Ft	9%
DIP	0	Ft	0%
Sum	41315	Total	

The condition of each pipe was rated on a scale of 0 to 4. The condition rating assignment was based on two primary factors: first, the age and material of the pipe, and second, the quantity and severity of identified issues from the videotaping effort.

- A rating of "0" or "No" priority was assigned to PVC or recently lined concrete pipes with no current identified issues, as it is not anticipated that the newer PVC mainline in the District will experience deterioration within the scope of this Facility Plan.
- A rating of "1" or "Low" priority was assigned to concrete pipes with no current identified issues. This designation signifies that the line is at risk of developing deficiencies within the scope of this facility plan but should not be prioritized for lining or repair until deficiencies are identified or the higher priority pipes are lined.
- A rating of "2" or "Medium" priority was assigned to concrete pipes with some identified issues, primarily minor structural deficiencies causing low I/I (offset joints, small cracks, etc.). This designation signifies that the line should be lined in an effort to reduce the District's I/I, but it does not have an immediate risk of failing.
- A rating of "3" or "High" priority was assigned to concrete pipes with multiple or severe identified issues, primarily major structural deficiencies that create a risk of failure for the pipe, including large cracks or holes, breakages, or roots. This designation signifies that the pipes should be the top priority for lining efforts.

Table 5-03 presents the collection system inventory of mainline by priority of repair. The current goal of the District is to CIPP line all concrete pipes, which is why all pipes in priorities 1, 2, and 3 are included in the Capital Improvements Plan.

Table 5-03. Mainline Inventory by Priority

Categorized by Lining Priority	Footage		
No Priority, PVC	6,565	Ft	16%
No Priority, Recently lined concrete	3,865	Ft	9%
Priority 1 ("Low")	17,713	Ft	43%
Priority 2 ("Medium")	8,384	Ft	20%
Priority 3 ("High")	4,789	Ft	12%
Total	**41,315**	**Ft**	

Table 5-04 presents the collection system inventory of manholes by condition. Please reference the Manhole Inventory Technical Memorandum in Appendix A

for more information, including a breakdown of the rating system. It should be noted that this table has changed since the 2020 memorandum, as several manholes were lined in the 2021 repair project (many of which were originally "poor" condition manholes). Additionally, a few manholes were re-assessed based on new information, as should be done each year.

Table 5-04. Manhole Inventory by Priority

Categorized by Lining Priority	Quantity	
Good	130	66%
Fair	26	13%
Poor	4	2%
Lined	24	12%
Unable to Quantify	14	7%
Total	**198**	

C. Collection System Flow Analysis

Pipes in sanitary sewer systems are typically sized to accommodate the peak hourly flow. Peak hourly flow is not recorded at the treatment plant, so existing data cannot be directly used. A peaking factor of 5.5 (Annual Average Daily flow (AADF) verses peak 4-hour flow) for the system was estimated by Curran-McLeod (*Wastewater Treatment Facilities Capacity Evaluation and Projections, 2017*) using a statistical analysis of the system flow rates. While this peaking factor was for peak 4-hour flow, the change to peak hourly flow is assumed to be negligible and within the range of estimation error.

The peaking factor of 5.5 times the AADF was applied to the flow rates and flow per sewer units developed above in the Population Projections and Design Loading Projections.

The capacity of select pipes in the collection system was estimated using Manning's equation and surveyed pipe slopes. Manning equation estimates flow rate as a function of diameter, slope, and estimated pipe roughness. A Manning's roughness factor of 0.013 was used under a pipe flowing full scenario. The calculated capacities do not take into consideration surcharging of manholes. Surcharging of manholes is when sewage starts to back up in the upstream manhole which provides addition pressure head and increases the flow capacity through the pipe. While surcharging is acceptable to DEQ, we chose to take the conservative approach and not include manhole surcharging in our capacity calculations. Table 5-05 below presents the flow rates applied.

Table 5-05. Current Conditions-Peak Flow Rates and Flow per Sewer Unit

Current Conditions	*Average Annual Daily Flow*	*Peaking Factor*	*Peak Hourly Flow*
Flow (gpd)	121,000	5.5	665,500
Flow (gpm)	84	5.5	462
Sewer Units	1,035		1,035
Flow per Unit (gpm)	0.081		0.447

The pipe segments studied included those identified for upsizing in the 2001 Amendment to the October 1995 Wastewater Facilities Plan. The selected segments represent lines in the lower part of the collections system where higher flow volumes are expected. The selected pipe segments are shown in Figure C at the end of this report. For the purposes of this report, it is assumed that the sewer lines upstream of selected pipes should have adequate capacity due to the limited number of connections and service areas and generally steeper lines with higher capacity.

The upstream number of sewer units and corresponding flow rates were estimated for each pipe segment. FDG evaluated four scenarios:

1) Existing Conditions.

Under existing conditions, all lines analyzed had more than sufficient capacity. Table 5-06 shows the capacity and remaining capacity in terms of gallons per minute and remaining Sewer units available.

Table 5-06. Existing Flow Capacity Analysis

Upstream MH	Downstream MH	Upstream Sewer Units[1]	Full Flow Capacity, sewer units	Full Flow Capacity, gpm	Peak Hourly Flow[2], gpm	% Capacity	Remaining Units Capacity
AS1	*HEADWORKS*	1035	2449	1095	463	42	1414
AS2	*AS1*	1035	3325	1486	463	31	2290
AS3	*AS2*	1035	9307	4160	463	11	8272
AS4	*AS3*	1035	2083	931	463	50	1048
AS5	*AS4*	1035	2718	1215	463	38	1683
AS6	*AS5*	1035	2444	1093	463	42	1409
AS7	*AS6*	1035	2246	1004	463	46	1211
AS9	*AS7*	1020	2066	923	456	49	1046
AS10	*AS9*	1020	2571	1149	456	40	1551
AS11	*AS10*	1020	2283	1021	456	45	1263
AS20	*AS19*	488	2331	1042	218	21	1843
ES10(B)	*ES10*	2	771	345	1	0	769
BS10	*BS8*	198	2169	969	89	9	1971
BS11	*BS10*	198	802	358	89	25	604
BS12	*BS11*	198	768	343	89	26	570
BS13	*BS12*	198	1413	632	89	14	1215
SB1	*BS13*	119	6695	2993	53	2	6576
SB2	*SB1*	119	4411	1972	53	3	4292

[1] Approximate number of existing sewer units contributing to pipe segment

[2] Peak hourly flow calculated using a conversion factor from sewer units, see Table 5-05

2) <u>Northwest Area Development.</u>

This scenario includes complete development of the large track of undeveloped land (approximately 65 acres) in the northwest portion of the town. The data presented includes current flows from the rest of the town. Development of this area using the current zoning density of 4 units/acre could result in the addition of roughly 262 units. The capacity of the downstream pipelines is adequate to support this development under current conditions. Table 5-07 presents the capacity of the existing and proposed sewer units in tabular form.

Currently, a land exchange with the United States Forest Service is in process. It has been rumored that this area could come into development in the next five years.

Table 5-07. Northwest Development Capacity Analysis

Upstream MH	Downstream MH	Upstream Sewer Units[1]	Full Flow Capacity, sewer units	Full Flow Capacity, gpm	Peak Hourly Flow[2], gpm	% Capacity	Remaining Unit Capacity
AS1	*HEADWORKS*	1297	2449	1095	580	53	1152
AS2	*AS1*	1297	3325	1486	580	39	2028
AS3	*AS2*	1297	9307	4160	580	14	8010
AS4	*AS3*	1297	2083	931	580	62	786
AS5	*AS4*	1297	2718	1215	580	48	1421
AS6	*AS5*	1297	2444	1093	580	53	1147
AS7	*AS6*	1297	2246	1004	580	58	949
AS9	*AS7*	1282	2066	923	573	62	784
AS10	*AS9*	1282	2571	1149	573	50	1289
AS11	*AS10*	1282	2283	1021	573	56	1001

[1] Approximate number of sewer units contributing to pipe segment in build-out condition

[2] Peak hourly flow calculated using a conversion factor from sewer units, see Table 5-05

3) Southeast Area Development

This scenario includes development of approximately 65 acres of privately-owned land located east of Ski Bowl East and south of the Frontage Road. Appling the zoning density of 22 units/acre results in the potential addition of 1,428 units. Applying the resulting additional flow rates to existing conditions for the rest of the town would require the upsizing of the downstream sewer lines as shown in Figure D. Table 7-08 presents the capacity of the existing and proposed sewer units in tabular form.

The results of this analysis show that 9 pipe segments would need to be upsized to accommodate this new development. These pipes are highlighted in Table 5-08 and Figure D. All pipe segments would need to be upsized only one pipe size (e.g., 8” to 10” or 10” to 12”) except for segments BS11-BS10 and BS12-BS11 which would need to be upsized from 8” to 12” diameter.

Table 5-08 Southeast Development Capacity Analysis.

Upstream MH	Downstream MH	Upstream Sewer Units[1]	Full Flow Capacity, sewer units	Full Flow Capacity, gpm	Peak Hourly Flow[2], gpm	% Capacity	Remaining Unit Capacity
AS1	*HEADWORKS*	2463	2449	1095	1101	101	n/a
AS2	*AS1*	2463	3325	1486	1101	74	862
AS3	*AS2*	2463	9307	4160	1101	26	6844
AS4	*AS3*	2463	2083	931	1101	118	n/a
AS5	*AS4*	2463	2718	1215	1101	91	255
AS6	*AS5*	2463	2444	1093	1101	101	n/a
AS7	*AS6*	2463	2246	1004	1101	110	n/a
AS9	*AS7*	2448	2066	923	1094	119	n/a
AS10	*AS9*	2448	2571	1149	1094	95	123
AS11	*AS10*	2448	2283	1021	1094	107	n/a
BS10	*BS8*	1626	2169	969	727	75	543
BS11	*BS10*	1626	802	358	727	203	n/a
BS12	*BS11*	1626	768	343	727	212	n/a
BS13	*BS12*	1626	1413	632	727	115	n/a
SB1	*BS13*	1547	6695	2993	692	23	5148
SB2	*SB1*	1547	4411	1972	692	35	2864

[1] Approximate number of Sewer Units contributing to pipe segment in build-out condition
[2] Peak hourly flow calculated using a conversion factor from sewer units, see Table 5-05

4) <u>Northeast Area Development</u>

This scenario includes the development of approximately 30 acres of undeveloped land located East of Camp Creek Road and north of Lige Lane. The land is currently owned by the USFS and is zoned Hoodland Residential with a density of 4 units/acre resulting in a potential for 137 units. This scenario was modeled assuming the existing 6" mainline (ES10(B) to ES10) on Yodel Lane would be the main point of connection for the future development. The capacity of this pipe and all downstream pipes are adequate to support this development under current conditions. Depending on the geometry of the development, connection to other existing sewer lines close to Lige Lane may also be used, in which case the Engineer should be consulted to model capacity of other pipes based on the development plans.

5) <u>Full Buildout</u>

This scenario includes the full buildout of the service area, including the development of the large undeveloped areas discussed above, as well as infill and redevelopment of the remaining areas to maximum zoning density.

Complete buildout will occur after the 20-year planning window of this study, but it is useful to review to see where potential upgrades are likely needed as developments are proposed. Significant maintenance work such as CIPP lining of pipes listed for upsizing should be carefully considered, as replacement to the larger sizes may be a preferred long-term option.

The upgrades to the collection system under full buildout are shown in Figure E. Table 5-09 lists shows the required upgrades for the full Buildout scenario in tabular form.

The results of this analysis show that 12 pipe segments would need to be upsized to accommodate this new development. These pipes are highlighted in Table 5-09 and Figure E. All pipe segments would need to be upsized only one pipe size (e.g., 8" to 10" or 10" to 12") except for segments AS4-AS3 (10" to 14") and BS11-BS10 and BS12-BS11 (8" to 12").

Table 5-09. Full Buildout Condition Capacity Analysis

Upstream MH	Downstream MH	Upstream Sewer Units[1]	Full Flow Capacity, sewer units	Full Flow Capacity, gpm	Peak Hourly Flow[2], gpm	% Capacity	Remaining Units Capacity
AS1	*HEADWORKS*	3391	2449	1095	1516	138	n/a
AS2	*AS1*	3391	3325	1486	1516	102	n/a
AS3	*AS2*	3391	9307	4160	1516	36	5917
AS4	*AS3*	3391	2083	931	1516	163	n/a
AS5	*AS4*	3391	2718	1215	1516	125	n/a
AS6	*AS5*	3391	2444	1093	1516	139	n/a
AS7	*AS6*	3391	2246	1004	1516	151	n/a
AS9	*AS7*	3368	2066	923	1505	163	n/a
AS10	*AS9*	3368	2571	1149	1505	131	n/a
AS11	*AS10*	3368	2283	1021	1505	147	n/a
AS20	*AS19*	864	2331	1042	386	37	1467
ES10(B)	*ES10*	120	771	345	54	16	651
BS10	*BS8*	1731	2169	969	774	80	438
BS11	*BS10*	1731	802	358	774	216	n/a
BS12	*BS11*	1731	768	343	774	225	n/a
BS13	*BS12*	1731	1413	632	774	123	n/a
SB1	*BS13*	1610	6695	2993	720	24	5085
SB2	*SB1*	1610	4411	1972	720	36	2801

[1] Approximate number of Sewer Units contributing to pipe segment in build-out condition

[2] Peak hourly flow calculated using a conversion factor from Sewer Units, see Table 5-05

6. COLLECTION SYSTEM CAPITAL IMPROVEMENT PLAN

A. Mainline Improvements

Upsizing of lines will be development driven. No attempt has been made in this report to predict when the developments and system improvements will be needed, but this report does quantify the number of sewer units that will trigger needed collection system improvements. It is assumed that these improvements will be financed by a combination of District cash resources, and funding by development as conditions of approval where appropriate.

Independent of growth, approximately 12% of the existing collection system is in a condition that warrants repairs in the near future. These priority 3 projects are listed in a 1 – 5-year timeframe in the Capital Improvement Plan.

Priority 1 and 2 do not warrant relining or replacement in the short-term and should be periodically inspected to quantify I/I and structural defects. These projects are listed in the 6–20-year priority list in the Capital Improvement Plan, although notably many of the District's existing lines are much older than 20 years and in very good condition. This indicates that the priority 1 and 2 pipelines are not necessarily destined to deteriorate to a priority 3 within the 20-year planning window.

The following Table 6-01 lists the estimated cost for improvements of each priority of the collection system. Assumptions include 6% mobilization and 15% Engineering & Contingency, and all dollars are as of 2022 with the Engineering News Record Seattle Construction Cost Index (ENR Seattle CCI) for November of 2022.

In 2022, approximately 850 feet of Priority 3 pipeline improvements were funded by the District. These pipelines have been removed from the CIP in the table below.

Table 6-01. Cost Estimate of CIPP Improvements 2022

LF	Total Laterals	Estimated Cost	Engr, Mob & Contin	Total
Priority 3 Runs - Cost Estimate				
3,931*	18	$ 353,790	$ 74,295	$ 428,085
Priority 2 Runs - Cost Estimate				
8,384	97	$ 754,560	$ 158,458	$ 913,018
Priority 1 Runs - Cost Estimate				
17,713	177	$ 1,594,170	$ 334,775	$ 1,928,945

* This includes 4,789 lf of pipeline identified in Table 5-03 as Priority 3, less the 858 lf repaired in 2022 by the District for net remaining of 3,931 lf.

If the District elected to improve ALL pipelines, priority 1, 2, and 3, the annual expense over a 20-year funding period at 3% would be approximately $215,000 per year.

B. Manhole Improvements

Table 6-02 presents the costs to complete lining of all "fair" and "poor" condition manholes. These improvements are included in the near-term 1–5-year Capital Improvement Plan.

Assumptions include 6% mobilization, 20% Engineering & Contingency, and all dollars are as of 2022 with the ENR Seattle CCI of 14,425.

Table 6-02. Cost Estimate of Manhole Lining

Total	Estimated Cost	Mob & Contingency	Total
"Poor" Condition - Cost Estimate			
4	$ 11,300	$ 2,938	$ 14,238
"Fair" Condition - Cost Estimate			
26	$ 73,450	$ 19,097	$ 92,547

C. Collection System Recommendations

To address collection system deficiencies, the Capital Improvement Plan recommends that the 1–5-year priority include improvements to all Priority 3 pipelines and all manholes with identified deficiencies. Growth-related pipeline improvements are evaluated in the Capital Improvement Plans at the end of this report.

The District should continue the 4-year rotation of video inspections and cleaning of the sewer lines.

7. COMBINED CAPITAL IMPROVEMENT PLAN

The Government Camp Sanitary District facilities are in good position to accommodate growth. There are no near-term improvements mandated to increase capacity and only a few capital improvements required to resolve deficiencies and improve operations.

Since the collection system and treatment plant are complete and functional and have sufficient capacity through the planning window, the most cost effective practice is to maintain, repair, and replace existing facilities as required. Therefore, cost comparisons for alternative designs and construction of new systems are not applicable.

A. Deficiency Related Capital Improvements

In addition to the collection system repairs, an evaluation of the plant has identified a list of equipment and construction improvements that must be addressed in the near term. The following table lists the Capital Improvement Plan for the 20-year planning window:

Table 7-01. GCSD CAPITAL IMPROVEMENT PLAN

No.	Improvement Project	1 – 5 Years	6-20 Years
Treatment Plant Improvements			
T10	SBR 1 Decanter	24,000	
T11	SBR 2 Decanter	24,000	
T15	WAS Pump No. 1	12000	
T16	WAS Pump No. 2	12000	
T17	Fine Bubble Diffusers SBR No. 1	30,000	
T18	Fine Bubble Diffusers SBR No. 2	30,000	
T19	UV Disinfection System Modules	120,000	
T21	Digester Mixer	14,400	
T22	Digester Decant Pump	4,200	
A	Process Water Pump	18,000	
B	SBR Float Replacement (2)	40,000	
C	SBR Diffusers Access System	150,000	
D	Redundant SBR Blower	10,000	
E	Replace WAS Check Valves (2)	4,000	
F	New Chemical Feed System	25,000	
G	Extended Public Safety Power Shutoff PSPS Fuel Trailer System	10,000	
H	300,000 g WAS Storage Tank		$600,000
	WWTP SUBTOTAL	$527,600	$600,000
Collection System Improvements			
C1	Priority 3 Pipeline Deficiencies	430,000	
C2	Manhole Deficiencies – Poor	15,000	
C3	Manhole Deficiencies – Fair		95,000
C4	Priority 2 Pipeline Deficiencies		1,035,000
C5	Priority 1 Pipeline Deficiencies		2,060,000
	I/I SUBTOTAL	$445,000	3,190,000
---	Planning & SDC Updates		10,000
	TOTAL	**$972,600**	**$3,800,000**

B. Treatment Plant Growth-Related Capital Improvements

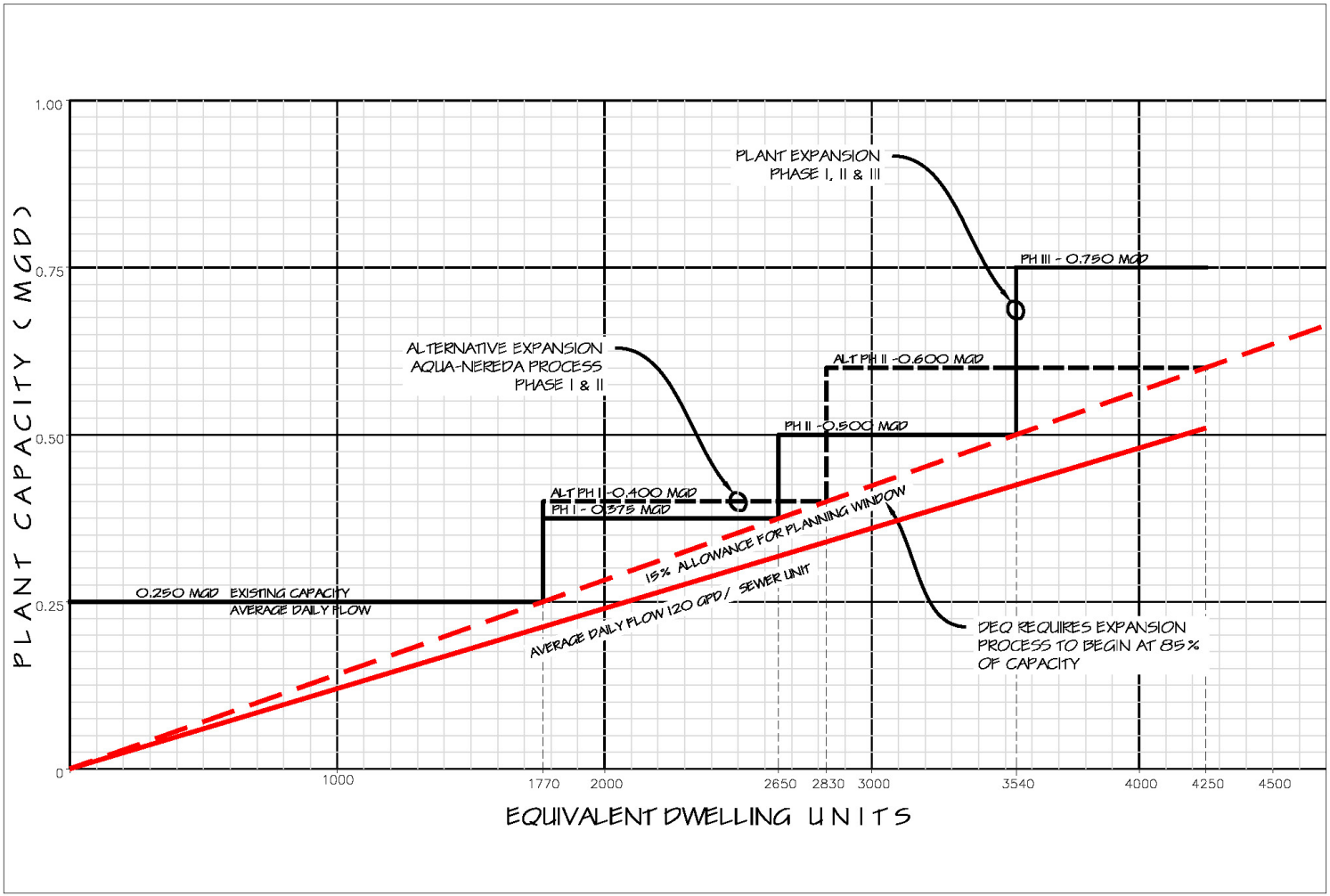
When the plant loadings approach 85% of capacity, the District should begin the expansion process, including researching the Aqua-Nereda Aerobic Granular Sludge process, which could extend the capacity of the two existing SRBs. The volume of WAS will be increased due to the low concentration wasted in the AGS process, and as a result the digester sizing and biosolids processing will both become more important components of any upgrade.

The timeline for expanding the treatment plant capacity will be entirely based on the addition of sewer units. The Plant Capacity vs. Sewer Units graph on the following page should be used as a general guideline to foresee approaching capacity limitations based on additional sewer units added to the collection system.

There are two capacity lines on the graph. The solid stepped line indicates the number of sewer units that would initiate a plant expansion based on the original SBR design capacities. This calls for additional SBR tank construction as the number of sewer units approach 1,770 (or 85% of 250,000 gpd), 2,650 (or 85% of 375,000 gpd), and 3,540 (or 85% of 750,000 gpd).

Alternatively, the dashed stepped line indicates the number of sewer units that would initiate a plant upgrade if the District adopted the relatively new Aqua-Aerobic Aqua-Nereda process. This essentially increases the capacity of the existing SBRs by an additional 60% to 400,000 gpd average annual flow, by the ability to process more batches per day.

Converting the existing SBR basins to the Aqua-Nereda process would be mandated as the number of sewer units approaches 1,770 (or average daily flows of 85% of 250,000 gpd which is the limiting capacity of the existing system). This upgrade would provide a capacity of 400,000 gpd with the two existing SBR basins. An additional SBR basin would be required as the number of sewer units approaches 2,830 (or 85% of 400,000 gpd) which would then provide a capacity of 600,000 gpd average annual flow.



\\cjm\c j m\Government Camp\Facility Planning\Sewer Capacity Graph.dwg, 5/16/2023 9:51:16 AM, DWG To PDF.pc3

C. Collection System Growth-Related Capital Improvements

To address collection system growth-related capacity needs, the District should monitor all new development and implement the pipeline upgrades when the number of sewer units reach the pipeline capacity.

There are generally two tables to guide the District to determine when collection system improvements are required. The first, Table 6-03, indicates the number of **system-wide sewer units** that will result in the identified pipelines reaching capacity.

Table 7-03 below anticipates growth-related pipeline replacement will occur when development approval results in the lines reaching their capacity. Capacities were calculated based on very conservative peak hourly flow, roughness coefficients, and no surcharge conditions. As a result, this report recommends upsizing the pipeline only when they reach 110% of the capacity calculated in Tables 5-08 and 5-09, as listed in the following table:

Table 7-03. System-Wide Growth – Pipeline Capacity Limitations

Upstream MH	*Downstream MH*	*Sewer Unit Capacity*
AS1	Headworks	2,700
AS4	AS3	2,288
AS5	AS4	2,984
AS6	AS5	2,684
AS7	AS6	2,470
AS9	AS7	2,273
AS11	AS10	2,520
BS11	BS10	882
BS12	BS11	846
BS13	BS12	1,548

The second table, Table 7-04, identifies pipelines that will be over capacity with **development of the southeast area** of the District, identified in Table 5-08. Similar to Table 7-03, Table 7-04 anticipates growth-related pipeline replacement will occur when development approval results in the lines reaching 110% of the calculated capacity, from development in the southeast area of the District ONLY.

Table 7-04. Southeast Area Growth – Pipeline Capacity Limitations

Upstream MH	*Downstream MH*	*Sewer Unit Capacity*
AS4	AS3	2,288
AS9	AS7	2,273
BS11	BS10	882
BS12	BS11	846
BS13	BS12	1,555

8. DISTRICT FINANCIAL RESOURCES SUMMARY

The District is in a strong financial position with the current monthly rates and System Development Charges. The District has 432 accounts and invoices for 1,035 EDU, currently at $41 per EDU per month.

Over the past years, the District accelerated debt service payments and has been able to retire the WWTP construction loan early. However, these accelerated payments have caused the District to defer funding the equipment replacement fund.

The District is committed to remove excessive inflow and infiltration, and to repair identified treatment plant and collection system deficiencies. Consequently, the District anticipates securing financing to fund the critical collection system deficiencies and replace treatment equipment that has served beyond its service life.

The capital improvement program is recommended to fund replacement of equipment that is approaching or has served beyond its rated service life. This includes all equipment listed with five years or less remaining service life in Table 3.08, which totals $270,600. Additional work identified by the operators totals $257,000 for a total of $527,600 of improvements at the plant. This capital project will also resolve nearly 60% of the accumulated deferred equipment obligation.

Collection system deficiencies are listed in Table 6.01, with the critically needed repairs identified as Priority 3 totaling $430,000. Additionally, manholes listed in poor condition in Table 6.02 have an estimated repair cost of $15,000. The total needed collection system improvements amount to $445,000.

In total, the capital improvements include $527,600 for the plant and $445,00 for collections, totaling $972,600. This report recommends the District secure funding for capital improvements totaling $1,000,000 to complete the plant and collection system improvements.

A pro forma budget for the next five years is shown in Table 8-01 below, and includes a line item to fund the $65,000 annual equipment replacement cost identified in Table 3.08, with remaining revenues sufficient to retire the anticipated debt service without raising user rates.

Based on current number of system users, over $100,000 per year can be committed to debt service to allow the District to continue to use the current monthly fee structure. The Pro Forma budget assumes that system growth (Number of EDU's) will increase at 1 percent per year, resulting in a 1% increase per year in Total Rate Revenue. All other revenues and all operating costs were assumed to grow at 3% per year.

The District can service a principal balance of $1,000,000, in the amount of $65,000 to $70,000 per year and retire the debt in 20 years without increasing rates. Since at least $100,000 per year is available to service debt, the debt can be retired in a shorter period of time without increasing rates.

A pro forma budget is shown in the following table:

Table 8-01. GCSD 5-Year Pro Forma Budget

	2022-23	*2023-24*	*2024-25*	*2025-26*	*2026-27*	*2027-28*
ESTIMATED OPERATING REVENUES: With 1% growth Rate						
User Rate per EDU	41	41	41	41	41	41
Number of EDU	1,035	1,045	1,056	1,066	1,077	1,088
Total Rate Revenue	$509,220	$514,312	$ 519,455	$ 524,650	$529,896	$535,195
Property Tax Revenues	$ 65,000	$ 66,950	$ 68,959	$ 71,027	$ 73,158	$ 75,353
Misc Revenues	$ 10,000	$ 10,100	$ 10,201	$ 10,303	$ 10,406	$ 10,510
TOTAL REVENUES	**$585,296**	**$592,449**	**$ 599,712**	**$ 607,088**	**$614,579**	**$622,187**
ESTIMATED OPERATING COSTS: With annual inflation of 3%						
Personal Services	$ 24,000	$ 24,720	$ 25,462	$ 26,225	$ 27,012	$ 27,823
Materials & Services	$270,000	$278,100	$ 286,443	$ 295,036	$303,887	$313,004
Equipment Replacement	$ 65,000	$ 66,950	$ 68,959	$ 71,027	$ 73,158	$ 75,353
Contingency	$ 80,000	$ 82,400	$ 84,872	$ 87,418	$ 90,041	$ 92,742
TOTAL EXPENSES	**$439,000**	**$452,170**	**$ 465,735**	**$ 479,707**	**$494,098**	**$508,921**
FISCAL YEAR NET	**$146,296**	**$140,279**	**$ 133,977**	**$ 127,380**	**$120,480**	**$113,266**

The current System Development Fee was last updated in January 2022, to its current fee of $5,861 per sewer unit, based on the ENR Seattle CCI. System Development Charge fees are increased periodically to reflect the cost of current construction. SDC is not shown as revenue in the Pro Forma budget since it fluctuates from year to year and therefore is not considered reliable for debt repayment.

The SDC methodology, however, was last updated in 2004 and has several components that could better reflect the impacts of growth. As a matter of bookkeeping, the methodology should be updated as a near-term Capital Improvement project.

GOVERNMENT LOT 4
GOVERNMENT LOT 5
GOVERNMENT LOT 6
GOVERNMENT LOT 7
GOVERNMENT LOT 2
GOVERNMENT LOT 1
GOVERNMENT LOT 3
GOVERNMENT LOT 4
HIGHWAY 26
LOOP ROAD
COLLINS LAKE
LOOP ROAD
LIGE LANE
HIGHWAY 26
REST AREA
TREATMENT PLANT
SKI BOWL WEST
SKI BOWL EAST
ODOT
MAZAMA LODGE
SCALE IN FEET
0
300
600
NORTH

FIRWOOD DESIGN GROUP
Reliable Engineering Solutions

GOVERNMENT CAMP SANITARY DISTRICT
MASTER PLAN 2022

FIGURE A: COLLECTION SYSTEM MAP

ZONING LEGEND:

RESIDENTIAL:

MOUNTAIN RECREATIONAL RESORT (MRR)
DLA STANDARD: 1,980 SF (22 UNITS PER ACRE)

HOODLAND RESIDENTIAL (HR)
DLA STANDARD: 10,890 SF (4 UNITS PER ACRE)

COMMERICAL:

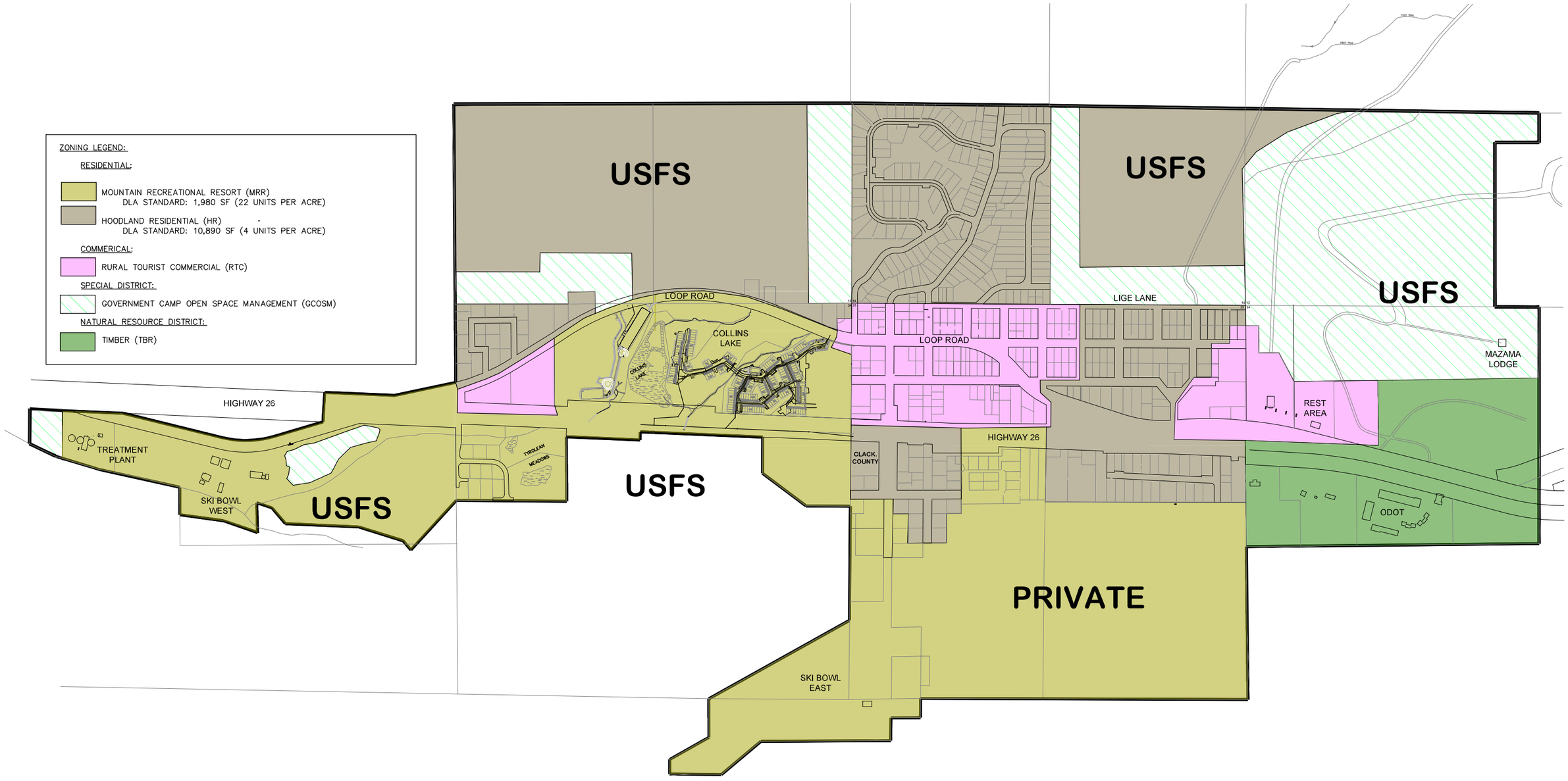
RURAL TOURIST COMMERCIAL (RTC)

SPECIAL DISTRICT:

GOVERNMENT CAMP OPEN SPACE MANAGEMENT (GCOSM)

NATURAL RESOURCE DISTRICT:

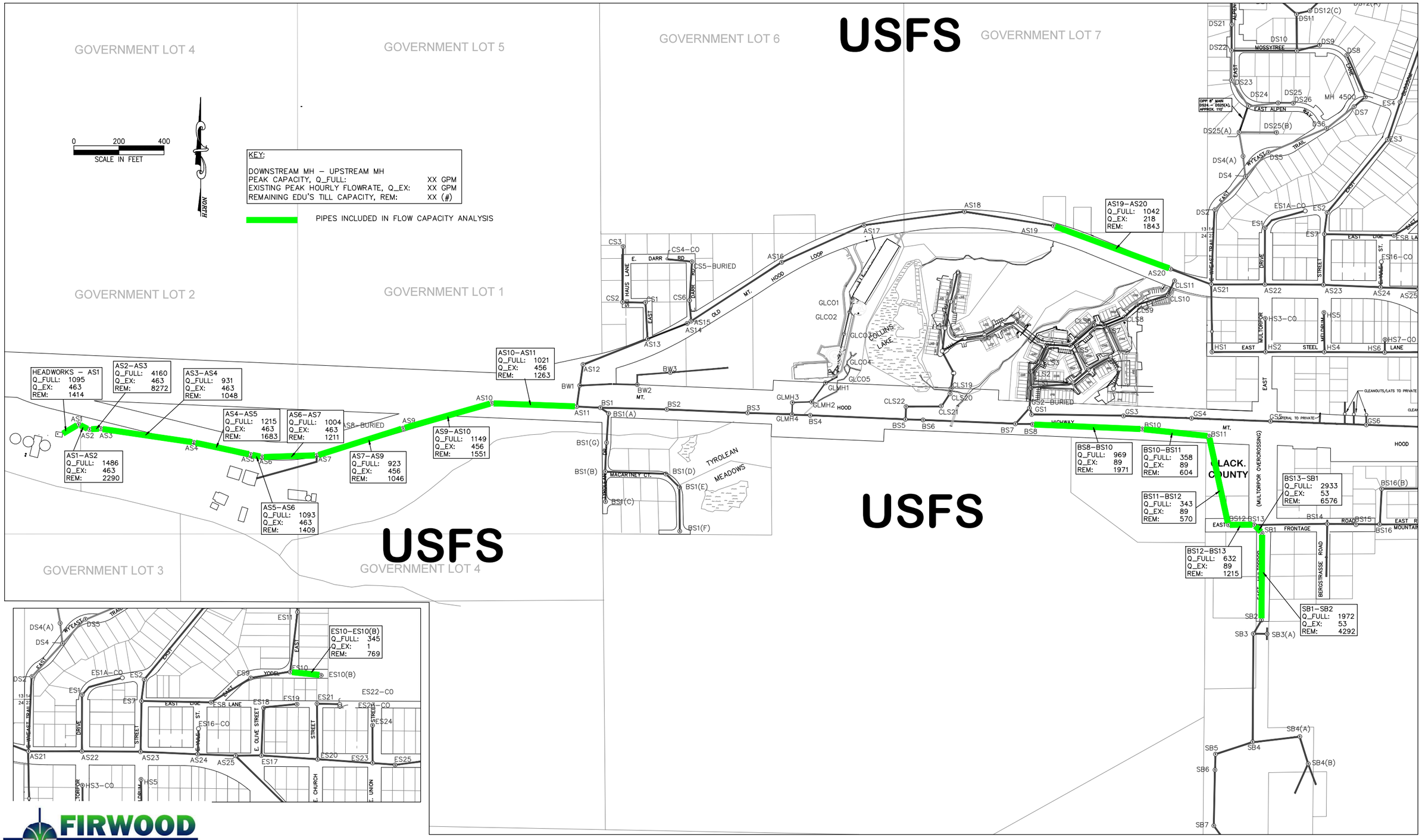
TIMBER (TBR)



FIRWOOD DESIGN GROUP
Reliable Engineering Solutions

GOVERNMENT CAMP SANITARY DISTRICT
MASTER PLAN 2022

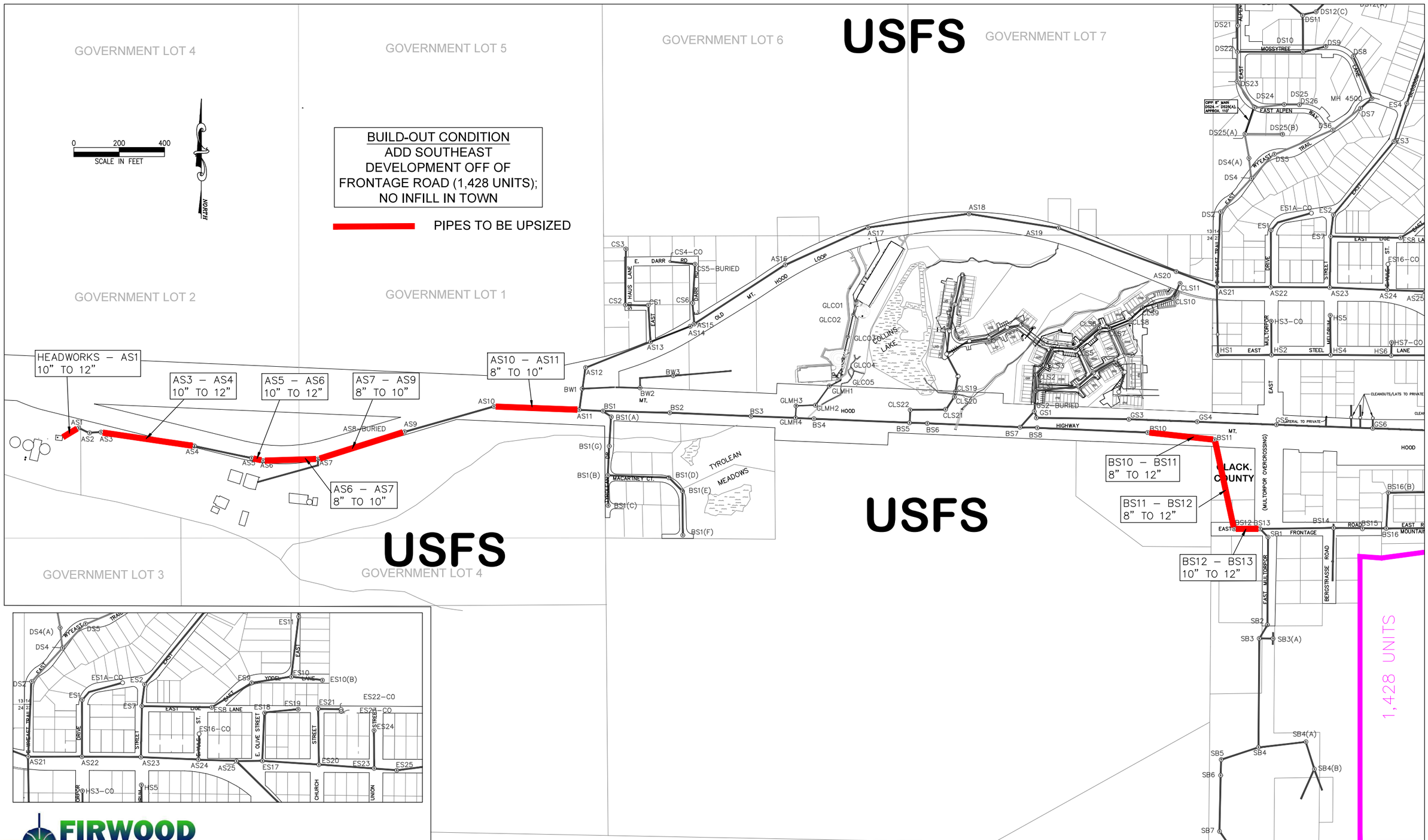
FIGURE B: ZONING MAP



FIRWOOD DESIGN GROUP
Reliable Engineering Solutions

GOVERNMENT CAMP SANITARY DISTRICT
MASTER PLAN 2022

FIGURE C: FLOW CAPACITY ANALYSIS - EXISTING CONDITIONS



GOVERNMENT CAMP SANITARY DISTRICT
MASTER PLAN 2022

FIGURE D: FLOW CAPACITY ANALYSIS - SOUTHEAST DEVELOPMENT

GOVERNMENT LOT 4

GOVERNMENT LOT 5

GOVERNMENT LOT 6

GOVERNMENT LOT 7

GOVERNMENT LOT 2

GOVERNMENT LOT 1

GOVERNMENT LOT 3

GOVERNMENT LOT 4

USFS

USFS

USFS

0 200 400
SCALE IN FEET

NORTH

BUILD-OUT CONDITION
FULL BUILD-OUT:

- INFILL TO INCREASE DENSITY BY 50%
- NORTHWEST DEVELOPMENT (262 UNITS)
- NORTHEAST DEVELOPMENT (117 UNITS)
- SOUTHEAST DEVELOPMENT (1428 UNITS)

PIPES TO BE UPSIZED

262 UNITS

117

1,428 UNITS

HEADWORKS – AS1
10" TO 12"

AS2 – AS3
10" TO 12"

AS3 – AS4
10" TO 14"

AS4 – AS5
10" TO 12"

AS5 – AS6
10" TO 12"

AS6 – AS7
8" TO 10"

AS7 – AS9
8" TO 10"

AS9 – AS10
10" TO 12"

AS10 – AS11
8" TO 10"

BS10 – BS11
8" TO 12"

BS11 – BS12
8" TO 12"

BS12 – BS13
10" TO 12"

AS8–BURIED

GS2–BURIED

CLEANOUTS/LATS TO PRIVATE

FIRWOOD DESIGN GROUP
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GOVERNMENT CAMP SANITARY DISTRICT
MASTER PLAN 2022

FIGURE E: FLOW CAPACITY ANALYSIS - FULL BUILD OUT

LEGEND

EXISTING SEWER LINE

PRIORITY 3 SEWER LINE REPAIR

GOVERNMENT LOT 1

GOVERNMENT LOT 2

GOVERNMENT LOT 3

GOVERNMENT LOT 4

GOVERNMENT LOT 5

GOVERNMENT LOT 6

GOVERNMENT LOT 7

AS12 TO BW1 LINED 2022

AS19 TO AS20 LINED 2022

AS20 TO AS21 LINED 2022

MT. HIGHWAY HOOD US26

SCALE IN FEET

0 300 600

NORTH

FIRWOOD DESIGN GROUP

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GOVERNMENT CAMP SANITARY DISTRICT
MASTER PLAN 2022

FIGURE F: PIPE LINING MAP - PRIORITY 3 LINES

APPENDIX A

Technical Memorandums (Dec 2020)

TECHNICAL MEMORANDUM

DATE: July 29th, 2020

RE: GSCD Master Plan Task 1A – Flow Mapping

TO: Government Camp Sanitary District

FROM: Erik Hoovestol, P.E., Firwood Design Group

OBJECTIVE

This technical memo summarizes the work by Firwood Design Group towards Task 1A, Flow Mapping, one of the four tasks in the scope of the information gathering phase of the Government Camp Sanitary District (GCSD) 20-Year Master Plan. The four tasks collectively present the district with an inventory of the collection system in its current condition and will provide a framework for recommendations to be in included in the upcoming master plan for maintenance and capital improvements to the system over a 20-year planning period.

Strategic flow mapping of a collection system is used as a low cost means to identify sections of pipe or areas of the system that are experiencing high levels of Infiltration and Inflow (I/I), contributing to excess downstream flows that can add to the District's Treatment Facility incoming flows. Flow mapping of the GCSD collection system was done visually, without the use of flow meters or other measuring devices. This is a simple, more cost-effective way that is more suited for smaller municipal systems. Flow mapping is driven by high groundwater, so problems with pipes, such as cracks, poor joints, or root intrusion, that are in areas of low groundwater levels may not be identified by this method.

The results of the flow mapping provide an estimate of areas that, when in times of high groundwater such as snow melt and rain events, experience high levels of I/I. These results will help guide the District in identifying areas for future maintenance and improvement projects.

METHODOLOGY

Field work for flow mapping was conducted on May 14th and 15th, 2020 during the daytime by Zach Adams, EIT, and Erik Hoovestol, P.E. of FDG, with some assistance from Dustin Thorson, from Puttman Infrastructure.

Since it is generally best to conduct flow mapping in a time of high groundwater, FDG coordinated with the District to determine that the best time to do this would be in mid-to-late Spring (May or early June) as this is when most of the snow melt in Government Camp occurs.

It is also typical for flow mapping to be done in the middle of the night, during hours where it can be assumed that there is negligible household or commercial activity that would contribute to sewage flows. It was the decision of FDG to conduct the mapping during the daytime since activity throughout the town was assumed to be minimal due to it being the offseason for winter and summer recreation, and because of COVID-19 related closures throughout the town.

Approximately 50 manholes were strategically chosen to be observed for incoming flows. The flows were quantified based on a relative scale of 0-10, with 0 being no flow and 10 being the highest observed flows. A rating of 10 was given to the lines at furthest downstream of the collection stream, just before the wastewater discharges to the wastewater treatment facility. From there, the field crew worked their way going upstream through the collection system and observing flows in manholes that received two or more incoming lines, to try to identify sections of the system that were experiencing high I/I. A copy of the raw data and field notes is included in the appendices of this memorandum.

RESULTS

The numerical "scores" for each section of the system was converted into a map that shows relative flows in all main lines on a color scale. (See attached) Based on the visual mapping and overall field observations, it was determined that I/I is spread fairly evenly throughout the entire town. There were few areas that experienced abnormally high I/I that could be concluded as high areas of priority for future lining or repair. There were also few areas that could be ruled out (no flows) as non-contributing areas of I/I.

The areas with lower than average observed flows were localized to the residential areas on the east ends of E. Lige Lane, Little Trail, and Steel Lane. These areas generally seemed to be dryer and saw minimal or no flows. Areas that experienced higher than average observed flows were the neighborhoods along Frontage Road east of Multopor Dr, and East Alpen Way from Wyeast

to the beginning of the mainline run. Both findings align with what had been previously expected of the respective areas.

The flow mapping identified a significant leak located on the lower portion of East Ski Haus Lane. Upon subsequent review of the video logs, a large gushing leak was viewed that will now be a priority repair.

Throughout the time in Government Camp during flow mapping, there was not as high of groundwater levels resulting from snow melt as was expected. It seemed that by this point most of the snow had already melted around town, which likely hindered optimal flow mapping. Additionally, there were multiple instances where signs of household activity resulting in sewage flows could be visibly seen in the lines. These instances were characterized by intermittent high flows, and opaque water. This contrasted flows from I/I sources, which are generally clear and steady flows. Unfortunately, the combination of lower-than-expected groundwater and household activity likely contributed to uncertainties with the flow mapping.

CONCLUSION & RECOMMENDATIONS

FDG concludes from this flow mapping that flows from infiltration are distributed fairly evenly throughout the collection system as no exceptionally high flow areas were identified. As was previously expected the higher elevation areas on the east end of town exhibited the lowest flows. Although not currently recommended by FDG, further flow mapping could be conducted in the future, with tweaks to the timing and methodology to minimize experienced issues in the process described in the previous paragraph above.

TECHNICAL MEMORANDUM

DATE: October 12th, 2020

RE: GSCD Master Plan Task 1B – Smoke Testing

TO: Government Camp Sanitary District

FROM: Erik Hoovestol, P.E., Firwood Design Group

OBJECTIVE

This technical memo summarizes the work by Firwood Design Group towards Task 1B, Smoke Testing, one of the four tasks in the scope of the information gathering phase of the Government Camp Sanitary District (GCSD) 20-Year Master Plan. The four tasks collectively present the district with an inventory of the collection system in its current condition and will provide a framework for recommendations to be in included in the upcoming master plan for maintenance and capital improvements to the system over a 20-year planning period.

Smoke testing is commonly performed during collection system analysis as it is cost-effective and can provide useful information such as illicit storm drain and roof drain connections to the sanitary sewer system. The "smoke", a non-toxic, odorless water vapor, is blown into the sewer mains using fans placed on top of manholes. Technicians then simply walk along the route and document and photograph locations where smoke is found. This task is ideally conducted in the late summer or fall when soil conditions are dryer, as often leaks in service lines can be found as the smoke will, surprisingly often, go through the soil and/or cracks in the pavement.

METHODOLOGY

FDG used American Leak Detection (ALD), a leak detection specialist service, to assist in smoke testing. They provided the necessary equipment, including a machine to ignite liquid smoke and fan the vapor into the manhole to distribute through the collection system. FDG provided two technicians on both days to lead the effort and identify and document issues in the system.

Field work was conducted on October 7th and 8th through nearly all the collection system. including the private lines within Collins Lake and the Grand Lodges. Collection system areas that were not covered were the highway line from manhole BS1 to BS11, Ski Bowl West and Treatment Plant lines from AS1 to AS5, and the rest area line from AS32 to AS33. These areas have no lateral service connections and were at lower predicted risk for having illicit connections or other issues. There were other areas of the system that were not planned to be tested, but the smoke machine was surprisingly efficient and could blow smoke with a much farther range than was anticipated, therefore allowing the field crew to cover more ground in a shorter amount of time.

System deficiencies identified were cataloged by the technicians in a qualitative format. When an issue was seen, the area of concern was photographed, and the identified problem was documented in a logbook. If occupants of the house were present, they would generally come outside because of the problem, where the FDG or ALD crew would discuss the issue with them and offer advice or information on how to resolve the issue. Most of the buildings in Government Camp were unoccupied during the smoke testing, so in most of the instances, building tenants or owners were unable to be notified of the issue.

Below is a list of the identified system deficiencies, organized by public or private problems.

RESULTS

Below is a list of the identified system deficiencies, organized by public or private problems.

Public

- Intersection of Frontage Rd & Bergstrasse Rd (MH BS14): Smoke coming out of pavement approx. 1' northeast of MH. Smoke came out of pavement where the white spray paint mark is. While this is to the northeast of the manhole, it does not necessarily mean this is exactly where the leak is, as the smoke will find either a crack in the pavement or easy path through landscape to the surface. However, past video logs show a line coming into the manhole from the north that has a service to the east approx. 5' from the manhole. There are no documented issues with this pipe form the video logs, but this is FDG's best guess on where the smoke could have leaked from.

Private

30386 E Wyeast Trail: Smoke billowing out of broken pipe / stub or other large opening in sanitary connections, old run-down house. Smoke not photographed.

88567 E Frontage Rd: Smoke coming out around toilet of second floor bathroom. Occupant is aware of the issue and was advised by ADS technician, Tony, to notify the homeowners about leak in home's private sewer lines.

30651 E Meldrum St: Smoke billowing out of broken pipe / stub or other large opening in sanitary connections, old run-down house.

89966 E Morrison Lane: Smoke coming out of ground at edge of house. Likely coming from lateral connection. Tony, from ADS, suspected the issue to be a sheared Fernco fitting or other type of fitting. See right photo, smoke coming out where pink paint mark is.

31340 E Multorpor Dr: Smoke coming out of driveway in front of house (see white paint mark in right photo). Likely a crack or broken section of private service line to house.

Additionally, a potential issue was identified along the main line up to Mazama Lodge, from MH AS38 to AS41. While the smoke machine was set up downstream on MH AS36, smoke was clearly visible out of the AS38 manhole and vents of a cabin nearby. However, no smoke was visible coming out of the manholes above, heading up the hill to MH AS41 and around Mazama Lodge. It is likely that there is a plug or obstruction in the mainline in this area. These lines have not been TV'ed since they were previously unidentified and not a part of the FDG Base Map before this year's information gathering effort. Therefore, it is recommended that these lines be a part of the scope of the TV project next year to identify the speculated issue in this area.

CONCLUSION & RECOMMENDATIONS

FDG concludes from the smoke testing that there is only one identified issue of concern in the District's public collection system, pertaining to manhole BS14 as discussed above. No illicit connections such as stormwater catch basins, driveway drains, etc. were observed. All other identified issues were on private sections of the collection system, generally near residential homes. When possible, residents were notified of the issue. However, as is the case often in Government Camp, many of the houses were unoccupied at the time of smoke testing, making it impossible to effectively relay this to building owners. Ideally, this memo will serve as a record of the identified issues on private properties for the District to use at their discretion.

The low number of illicit connections found compared to other municipalities is likely due to the lack of piped public storm drains and roadways without curbs and gutters in the residential neighborhoods and also that stormwater run-off on private home sites typically just runs off downhill and disposal is not an issue.

TECHNICAL MEMORANDUM

DATE: December 21st, 2020

RE: GSCD Master Plan Task 1C – Manhole Inventory

TO: Government Camp Sanitary District

FROM: Erik Hoovestol, P.E., Firwood Design Group

OBJECTIVE

This technical memo summarizes the work by Firwood Design Group towards Task 1C, Manhole Inventory, one of the four tasks in the scope of the information gathering phase of the Government Camp Sanitary District (GCSD) 20-Year Master Plan. The four tasks collectively present the district with an inventory of the collection system in its current condition and will provide a framework for recommendations to be in included in the upcoming master plan for maintenance and capital improvements to the system over a 20-year planning period.

FDG recommended completing a manhole inventory during the summer for the entire system to identify which manholes need repairs. There are approximately 200 manholes in the District. Not only will the information gathered during the inventory be useful to identify repairs needed, but the information will also be collated and bound in a notebook to serve as a handy reference for district operational staff for the future.

METHODOLOGY

The field work for the inventory was conducted over many visits from June to October to Government Camp, often coinciding with other work and efforts for different projects, including Flow Mapping, the 2020 Sanitary Rehabilitation Project and the previously planned 2020 Road District Overlay. There were two days, Sept 3rd and Oct. 10th, that were solely dedicated to manhole inventory. Most of the work was completed individually by Zach Adams, EIT of FDG, but was occasionally assisted in some cases by either Sean Freeman, survey technician; or Erik Hoovestol, P.E. of FDG; or Dustin Thorson, of Puttman Infrastructure. The

times with two people in the field were helpful when identifying manholes along the highway for safety purposes, and for difficult-to-remove manhole covers.

The inventory includes: a photograph of the manhole at the surface, a photo of the interior, depths, a sketch of the incoming and outgoing pipes, notes on evidence of infiltration (staining), notes as to general condition, and any recommended repairs. The manholes were rated based on their overall condition by assigning one of the three following qualifiers:

- *Poor*: Manhole is high priority for lining or structural repair due to one or more severe issues, such as holes, cracks, major staining, poor structural condition, or other issue related to heavy visible or potential I/I.

- *Fair*: Manhole is low priority for future lining projects due to one or more small issues, such as minor staining, leaking, seepage, or other signs related to light potential I/I.

- *Good*: Manhole has no visible issues that are currently causing or has the potential to cause I/I and do not need repair or lining. If manholes needed cleaning or channeling, these were noted in the comments, but were not seen as pertinent in the ranking of priority for lining.

RESULTS

There was a total of 199 manholes in the Government Camp Sanitary District that were identified through a combination of FDG's base map, available as-built construction plans, past TV inspections, and field work and reconnaissance. Below is the quantity of manholes that were identified in each condition category:

Good	156 (78.4%)
Fair	19 (9.5%)
Poor	8 (4.0%)
Unable to Inventory	16 (8.0%)
Total	**199 Manholes**

The details of the manholes in these categories are detailed in the tables below.

Poor Condition Manholes

Manhole ID	**Location**	**Notes**
BS18	Located in grassy area next to gravel driveway off Frontage Road.	Could not get lid off, casting separated from MH structure. Needs attention.
BS29	Ranger Station	Minor seepage in MH, evidence of white calcium build-up.
DS10	Mossy Tree Lane	Major I/I staining all around inside of manhole
DS11	Located behind houses (88475, 88535 Mossy Tree Lane) next to propane tank.	Major I/I staining all around. Lots of drops of water coming in, clearly I/I.
DS18	East Alpen Way	I/I coming in MH through hole on NW side, very steady. Hole looks large enough for I/I to be contributing to increased downstream flows.
HS4	East Steel Lane	Major I/I staining along all sides of MH. Root intrusion below rim. Standing water. Two inside drop services.
SB4	Ski Bowl East	Lots of staining, poor condition overall.
SB6	Ski Bowl East	South side of casting is breaking off. Manhole not set in properly, poses a potential hazard. Should be fixed in the future.

Fair Condition Manholes

Manhole ID	**Location**	**Notes**
AS10	Mt Hood Highway	Brick at bottom of manhole, signs of some small leaks/seepage at the bottom. No visible I/I.
AS11	Mt Hood Highway	Iron staining on west side. Bottom is brick, signs of minor seepage and staining at bottom.
AS16	Loop Road	Visible leaks in MH, looks like "rain drops" coming in on the east side. Lots of moisture, definite signs of I/I.
AS34	Above Rest Area	Grout around manhole (set above ground) has cracks and in poor shape. Staining and signs of I/I in deep manhole.
BS5	Mt Hood Highway	North channel has lots of debris build-up and there is grout in the Wye that is falling apart. Recommend for vac truck cleaning.
BS16	East Frontage Road	Minor iron staining on north side of MH
BS19	Located in backyard of house (88972 E Round Mountain Loop), somewhat hidden.	White staining all around. MH lid in poor condition. Very deep manhole. Lateral coming in from NW.

BS20	East Round Mountain Loop, located off gravel driveway in grassy area.	Major I/I staining on upper west side of MH.
BS33	ODOT Station	Wet, moist, signs of I/I in MH.
BW1	Located in grassy triangle between loop road and highway, close to the brewery.	Minor iron signing and signs of leaking/seepage all around.
BW2	Loop Road / Mt Hood Brewery	Debris build-up, needs cleaning, but overall good condition.
BW3	Loop Road / Mt Hood Brewery	Debris build-up, needs cleaning, but overall good condition.
CS3	Ski Haus Lane, located in gravel driveway.	Dirty, lots of debris build-up, needs cleaning. Two laterals in from nearby houses.
CLS19	Collins Lake Resort, north side of meandering creek.	Moist and wet inside, major staining, likely I/I getting in.
DS6	East Wyeast Trail	Some debris build-up and minor staining all around.
DS8	Mossy Tree Lane	No visible inlets, glorified cleanout(?) Standing water accumulating, about 6" deep, due to "channel" invert out being above MH base.
DS12	East Alpen Way	Some standing water in MH from debris build-up. Staining all around.
GLMH4	Mt Hood Highway	Minor seepage on south and west signs of MH, some moisture. Could be I/I.
SB3(A)	Ski Bowl East	Standing water, low flows. Minor I/I staining. Inlets are pipe stubs.

Manholes Not Inventoried

Manhole ID	**Location**	**Notes**
AS5	Ski Bowl West	Covered by trash receptacles. Found but could not open. Receptacles need to be moved for access.
AS33	Rest Area	Covered in overgrown vegetation and muck. Needs clearing for access.
BS27(A)	PGE Station	Could not find. Likely buried under gravel on hill by PGE Station, based off location as per available As-Built maps.
BS32	Below ODOT Station	Could not open, manhole lid holes very small and unable to get off with available tools.
BS34	Below ODOT Station	Could not locate. Confirmed that this manhole is buried under at least a few feet of gravel and debris on hillside below ODOT station. See manhole inventory maps for approximate location of

		manhole.
BS35	Below ODOT Station	Could not locate. Confirmed that this manhole is buried under at least a few feet of gravel and debris on hillside below ODOT station. See manhole inventory maps for approximate location of manhole.
CLS21	North Shoulder Mt Hood Highway	Located through smoke testing, but buried by gravel and overgrown vegetation. Needs clearing/shoveling for access.
CS5	East Darr Road	Could not locate, likely buried under gravel driveway at 30546 E Darr Rd. Approximate location shown based on previous survey data.
DS15	East Alpen Way	Paved over (confirmed). See outline in pavement in report photo.
DS25	East Alpen Way	Paved over, approximate location at base of driveway of 30310 E Alpen Way house.
ES14	Camp Creek Trail	Could not find, in wilderness, buried? See map for approximate location.
ES15	Camp Creek Trail	Could not find, in wilderness, buried? See map for approximate location.
GLMH1	Grand Lodges Resort	Found but covered by fallen tree. Tree needs cleared and moved to access.
GLMH2	North Shoulder Mt Hood Highway	Found but cannot open because buried under thick layer of gravel.
GS2	Collins Lake / North Shoulder Mt Hood Highway	Could not find. Likely buried or covered with overgrown vegetation or debris.
GS6	North Shoulder Mt Hood Highway	Found, but cannot open because covered in gravel and muck.

Additionally, to improve upon the existing FDG maps of the GCSD, several manholes that were identified through the inventory effort were surveyed and added to the FDG Base Map. There were also some areas that were shown incorrectly on the map. The following areas were surveyed and either added to or revised on the base map:

- BS1(A), BS1(B)…BS1(G): The new Tyrolean Meadows development along Tyrolean Drive and Macartney Court south of Highway 26 had previously not been identified or shown on the base map. Seven manholes were surveyed and added to the map. These lines were also videoed in the 2020 TV project.

- BW1 – BW3: The manholes on the line from the AS mainline to the Best Western Hotel was surveyed and updated on the base map. This was done in conjunction with the repair of the mainline from BW1 to BW2 during the 2020 Sewer Rehabilitation Project.

- Collins Lake Resort: While no additional manholes were found or surveyed in the Collins Lake development, the sewer system and connections throughout the resort was revised through the inventory process. In several cases, there were manholes on the map that turned out to be cleanouts, reflecting an error in the available as-built maps of the resort. Additionally, the path and connections of the lines in some areas turned out to be incorrect and were revised on the base map accordingly.

- DS4 – DS24: The network of manholes and connections on East Wyeast Trail near the Barlow Pass West apartments had been previously mapped incorrectly, showing a connection from DS4(A) to DS5, rather than to DS4. Additionally, a previously un-surveyed MH DS3 was confirmed to be non-existent.

- AS37-AS41 (Mazama Lodge): The previous base map had the AS line ending at MH AS37. Through the inventory, four additional manholes were found that lead up to the Mazama Lodge. While these were not surveyed, approximate distances between manholes were paced out. Their approximate locations are now shown on the base map. These have not been included in any of the past GCSD TV projects, and it is recommended that they are included in the scope of next year's TV effort because of a potential identified obstruction in the lines (see Smoke Testing memo for more detail).

- SB1 – SB7 The line along East Multorpor Drive, from Frontage Road to Ski Bowl East, as previously shown on the maps under different labeling in approximate locations. These manholes were renamed and surveyed this summer and are now precisely shown on the map.

CONCLUSION & RECOMMENDATIONS

FDG concludes from the manhole inventory that the identified manholes in poor condition shall be priority to address in the coming years of manhole lining and repair, with the fair condition manholes being lower priority. Additionally, the manholes that were unable to be inventoried for various reasons shall be located and/or uncovered to allow for future access. The manhole inventory report shall serve as a reference to the District and contractors of District projects in being able to locate, identify, or look up detail of manholes in the collection system.

TECHNICAL MEMORANDUM

DATE: September 9th, 2020

RE: GSCD Master Plan Task 1D – Complete Video Database

TO: Government Camp Sanitary District

FROM: Erik Hoovestol, P.E., Firwood Design Group

OBJECTIVE

This technical memo summarizes the work by Firwood Design Group towards Task 1D, Complete Video Database, one of the four tasks in the scope of the information gathering phase of the Government Camp Sanitary District (GCSD) 20-Year Master Plan. The four tasks collectively present the district with an inventory of the collection system in its current condition and will provide a framework for recommendations to be in included in the upcoming master plan for maintenance and capital improvements to the system over a 20-year planning period.

This spreadsheet database of the videos was conceived in preparation for the 2020 Sanitary Sewer Rehabilitation Project. FDG had prepared a spreadsheet data base of each pipe run that has been videoed during the last two years (2018 & 2019). This represents about 40% of the system. This database proved to be especially useful for quickly identifying mainlines to target for the 2020 Sewer Rehabilitation Project and estimating associated costs.

This year's work completed the video database, collecting and processing video from 2017 and this year, 2020, which when added to 2018 and 2019 video collectively represents the entire system. FDG plans for this database to be similarly utilized in future repair projects, and to develop and guide the twenty-year master plan.

METHODOLOGY

The database includes the following information for each pipe segment:

- Upstream and downstream manhole

- Direction of camera video
- Length of video
- Date video recorded
- Location/Street of run
- As-Built Year (if available to FDG)
- Diameter and material type
- Number of service laterals and how many of them are capped

The videos were also accompanied with reports that identified problems in the runs called out by the video operators, including, but not limited to:

- Cracks
- Broken pipe segments
- Pipe material transitions
- Root intrusions
- Issues concerning joints
- Protruding taps

In the video reports, the above issues are associated with the footage identified and are usually accompanied with comments. These issues have been included in the spreadsheet as well, in the form of a simple tally. This quickly can show the quantity and severity of issues identified in the pipes.

RESULTS

The compiled video database details the findings of video of the complete Government Camp Sanitary District system. An early version of the database was used to determine high priority main lines to target for the 2020 Sanitary Sewer Rehabilitation Project performed earlier this year and to determine estimated costs of the project. The extent of the work performed is also reflected in the spreadsheet database, to keep an ongoing record of repairs to the system.

Some areas of town that have relatively high amount of identified problems as a whole are listed below:

- AS15 – AS20 – Gov't Camp Loop Road
- DS18 – DS22 – Alpen Way
- SB1 – SB5 – Ski Bowl East
- BS8 – BS15 – Mt Hood Highway / East Frontage

CONCLUSION & RECOMMENDATIONS

The database is an easily navigable tool to quickly find main lines that have several identified issues and for estimating the number of repairs needed. However, the information presented is not comprehensive and is meant to be used in conjunction with the detailed reports and/or videos themselves to truly determine the extent of the identified issues.

APPENDIX B

NPDES Permit

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTE DISCHARGE PERMIT

Department of Environmental Quality
Northwest Region – Portland Office
2020 SW 4th Avenue, Suite 400, Portland, OR 97201-4987
Telephone: (503) 229-5263

Issued pursuant to ORS 468B.050 and The Federal Clean Water Act

ISSUED TO:

Government Camp Sanitary District
PO Box 25
Government Camp, OR 97028

SOURCES COVERED BY THIS PERMIT:

	Type of Waste	Outfall Number	Outfall Location
	Treated Wastewater	001	R.M. 4

FACILITY TYPE AND LOCATION:

Activated Sludge - Sequencing Batch Reactor
Government Camp STP
85200 East Highway 26
Government Camp

Treatment System Class: Level II
Collection System Class: Level II

RECEIVING STREAM INFORMATION:

Basin: Sandy
Sub-Basin: Lower Columbia / Sandy
Receiving Stream: Camp Creek
LLID: 1218960453118
Hydro Code: 23A-ZIGZ 4 I
County: Clackamas

EPA REFERENCE NO: OR-002779-1
Issued in response to Application No. 985727 received June 13, 2002.
This permit is issued based on the land use findings in the permit record.

Neil Mullane, Water Quality Manager
Northwest Region

September 25, 2003
Date

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system and discharge to public waters adequately treated wastewaters only from the authorized discharge point or points established in Schedule A and only in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

Unless specifically authorized by this permit, by another NPDES or WPCF permit, or by Oregon Administrative Rule, any other direct or indirect discharge to waters of the state is prohibited, including discharge to an underground injection control system.

SCHEDULE A

1. Waste Discharge Limitations not to be exceeded after permit issuance.

a. Treated Effluent Outfall 001

(1) June 1 - October 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$ (See Note 1)	10 mg/L	15 mg/L	21	31	42
TSS	10 mg/L	15 mg/L	21	31	42

(2) November 1 - May 31:

Parameter	Average Effluent Concentrations Monthly	Weekly	Monthly* Average lb/day	Weekly* Average lb/day	Daily* Maximum lbs
$CBOD_5$	25 mg/L	40 mg/L	52	83	104
TSS	30 mg/L	45 mg/L	63	94	125

* Average dry weather design flow to the facility equals 0.25 MGD. Mass load limits based upon average dry weather design flow to the facility.

(3)

Other parameters (year-round)	Limitations
E. coli Bacteria	Shall not exceed 126 organisms per 100 mL monthly geometric mean. No single sample shall exceed 406 organisms per 100 mL. (See Note 2)
pH	Shall be within the range of 6.0 - 9.0
$CBOD_5$ and TSS Removal Efficiency	Shall not be less than 85% monthly average

(4) Except as provided for in OAR 340-045-0080, no wastes shall be discharged and no activities shall be conducted which violate Water Quality Standards as adopted in OAR 340-041-0485 except in the following defined mixing zone:

The allowable mixing zone is that portion of Camp Creek 30 feet downstream from the point of discharge.

(5) Temperature Limits
The excess thermal load discharged during the period of May 1 through October 31 shall not exceed 5.9 million kcal/day.

(6) Chlorine and chlorine compounds shall not be used as a disinfecting agent of the treated effluent and no chlorine residual shall be allowed in the discharged effluent due to chlorine used for maintenance purposes.

NOTES:

1. The $CBOD_5$ concentration limits are considered equivalent to the minimum design criteria for BOD_5 specified in Oregon Administrative Rules (OAR) 340-041. These limits and $CBOD_5$ mass limits may be adjusted (up or down) by permit action if more accurate information regarding $CBOD_5/BOD_5$ becomes available.

2. If a single sample exceeds 406 organisms per 100 mL, then five consecutive re-samples may be taken at four-hour intervals beginning within 28 hours after the original sample was taken. If the log mean of the five re-samples is less than or equal to 126 organisms per 100 mL, a violation shall not be triggered.

3. The thermal load limit was calculated using the maximum week dry weather design flow and an estimated maximum 7-day average effluent temperature. This permit may be re-opened, and the maximum allowable thermal load modified, when more accurate effluent temperature data becomes available. In addition, upon approval of a Total Maximum Daily Load for temperature for this sub-basin, this permit may be re-opened and new temperature and/or thermal load limits assigned.

SCHEDULE B

1. **Minimum Monitoring and Reporting Requirements** (unless otherwise approved in writing by the Department).

The permittee shall monitor the parameters as specified below at the locations indicated. The laboratory used by the permittee to analyze samples shall have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis, the results shall be included in the report, but not used in calculations required by this permit. When possible, the permittee shall re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.

a. Influent

The facility influent sampling locations are the following:

* Influent grab samples and measurements and composite samples are taken just after screening.

Item or Parameter	Minimum Frequency	Type of Sample
Total Flow (MGD)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
CBOD5	Weekly	Composite
TSS	Weekly	Composite
pH	2/week	Grab
Temperature	2/week	Grab
Ammonia (NH3-N)	Weekly	Composite

b. Treated Effluent Outfall 001

The facility effluent sampling locations are the following:

* Effluent grab samples and measurements are taken following UV disinfection. Composite samples are taken at the same location.

Item or Parameter	Minimum Frequency	Type of Sample
CBOD5	Weekly	Composite
TSS	Weekly	Composite
pH	2/Week	Grab
E. coli	Weekly	Grab (See Note 1)
UV Radiation Intensity	Daily	Reading (See Note 2)
UV Transmittance	Daily	Grab (See Note 3)
Pounds Discharged ($CBOD_5$ and TSS)	Weekly	Calculation
Average Percent Removed ($CBOD_5$ and TSS)	Monthly	Calculation
Ammonia (NH3-N)	Weekly	Composite

c. Biosolids Management

Item or Parameter	Minimum Frequency	Type of Sample
Sludge analysis including: Total Solids (% dry wt.) Volatile solids (% dry wt.) Biosolids nitrogen for: NH_3-N; NO_3-N; & TKN (% dry wt.) Phosphorus (% dry wt.) Potassium (% dry wt.) pH (standard units) Sludge metals content for: As, Cd, Cu, Hg, Mo, Ni, Pb, Se & Zn, measured as total in mg/kg	Annually	Composite sample to be representative of the product to be land applied (see Note 4)
Record of locations where biosolids are applied on each DEQ authorized site. (Site location maps to be maintained at the treatment facility for review upon request)	Each Occurrence	Date, volume & locations where biosolids were applied recorded on the site location map.
Quantity and type of alkaline product used to stabilize biosolids [when required to meet federal pathogen and vector attraction reduction requirements in 40 CFR 503.32(b)(3) and 40 CFR 503.33(b)(6)]	Each occurrence	Measurement
Initial time when solids that received alkaline agent ascended to pH >= 12	Each batch	Date, time, and actual pH measurement (corrected to standard at 25°C)
2 hours after initial alkaline addition and sustained at pH >= 12	Each batch	Date, time, and actual pH measurement (corrected to standard at 25°C)
24 hours after initial alkaline addition and pH >= 11.5 was sustained	Each batch	Date, time, and actual pH measurement (corrected to standard at 25°C)

d. Temperature Monitoring (Monitored only during June 1 - October 31)

Item or Parameter	Minimum Frequency	Type of Sample
Effluent Temperature, Daily Max (See Note 5)	Same frequency as pH	Grab between 3 and 4 PM
Effluent Temperature, Average of Daily Maximums (See Note 5)	Weekly	Calculation
Excess Thermal Load (See Note 5)	Weekly	Calculation (See Note 6)

2. Reporting Procedures

a. Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to the Department's Northwest Region - Portland office by the 15th day of the following month.

b. State monitoring reports shall identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. Monitoring reports shall also identify each system classification as found on page one of this permit.

c. Monitoring reports shall also include a record of the quantity and method of use of all sludge removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.

3. Report Submittals

a. The permittee shall have in place a program to identify and reduce inflow and infiltration into the sewage collection system. An annual report shall be submitted to the Department by February 1 each year which details sewer collection maintenance activities that reduce inflow and infiltration. The report shall state those activities that have been done in the previous year and those activities planned for the following year.

b. For any year in which biosolids are land applied, a report shall be submitted to the Department by February 19 of the following year that describes solids handling activities for the previous year and includes, but is not limited to, the required information outlined in OAR 340-050-0035(6)(a)-(e).

NOTES:

1. *E. coli* monitoring must be conducted according to any of the following test procedures as specified in **Standard Methods for the Examination of Water and Wastewater, 19th Edition**, or according to any test procedure that has been authorized and approved in writing by the Director or an authorized representative:

Method	Reference	Page	Method Number
mTEC agar, MF	Standard Methods, 18th Edition	9-29	9213 D
NA-MUG, MF	Standard Methods, 19th Edition	9-63	9222 G
Chromogenic Substrate, MPN Colilert QT	Standard Methods, 19th Edition Idexx Laboratories, Inc.	9-65	9223 B

2. The intensity of UV radiation passing through the water column will affect the systems ability to kill organisms. To track the reduction in intensity, the UV disinfection system must include a UV intensity meter with a sensor located in the water column at a specified distance from the UV bulbs. This meter will measure the intensity of UV radiation in mWatts-seconds/cm2. The daily UV radiation intensity shall be determined by reading the meter each day. If more than one meter is used, the daily recording will be an average of all meter readings each day.

3. UV disinfection effectiveness will be reduced as effluent light transmittance decreases. A bench test measurement of UV transmittance will provide the operator additional verification of the UV disinfection system effectiveness.

4. Composite samples from the biosolids truck discharge line shall consist of at least 4 aliquots of equal volume collected during the land application period and combined.

   Inorganic pollutant monitoring must be conducted according to Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Second Edition (1982) with Updates I and II and third Edition (1986) with Revision I.

5. After two full years of temperature monitoring, and if approved in writing by the Department, monitoring may be waived for those months when the effluent temperature does not exceed the stream temperature standard.

6. Calculated as follows:
   (Weekly average of daily maximum effluent temperatures in °C - applicable summer stream temperature standard, 12.8°C) X 1.8 X (Weekly average of daily flow in MGD) X 8.34 #/gal X 0.2520 kcal/BTU =Excess Thermal Load, in million kcal/day.

SCHEDULE C

Compliance Schedules and Conditions

1. By no later than ninety (90) days after permit issuance, the permittee shall submit to the Department a report which either identifies known sewage overflow locations and a plan for estimating the frequency, duration and quantity of sewage overflowing, or confirms that there are no overflow points. The report shall also provide a schedule to eliminate the overflow(s), if any.

2. The permittee is expected to meet the compliance dates which have been established in this schedule. Either prior to or no later than 14 days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director may revise a schedule of compliance if he/she determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. All biosolids shall be managed in accordance with the current DEQ approved biosolids management plan. Any changes in solids management activities that significantly differ from operations specified under the approved plan require the prior written approval of the DEQ.

2. This permit may be modified to incorporate any applicable standard for biosolids use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for biosolids use or disposal is more stringent than any requirements for biosolids use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

3. *The permittee shall comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49,* "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and accordingly:

   a. The permittee shall have its wastewater system supervised by one or more operators who are certified in a classification and grade level (equal to or greater) that corresponds with the classification (collection and/or treatment) of the system to be supervised as specified on page one of this permit.

Note: A "supervisor" is defined as the person exercising authority for establishing and executing the specific practice and procedures of operating the system in accordance with the policies of the permittee and requirements of the waste discharge permit. "Supervise" means responsible for the technical operation of a system, which may affect its performance or the quality of the effluent produced. Supervisors are not required to be on-site at all times.

   b. The permittee's wastewater system may not be without supervision (as required by Special Condition 3.a. above) for more than thirty (30) days. During this period, and at any time that the supervisor is not available to respond on-site (i.e. vacation, sick leave or off-call), the permittee must make available another person who is certified in the proper classification and at grade level I or higher.

   c. The permittee is responsible for ensuring the wastewater system has a properly certified supervisor available at all times to respond on-site at the request of the permittee and to any other operator.

   d. The permittee shall notify the Department of Environmental Quality in writing within thirty (30) days of replacement or redesignation of certified operators responsible for supervising wastewater system operation. The notice shall be filed with the Water Quality Division, Operator Certification Program, 811 SW 6th Ave, Portland, OR 97204. This requirement is in addition to the reporting requirements contained under Schedule B of this permit.

   e. Upon written request, the Department may grant the permittee reasonable time, not to exceed 120 days, to obtain the services of a qualified person to supervise the wastewater system. The written request must include justification for the time needed, a schedule for recruiting and hiring, the date the system supervisor availability ceased and the name of the alternate system supervisor(s) as required by 3.b. above.

4. The permittee shall notify the DEQ Northwest Region - Portland Office (phone: (503) 229-5263) in accordance with the response times noted in the General Conditions of this permit, of any malfunction so that corrective action can be coordinated between the permittee and the Department.

NPDES GENERAL CONDITIONS
(SCHEDULE F)

SECTION A. STANDARD CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of Oregon Revised Statutes (ORS) 468B.025 and is grounds for enforcement action; for permit termination, suspension, or modification; or for denial of a permit renewal application.

2. Penalties for Water Pollution and Permit Condition Violations

Oregon Law (ORS 468.140) allows the Director to impose civil penalties up to $10,000 per day for violation of a term, condition, or requirement of a permit.

In addition, a person who unlawfully pollutes water as specified in ORS 468.943 or ORS 468.946 is subject to criminal prosecution.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. In addition, upon request of the Department, the permittee shall correct any adverse impact on the environment or human health resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

4. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and have the permit renewed. The application shall be submitted at least 180 days before the expiration date of this permit.

The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date.

5. Permit Actions

This permit may be modified, suspended, revoked and reissued, or terminated for cause including, but not limited to, the following:

a. Violation of any term, condition, or requirement of this permit, a rule, or a statute;

b. Obtaining this permit by misrepresentation or failure to disclose fully all material facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

The filing of a request by the permittee for a permit modification or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. Toxic Pollutants

The permittee shall comply with any applicable effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

7. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege.

8. Permit References

Except for effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and standards for sewage sludge use or disposal established under Section 405(d) of the Clean Water Act, all rules and statutes referred to in this permit are those in effect on the date this permit is issued.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls, and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems that are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Duty to Halt or Reduce Activity

For industrial or commercial facilities, upon reduction, loss, or failure of the treatment facility, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until the facility is restored or an alternative method of treatment is provided. This requirement applies, for example, when the primary source of power of the treatment facility fails or is reduced or lost. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass of Treatment Facilities

a. Definitions

(1) "Bypass" means intentional diversion of waste streams from any portion of the treatment facility. The term "bypass" does not include nonuse of singular or multiple units or processes of a treatment works when the nonuse is insignificant to the quality and/or quantity of the effluent produced by the treatment works. The term "bypass" does not apply if the diversion does not cause effluent limitations to be exceeded, provided the diversion is to allow essential maintenance to assure efficient operation.

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities or treatment processes which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to

occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Prohibition of bypass.

(1) Bypass is prohibited unless:

(a) Bypass was necessary to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The permittee submitted notices and requests as required under General Condition B.3.c.

(2) The Director may approve an anticipated bypass, after considering its adverse effects and any alternatives to bypassing, when the Director determines that it will meet the three conditions listed above in General Condition B.3.b.(1).

c. Notice and request for bypass.

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior written notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in General Condition D.5.

4. Upset

a. Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operation error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of General Condition B.4.c are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the causes(s) of the upset;

(2) The permitted facility was at the time being properly operated;

(3) The permittee submitted notice of the upset as required in General Condition D.5, hereof (24-hour notice); and

(4) The permittee complied with any remedial measures required under General Condition A.3 hereof.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

5. Treatment of Single Operational Event

For purposes of this permit, A Single Operational Event which leads to simultaneous violations of more than one pollutant parameter shall be treated as a single violation. A single operational event is an exceptional incident which causes simultaneous, unintentional, unknowing (not the result of a knowing act or omission), temporary noncompliance with more than one Clean Water Act effluent discharge pollutant parameter. A single operational event does not include Clean Water Act violations involving discharge without a NPDES permit or noncompliance to the extent caused by improperly designed or inadequate treatment facilities. Each day of a single operational event is a violation.

6. Overflows from Wastewater Conveyance Systems and Associated Pump Stations

a. Definitions

(1) "Overflow" means the diversion and discharge of waste streams from any portion of the wastewater conveyance system including pump stations, through a designed overflow device or structure, other than discharges to the wastewater treatment facility.

(2) "Severe property damage" means substantial physical damage to property, damage to the conveyance system or pump station which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of an overflow.

(3) "Uncontrolled overflow" means the diversion of waste streams other than through a designed overflow device or structure, for example to overflowing manholes or overflowing into residences, commercial establishments, or industries that may be connected to a conveyance system.

b. Prohibition of overflows. Overflows are prohibited unless:

(1) Overflows were unavoidable to prevent an uncontrolled overflow, loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the overflows, such as the use of auxiliary pumping or conveyance systems, or maximization of conveyance system storage; and

(3) The overflows are the result of an upset as defined in General Condition B.4. and meeting all requirements of this condition.

c. Uncontrolled overflows are prohibited where wastewater is likely to escape or be carried into the waters of the State by any means.

d. Reporting required. Unless otherwise specified in writing by the Department, all overflows and uncontrolled overflows must be reported orally to the Department within 24 hours from the time the permittee becomes aware of the overflow. Reporting procedures are described in more detail in General Condition D.5.

7. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs, upon request by the Department, the permittee shall take such steps as are necessary to alert the public about the extent and nature of the discharge. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

8. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in such a manner as to prevent any pollutant from such materials from entering public waters, causing nuisance conditions, or creating a public health hazard.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Sampling and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and shall be taken, unless otherwise specified, before the effluent joins or is diluted by any other waste stream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Director.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements is consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10 percent from true discharge rates throughout the range of expected discharge volumes.

3. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

4. Penalties of Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than two years, or

by both. If a conviction of a person is for a violation committed after a first conviction of such person, punishment is a fine not more than $20,000 per day of violation, or by imprisonment of not more than four years or both.

5. Reporting of Monitoring Results

Monitoring results shall be summarized each month on a Discharge Monitoring Report form approved by the Department. The reports shall be submitted monthly and are to be mailed, delivered or otherwise transmitted by the 15th day of the following month unless specifically approved otherwise in Schedule B of this permit.

6. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report. Such increased frequency shall also be indicated. For a pollutant parameter that may be sampled more than once per day (e.g., Total Chlorine Residual), only the average daily value shall be recorded unless otherwise specified in this permit.

7. Averaging of Measurements

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean, except for bacteria which shall be averaged as specified in this permit.

8. Retention of Records

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records of all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

9. Records Contents

Records of monitoring information shall include:

a. The date, exact place, time and methods of sampling or measurements;

b. The individual(s) who performed the sampling or measurements;

c. The date(s) analyses were performed;

d. The individual(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of such analyses.

10. Inspection and Entry

The permittee shall allow the Director, or an authorized representative upon the presentation of credentials to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit, and

d. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by state law, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Planned Changes

The permittee shall comply with Oregon Administrative Rules (OAR) 340, Division 52, "Review of Plans and Specifications". Except where exempted under OAR 340-52, no construction, installation, or modification involving disposal systems, treatment works, sewerage systems, or common sewers shall be commenced until the plans and specifications are submitted to and approved by the Department. The permittee shall give notice to the Department as soon as possible of any planned physical alternations or additions to the permitted facility.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

3. Transfers

This permit may be transferred to a new permittee provided the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of the permit and the rules of the Commission. No permit shall be transferred to a third party without prior written approval from the Director. The permittee shall notify the Department when a transfer of property interest takes place.

4. Compliance Schedule

Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

5. Twenty-Four Hour Reporting

The permittee shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally (by telephone) within 24 hours, unless otherwise specified in this permit, from the time the permittee becomes aware of the circumstances. During normal business hours, the Department's

Regional office shall be called. Outside of normal business hours, the Department shall be contacted at 1-800-452-0311 (Oregon Emergency Response System).

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. If the permittee is establishing an affirmative defense of upset or bypass to any offense under ORS 468.922 to 468.946, and in which case if the original reporting notice was oral, delivered written notice must be made to the Department or other agency with regulatory jurisdiction within 4 (four) calendar days. The written submission shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected;

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and

e. Public notification steps taken, pursuant to General Condition B.7.

The following shall be included as information that must be reported within 24 hours under this paragraph:

a. Any unanticipated bypass which exceeds any effluent limitation in this permit.

b. Any upset which exceeds any effluent limitation in this permit.

c. Violation of maximum daily discharge limitation for any of the pollutants listed by the Director in this permit.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

6. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under General Condition D.4 or D.5, at the time monitoring reports are submitted. The reports shall contain:

a. A description of the noncompliance and its cause;

b. The period of noncompliance, including exact dates and times;

c. The estimated time noncompliance is expected to continue if it has not been corrected; and

d. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

7. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information that the Department may request to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Other Information: When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

8. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified in accordance with 40 CFR 122.22.

9. Falsification of Information

A person who supplies the Department with false information, or omits material or required information, as specified in ORS 468.953 is subject to criminal prosecution.

10. Changes to Indirect Dischargers - **[Applicable to Publicly Owned Treatment Works (POTW) only]**

The permittee must provide adequate notice to the Department of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants and;

b. Any substantial change in the volume or character of pollutants being introduced into the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

11. Changes to Discharges of Toxic Pollutant - **[Applicable to existing manufacturing, commercial, mining, and silvicultural dischargers only]**

The permittee must notify the Department as soon as they know or have reason to believe of the following:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels:

(1) One hundred micrograms per liter (100 µg/L);

(2) Two hundred micrograms per liter (200 µg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 µg/L);

(2) One milligram per liter (1 mg/L) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

(4) The level established by the Department in accordance with 40 CFR 122.44(f).

SECTION E. DEFINITIONS

1. BOD means five-day biochemical oxygen demand.

2. TSS means total suspended solids.

3. mg/L means milligrams per liter.

4. kg means kilograms.

5. m^3/d means cubic meters per day.

6. MGD means million gallons per day.

7. Composite sample means a sample formed by collecting and mixing discrete samples taken periodically and based on time or flow.

8. FC means fecal coliform bacteria.

9. Technology based permit effluent limitations means technology-based treatment requirements as defined in 40 CFR 125.3, and concentration and mass load effluent limitations that are based on minimum design criteria specified in OAR 340-41.

10. CBOD means five day carbonaceous biochemical oxygen demand.

11. Grab sample means an individual discrete sample collected over a period of time not to exceed 15 minutes.

12. Quarter means January through March, April through June, July through September, or October through December.

13. Month means calendar month.

14. Week means a calendar week of Sunday through Saturday.

15. Total residual chlorine means combined chlorine forms plus free residual chlorine.

16. The term "bacteria" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and E. coli bacteria.

17. POTW means a publicly owned treatment works.