CITY OF GRANTS PASS

WATER RESTORATION PLANT FACILITY PLAN

EXECUTIVE SUMMARY

FINAL

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ES.1 PLANNING OBJECTIVES

The Water Restoration Plant (WRP) Facilities Plan (Plan) was prepared to identify a logical path forward for the City of Grants Pass WRP for the next twenty years. The Plan aligns with the City's goal to "maintain, operate, and expand infrastructure to meet community needs." Therefore, the Plan identifies improvements needed to accommodate projected growth in the wastewater service area, maintain assets, and comply with anticipated future regulatory requirements. Projects needed during the planning period were programmed in a 20-year Capital Improvement Program (CIP). Key elements addressed in the Plan include:

- Wastewater flow and load projections from current conditions through the 20-year planning period,
- A plan for treatment facility projects that addresses current operational issues, accommodates growth, and provides flexibility to adapt to a variety of potential regulatory scenarios, including changes to the current permit requirements,
- A consideration of new and innovative process technologies for optimizing the existing liquid process facilities, and
- Recommended layout for phased WRP process expansions.

ES.2 BASIS OF PLANNING

The basis of planning establishes the foundation that provides a consistent framework for evaluating the WRP. The basis of planning includes defining the current and future WRP service area, current and future flow and loading conditions, and permitting and regulatory requirements that could impact the type and/or timeframe of needed improvements. A summary of these items follows:

WRP Service Area

The existing service area and land use for the WRP is presented in Figure ES.1.

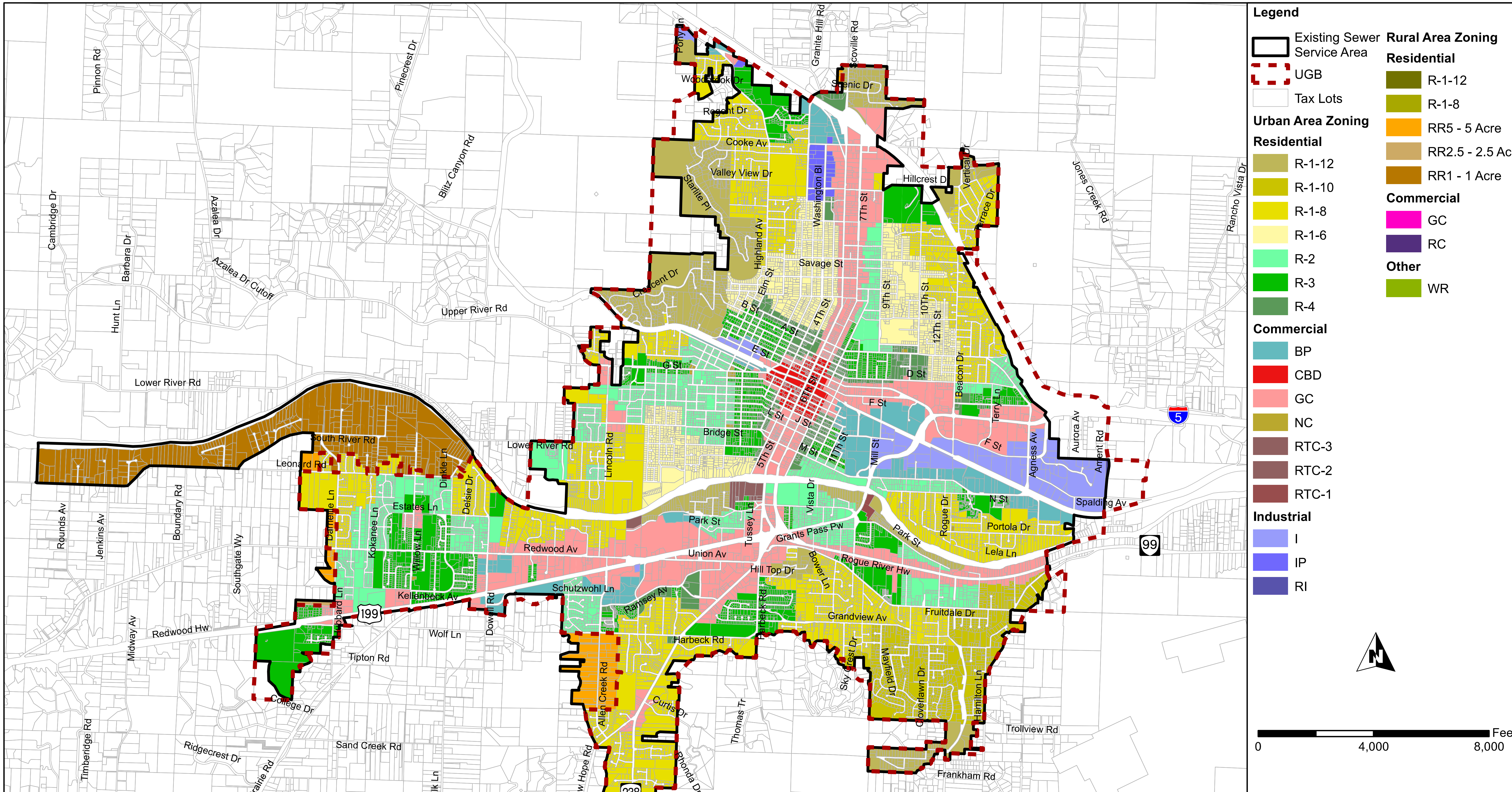

Figure ES 1
Existing Service Area Land Use
Water Restoration Plant Facilities Plan
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Population, Flow, and Load Projections

Population projections for the Plan followed the Water Master Plan and forecasts issued by the Oregon Office of Economic Analysis (OEA). A summary of the current and projected flows and loads based on the projected growth is provided in Table ES.1. The "current" data is based on the existing sewer service area; the projected 2035 data is based on growth anticipated within the current UGB as presented in Figure ES 1.

Table ES.1 Flow and Loads Projections
City of Grants Pass – Executive Summary

Description	Current	2035
Population	41,766	62,951
Flows:		
Average Dry Weather Flow (ADWF), mgd	5.2	7.8
Average Annual Flow (AAF), mgd	6.2	9.3
Average Wet Weather Flow (AWWF), mgd	7.1	10.6
Maximum Month Dry Weather Flow (MMDWF), mgd	6.3	9.4
Maximum Month Wet Weather Flow (MMWWF), mgd	10.3	15.5
Peak Day Flow (PDF), mgd	21.7	27.7
Peak Hour Flow (PHF), mgd	27.2	33.9
Loads:		
BOD_5		
Annual Average	7,500	12,000
Maximum Month	9,300	14,800
Maximum Week	12,200	19,400
Peak Day	16,500	26,300
TSS		
Annual Average	8,400	12,600
Maximum Month	11,600	17,500
Maximum Week	13,600	20,500
Peak Day	21,700	32,700
Ammonia		
Annual Average	920	1,390
Maximum Month	1,180	1,770
Maximum Day	1,480	2,220
Phosphorus		
Annual Average	260	390
Maximum Month	410	610
Maximum Day	570	860

Regulatory Considerations

Water quality standards and regulations continue to evolve and there are a number of new regulatory initiatives being discussed and/or implemented at the state and federal level that could significantly impact the future processes and/or operation of the Grants Pass WRP. The following are considered the most likely potential regulatory issues that could impact the Grants Pass WRP:

- Blending of wet weather flows: The Grants Pass WRP was designed to operate in a "blending" mode when flow exceeds the secondary system capacity. In this mode, the City currently meets all discharge permit limits, but not all flow receives secondary treatment. In the future all flow may need to receive secondary treatment. The City has adopted a comprehensive rehabilitation/replacement program to reduce and manage infiltration/inflow (I/I) and associated peak wet-weather flows. In addition to managing I/I within the collection system, the Plan identified that the City may need to operate in contact stabilization mode during peak flow events to accommodate peak hour flows (PHFs). If regulations change, disallowing blending, the City must reduce peak flows and/or increase secondary treatment capacity.
- Ammonia: The City's 2010 NPDES permit includes effluent quality requirements for ammonia. The current permit requirement was based on toxicity analysis for ammonia in the Rogue River. This requires the WRP to operate in a partial nitrification mode to reduce ammonia levels to a range of 9.6 to 21 mg/L during the summer months. Currently, to increase removal of ammonia (nitrification) the activated sludge system has been operated with a higher solids residence time (SRT). This increase in SRT results in a decrease in process capacity. The plan identifies additional aeration basin capacity is required to meet current and future permit requirements.

  Additionally, it is possible that nitrite could be regulated in the future. This may require the City to provide full nitrification with additional aeration basins.
- Temperature: The City currently has a thermal load based on Total Maximum Daily Load (TMDL). Northwest Environmental Advocates (NEA) challenged DEQ in federal court regarding the temperature rule and Natural Thermal Potential of streams and the federal court found in favor of NEA. For the City, this could mean new lower thermal load or temperature limits will be included in future NPDES permits. The Plan recommends monitoring this issue closely.
- Mass load limitations: The City's NPDES permit does not provide an increase in mass load and requires that all existing mass load limits, as established in the City's previous NPDES permit, continue to be met, even for higher flows. This requires higher levels of treatment prior to discharge. The Plan identifies fine screening and/or enhanced primary treatment to meet limits within the planning period.
- Priority persistent toxics: In the 2007 Oregon Legislature passed Senate Bill 737, which requires DEQ to list, monitor, and eventually control priority persistent bioaccumulative toxics that have a documented effect on human health, wildlife and aquatic life. DEQ will

use this list to prioritize toxic monitoring and other state water quality programs in the future. The implications of this regulatory issue for the City is increased monitoring, public education to limit toxics in the sewage, and pro-active pre-treatment program outreach within the planning period.

ES.3 EXISTING TREATMENT FACILITY

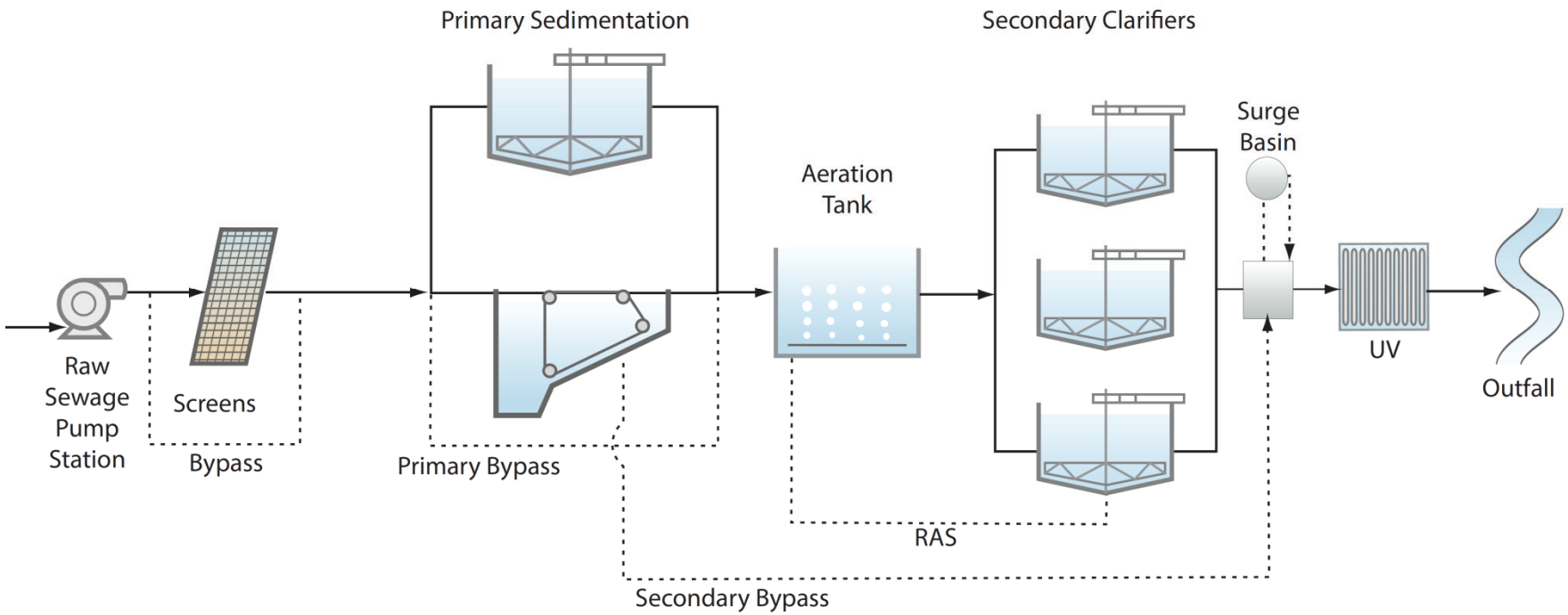
The Grants Pass WRP liquid stream processes includes the following major unit process - raw sewage pump station, screening, primary sedimentation, aeration, secondary sedimentation, and ultraviolet disinfection system. Figure ES.2 presents the liquids stream process schematic.

Solids from the primary process are processed in a gravity thickener (GT) prior to conveying to the anaerobic digester. The secondary process solids are processed on a Gravity Belt Thickener (GBT) prior to being sent to the anaerobic digester. The digested solids are dewatered using a belt filter press and hauled to a landfill for disposal. Figure ES.3 presents the solids schematic.

An evaluation of the unit processes was conducted to form the basis for identifying expansions required to meet flows, loads, and regulatory requirements through the planning period. Analysis of historical plant operation was used to identify on-going performance deficiencies. Design capacity of each unit process was compared to the projections of future flows and loads to identify requirements to accommodate growth and potential future effluent standards, and existing facilities information was reviewed to determine how new facilities could be integrated into the facility to achieve long-term capacity and treatment objectives.

Carollo's Biotran plant process simulator was calibrated based on plant data and used to estimate performance of unit processes and capacities. The Biotran model used mass balances and biological and physical models to simulate interactions between the different processes at the WRP. Model results, in conjunction with wastewater characteristics and design criteria, were used to establish treatment capacities for the different unit processes. The capacity of each unit process is summarized in Table ES.2.

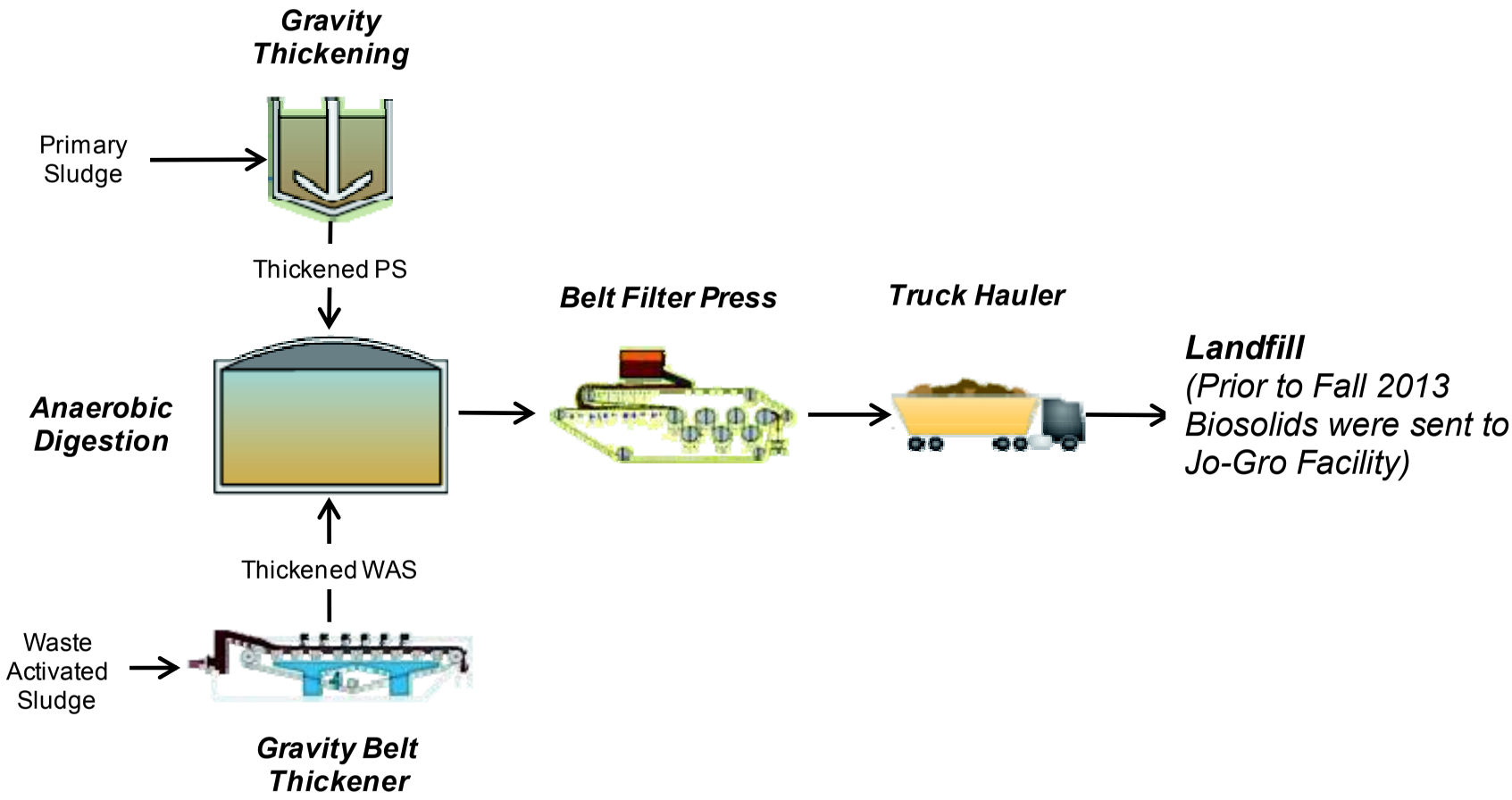
In addition to the process analysis, an assessment of the condition of WRP facilities and equipment was conducted. The complete condition and seismic assessment along with process analysis was then incorporated into the recommended plan for facility improvements through the planning period.



GRANTS PASS WRP LIQUID STREAM PROCESS SCHEMATIC

FIGURE ES 2

CITY OF GRANTS PASS
LIQUID STREAM PROCESS ANALYSIS



PROCESS SCHEMATIC FOR EXISTING SOLIDS TREATMENT

FIGURE ES 3

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WATER RESTORATION PLANT FACILITY PLAN

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Table ES.2 WRP Unit Process Capacity Summary
City of Grants Pass – Executive Summary

Unit Process	Criteria	Current Rated Capacity
Raw Sewage Pump Station	PHF with largest unit out of service	44 mgd(1)
Influent Screening Facilities	PHF all units in service with bypass	18.5 mgd
Primary Sedimentation Tanks	Overflow criterion for MMWWF @2000 gpd/sf Overflow criterion for PHF @4000 gpd/sf	20.9 mgd
Aeration Tanks	Minimum aerobic SRT = 3 days	13.5 mgd
Aeration Tanks with ML Bypass Open	Minimum aerobic SRT = 3 days	19.7 mgd
Secondary Clarifiers	PHF with all units in service	22.4 mgd
UV Disinfection	Dose 20-25 mJ/cm^2 with one log of safety at PHF conditions	47 mgd
Effluent Outfall Diffuser	Based on a Rogue River ordinary high water surface elevation of 890.00 feet	76 mgd
Gravity Thickener	Maximum month dry weather solids loading	17,900 ppd
Gravity Belt Thickeners	Maximum month dry weather flow	0.325 mgd
Anaerobic Digestion	20 days HRT 0.15 ppd VS/day	0.021 mgd 8,900 ppd
Belt Filter Press	Maximum month dry weather solids loading	9,900 ppd(2)

Notes:
(1) Firm capacity, assumes largest pump out of service.
(2) Based on 35 hours per week operation.

ES.4 RECOMMENDED WRP IMPROVEMENTS

Recommended improvements for major liquid stream unit processes are summarized below:

Raw Sewage Pump Station. The current pump station has sufficient capacity through 2035. No upgrades are needed.

Screening System. The two existing screens and screenings handling system have adequate capacity for 2035 loadings. However, channel modifications are required to allow all flow to go through the headworks under PHF conditions

Primary Sedimentation Tanks. To operate effectively with 2035 flows, two additional primary sedimentation tanks of equivalent size to the two existing rectangular units are needed. To meet the MMWWF capacity criterion, one new tank is required immediately, while the second will be needed by 2030.

Grit Removal System. The existing grit removal system has adequate capacity for 2035 loadings. However, based on the condition assessment the system should be replaced as soon as feasible.

Activated Sludge System. The activated sludge system is nearing current capacity during both the partial nitrification and winter secondary treatment seasons. Construction of two new aeration tanks with associated appurtenances is recommended. Additionally, the capacity of the existing secondary clarifiers is inadequate for current PHF loadings at the desired loading rate of 1250 gpd/sf. A new 100-foot diameter clarifier is recommended to provide treatment capacity for the majority of the planning period.

UV Disinfection. Alternatives to upgrade the existing medium pressure UV system with a more energy efficient system with an estimated lower maintenance cost were investigated. Replacement of the equipment in either one or both UV channels is recommended. These upgrades may be eligible for energy efficiency grants from Energy Trust of Oregon.

The recommended solid stream improvements are as follows:

Gravity Thickeners. Construction of one 25-ft diameter gravity thickeners with 17 ft walls and rehabilitating the existing gravity thickener is recommended. Two progressive cavity pumps for underflow pumping and scum pumps are also included in the upgrade. As the current gravity thickener is in poor condition, it is assumed the upgrades will be constructed immediately.

WAS Diversion Pipeline and Mixing Upgrades. The WAS diversion pipeline includes the installation of a pipeline to provide a thickened waste activated sludge (TWAS) bypass for the digester. This pipeline connects the GBT to the sludge holding tank. Mixer and basin upgrades are also recommended for the sludge holding tank and chlorine contact basin to allow sludge storage in the event of a catastrophic failure of the BFP. The mixer and basin upgrades include replacing the existing sludge mechanism in the sludge holding tank with a mixer, as it is in poor condition, and removing the baffle walls and installing a mixer in the chlorine contact basin. The pipeline and basin upgrades are not necessary until year 2021.

Seismic Upgrades. In addition to the liquid and solid stream processes the following seismic upgrades are recommended since several structures at the WRP do not meet the Life Safety Level performance objectives as defined by American Society of Civil Engineers Standard 31 (ASCE 31-03). These upgrades include the following:

- Operations Building: Adding straps, wall anchors, equipment anchorage, pipe bracing, roof collector element, anchor face brick, and replacing glass.
- Digester Control Building: Upgrades in the digester control building include adding wall anchors, replacing glass, adding equipment anchorage, and pipe bracing.
- Headworks Electrical Building: This project element includes replacing roofing, adding straps, adding wall anchors, equipment anchorage, bracing duct and pipes.
- Plant Drain Pump Station: Adding equipment anchorage.
- Oil Storage House: The task under this project will include adding anchorage and removing and infilling access door.
- Gravity Thickener Sludge Pump Building: Replacing damaged plywood, complete nailing, and adding wall anchorage.

ES.5 CAPITAL IMPROVEMENT PLAN

Based on basis of planning and alternative analysis, the improvements required to meet and accommodate growth, and upgrade facilities to comply with current and anticipated regulations, the Capital Improvement Plan (CIP) was organized into three phases. These phases are assembled by need, logical construction sequence, and cash flow.

Table ES.3 summarizes the estimated total project costs for the improvements recommended in the CIP. All cost estimates prepared as part of the planning effort are order-of-magnitude estimates.

As presented, in Phase 1 the older of the two aged ultraviolet (UV) disinfection units is replaced with a new, more energy efficient UV unit. This upgrade restores the reliability of the disinfection process. Additionally, seismic upgrades are made to existing facilities to address life safety issues that are not addressed in Phase 2.

Phase 2 includes projects needed to treat maximum month wet weather flows, increase peak hour capacity, and allow the existing aeration basin to be taken offline to replace diffusers and make other needed repairs. Additionally, Phase 2 includes rehabilitation of the existing gravity thickener and construction of one new gravity thickener to provide a reliable sludge thickening process.

Phase 3 expands plant capacity to accommodate growth and addresses the remainder of plant upgrades needed through the planning year 2035.

Table ES.3 Recommended CIP
City of Grants Pass – Executive Summary

CIP Project Phase	Cost, $	Fiscal Years
Phase 1	1,500,000	2015 – 2016
UV Disinfection	1,093,000	
Seismic Upgrades	407,000	
Phase 2	9,643,000	2016-2020
Primary Clarifier No. 3	2,703,000	
Aeration Basins No. 3 and 4	5,728,000	
Rehabilitate GT and One New GT	1,100,000	
Screening Hydraulic Improvements	112,000	
Phase 3	8,918,000	2020-2023
Primary Clarifier No. 4	2,703,000	
Secondary Clarifier No. 4	5,017,000	
WAS Diversion Pipeline and Mixing Upgrades	440,000	
Degritting Improvements	758,000	
Total CIP	20,061,000	