FINAL REPORT | MAY 2026

Water Quality and Recycled Water Supply Feasibility Study

PREPARED FOR

Russian River County Sanitation District

Sonoma Water

PREPARED BY

WEST YOST

Water. Engineered.

Water Quality and Recycled Water Supply Feasibility Study

Prepared for

Russian River County Sanitation District

Project No. 798-50-24-05

Prepared by: Charles Hardy, PE, RCE #71015	May 6, 2026 Date

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LIST OF ACRONYMS AND ABBREVIATIONS

AAF	Annual Average Flow
ADWF	Average Dry Weather Flow
AF	Acre-Feet
AFY	Acre-Feet per Year
BNR	Biological Nutrient Removal
BOD	Biological Oxygen Demand
CCB	Chlorine Contact Basin
CIMIS	California Irrigation Management Information System
CIWQS	California Integrated Water Quality System
DAC	Disadvantaged Community
DDW	Division of Drinking Water
DI	Ductile Iron
ECA	Enhanced Compliance Action
EQ	Equalization
ESD	Equivalent Single-Family Dwelling
Feasibility Study	Water Quality and Recycled Water Supply Feasibility Study
FEMA	Federal Emergency Management Agency
FTE	Full-Time Equivalent
FWD	Forestville Water District
GCSD	Graton Community Services District
GIS	Geographic Information System
gpd	Gallon per Day
I&I	Inflow and Infiltration
Laguna WWTP	Regional Laguna WWTP
lb/day	Pound per Day
MABR	Membrane Aerated Biofilm Reactor
MBR	Membrane Bioreactor
MG	Million Gallon
mg/L	Milligram per Liter
mgd	Million Gallon per Day
MHI	Median Household Income
MLSS	Mixed Liquor Suspended Solids
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
O&M	Operations and Maintenance
OCSD	Occidental County Sanitation District
OPCC	Opinion of Probable Capital Cost
OPTCC	Opinion of Probable Total Capital Cost
OWTS	On-Site Wastewater Treatment System
PDF	Peak Day Flow

PVC	Polyvinyl Chloride
RCP	Representative Concentration Pathways
Regional Water Board	North Coast Regional Water Quality Control Board
RRCSD	Russian River County Sanitation District
SAF	Suspended Air Flotation
Santa Rosa	City of Santa Rosa
Settlement Agreement	*Settlement Agreement and Stipulation for Entry of Order No. R1-2023-0049*
SMR	Self-Monitoring Report
Sonoma Water	Sonoma County Water Agency
SRT	Solids Retention Time
SSO	Sanitary Sewer Overflow
State Water Board	California State Water Resources Control Board
TM	Technical Memorandum
TMDL	Total Maximum Daily Load
TSO	Time Schedule Order
TSS	Total Suspended Solids
UV	Ultraviolet Light
WAS	Waste Activated Sludge
West County	Western Sonoma County
Windsor	Town of Windsor
WWTP	Wastewater Treatment Plant

CHAPTER 1
Introduction

The Russian River County Sanitation District (RRCSD) has prepared this Water Quality and Recycled Water Supply Feasibility Study (Feasibility Study) to evaluate potential regional wastewater management solutions for both sewered and unsewered communities in western Sonoma County (West County). This section introduces this study effort under the following headings:

- Regulatory Background
- Study Approach
- Study Area
- Report Overview

1.1 REGULATORY BACKGROUND

On December 13, 2023, the North Coast Regional Water Quality Control Board (Regional Water Board) entered into a *Settlement Agreement and Stipulation for Entry of Order No. R1-2023-0049* (Settlement Agreement)[1] with Sonoma County Water Agency (Sonoma Water) and RRCSD. The Settlement Agreement defines an Enhanced Compliance Action (ECA) that must be completed by RRCSD as follows:

> *The ECA project (Project) titled "West County Water Quality and Recycled Water Supply Feasibility Project with Stakeholder Committee" consists of conducting a high-level feasibility study to evaluate potential regional projects that could improve water quality, water supply reliability, Pathogen TMDL compliance[2], and climate change resiliency in the Russian River watershed, and address ratepayer costs for West County wastewater systems by exploring the cost savings of regionalization. The feasibility study would be coupled with a stakeholder program to help inform and identify community support for potential regional solutions to the many wastewater challenges and water resource opportunities in west Sonoma County. The primary deliverable will be a Final Feasibility Study Report with data needed to make informed decisions for a future of resiliency supporting long-term improvements and short-term pathogen TMDL implementation. This ECA project will investigate creating regional wastewater treatment and reuse systems for more reliable and cost-effective services, study water recycling systems and pipelines, survey wastewater connection and consolidation opportunities for onsite wastewater treatment systems, and explore employing increased climate change resiliency.*

This document fulfills the Draft Feasibility Study Report requirement of the ECA. Sonoma Water has conducted a stakeholder engagement process in parallel with preparation of the Feasibility Study technical analysis.

Feedback from the stakeholder engagement program was incorporated into a November 2025 version of the Draft Feasibility Study Report, where relevant. This March 2026 version of the Draft Feasibility Study Report includes additional refinements made to incorporate additional feedback received from the stakeholder group based on their review of the November 2025 Draft Feasibility Study Report. The

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[1] The Settlement Agreement had been developed to address actions required following three sanitary sewer overflow (SSO) events that violated provisions within the previous discharge permit for the RRCSD Wastewater Treatment Plan (WWTP) (Regional Water Board Order No. R1-2014-0002).

[2] The Regional Water Board established the Pathogen TMDL for the Russian River on July 10, 2020. In 2015, the Russian River was listed as being impaired related to bacteria (e.g. pathogens). The Pathogen TMDL was adopted to address pathogens from specific controllable pathogen sources, which include treated municipal wastewater and untreated wastewater from sanitary sewer systems and Onsite Wastewater Treatment Systems (OWTSs).

stakeholder comments received based on review of the November 2025 version of the Draft Feasibility Study Report are included as Appendix I. A Final Feasibility Study Report will be prepared based on Regional Board input. Completion of the final report is anticipated in May 2026, following receipt of Regional Water Board comments on the draft report.

1.2 STUDY APPROACH

The goal for this Feasibility Study is to identify the wastewater treatment and major conveyance infrastructure that would potentially be needed to support regionalization of wastewater treatment within the West County area. Detailed analysis, including defining the specific collection system infrastructure required within currently unsewered areas and design-level evaluations, are outside the scope of this work. Within that framework, the Feasibility Study is structured around a systematic, two-phase process. In the first phase, alternatives for regionalizing wastewater treatment for the four existing wastewater agencies of interest that serve the West County area were identified, screened and evaluated. These four agencies of interest are as follows:

- RRCSD
- Forestville Water District (FWD)
- Graton Community Services District (GCSD)
- Occidental Community Services District (OCSD)

In the first phase, eight potential alternatives were identified and screened to define five feasible alternatives.[3] The second phase of the evaluation involved further analysis of these five preferred alternatives to include the infrastructure required to receive, treat and recycle wastewater from nearby unsewered areas.

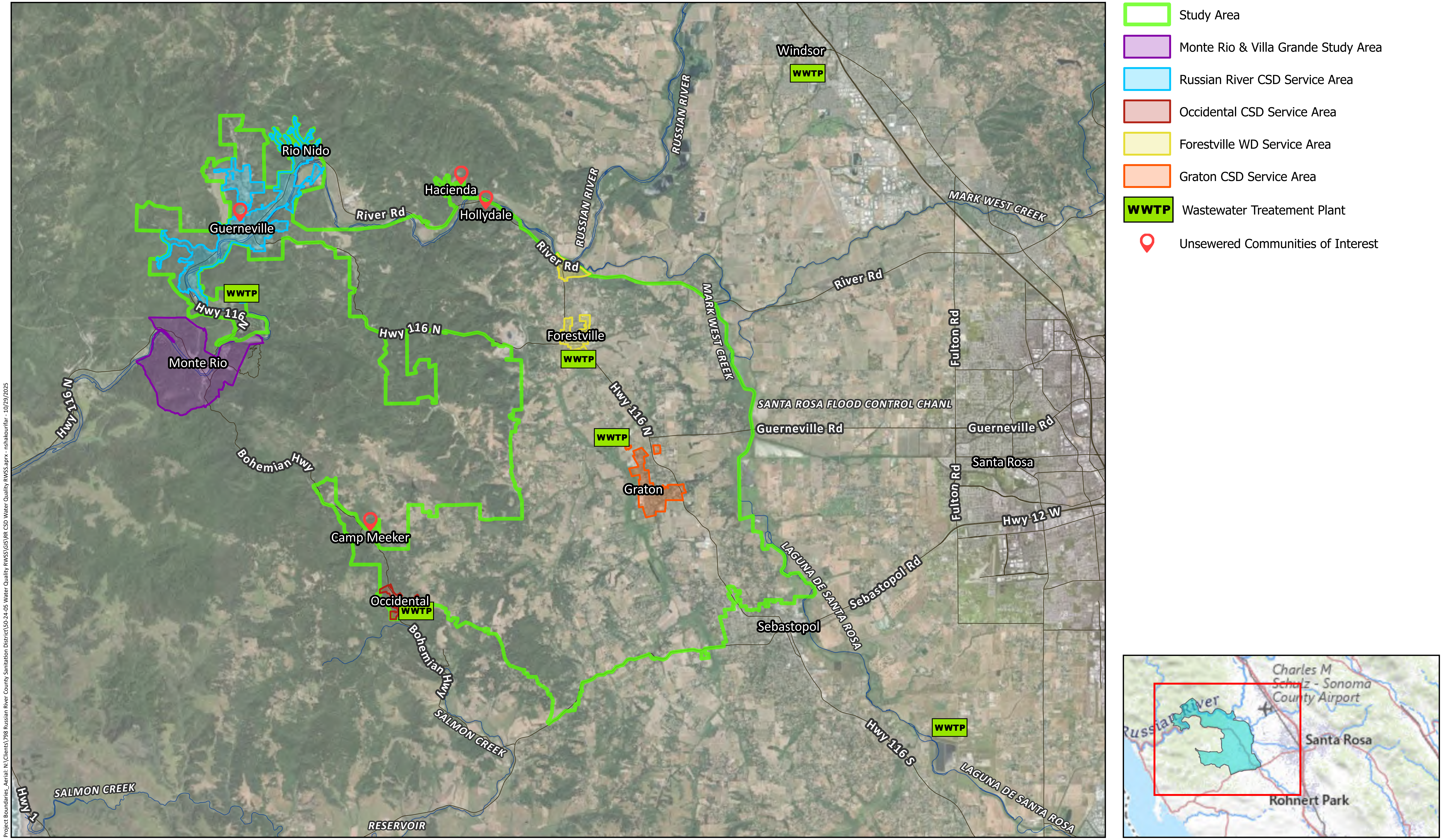
1.3 STUDY AREA

The Study Area is shown on Figure 1-1. This area encompasses the existing service areas of the four existing West County wastewater agencies of interest, as well as currently unsewered parcels that are near the existing service areas or along major roadways that connect the existing service area. In accordance with the Settlement Agreement, the Study Area also includes the following economically disadvantaged communities (DACs):

- Hacienda
- Hollydale
- Camp Meeker
- Guerneville[4]

[3] Feasible alternatives refer to potentially viable, lower cost, and higher qualitative ranking regionalization approaches. Defining a project that will ultimately be implemented will need to include additional engineering analysis and assessment of governance and financing feasibility that are outside the scope of this technical feasibility study.

[4] Most of the unincorporated area of Guerneville is included within the RRCSD service area.



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Water Quality and Recycled

Water Supply Feasibility Study

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Study Area

Figure 1-1

Two related efforts were also referenced in defining the Study Area:

- Sonoma County's recently completed Geographic Information Systems (GIS) analysis that identifies groupings of unsewered "community clusters" of interest.
- The Monte Rio/Villa Grande area was defined under the Monte Rio/Villa Grande Wastewater Solutions Project, which evaluates strategies for management of wastewater from a currently unsewered area southwest of the RRCSD service area. Findings and information from the *Feasibility and Preliminary Design Report* for that project (Monte Rio Study Report)[5] are incorporated into this Feasibility Study.

1.4 REPORT OVERVIEW

This Feasibility Study Report is organized into nine chapters as follows:

- **Chapter 1. Introduction**
- **Chapter 2. Service Area and Wastewater Characteristics**: This chapter documents the wastewater systems of the four West County agencies of interest, including: influent and effluent characteristics, regulatory requirements, treatment facilities layouts and capacities, and recycled water operations. Opportunities and constraints related to potential regionalization strategies are also identified.
- **Chapter 3. Alternatives Screening:** This chapter presents a screening evaluation of eight conceptual regionalization alternatives that were developed to serve the four West County agencies of interest. The alternatives evaluated include strategies that involve developing local regional treatment facilities and strategies that involve export of wastewater to the Town of Windsor (Windsor) Wastewater Treatment Plant (WWTP) or the City of Santa Rosa (Santa Rosa) Laguna WWTP. Baseline infrastructure needs and capital costs were defined for each regional alternative, and a qualitative screening analysis was used to define the five feasible alternatives (from a technical, infrastructure cost, and qualitative ranking perspective).
- **Chapter 4. Feasible Alternatives Analysis:** This chapter presents a quantitative cost-benefit evaluation of the five feasible alternatives established in Chapter 3. This additional evaluation included refining of the infrastructure needs, preparing site layouts, and development of a 20-year lifecycle costs analysis. The lifecycle costs were then combined with qualitative screening criteria to identify feasible strategies.
- **Chapter 5. Unsewered Areas Characterization:** This chapter presents the characterization of unsewered parcels within the Study Area that was used to define the clusters of parcels (community clusters) that were selected for inclusion in the Feasibility Study. Twelve community clusters were selected, based on a high-level ranking analysis, including the previously studied Monte Rio/Villa Grande area.

[5] Brelje & Race Consulting Engineers, 2026. *Monte Rio and Villa Grande Wastewater Solutions. Feasibility and Preliminary Design Report*. Prepared for Sonoma Water. January 2026.

- **Chapter 6. Recycled Water Opportunities and Constraints:** The Regional Water Board's *Water Quality Control Plan for the North Coast Region* (Basin Plan) prohibits point source waste discharges to the Russian River and its tributaries during the period of May 15 through September 30. Therefore, recycled water use within the West County area will need to increase if currently unsewered parcels are incorporated into a regional wastewater treatment strategy. Chapter 6 documents an assessment of potential recycled water market opportunities and constraints within the West County area.
- **Chapter 7. Climate Change Resiliency:** This chapter documents the flooding-related climate change risks to existing wastewater treatment infrastructure within the Study Area. Possible flood-related impacts for both existing conditions and potential climate change scenarios were identified for the four wastewater treatment facilities and the existing OWTSs. This chapter also documents the potential water supply-related benefits associated with regionalization. Possible water supply impacts under future climate change scenarios are described.
- **Chapter 8. Potential Unsewered Community Solutions:** This chapter documents the infrastructure needs and 20-year lifecycle costs for expanding the five feasible alternatives addressed in Chapters 3 and 4 to also include the wastewater generated from the twelve unsewered community clusters selected in Chapter 5. The objective of this analysis was to identify strategies that could be further investigated following completion of this Feasibility Study.
- **Chapter 9. Conclusions and Recommendations:** This chapter provides a summary of the major findings and recommendations identified through the development of this Feasibility Study.

CHAPTER 2
Service Area and Wastewater Characterization

This Chapter provides service area and wastewater characteristics for the four wastewater districts of interest. The topics addressed are as follows:

- Information Sources
- RRCSD
- GCSD
- FWD
- OCSD
- Combined Flows and Loads

2.1 INFORMATION SOURCES

The information presented in this Chapter was derived from the information summarized below by agency. In addition to this information, the Sonoma County Hazard Mapping Tool[1] was used to identify potential hazards for each of the three WWTPs of interest.

2.1.1 RRCSD

- Data:
  - West Yost visit (June 7, 2024) to the RRCSD WWTP site
  - Subsequent communications with RRCSD/Sonoma Water staff
  - California Integrated Water Quality System Project (CIWQS) Self-Monitoring Report (SMR) data
  - U.S. Decennial Census Data
- Documents (plans, reports):
  - CIWQS Violation Reports and Sanitary Sewer Overflow (SSO) Reports
  - National Pollutant Discharge Elimination System (NPDES) Waste Discharge Requirements Order No. R1-2021-0002 for the RRCSD WWTP (discharge permit)
  - RRCSD 2023 Annual Recycled Water Report
  - RRCSD 2021 Title 22 Recycled Water Engineering Report
  - 2022 RRCSD Land Discharge/Recycled Water Operations and Management Plan
  - 2024 Median Household Income (MHI) Survey by RCAC Community & Environmental Services
  - RRCSD Spring 2024 Newsletter
  - 2024 Ordinance No. 6485 – 94 RRCSD (sewer rate ordinance)
- May 2024 *Technical Memorandum 2. Russian River Treatment Plant Asset Management Plan* (Asset Management Plan) by Carollo
- January 2025 Regulatory Analysis and Flow and Loads Analysis reports for RRCSD WWTP Master Plan by Woodard & Curran and HDR (RRCSD Treatment Plant Master Plan)
- August 2025 Capacity Assessment draft report for RRCSD Treatment Plant Master Plan

[1] https://experience.arcgis.com/experience/64d531fc0e654c19a40a172a074a5640/ page/Hazard-Mapping-Tool

- As-built drawings:
  - 1979 RRCSD WWTP (original construction)
  - 2005 Third Unit Processes Project
  - 2013 Biological Nutrient Removal (BNR) Project

2.1.2 GCSD

- Data:
  - West Yost visit (June 18, 2024) to the GCSD WWTP site
  - Subsequent communications with GCSD/Sonoma Water staff
  - CIWQS SMR data
  - U.S. Decennial Census Data
- Documents (plans, reports):
  - CIWQS Violation Reports SSO Reports
  - NPDES Permit Waste Discharge Requirements Order No. R1-2018-0001 for the GCSD WWTP
  - Tentative NPDES Permit Waste Discharge Requirements Order No. R1-2024-0001 for the GCSD WWTP
  - GCSD 2023 Title 22 Recycled Water Engineering Report
  - 2022 Occidental to Graton Wastewater Pipeline Feasibility Study by Brelje & Race Consulting Engineers
  - GCSD Fiscal Year 2023/2024 Budget
  - 2025 *Sewer Rate Study for the GCSD Draft Report* by Lechowicz + Tseng Municipal Consultants

2.1.3 FWD

- Data:
  - West Yost visit (June 18, 2024) to the FWD WWTP site
  - Subsequent communications with FWD/Sonoma Water staff
  - CIWQS SMR data
  - U.S. Decennial Census Data
- Documents (plans, reports):
  - CIWQS Violation Reports and SSO Reports
  - NPDES Permit Waste Discharge Requirements Order No. R1-2024-0004 for the FWD WWTP
  - FWD 2023 Title 22 Recycled Water Engineering Report
  - FWD Fiscal Year 2023/2024 Budget
  - 2022 FWD Resolution No. 421
  - 2024 FWD Ordinance Number 83
- 2001 FWD WWTP Upgrade As-Built Drawings

2.1.4 OCSD

- Data:
  - West Yost visit (June 7, 2024) to the OCSD WWTP site
  - Subsequent communications with OCSD/Sonoma Water staff
  - OCSD truck hauling and pond water depth data
  - CIWQS SMR data
  - California Irrigation Management Information System (CIMIS) weather data
  - U.S. Decennial Census Data
- Documents (plans, reports):
  - CIWQS Violation Reports and SSO Reports
  - 2022 Occidental to Graton Wastewater Pipeline Feasibility Study by Brelje & Race Consulting Engineers
  - 2017 Project study for wastewater transport to Airport/Larkfield/Wikiup Sanitation Zone (Airport) WWTP
  - 2015 WWTP Reclaimed Water Project Alternatives Analysis by Stantec Consulting Services
  - OCSD Budgets for Fiscal Years 2021-2025
  - 2024 Ordinance No. 6484 – 100 OCSD (sewer rate ordinance)
- As-built drawings:
  - 1969 OCSD Water Quality Control Facility Expansion No. 1
  - 1985 OCSD Wastewater System Improvements
  - 2017 OCSD Wastewater Transport Compliance

2.2 RRCSD SERVICE AREA AND FACILITIES

This section details the RRCSD service area and wastewater facilities, focused on the following topics:

- Service area overview
- Regulatory requirements
- Wastewater characteristics
- Treatment facilities
- Recycled water operations
- Opportunities and constraints

The RRCSD is currently in the process of completing the RRCSD Treatment Plant Master Plan, and information developed as part of that effort has been used to the extent possible to complete this section.

2.2.1 RRCSD Service Area Overview

RRCSD provides wastewater collection, treatment and disposal for portions of the unincorporated communities of Rio Nido, Vacation Park, Guerneville and Guernewood Park. Sonoma Water manages and operates the RRCSD facilities. The 2,700-acre RRCSD service area and RRCSD collection system are shown on Figure 2-1.

The RRCSD collection system consists of the following facilities:

- 35 miles of gravity pipe
- Five miles of pressurized force main
- 11 lift stations

The collection system extends along both sides of the Russian River and crosses the river in two locations. During periods of high rainfall and flooding, the lift stations often become inundated. RRCSD has reported 12 SSOs since January 2019.

Pending funding availability, preferably grant funding, RRCSD plans to replace three force mains and upgrade the lift stations to improve seismic and flood resiliency and address aging-related deficiencies. However, high peak influent flows to the WWTP are expected to continue, as these collection system improvements are not specifically focused on reducing inflow and infiltration (I&I).

The service area currently serves a population of 7,305 residents, comprising 3,213 equivalent single-family dwellings (ESDs)[2] including commercial and institutional customers and 2,503 connections. Between 2010 and 2020, Guerneville's residential population grew an average of less than 0.1 percent per year, based on U.S. census data. As part of the RRCSD Treatment Plant Master Plan currently under development for RRCSD, a growth rate of 0.6 percent per year is anticipated over the next 20 years. This would result in an additional 408 new ESDs or an increase of 13 percent.

The RRCSD service area has been classified in the past as a DAC, allowing RRCSD to be eligible for certain California State Water Resources Control Board (State Water Board) funding programs. The 2024 MHI Survey found the service area MHI was 81 percent of the 2022 California statewide MHI, putting RRCSD just over the 80 percent threshold to be considered a DAC. RRCSD staff anticipate RRCSD may be reclassified as a DAC once the Statewide MHI is updated.

The American Community Survey 5-year data, which is used to calculate the Statewide MHI, was last updated to include 2023 data in December 2024. Based on that update, RRCSD is classified as a small DAC through March 31, 2026. The statewide MHI for the 2019 to 2023 period is $96,334. According to the income survey conducted on March 28, 2024, RRCSD's MHI is $74,625, which is 77 percent of the statewide MHI. While not an official determination, it is anticipated the RRCSD will continue to qualify as a small DAC annually through the year 2029, when the income survey data expires - provided there are no significant changes to the RRCSD's boundaries, demographics or other factors that might prompt the California Division of Financial Assistance to request a new income survey. This projection also assumes that the statewide MHI continues to increase each year.

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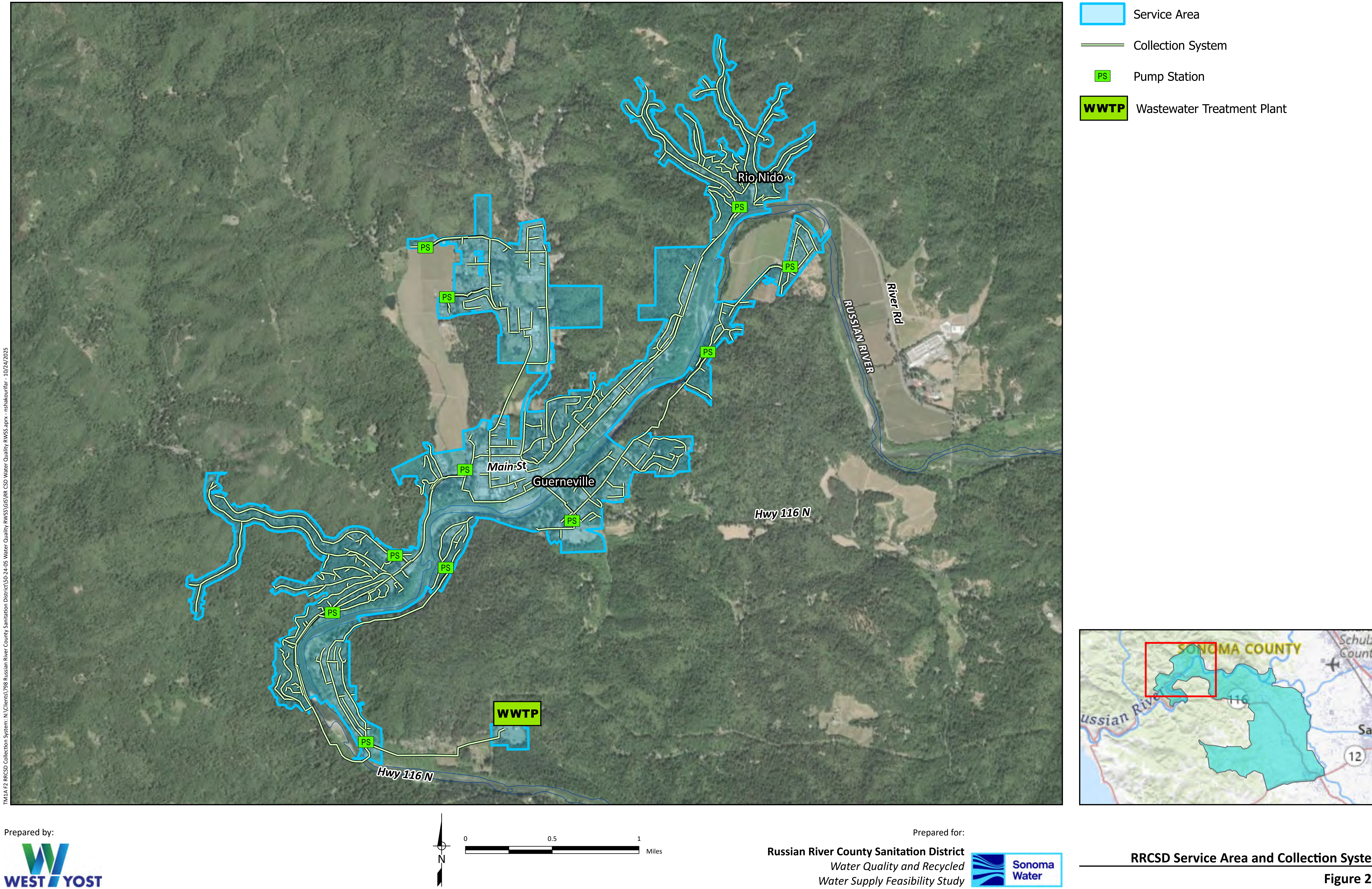
[2] RRCSD defines an ESD as having sewer flow of 120 gallons per day and BOD and TSS concentrations of 200 mg/L (Exhibit A of RRCSD rate ordinance (2024 Ordinance No. 6485 – 94 RRCSD)).



TM1A F2 RRCSD Collection System: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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RRCSD Service Area and Collection System

Figure 2-1

The annual service rate for RRCSD customers for Fiscal Year 2023/2024 was $2,104 per ESD, which was increased from the previous year by 8.9 percent. Rates increased another 8.9 percent for Fiscal Year 2024/2025 to $2,292 per ESD. According to the RRCSD Fiscal Year 2024/2025 budget, rate increases will be necessary for several years to cover the cost of upgrading aging infrastructure.

2.2.2 RRCSD Regulatory Requirements

RRCSD produces disinfected tertiary effluent, which is permitted for discharge to the Russian River from October 1 through May 14. Between May 15 and September 30, discharge to Russian River is not allowed, and RRCSD uses treated wastewater for golf course irrigation and land disposal on its own property. Effluent limits for receiving water discharge and recycled water use listed in the RRCSD NPDES Permit are presented in Table 2-1.

Table 2-1. RRCSD Effluent Limitations from Current Discharge Permit

Parameter	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Surface Water Discharge (October 1 – May 14)[a,b,c]					
BOD, mg/L	10	15	-	-	-
TSS, mg/L	10	15	-	-	-
Total Coliform, MPN/100 mL	-	2.2	23	-	240
Aluminum, µg/L[d]	200	-	606	-	-
pH[e]	-	-		6.5	8.5
Turbidity, NTU	-	-	2/5[f]	-	10
Recycled Water Discharge to Golf Course (May 15 – September 30)[b,g]					
Nitrate, Total (as N), mg/L	10	20	-	-	-
Total Coliform, MPN/100 mL	-	2.2	23	-	240
Turbidity, NTU	-	-	2/5[f]	-	10
Land Disposal (May 15 – September 30)[b,f]					
Nitrate, Total (as N), mg/L	10	20	-	-	-
Sodium, mg/L	60	-	-	-	-
Aluminum, mg/L	1.0	-	-	-	-
pH	-	-	-	6.0	9.0
Turbidity, NTU	-	-	2/5[f]	-	10

(a) Discharges to the Russian River also cannot exceed one percent of river flow.
(b) Ammonia effluent monitoring is required for all final discharge locations, but no ammonia limits are in place.
(c) The BOD, TSS limits apply year-round to storage pond discharge.
(d) The Russian River is impaired for aluminum based on the California secondary maximum contaminant level, so effluent limits for aluminum are required.
(e) More relaxed pH limits (6.0-9.0) apply upstream of storage. The pH limits shown apply prior to river discharge regardless of whether effluent is stored or directly discharged.
(f) Effluent turbidity cannot exceed 2 NTU on average during any 24-hour period or 5 NTU more than 5 percent of the time during any 24-hour period.
(g) BOD, TSS and surface discharge pH limits (6.5-8.5) also apply when direct discharge (i.e., bypassing storage ponds) occurs to recycled water use/land disposal.
NTU = nephelometric turbidity unit

The WWTP is designed to provide BNR. Accordingly, the permit documents that the discharge does not demonstrate reasonable potential to cause or contribute to an in-stream excursion above the U.S. Environmental Protection Agency's Freshwater Criteria for ammonia-nitrogen of 1.8 milligrams per liter (mg/L) and the Maximum Contaminant Level for nitrate-nitrogen of 10 mg/L. The permit also does not include limits for ammonia or nitrate but does require monitoring for these in the discharges to the Russian River to ensure the facility continues to meet the ammonia and nitrate standards.

2.2.3 RRCSD Wastewater Characteristics

The RRCSD Treatment Plant Master Plan has defined current and projected (2042/2043) flow and load statistics for the WWTP, including for biological oxygen demand (BOD) and total suspended solids (TSS) loads. The current and projected flows of interest are presented in Table 2-2, and current and projected loads of interest in Table 2-3.

Table 2-2. RRCSD Current and Projected Influent Flows, mgd

Flow Statistic	Current[a]	Anticipated Flow from New Connections[b]	Projected[a]
Average Dry Weather Flow (ADWF)	0.34	0.04	0.38
Annual Average Flow (AAF)	0.59	0.07	0.66
Maximum 30-Day Flow	2.0	0.16	2.16
Maximum 7-Day Flow	3.29	0.36	3.65
Equalized Peak Day Flow (PDF)	3.5[c]	0	4.2/5.0[c]
Peak Day Flow	3.7	0.4	5.2

(a) Current and projected values based on January 2025 Flow and Loads Analysis report for the RRCSD Treatment Plant Master Plan prepared by Woodard & Curran and HDR.
(b) Flow values for new connections are calculated as the difference between the RRCSD Treatment Plant Master Plan current and projected values. The RRCSD Treatment Plant Master Plan envisions no increase in PDF with new connections, as shown here.
(c) Equalized peak day flow was developed as part of the RRCSD Treatment Plant Master Plan.
mgd = million gallons per day

Table 2-3. RRCSD Current and Projected Influent Loads

Water Quality Statistic	Current[a]		Projected
	Average	Maximum	
Influent Water Quality			
BOD Concentration, mg/L	300	330	--
BOD Load, pounds per day (lb/day)	830	4,880	1,310[b]
TSS Concentration, mg/L	290	320	--
TSS Load, lb/day	830	4,310	1,310[b]
30-Day Influent Water Quality[c]			
30-Day Maximum BOD Load, lb/day	1,660		2,620
30-Day Maximum TSS Load, lb/day	1,660		2,620

(a) Current values based on January 2025 Flow and Loads Analysis report for the RRCSD Treatment Plant Master Plan, except as noted.
(b) These are projected average annual loads from the RRCSD Treatment Plant Master Plan report.
(c) Maximum 30-day BOD and TSS loads reported in the January 2025 Flow and Loads Analysis report appear to be influenced by high outlier and possible unrepresentative BOD and TSS data. For this TM, the maximum 30-day BOD and TSS loads have been calculated as two times the average annual loads from the January 2025 report.

For projected Maximum 30-Day Loads, a peaking factor of two times the Average Annual Loads has been used instead of using the RRCSD Treatment Plant Master Plan values (which applied peaking factors of 3.3 and 3.4 for BOD and TSS, respectively). This approach was selected for the following reasons:

- A typical maximum month BOD/TSS peaking factor is 1.2 to 1.5. So, a peaking factor of 2 is still a conservative value.
- The peak 30-day loads defined in the RRCSD Treatment Plant Master Plan are based on four weekly samples collected per month and if one daily value is incorrectly measured with an unusually high concentration (which could be the case), the 30-days values are overstated.
- The RRCSD WWTP experiences significant I&I, which should cause a decrease in BOD/TSS concentrations due to this diluting effects of this flow contribution to the sewer system. However, samples with elevated BOD/TSS concentrations have been collected during wet weather events. While higher flows could cause some increase in loads if a significant amount of material is resuspended in the sewer system, it is not likely that resuspension of material would cause a load increase by a factor of three or more.
- If overly conservative BOD/TSS loads are applied for this Draft Feasibility Study, it could result in an over-estimate of the treatment facilities required to support regionalization.

The RRCSD Treatment Plant Master Plan also identifies these same concerns, stating that the maximum month BOD and TSS loads are significantly higher than previous projections and recommending that Sonoma Water initiate additional monitoring of the wet weather conditions over multiple years and update flow and load projections accordingly. The RRCSD Treatment Plant Master Plan further acknowledges that adjustments to the RRCSD WWTP Capital Improvement Program may be required following this effort, as the analysis completed using the elevated load values demonstrates that a third treatment basin would be needed to accommodate planned growth within the RRCSD service area.

2.2.4 RRCSD Treatment Facilities

The RRCSD WWTP, located on the south end of the collection system, was constructed in 1979. A site layout is presented on Figure 2-2. The tertiary treatment process, as shown schematically on Figure 2-3, includes the following:

- Headworks with two coarse screens;
- Aerated grit chamber;
- Two, 0.4 million gallon (MG) biological treatment basins;
- One, 0.4 MG equalization (EQ) basin;
- Three secondary clarifiers (one, 60-ft diameter and two, 40-ft diameter);
- Two Aquadisk cloth media filters; and
- Ultraviolet light (UV) disinfection.

In 2013, RRCSD retrofitted two of three existing aeration basins for BNR. The basins are configured to operate in multiple modes, including with an anaerobic selector for phosphorus removal. RRCSD is currently operating in Nitrification/Denitrification mode. Waste solids from the basins are thickened by a belt filter press and hauled to a landfill for disposal.

TM1A F3 RRCSD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

Prepared by:

WEST YOST

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Prepared for:

Russian River County Sanitation District

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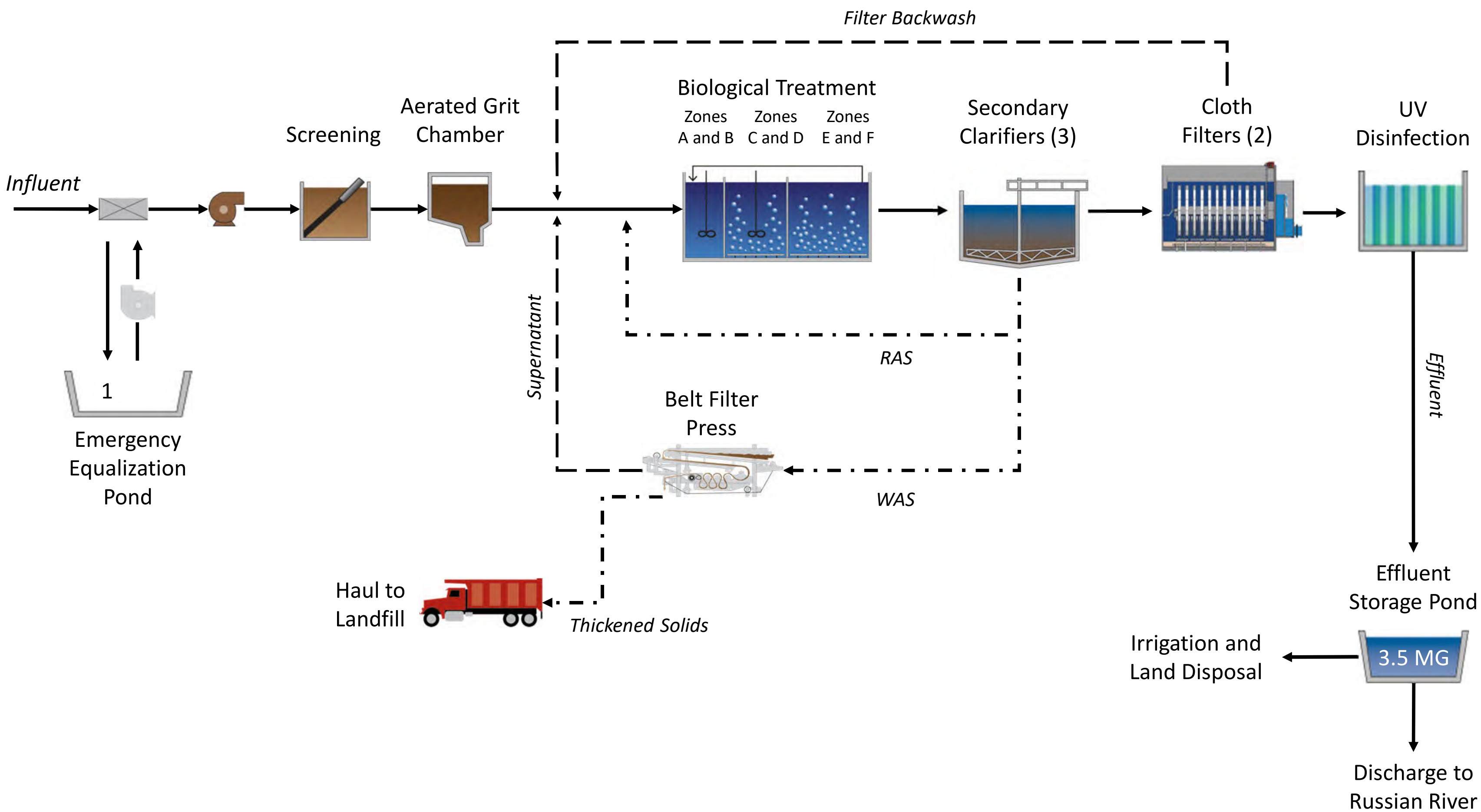
RRCSD WWTP Site Layout

Figure 2-2

Figure 2-3. RRCSD WWTP Process Schematic



Treated effluent is sent to the 3.5-MG effluent storage pond, from where it is either discharged to the Russian River or directed to the irrigation reuse/land disposal sites. A 1-MG emergency storage pond is used for influent EQ during periods of high influent flow or treated effluent not meeting permit limits and requiring retreatment. A third, unused aeration basin provides an additional 0.4 MG of EQ storage.

Several condition-related projects have been identified for RRCSD WWTP in the 2024 Asset Management Plan. Of these improvements the following major projects are included in this analysis:

- Equipment replacements:
  - Aeration basin propeller mixer
  - Aeration basin mixed liquor transfer pumps
  - Secondary clarifier mechanism and drive
  - Tertiary filters
  - UV disinfection modules and various valving
  - Other pumps: waste activated sludge (WAS), tertiary system
  - Pond liner
  - UV air scour blower
- Major rehabilitation projects:
  - Emergency generator
  - Coating/repainting

RRCSD also recently completed design of headworks improvements to replace the influent flow meter, the two bar screens, and the grit washing and dewatering unit; to add a screenings washer/compactor; and to improve efficiency of the aerated grit tank.

The RRCSD Treatment Plant Master Plan included an assessment of the WWTP capacity-related improvements needed to process the anticipated 2035 flows and loads. However, that analysis also acknowledged the need to collect additional influent water quality data during peak flow events to confirm the recommendations. A summary of the findings from the RRCSD Treatment Plant Master Plan along with a discussion of the identified improvements that have been included in the analysis presented in this Feasibility Study is provided in Table 2-4.

Table 2-4. Comparison of RRCSD Treatment Plant Master Plan Capacity Findings to Feasibility Study Approach		
Process	Findings from Treatment Plant Master Plan for Equalized Peak Flow of 5.0 mgd	Approach for Feasibility Study
Influent EQ	• No additional EQ storage needed to equalize flow to a peak flow of 4.2 mgd[(a)] if the existing 0.4 MG EQ basin is available (and not required for biological treatment.) • No additional EQ storage needed to equalize to a peak flow of 5.0 mgd if the existing 0.4 MG EQ basin is not available.	Assume 0.4 MG EQ basin is not required for treatment and can be used for influent flow equalization. Therefore, the WWTP should be able to accommodate an additional 0.8 mgd of peak flow through the facility.
Influent Screens	Existing capacity of 5.5 mgd adequate for projected equalized peak flows.	No expansion required.
Grit Removal	Existing capacity of 4.1 mgd inadequate for peak flow.	The Grit system would be partially bypassed if flows exceed 4.1 mgd or the higher flows will be pushed through the system. Additional evaluation of grit system performance at peak flows should be completed to confirm expansion needs.
Aeration Basins	Capacity of third basin may be needed by Year 2033. However, additional influent monitoring recommended to confirm peak loads.	Expansion of the aeration basins in not included in the Feasibility Study. Projected peak loads presented in the Master Plan are likely unrepresentative and this Feasibility study assumes a 2.0 maximum month BOD load peaking factor. Projected 2033 loads from the Master Plan confirm the two basins should be able to adequately treat a maximum month load of 3,650 lb/day, which is significantly lower than the projected RRCSD maximum month load defined for this Feasibility Study (see Table 2-3). Additional data collection is needed to confirm these assumptions.
Aeration Basin Blowers	Existing blowers will approach end of useful life by Year 2033. Replacement recommended.	Aeration blower replacement has been included in the condition-related improvements costs. Additional data collection is needed to confirm blower sizing.
Secondary Clarifiers	Existing capacity adequate.	No expansion required.
Floc Tank	Inadequate detention time. New dosing point recommended.	Project can likely be implemented by staff and is not include in the facility improvement costs.
Tertiary Filters (2 units with 8 disks each)	At the manufacturers recommended loading rate of 6.5 gpm/sf, filters have a firm capacity of 4.0 mgd.	At a flow rate of 4.2 mgd, the filter loading would be 6.8 gpm/sf, which is about 5 percent higher than the manufacturers recommended rate but significantly lower than the 22 gpm/sf loading rates approved by California Division of Drinking Water (DDW). A new filter is assumed to not be required. Additional stress testing should be completed to confirm the 6.8 gpm/sf rating.
UV Disinfection	No treatment capacity concerns. Recommendation to upsize 12-inch segments of UV effluent piping to 18-inch.	Hydraulic capacity improvements have been included.
Belt Filter Press	The capacity of the presses will need to be increased to handle the projected loads. However, additional influent monitoring recommended to confirm peak loads.	Expansion/upsizing the presses is not included in the Feasibility Study. Similar to the aeration basin approach, the projected peak loads presented in the Master Plan are likely unrepresentative. Additional data collection is needed to confirm this approach.
Miscellaneous Conveyance Infrastructure	Various hydraulic improvements needed: • Mixed Liquor pump station and pipe(a) • Flow structure needs new 10-inch secondary effluent pipe	Replacement of the mixed liquor transfer pumps was already included in the condition-related improvements costs. Replacement mixed liquor piping and secondary effluent piping has been included in the improvement needs for the facility.

EQ = equalization
gpm/sf = gallons per minute per square foot
MG = million gallons
mgd = million gallons per day

(a) Following evaluation of the 5.0 mgd equalized peak flow condition, the RRCSD Treatment Plant Master Plan team verified that the flow can be equalized to 4.2 mgd with the use of the 0.4 mgd EQ basin.

As shown in Table 2-4, the analysis performed for the Master Plan indicates that Peak Day flows through the WWTP can be equalized to 5.0 mgd with use of existing Emergency Storage Pond. If 0.4 MG EQ basin is also available, flows can be equalized to 4.2 mgd. However, these findings may need additional study to identify what factors led to a recent (January 2026) spill event at the WWTP. The Master Plan does, however, identify the following hydraulic capacity-related improvements:

- Upsize 12-inch sections of the UV effluent piping to 18 inches
- Upsize the mixed liquor transfer piping.
- Install a second 10-inch secondary effluent pipeline for discharge from the secondary effluent flow structure

In addition, based on the findings from the RRCSD Treatment Plant Master Plan, replacement of the aeration basin blowers has been added to the condition-related improvement list

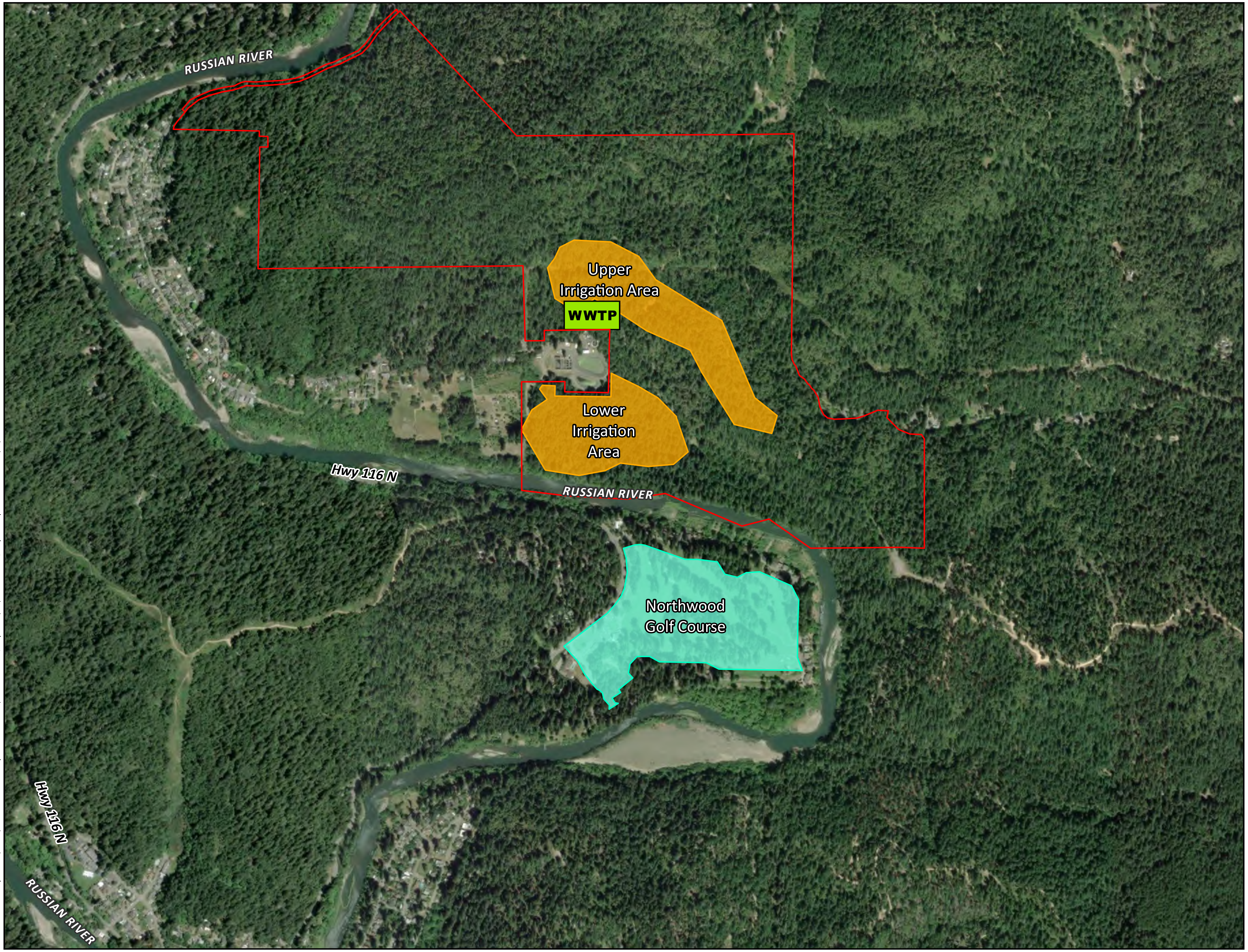
2.2.5 RRCSD Recycled Water Operations

Between May 15 and September 30, RRCSD disposes or beneficially reuses all treated wastewater via irrigation as disinfected tertiary recycled water conforming to Section 60301.230 of Title 22 California Code of Regulations. The recycled water is applied on the following properties:

- 39-acre Northwood Golf Course, located south of the WWTP (beneficial reuse)
- 17 acres of wooded area surrounding the WWTP (land disposal)

These irrigation areas and vicinity are shown on Figure 2-4. Recycled water is conveyed by purple pipe for on-demand irrigation because the golf course has no onsite storage. From 2019 to 2023, an average of 49 acre-feet per year (AFY) of recycled water was applied to the golf course during the irrigation season. The remainder of RRCSD's irrigation season effluent – an average of 73 AFY – is applied to the 17-acre wooded irrigation area.

RRCSD is also currently assessing the potential for additional recycled water disposal on a 394-acre forested property that surrounds the WWTP and was acquired by Sonoma County and transferred to the RRCSD in August 2024. This site does include a conservation easement limiting uses of the site, and the topography of the site also presents challenges for installing new irrigation infrastructure. Nevertheless, use of about 3 percent of this site for recycled water applications may be possible.



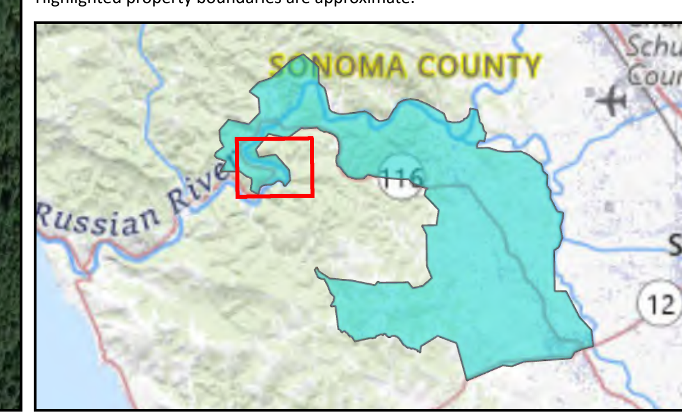
Upper and Lower Irrigation Areas.

Northwood Golf Course

WWTP Wastewater Treatment Plant

Potential Irrigation Area

Note:
Highlighted property boundaries are approximate.



TM1A F5 RRCSD ReW System: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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0 1,000 2,000 Feet

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RRCSD Recycled Water Users

Figure 2-4

2.2.6 RRCSD Regionalization Opportunities and Constraints

RRCSD has several opportunities that could be beneficial to potential regionalization strategies and/or acceptance of additional wastewater from neighboring unsewered communities, including:

- The RRCSD Treatment Plant Master Plan indicates that maximum month influent BOD loads could increase to approximately 3,650 lb/day[3] over the next 20 years, and the WWTP could likely process influent loads that are greater than these projections.
- The RRCSD Treatment Plant Master Plan indicates that equalized peak day flows could increase to 5.0 mgd with only the use of existing Emergency Storage Pond. If the 0.4 MG EQ basin is also available, peak day flows can be equalized to 4.2 mgd[4].
- Up to approximately 3 percent of the recently acquired 394-acre forested property surrounding the WWTP could offer potential for additional recycled water disposal.
- The RRCSD WWTP is less than two miles north of the currently unsewered Monte Rio/Villa Grande communities, which are currently investigating options for sewer system connection, and could potentially accept their flows.
- The existing RRCSD service area includes and has other nearby unsewered parcels that are likely good candidates for expanded service.

RRCSD also faces some constraints, as follows:

- The site is constrained on all sides, and an expansion of the facility's footprint is not likely to be feasible. Therefore, it is assumed that all treatment and storage must occur within the footprint of the existing facilities.
- Projected growth within the RRCSD service is expected to utilize most of the available hydraulic capacity in the treatment facilities. Although the RRCSD Treatment Plant Master Plan identifies only minor hydraulic conveyance improvements are needed, feedback from operations staff following a spill that occurred at the WWTP in January 2025 indicates that there may be additional limitations related to processing of peak flows that need to be considered.
- Several condition-related improvements at the WWTP are necessary to provide continued long-term treatment reliability.
- The collection system has significant I&I issues and portions of the collection system become inundated under river flood conditions resulting from significant storm events. Therefore, extensive collection system upgrades are needed and costs of these improvements have not been defined. Connection to the RRCSD WWTP will need to bypass the existing collection system to avoid potential compounding impacts. Moreover, even with this provision in place, management of I&I must be addressed before the facility accepts additional flows.

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[3] As noted previously in this Chapter, the RRCSD Treatment Plant Master Plan identifies the potential need to treat loads in excess of this load value and recommends additional monitoring during peak flow events to confirm this finding.

[4] Additional study of the available storage needs to equalize peak day flows at the RRCSD WWTP may be needed in light of the recent (January 2026) spill event.

- The RRCSD WWTP is not ideally situated with respect to protection from potential hazards, as follows:
  - The site is adjacent to a designated FEMA flood zone, as further detailed in Chapter 7 of this report.
  - The site is in an area that has a strong or very strong earthquake hazard potential, a high landslide hazard potential, a high susceptibility liquefaction potential.
  - Although the site itself is in an area with a low or very low wildfire hazard potential, the site is adjacent to a high wildfire hazard area.
- The RRCSD WWTP is far from the majority of the West Sonoma County population centers as compared to other treatment facilities in the region.
- There are limited opportunities for the beneficial reuse of treated effluent near the WWTP.
- The recently acquired 394-acre forested property surrounding the WWTP may offer potential opportunities for future expansion of storage and/or land disposal capacity, depending on the project needs. But this site has restrictions for onsite uses and challenging topography that could preclude the ability to construct new infrastructure within this area. RRCSD staff estimate that about 3 percent of the area may be available for land application. This needs to be evaluated further before a determination of dry-season disposal potential can be made.

2.3 GCSD SERVICE AREA AND FACILITIES

This section details the GCSD service area and wastewater facilities, focused on the following topics:

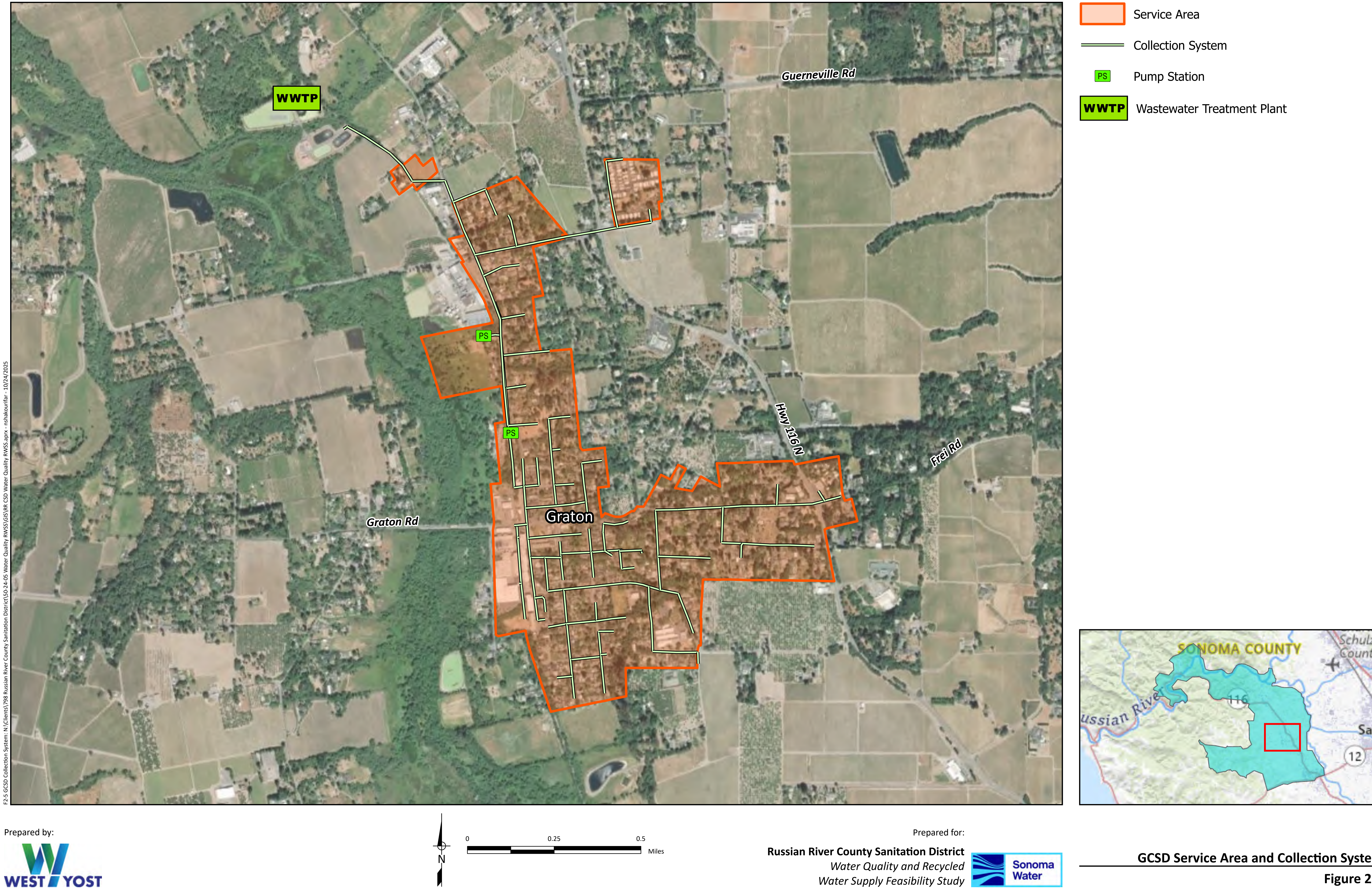
- Service area overview
- Regulatory requirements
- Wastewater characteristics
- Treatment facilities
- Recycled water operations
- Opportunities and constraints

2.3.1 GCSD Service Area Overview

GCSD provides wastewater collection, treatment and disposal for a portion of the unincorporated community of Graton. The GCSD service area and general layout of the GCSD collection system are shown on Figure 2-5. The collection system consists of the following:

- 6.2 miles of gravity pipe
- 0.3 miles of force main
- Two lift stations

Influent wastewater is conveyed north for treatment at the GCSD WWTP. A condition assessment conducted in early 2024 revealed that, by length, over 50 percent of GCSD gravity pipelines as well as both force mains connected to the lift stations require replacement, repair or maintenance. GCSD intends to pursue grant funding to complete these improvements.



F2-5 GCSD Collection System: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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GCSD Service Area and Collection System

Figure 2-5

The GCSD service area consists of:

- 1,700 residents
- 644 ESDs, including commercial and institutional customers[5]

Between 2010 and 2020, Graton's residential population decreased an average of 0.1 percent per year, based on U.S. census data, suggesting the service area is unlikely to experience significant population change within the next 10 years. GCSD staff indicated the possibility for connecting about 50 ESDs in the next 10 years.

Two other new flow and load sources also need consideration with any future planning for the GCSD WWTP. In July of 2024, an apple processing facility operated by Manzana Products was connected to the GCSD collection system. Manzana estimates the facility will produce an average of 37,000 gallons per day (gpd) of process wastewater, with BOD concentrations half that of typical domestic wastewater. GCSD will also receive an additional average flow of 0.028 mgd from OCSD estimated to begin in August 2028, once the planned Occidental-Graton Pipeline is constructed.

The community of Graton has historically had DAC status and was pursuing DAC funding for some necessary collection system improvements. However, an updated DAC study is needed to establish the current DAC status. GCSD charges annual service rates for sewer service, with a current annual rate of $1,574 per ESD.

2.3.2 GCSD Regulatory Requirements

GCSD produces tertiary effluent, which is permitted for discharge to Atascadero Creek, a tributary of the Russian River, from October 1 through May 14. Between May 15 and September 30, discharge to Atascadero Creek is not allowed, and GCSD beneficially reuses recycled water via irrigation of permitted recycled water use areas. (A portion of the flow may also be applied via land disposal on District-owned property.) The effluent limits for receiving water and recycled water discharge required by the soon-to-be-adopted NPDES Permit for GCSD WWTP are listed in Table 2-5.

GCSD can reliably meet the current ammonia limits of 13 mg/L (maximum daily) and 5.6 mg/L (average monthly) - with only one violation of these limits in the past five years, but the next permit will include the more stringent nitrogen limits (Ammonia Impact Ratio) found in the recently renewed (2024) FWD permit. **Based on this information, GCSD WWTP is expected to need significant improvements to achieve additional nitrogen removal for continued surface water discharge.**

[5] GCSD defines an ESD as having sewer flow of 150 gpd, BOD concentration of 250 mg/L and TSS concentration of 300 mg/L (Table 13 of 2025 GCSD Sewer Rate Study draft report).

Table 2-5. GCSD Effluent Limitations from Tentative 2025 Discharge Permit					
Parameter	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Receiving Water Discharge (October 1 – May 14)[a]					
BOD, mg/L	10	15	-	-	-
TSS, mg/L	10	15	-	-	-
Total Coliform, MPN/100 mL	-	2.2	23	-	240
pH	-	-		6.5	8.5
Residual Chlorine, mg/L	0.01	-	0.02	-	-
Manganese, mg/L[b]	50	-	100	-	-
Ammonia Impact Ratio[c]	1.0	-	1.0	-	-
Nitrate-Nitrogen,[b] mg/L	10	-	20	-	-
2,3,7,8-TCDD (Dioxin) Equivalents, µg/L	1.4 x 10-8	2.8 x 10-8	-	-	-
Turbidity, NTU	-	-	2/5[d]	-	10
Recycled Water Discharge (May 15 – September 30)					
pH	-	-	-	6.0	9.0
Total Dissolved Solids, mg/L	500	-	-	-	-
Turbidity, NTU	-	-	2/5[d]	-	10

(a) Discharges to the Atascadero Creek also cannot exceed one percent of river flow.
(b) Tentative permit includes new effluents limits for manganese and nitrate.
(c) An Ammonia Impact Ratio of 1.0 means the applicable ammonia standards are applied to the discharge with no dilution credit. Values of the ammonia standards vary depending on pH and temperature data for the receiving water. Based on a preliminary review of recent data, standards applied to the discharge could be as low as 3.5 and 8.7 mg/L for average monthly and average weekly, respectively.
(d) Effluent turbidity cannot exceed 2 NTU on average during any 24-hour period or 5 NTU more than 5 percent of the time during any 24-hour period.

2.3.3 GCSD Wastewater Characteristics

GCSD WWTP influent wastewater characteristics have been defined using influent flow and water quality data from January 2019 to April 2024. Notably, this period precedes the recent Manzana connection.

Calculated flow statistics for the WWTP are presented in Table 2-6 for current and projected conditions, as well as the portion estimated for anticipated new connections. Calculated influent concentration and load statistics are shown in Table 2-7.

Table 2-6. GCSD Current and Projected Influent Flows, mgd					
		Projected			
Flow Statistic	Current[a]	OCSD[b]	Manzana Process Water	Anticipated New GCSD Connections	Total Projected
ADWF	0.08	0.028	0.037	0.009[c]	0.15
AAF	0.13	0.037	0.037	0.009	0.21
Maximum 30-Day Flow	0.47	0.072	0.045[d]	0.053	0.64
Maximum 7-Day Flow	0.89	0.11	0.045[d]	0.10	1.1
PDF	1.2	0.13	0.045	0.13	1.5

(a) Current values based on influent flow data from January 2019 to April 2024.
(b) Projected OCSD flows from Table 2-15.
(c) New connections ADWF based on 60 new ESDs (including 10 ESDs for Manzana domestic wastewater) and 124 gpd per ESD, calculated from current ADWF of 80,000 gpd and 644 ESDs.
(d) Maximum 30-day flows for Manzana process water not defined. Assuming maximum 30-day and maximum 7-day flows equal to PDF.

Table 2-7. GCSD Current and Projected Influent Water Quality						
	Current[a]		Projected			
Water Quality Statistic	Average	Maximum	OCSD[b]	Manzana Process Water	Anticipated New GCSD Connections	Total Projected
Concentrations, mg/L						
BOD	320	840	490	190	*320*	270[c]
TSS	290	680	430	160	*290*	240[c]
Loads, lb/day						
BOD	260	690	130	60	20[d]	470
TSS	240	550	110	50	20[d]	420
30-Day Maximum BOD	390		190	60	40[e]	680
30-Day Maximum TSS	360		170	50	40[e]	620

(a) Current values based on influent data from January 2019 to April 2024.
(b) Projected OCSD loads from Table 2-16.
(c) Total projected BOD and TSS concentrations calculated from respective total average loads and total projected AAF (Table 2-6).
(d) New connections average loads calculated from current average concentrations and AAF for new connections (Table 2-6).
(d) New connections 30-day maximum loads calculated from current 30-day maximum concentrations and maximum 30-day flow for new connections (Table 2-6).

2.3.4 GCSD Treatment Facilities

The GCSD WWTP was originally constructed in 1976, with significant upgrades in 2012 focused primarily on adding filtration to produce tertiary effluent. A site layout is shown on Figure 2-6. The treatment processes, as shown schematically on Figure 2-7, include the following:

- Headworks with grit chamber, comminutor, and manual bar screen;
- Two, 1.24 MG partial mix aerated treatment ponds, which are operated in series;
- One, 1.2 MG settling pond;
- Suspended air flotation (SAF) for solids removal (mostly algae from settling pond surface) upstream of filtration;
- 5,000-gallon surge tank, with two, 250 gpm transfer pumps;
- Two Fuzzy Filters; and
- Chlorine disinfection.

Solids from the SAF process are composted onsite and applied to GCSD property surrounding the WWTP. Treated effluent is directed to two effluent storage ponds with volumes of 13.8 MG and 9.1 MG. The treated flows are held in these ponds until it is directed to recycled water customers or discharged to the Atascadero Creek.

F2-6 GCSD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/27/2025

0 150 300
Feet

Prepared by:

WEST YOST

Prepared for:

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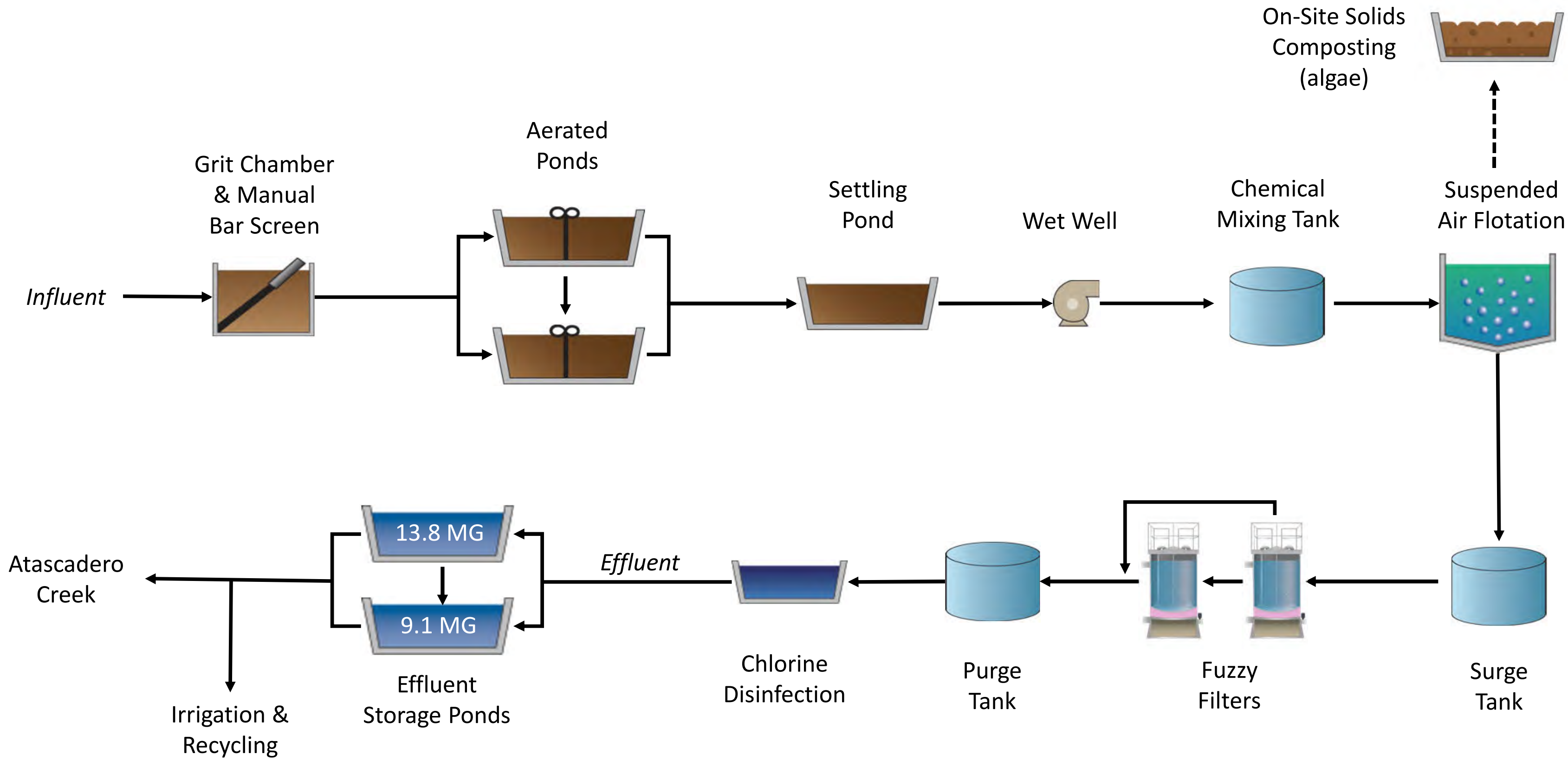
GCSD WWTP Site Layout

Figure 2-6

Figure 2-7. GCSD WWTP Process Schematic



A spreadsheet-based, pond model analysis was conducted to determine the treatment capacity of the existing GCSD WWTP treatment ponds. For this analysis, the effluent BOD treatment target is set to 30 mg/L to meet a definition of “oxidized wastewater” ahead of tertiary treatment. The process model relies on an assumption of first-order rate kinetics, with the rate coefficient based on a partial mix aerated pond configured for Ponds 1 and 2 and a facultative pond for the settling pond. Key inputs and modeling results for current and projected conditions are presented in Table 2-8. **As shown, the GCSD WWTP ponds do not provide adequate treatment capacity to produce 30 mg/L ahead of the filtration process.**

Table 2-8. GCSD WWTP Treatment Pond Capacity Evaluation

Scenario	ADWF,[a] mgd	Maximum 30 Day Flow, mgd	Maximum 30 Day BOD Load, lb/day	Secondary Effluent BOD, mg/L
Current Flows	0.08	0.47	390	36
Future Flows	0.15	0.64	680	**56**[b]

(a) Maximum 30-day flows are used in the modeling, but ADWF is shown for reference.
(b) Secondary effluent notable above 30 mg/L indicates inadequate secondary treatment.

Available capacity of the other treatment unit processes has been evaluated with a simplified analysis based on peak flows. The results of that evaluation are provided in Table 2-9. **As shown, the GCSD WWTP flow-based treatment facilities do not provide adequate treatment capacity to treat the projected influent flows.**

Table 2-9. GCSD Flow-Based Capacity Evaluation

Key Statistic for Defining Capacity	Treatment Process of Interest	Projected Influent Value	Current Design Capacity
Peak Influent Flow	Influent screens	1.5 mgd[a]	0.85 mgd[b]
	Grit Removal		
Equalized Peak Influent Flow/Peak Week Flow	SAF	1.1 mgd	0.58 mgd
	Filtration		0.58 mgd
	Disinfection		0.51 mgd[c]

(a) Value shown in peak daily flow. Peak influent flow could be 2 to 3 times this value (or higher).
(b) Reported peak design flow for the original facility. Capacity of existing headworks facility is not defined.
(c) Disinfection capacity based on 30-minute detention time.

Based on the information presented in Table 2-8 and Table 2-9, the GCSD WWTP will require additional treatment capacity to process the anticipated future flows. In addition to the capacity-related improvements discussed above, the GCSD WWTP has identified the following projects that will be needed in the near term:

- **Installation of a mechanical bar screen at the WWTP headworks;**
- **Installation of a disinfection system that can produce effluent water quality that meets "disinfected tertiary recycled water" standards; and**
- **Replacement of the existing temporary pumping facility that is used to convey effluent from the treatment facilities to the storage ponds/outfall in the Atascadero Creek with a new, permanent pump station.**

2.3.5 GCSD Recycled Water Operations

Between May 15 and September 30, GCSD disposes or beneficially reuses an average of 50 AFY of recycled water via irrigation on the following sites:

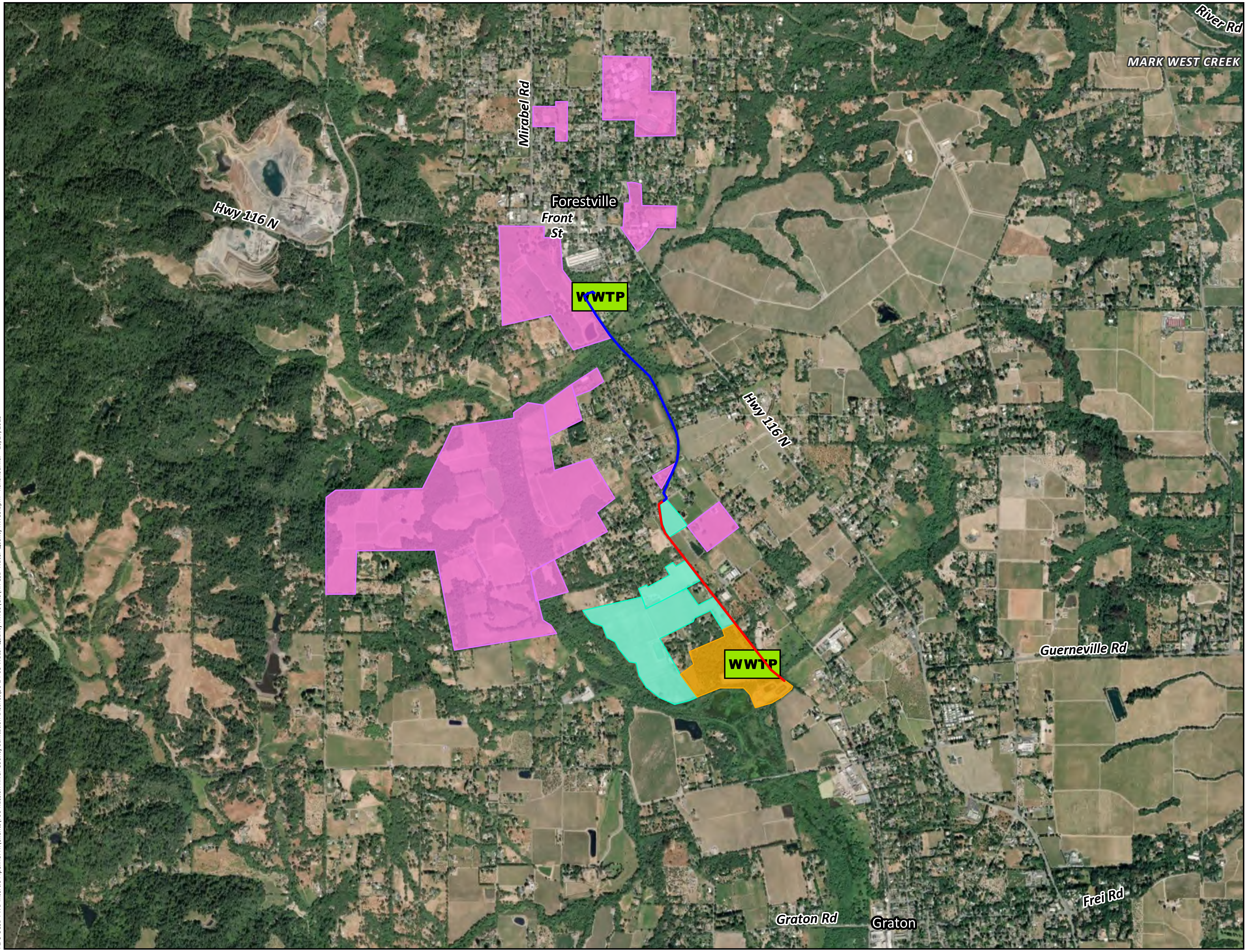
- Three vineyards covering around 103 acres (beneficial reuse)
- A 20.5-acre field owned by GCSD (land disposal)

GCSD distributes recycled water to its customers along a 1.7-mile intertie pipeline that connects to the FWD WWTP. A layout of the intertie pipeline and GCSD and FWD recycled water customers is shown on Figure 2-8. The intertie consists of a portion of the original 8-inch ductile iron (DI) pipeline and a newer 6-inch polyvinyl chloride (PVC) pipe, which connects to the 8-inch DI pipe approximately halfway between the two agency's WWTPs. The segment of DI pipe closer to the FWD WWTP could potentially be repurposed. West Yost has recently and separately worked with GCSD on a condition assessment of this intertie pipeline, and recommended slip-lining the currently unused portion of the intertie pipeline with a non-metallic pipeline to avoid further impacts from pipeline corrosion.

The intertie pipeline allows the two agencies to share recycled water facilities, including storage and distribution to customers. The two agencies do not currently have a formal agreement on shared resources, but typical operations involve the following:

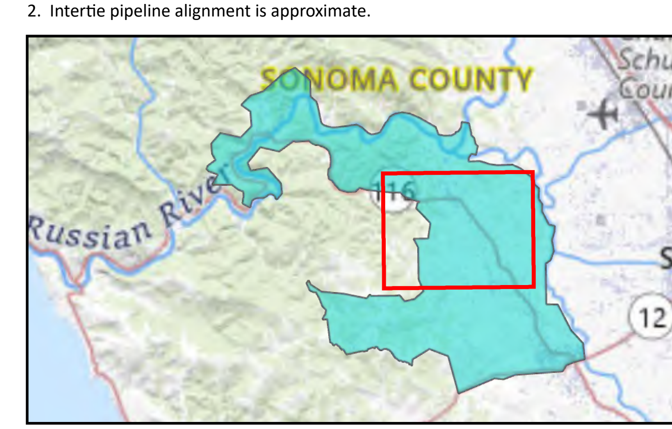
- Storage of FWD flows in the GCSD storage ponds during the late summer/early fall period - prior to the start of the surface water discharge season.
- Irrigation of water from the GCSD storage ponds at FWD customer sites.

GCSD and FWD staff have expressed an interest in working together to optimize beneficial reuse operations. Both agencies have also expressed an interest in zero surface water discharge (i.e., reuse only) in lieu of improvement treatment to meet ammonia and nitrate effluent water quality standards.



Graton CSD Customers
Graton CSD Property
Forestville WD Customers
Graton Intertie Segment
Forestville Intertie Segment
WWTP Wastewater Treatment Plant
Potential Irrigation Area

Notes:
1. Highlighted property boundaries are approximate.
2. Intertie pipeline alignment is approximate.



F2-8 GCSD FWD Intertie Pipeline: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/27/2025

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GCSD-FWD Recycled Water Intertie Pipeline and Recycled Water Users

Figure 2-8

2.3.6 GCSD Regionalization Opportunities and Constraints

GCSD has several opportunities that could be beneficial to potential regionalization strategies and/or acceptance of additional wastewater from neighboring unsewered communities, including:

- The planned connection with OCSD raises the possibility of adding dischargers from unsewered communities near OCSD, such as the Camp Meeker DAC.
- The existing intertie pipeline and working relationship with FWD could allow the districts to reduce costs by collaborating on WWTP upgrades, which will be necessary at both facilities.
- GCSD has significant storage capacity, which could be leveraged to expand its recycled water program.
- GCSD owns an approximate 20.5-acre parcel adjacent to the WWTP that is currently used for land disposal and could be leveraged for another purpose.
- The existing GCSD service area has nearby unsewered parcels that are likely good candidates for expanded service.
- The WWTP is in an aera of relatively low environmental hazard risk, as follows:
  - not a landslide hazard area,
  - very low wildfire hazards, and
  - moderate susceptibility to liquefaction.

GCSD also faces some constraints, as follows:

- The capacity provided by the WWTP is not adequate to treat the currently anticipated flows and loads and will need to be expanded.
- The WWTP also requires several condition-related improvements.
- The Regional Water Board is in the process of adopting a new NPDES permit for GCSD WWTP, which is expected to include nitrogen effluent limits unachievable without significant treatment upgrades.
- The WWTP is mapped within a FEMA flood zone, as detailed in Chapter 7 of this report.
- The WWTP is mapped in an area with a strong to severe earthquake hazard.
- Winter surface water discharge to Atascadero Creek is complicated and expensive due to the discharge location.

2.4 FWD SERVICE AREA AND FACILITIES

This section details the FWD service area and wastewater facilities, focused on the following topics:

- Service area overview
- Regulatory requirements
- Wastewater characteristics
- Treatment facilities
- Recycled water operations
- Opportunities and constraints

2.4.1 FWD Service Area Overview

FWD provides wastewater collection, treatment and disposal for a portion of the unincorporated community of Forestville. The FWD service area and general layout of the FWD collection system are shown on Figure 2-9.

FWD has two separate, interconnected service areas: Forestville Central and Mirabel Heights. The Forestville Central service area, just north of the treatment plant, is served by a 6.5-mile gravity collection system. North of downtown and abutting the Russian River is the Mirabel Heights neighborhood. Wastewater from the neighborhood is conveyed by gravity to the northerly Terminal Lift Station. These flows are pumped to a junction at the south end of the neighborhood, where they combine with flows from a lift station operated by Steelhead Beach County Park, then flow by gravity to an intermediate pump station. The Mirabel Heights force main then connects to the Forestville Central gravity main at Van Keppel Road. The final combined flows are then conveyed by gravity to the FWD WWTP.

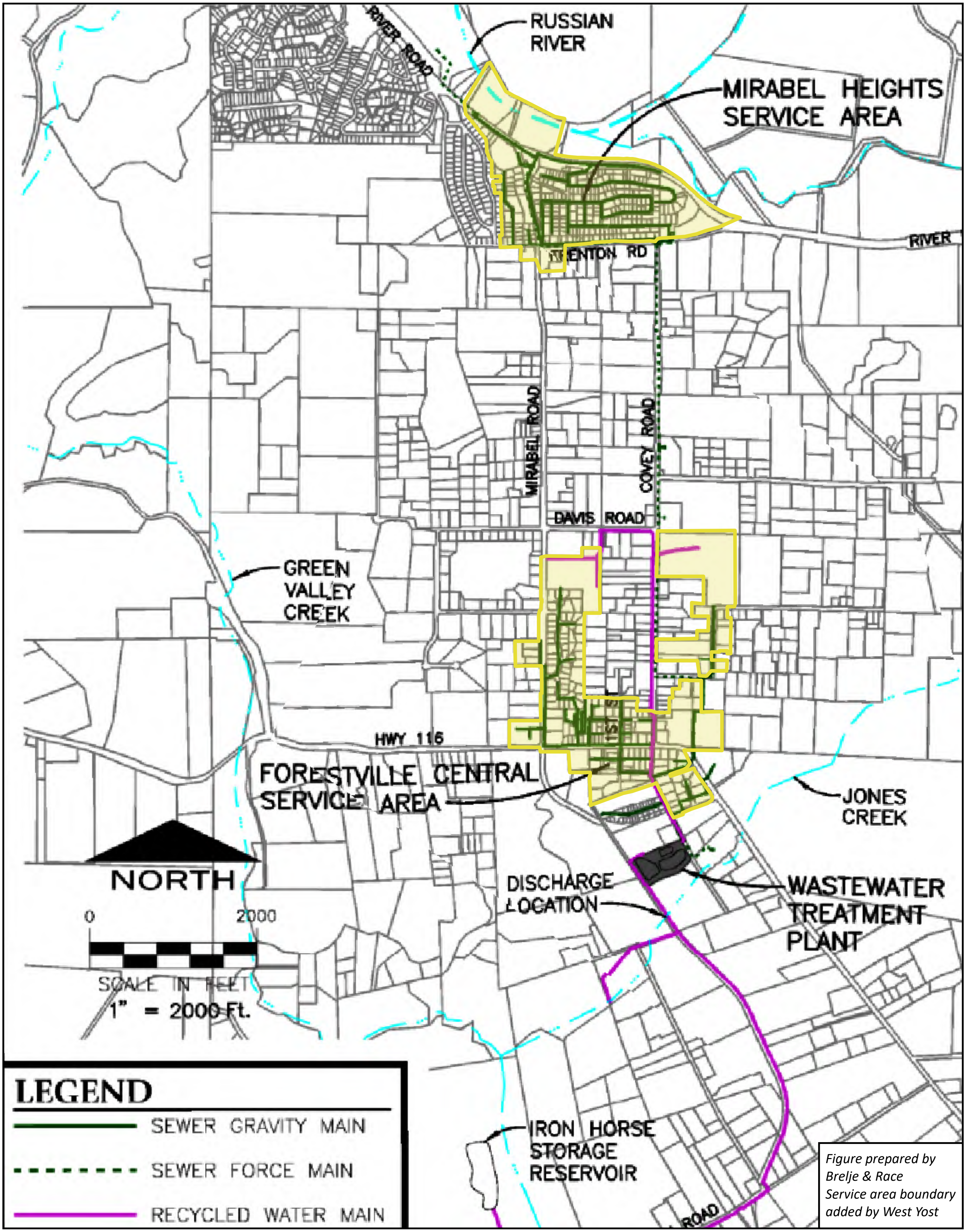
The FWD service area consist of:

- 930 residents
- 660 ESDs, including commercial and institutional customers[6]

Between 2010 and 2020, Forestville's residential population decreased an average of 0.1 percent per year, based on U.S. census data, suggesting the service area is unlikely to experience significant population change within the next 10 years. FWD has identified up to 50 ESDs of existing unsewered parcels within the service area that could potentially be added to the collection system.

Forestville does not currently qualify as a DAC. The current annual sewer service rate for FWD customers is $1,531 per ESD.

[6] FWD defines an ESD as having sewer flow of 140 gpd and BOD and TSS concentrations of 324 mg/L (Exhibit A of 2022 FWD Resolution No. 421).



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FWD Wastewater Service Area and Collection System

Figure 2-9

2.4.2 FWD Regulatory Requirements

FWD produces tertiary effluent, which is permitted for discharge to Jones Creek, a tributary of the Russian River, from October 1 through May 14. Between May 15 and September 30, discharge to Jones Creek is not allowed, and FWD beneficially reuses recycled water via irrigation of permitted recycled water use areas. The effluent limits for receiving water and recycled water discharge required by the current NPDES Permit are listed in Table 2-10.

As shown in Table 2-10, the FWD WWTP is required to provide reliable ammonia and nitrate removal - which is not possible with a pond-based treatment system like the FWD WWTP. In response to repeated exceedances of nitrate and ammonia effluent limits, the Regional Water Board issued FWD a Time Schedule Order (TSO) for nitrate and ammonia in 2018. The TSO requires full compliance with the final nitrate and ammonia limits by March 1, 2026.[7] Reliably meeting nitrogen limits will require treatment upgrades at the FWD WWTP. **Based on this information, the FWD WWTP is expected to need significant improvements to achieve additional nitrogen removal for continued surface water discharge.**

Table 2-10. FWD Effluent Limitations from Current Discharge Permit

Parameter	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
Receiving Water Discharge (October 1 – May 14)[(a)]					
BOD, mg/L	10	15	-	-	-
TSS, mg/L	10	15	-	-	-
Total Coliform, MPN/100 mL	-	2.2	23	-	240
pH	-	-	-	6.5	8.5
Residual Chlorine, mg/L	0.01	0.02	-	-	-
Cyanide, µg/L	4.4	7.9	-	-	-
Dichlorobromomethane, µg/L	0.56	1.1	-	-	-
Ammonia Impact Ratio[(b)]	1.0	1.0	-	-	-
Nitrate, Total (as N), mg/L	10	-	-	-	-
Manganese, mg/L	50	100	-	-	-
Turbidity, NTU	-	-	2/5[(c)]	-	10
Recycled Water Discharge (May 15 – September 30)[(d)]					
Nitrate, Total (as N), mg/L	10	-	-	-	-
Total Dissolved Solids, mg/L	500	-	-	-	-
pH	-	-	-	6.0	9.0
Turbidity, NTU	-	-	2/5[(c)]	-	10

(a) Discharges to the Jones Creek cannot exceed one percent of river flow.
(b) An Ammonia Impact Ratio of 1.0 means the applicable ammonia standards are applied to the discharge with no dilution credit. Values of the ammonia standards vary depending on pH and temperature data for the receiving water. Based on a preliminary review of recent data, standards applied to the discharge could be as low 6.9 and 18 for average monthly and average weekly, respectively.
(c) Effluent turbidity cannot exceed 2 NTU on average during any 24-hour period or 5 NTU more than 5 percent of the time during any 24-hour period.
(d) The recycled water limits also apply to transfers to GCSD storage ponds.

[7] FWD is working with the Regional Water Board on an extension of this timeline beyond March 2026.

2.4.3 FWD Wastewater Characteristics

FWD WWTP influent wastewater characteristics have been defined using influent flow and water quality data from January 2019 to April 2024. Calculated flow statistics for the WWTP are presented in Table 2-11 for current and projected conditions. Calculated influent concentration and load statistics are shown in Table 2-12.

Table 2-11. FWD Current and Projected Influent Flows, mgd

ADWF	0.059	0.005[c]	0.064
AAF	0.080	0.005	0.085
Maximum 30-Day Flow	0.23	0.019	0.25
Maximum 7-Day Flow	0.36	0.029	0.39
PDF	0.73	0.058	0.79

(a) Current values based on influent flow data from January 2019 to April 2024.
(b) Flows were estimated by applying the same ratios between ADWF and other flow statistics observed under current conditions.
(c) New connections ADWF based on 50 new ESDs and an ADWF per ESD of 95 gpd per FWD Ordinance Number 83, which defines median single-family annual usage as 34,600 gallons.

Table 2-12. FWD Current and Projected Influent Water Quality

Water Quality Statistic	Current[a]		Anticipated New Connections	Projected
	Average	Maximum		
Concentrations, mg/L				
BOD	280	700	280	
TSS	260	670	260	
Loads, lb/day				
BOD Load	160	400	10[b]	170
TSS Load	150	390	10[b]	160
30-Day Maximum BOD Load[c]	250		20[d]	270
30-Day Maximum TSS Load[c]	230		20[d]	250

(a) Current values based on influent data from January 2019 to April 2024.
(b) New connections average loads calculated from current average concentrations and ADWF for new connections (Table 2-11).
(c) New connections 30-day maximum loads calculated from current 30-day maximum concentrations and maximum 30-day flow for new connections.
(d) BOD and TSS measurements were not recorded frequently enough to calculate 30-day running average concentrations or loads. For planning purposes, the maximum 30-day BOD and TSS loads have been calculated as 1.5 times the average load.

2.4.4 FWD Treatment Facilities

The FWD WWTP is located south of the FWD collection system. A layout of the treatment plant site is shown on Figure 2-10, and a treatment process schematic on Figure 2-11.

The tertiary treatment process consists of the following:

- Headworks with rotary screen;
- Three-cell aeration pond, with a total volume of 2.9 MG;
- Settling/EQ pond with a total volume of 0.75 MG;
- Membrane filtration, with two trains each having 36 modules; and
- Chlorine disinfection.

Treated effluent is directed to a 2.3-MG effluent storage pond where it is held prior to reuse or discharge to the Jones Creek. FWD also provides recycled water to Iron Horse Vineyards which has its own 14.7-MG reservoir for recycled water storage.

A spreadsheet-based, pond model analysis was conducted to determine the treatment capacity of the existing FWD WWTP treatment ponds using the same approach described for the GCSD WWTP ponds. Key inputs and modeling results for current and projected conditions are presented in Table 2-13.

Table 2-13. FWD WWTP Treatment Pond Capacity Evaluation

Scenario	Equivalent ADWF,[(a)] mgd	Maximum Month Flow, mgd	Maximum 30 Day BOD Load, lb/day	Secondary Effluent BOD, mg/L
Current Flows	0.061	0.24	250	16
Future Flows	0.065	0.25	270	18

(a) Maximum 30-day flows are used in the modeling, but ADWF is shown for reference.

A simplified analysis of available capacity of the remaining systems based on peak flows is provided in Table 2-14.

Table 2-14. FWD Flow-Based Capacity Evaluation

Key Statistic for Defining Capacity	Treatment Process of Interest	Projected Influent Value	Current Design Capacity
Peak Influent Flow	Influent screens	0.8 mgd[(a)]	2.0 mgd[(b)]
	Grit Removal		
Equalized Peak Influent Flow	Filtration	0.09 mgd/ 0.4 mgd[(c)]	0.16 mgd/ 0.29 mgd[(d)]
	Disinfection	0.4	0.58 mgd[(e)]

(a) Value shown in peak daily flow. Peak influent flow could be 2 to 3 times this value (or higher).
(b) Reported capacity of the rotary screen. Flows can be bypassed around the screen if needed.
(c) Anticipated summer/winter equalized peak based on AA and Peak Week flows.
(d) The filters can theoretically process a net average of 200 gpm each. In practice, each of the two filter units has able to process approximately 50 to 60 gpm during summer months, and 100 gpm during winter month. (Recycled Water Engineering Report, Brelje and Race, August 2018)
(e) Disinfection capacity based on 105-minute detention time.

F2-10 FWD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/27/2025

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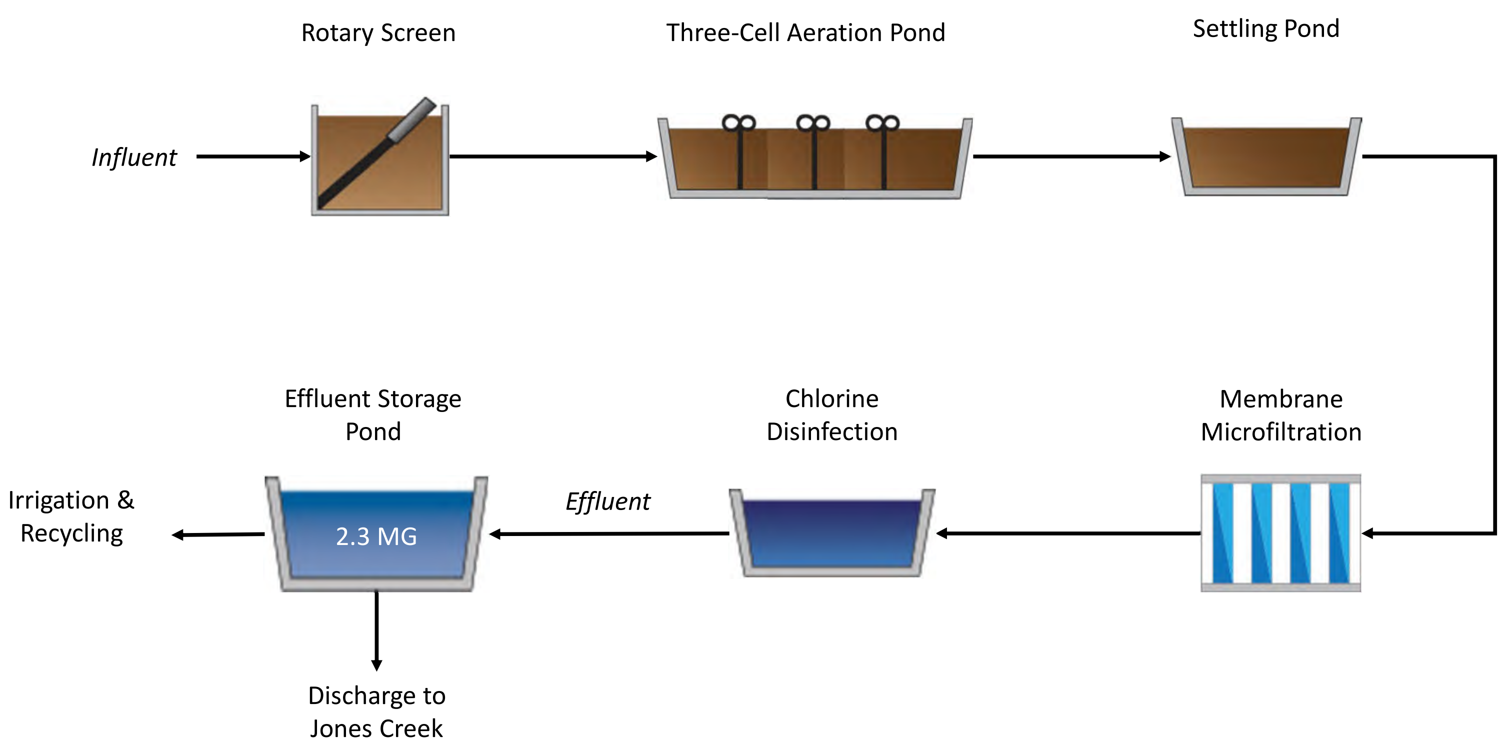
FWD WWTP Site Layout

Figure 2-10

Figure 2-11. FWD WWTP Process Schematic



Based on the information presented in Table 2-13 and Table 2-14, the FWD WWTP should have more than adequate capacity for current and planned connections with the exception of the filtration system, which may be limited to process flows during peak wet-season periods.

2.4.5 FWD Recycled Water Operations

Between May 15 and September 30, FWD beneficially reuses approximately 84 AFY of recycled water for the following uses:

- A recycled water fill station at the WWTP, where permitted residential and commercial users can collect recycled water for hauling.
- 198 acres of agricultural land comprising mostly vineyards.
- Approximately 18 acres of turf landscape, which includes local school grounds and parks.
- Approximately six acres of landscape irrigation that includes a mixture of turf and landscape vegetation.

As previously noted, FWD and GCSD work together to manage their effluent/recycled water facilities. In addition, FWD reports recycled water deliveries to existing users are significantly lower than irrigation demands – suggesting a potential to deliver more flow to these users.

2.4.6 FWD Regionalization Opportunities and Constraints

FWD has several opportunities that could be beneficial to potential regionalization strategies and/or acceptance of additional wastewater from neighboring unsewered communities, including:

- The WWTP receives relatively low flows and loads compared to its rated design capacity and could likely accommodate increased influent loads.
- The WWTP is not adjacent to a FEMA flood zone.
- The WWTP has relatively low seismic risk, as it is:
  - Not in a landslide hazard area,
  - In an area with very low susceptibility to liquefaction,
- The WWTP is in an area with low or very low potential for wildfire hazard.
- The existing intertie pipeline and working relationship with GCSD could allow the districts to reduce costs by collaborating on WWTP upgrades, which will be necessary at both facilities.
- FWD is reported to have significant recycled water demands, which could be leveraged to bring additional flows into the existing recycled water program.
- The existing FWD service area includes and has other nearby unsewered parcels that are likely good candidates for expanded service.

FWD also faces significant constraints to regionalization:

- The WWTP is mapped within a strong to severe earthquake hazard area.
- The membrane filters are nearing the end of their useful life and are not able to meet their rated treatment capacity. Replacement of the system will be needed. In addition, a pre-treatment step may be required to support long-term membrane filtration.

- The WWTP cannot meet current nitrogen effluent limits without significant treatment upgrades.
- The WWTP has limited effluent storage capacity.
- Winter surface water discharge to Jones Creek is complicated and expensive for the facility.

2.5 OCSD SERVICE AREA AND FACILITIES

This section details the OCSD service area and wastewater facilities, focused on the following topics:

- Service area overview
- Wastewater characteristics
- Current and future operations
- Opportunities and constraints

2.5.1 OCSD Service Area Overview

OCSD provides wastewater collection and disposal for a portion of the unincorporated community of Occidental. Sonoma Water manages and operates the OCSD facilities.

The OCSD services area and collection system are shown on Figure 2-12. The collection system comprises:

- 1.6 miles of gravity pipe
- 0.6 miles of force main
- One lift station, updated for truck filling in 2017 (“PS” on the figure)

The lift station is used to convey raw wastewater to the WWTP site, which is currently used for storage. All wastewater is ultimately hauled from a truck filling station to the Airport WWTP south of the Town of Windsor and about 11 miles from the OCSD WWTP site.

The OCSD service area consists of the following:

- 610 residents
- 273 ESDs,[8] including commercial and institutional customers
- 99 connections

The service area is primarily comprised of commercial users in the downtown area of Occidental. Between 2010 and 2020, Occidental’s residential population grew an average of 0.15 percent per year, based on U.S. census data. However, no growth is planned or expected for the OCSD service area.

Occidental does not qualify as a DAC. The customer annual service rates are $3,006 per ESD for Fiscal Year 2024/2025.

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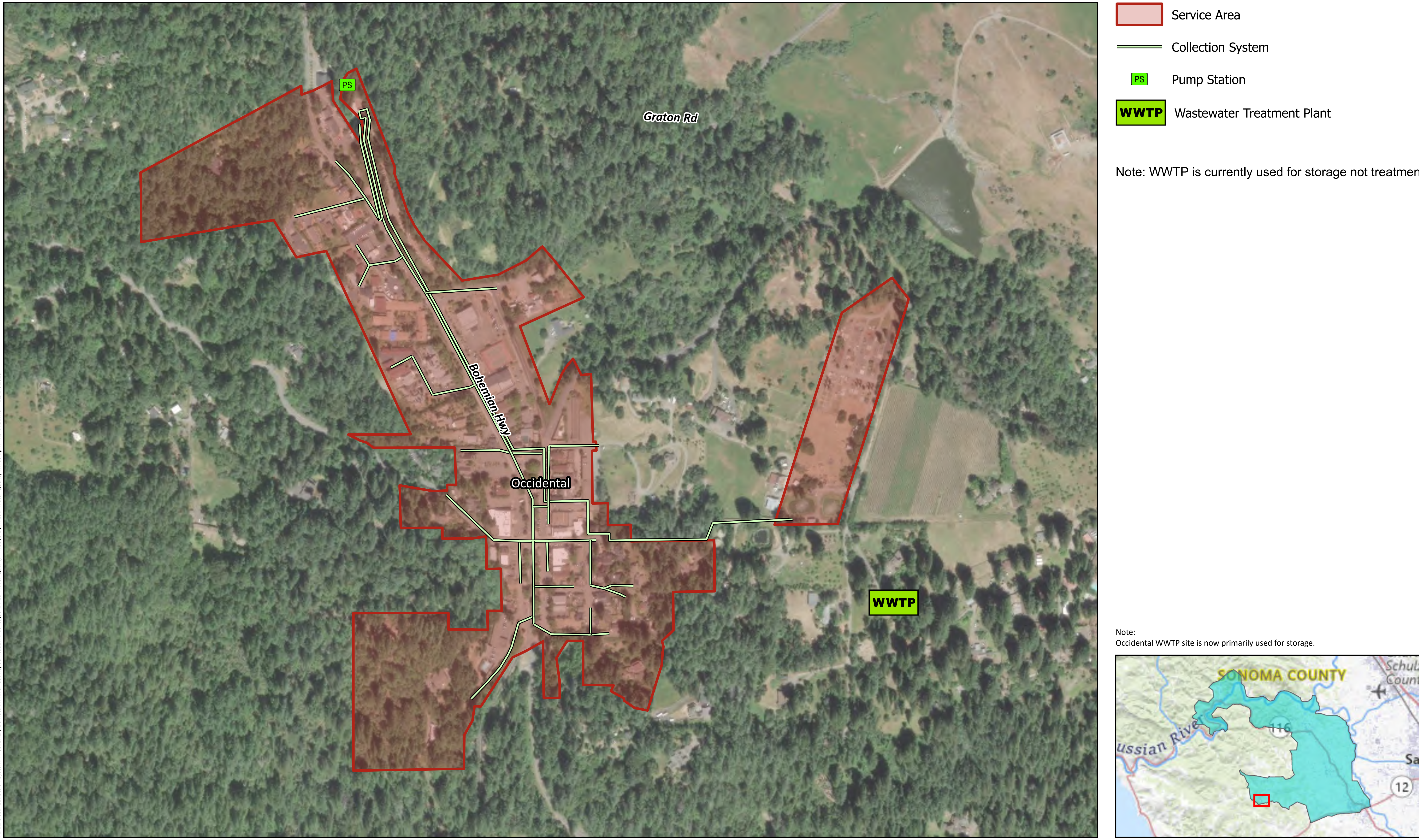
[8] OCSD defines an ESD as having sewer flow of 66 gallons per day and BOD and TSS concentrations of 250 mg/L (Exhibit A of OCSD rate ordinance [2024 Ordinance No. 6484 – 100 OCSD]).



F2-12 OCSD Collection System: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/27/2025

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OCSD Service Area and Collection System

Figure 2-12

2.5.2 OCSD Wastewater Characteristics

Truck hauling volume data from January 2019 to April 2024 was used to define influent wastewater characteristics. Table 2-15 and Table 2-16 present the calculated flow and water quality statistics, respectively. These represent both current and projected OCSD flows and loads, as no growth is assumed for the OCSD service area.

Table 2-15. OCSD Current and Projected Influent Flow Statistics, mgd

Flow Statistic	Current/Projected[a]
ADWF	0.028
AAF	0.037
Maximum 30-Day Flow	0.072
Maximum 7-Day Flow	0.11
PDF[b]	0.13

(a) Based on wastewater hauling data from January 2019 to April 2024. Zero growth in OCSD flows is assumed over the planning period.
(b) A water balance on the OCSD system was completed using hauling volume data, water level data from OCSD influent holding ponds and CIMIS precipitation and evapotranspiration data from January and February of 2023. Based on the water balance, peak hour flows during the period were as high as 0.53 mgd, and PDF as high as 0.16 mgd.

Table 2-16. OCSD Current and Projected Influent Water Quality Statistics

Water Quality Statistic	Current/Projected[a]	
	Average	Maximum
Concentrations, mg/L		
BOD	490	930
TSS	430	980
Loads, lb/day		
BOD Load	130	320
TSS Load	110	300
30-Day Maximum BOD Load[b]	190	
30-Day Maximum TSS Load[b]	170	

(a) Based on influent data from January 2019 to April 2024. Zero growth in OCSD loads is assumed over the planning period.
(b) BOD and TSS measurements were not recorded frequently enough to calculate 30-day running average concentrations or loads. For planning purposes, the maximum 30-day BOD and TSS loads have been calculated as 1.5 times the average load.

To further evaluate influent flows, a water balance of the OCSD system was completed using the following:

- Hauling volume data
- Water level data from OCSD influent holding ponds
- CIMIS precipitation and evapotranspiration data from January and February of 2023

Based on the water balance, PDF was estimated to be 0.16 mgd and peak hour flows were estimated to be as high as 0.53 mgd.

The calculated OCSD WWTP average influent BOD and TSS concentrations are about 1.5 times higher than the respective average influent concentrations of the other West County facilities. These higher concentrations could reflect OCSD's larger fraction of commercial flows. The Occidental to Graton Pipeline Feasibility Study, which relied on influent data from 2007 to 2017, defined a higher average BOD concentration of 584 mg/L but a similar average TSS concentration of 424 mg/L.

2.5.3 OCSD Facilities

As previously noted, OCSD no longer provides wastewater treatment at the OCSD WWTP site as OCSD began hauling wastewater to the Airport WWTP in 2017 for treatment and disposal.

The OCSD facilities are as follows:

- Influent lift station, which conveys flow to the former WWTP site about half a mile away;
- The former WWTP 0.65 MG and 0.22 MG aerated ponds are used for EQ and longer term storage;
- Hauling truck filling site, which is adjacent to the influent lift station and can fill directly from the storage ponds or the 0.04 MG influent lift station wet well.

A schematic of this process is shown on Figure 2-13. Trucking takes place between 2 and 5 days per week, with multiple 3,800-gallon loads hauled each day.

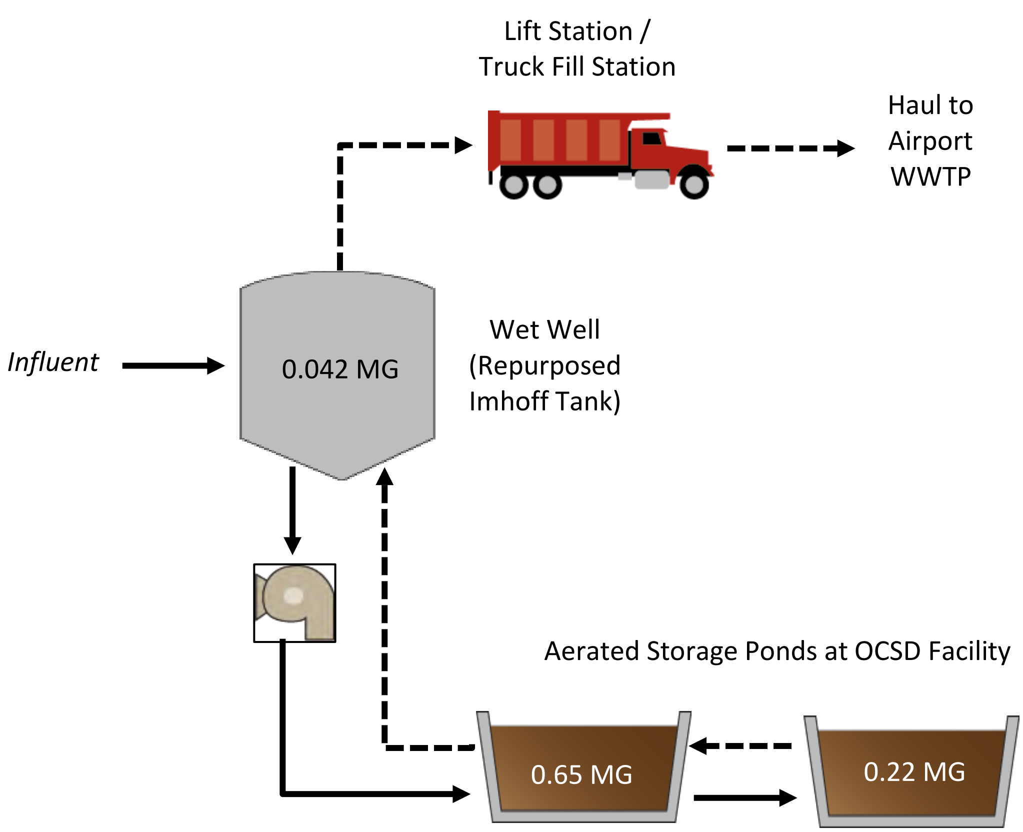

Figure 2-13. OCSD Current Operations Schematic

To control odor, the ponds are kept at an operational water depth of three feet and continue to be aerated. OCSD evaluates accumulation of solids in the ponds annually and has had solids removed every few years.

Design of a new raw wastewater pipeline from the OCSD lift station to the GCSD WWTP has recently been funded and is underway. The funding source for the construction and connection fee has yet to be determined. Construction of the pipeline is anticipated to be completed in 2028 or 2029, pending securing of additional funding.

The proposed pipeline and pump station will be designed for 0.26 mgd, twice the recent OCSD PDF of 0.13 mgd. This sizing was based on an assumed pumping for 12 hours per day. However, the GCSD WWTP may not be able to accept all peak influent flows from OCSD under current operating conditions. In that case, OCSD may still need to haul a portion of the OCSD flows to another WWTP.

2.5.4 OCSD Regionalization Opportunities and Constraints

The planned Occidental-Graton wastewater pipeline and pump station provide some opportunities that could be beneficial to potential regionalization strategies and/or acceptance of additional wastewater from neighboring unsewered communities in that the facilities are proposed to be sized for twice the anticipated PDF for the OCSD service area. This planned sizing, combined with the available EQ storage at the former OCSD WWTP site, potentially allows for additional flows from unsewered homes/communities nearby.

Constraints related to OCSD include the following:

- Once the size of the new pipeline and pump station are set (designed), accommodating additional flows will be limited.
- The GCSD WWTP treatment capacity would need to be expanded to accept additional flows, as discussed in the prior section dedicated to GCSD.
- Odor concerns from the OCSD site neighbors could impact long-term site use for EQ storage.

2.6 COMBINED SERVICE AREA FLOWS AND LOADS

The following tables present the combined ESD, flow and load information, based on the information presented in the previous sections:

- Table 2-17: The number of projected ESDs from the West County service areas
- Table 2-18: Proposed design (projected) flows
- Table 2-19: Proposed design (projected) BOD and TSS loads

Table 2-17. Projected West County ESDs	
	Number of ESDs/Connections[a]
RRCSD	3,621
OCSD	273
GCSD	714
FWD	711
Total Projected ESDs	**5,319**

(a) As noted in the previous sections, each agency currently defines ESDs differently, as shown below:
- RRCSD: 1 ESD has sewer flow = 120 gpd and BOD/TSS = 200 mg/L
- OCSD: 1 ESD has sewer flow = 66 gpd and BOD/TSS = 250 mg/L
- GCSD: 1 ESD has sewer flow = 150 gpd, BOD = 250 mg/L and TSS = 300 mg/L
- FWD: 1 ESD has sewer flow = 140 gpd and BOD/TSS = 324 mg/L

Table 2-18. Proposed Design Flows for West County Agencies

	ADWF, mgd	AAF, mgd	Maximum 30 Day Flow, mgd	Maximum 7 Day Flow, mgd	PDF, mgd
Projected RRCSD Flows	0.38	0.66	2.2	3.5[a]	4.2/5.0[a]
Projected GCSD/OCSD Flows	0.15	0.21	0.64	1.1	1.5
Projected FWD Flows	0.064	0.085	0.25	0.39	0.79
Total Combined Flows	**0.59**	**0.96**	**3.1**	**5.0**	**7.8**

(a) Equalized flow. The RRCSD Treatment Plant Master Plan indicates that Peak Day flows through the WWTP can be equalized to 5.0 mgd with use of existing Emergency Storage Pond. If 0.4 MG EQ basin is also available, flows can be equalized to 4.2 mgd. RRCSD Treatment Plant Master Plan indicates that un-equalized maximum 7-day flow is 3.65 mgd and un-equalized sustained peak flows are 5.2 mgd. These findings may need additional study in light of the recent (January 2026) spill event.

Table 2-19. Proposed Design BOD and TSS Loads for West County Agencies

	BOD Loads, lb/day		TSS Loads, lb/day	
	Average Annual	Maximum 30 day	Average Annual	Maximum 30 day
Projected RRCSD Loads	1,310	2,620	1,310	2,620
Projected GCSD/OCSD Loads	470	680	420	620
Projected FWD Loads	170	270	160	250
Total Combined Loads	**1,950**	**3,570**	**1,890**	**3,490**

CHAPTER 3
Alternatives Screening

This Chapter presents the development and screening of alternatives for regionalizing the wastewater treatment and disposal/reuse services for the four existing wastewater service areas within West County.[1,2] The purpose of this evaluation is to establish baseline infrastructure needs and capital costs for each regional alternative and to screen the alternatives down to one or more feasible alternatives.[3] The topics addressed are as follows:

- Regionalization Alternatives Overview
- Anticipated Flows and Loads
- Local Facility Scenarios
- Export Scenarios
- Combination Scenarios
- Alternatives Screening

3.1 REGIONALIZATION ALTERNATIVES OVERVIEW

Eight alternatives have been identified for this screening evaluation. The eight alternatives, organized by major category, are as follows:

1. **Local Facility Scenarios**: Flows from all West County agencies are treated at upgraded/expanded WWTPs within West County as follows:
   - **1a. Two Local Facilities:** Wastewater is treated at two different plants, the existing RRCSD plant and a new, combined FWD/GCSD plant.
   - **1b. One Facility at RRCSD:** All wastewater is directed to an expanded plant at the RRCSD site.
   - **1c. One Facility at FWD:** All wastewater is directed to a new plant at the FWD site, with recycled water facilities split across the existing FWD/GCSD systems.
2. **Export Scenarios:** Flows from all West County agencies are conveyed for treatment at WWTPs outside West County, as follows:
   - **2a. Export to Windsor:** All wastewater is directed to the Windsor WWTP.
   - **2b. Export to Santa Rosa's Laguna WWTP:** All wastewater is directed to the Santa Rosa Regional Laguna WWTP (Laguna WWTP).
   - **2c. Export to Windsor and Santa Rosa's Laguna WWTP**: Wastewater generated from RRCSD is directed to the Windsor WWTP, and wastewater generated from FWD/GCSD is directed to the Laguna WWTP.

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[1] The analysis incorporates the planned discharge of OCSD flows to the GCSD and costs related to this project element are not included in this assessment The proposed alignment for the planned OCSD to GCSD pipeline is shown on figures, where relevant.

[2] The evaluation is limited to consolidation of treatment and recycled water facilities only. Collection system infrastructure improvements are not evaluated.

[3] As noted in Chapter 1, the purpose of this study is to identify one or more feasible alternatives for regionalization. Additional engineering analysis and assessment of governance and financing feasibility would be needed to define the recommended approach.

3. **Combination Scenarios:** Some flows from West County agencies are treated locally while other flows are exported, as follows:
   - **3a. Treat at RRCSD; FWD/GCSD Export to Santa Rosa's Laguna WWTP**: RRCSD flows continue to be treated at the existing plant, while FWD/GCSD/OCSD flows get directed to the Laguna WWTP.
   - **3b. Treat at FWD/GCSD; RRCSD Export to Windsor**: FWD/GCSD/OCSD flows are treated at a new combined FWD/GCSD plant, while RRCSD flows get directed to the Windsor WWTP.

3.2 ANTICIPATED FLOWS AND LOADS

This section presents the design flows and loads for the eight alternatives considered in this evaluation. For four of the alternatives (1a, 2c, 3a and 3b), the wastewater generated within the West County area will be split between two different facilities, where RRCSD flow is treated at one site and FWD/GCSD/OCSD flows are treated at an alternative site. The remaining four alternative (1b, 1c, 2a and 2b) assumes all of the wastewater generated within West County will be treated at a single location.

3.2.1 Alternatives 1a, 2c, 3a and 3b

The projected flows and loads under Alternatives 1a, 2c, 3a and 3b are presented in Table 3-1 and Table 3-2, respectively, based on the information presented for each individual facility in Chapter 2.

Table 3-1. Projected Flows for Alternatives 1a, 2c, 3a and 3b

Scenario	ADWF, mgd	MMF, mgd	MWF, mgd	PDF, mgd
Treatment at the RRCSD WWTP				
Projected Flows	0.38	2.2	3.5[a]	4.2/5.0[a,b]
Treatment at the FWD/GCSD WWTP				
Projected GCSD/OCSD Flows	0.15	0.64	1.1	1.5
Projected FWD Flows	0.064	0.25	0.39	0.79
Total Combined GCSD/OCSD/FWD Flows	**0.21**	**0.89**	**1.5**	**2.3**

ADWF = Average Dry Weather Flow
MMF = Maximum 30-Day Flow
MWF = Maximum 7-Day Flow
PDF = Maximum Day Flow
(a) Equalized flow. The RRCSD Treatment Plant Master Plan indicates that Peak Day flows through the WWTP can be equalized to 5.0 mgd with use of existing Emergency Storage Pond. If 0.4 MG EQ basin is also available, flows can be equalized to 4.2 mgd. RRCSD Treatment Plant Master Plan indicates that un-equalized maximum 7-day flow is 3.65 mgd and un-equalized sustained peak flows are 5.2 mgd. These findings may need additional study in light of the recent (January 2026) spill event.

Table 3-2. Projected BOD and TSS Loads for Alternatives 1a, 2c, 3a and 3b

Scenario	BOD Loads, lb/day		TSS Loads, lb/day	
	Average Annual	Maximum 30 day	Average Annual	Maximum 30 day
Treatment at the RRCSD WWTP				
Projected Loads	1,310	2,620	1,310	2,620
Treatment at the FWD/GCSD WWTP				
Projected GCSD/OCSD Loads	470	680	420	620
Projected FWD Loads	170	270	160	250
Total Combined GCSD/OCSD/FWD Loads	**640**	**950**	**580**	**870**

3.2.2 Alternatives 1b, 1c, 2a and 2b

The projected flows and loads under Alternatives 1b, 1c, 2a and 2b are presented in Table 3-3 and Table 3-4, respectively, based on the information presented in Chapter 2.

Table 3-3. Projected Flows for Alternatives 1b, 1c, 2a and 2b

Scenario	ADWF, mgd	MMF, mgd	MWF, mgd	PDF, mgd
Projected RRCSD Flows	0.38	2.2	3.5[(a)]	4.2/5.0[(a)]
Projected GCSD/OCSD Flows	0.15	0.64	1.1	1.5
Projected FWD Flows	0.064	0.25	0.39	0.79
Total Flows	**0.59**	**3.1**	**5.0**	**6.5-7.3**

ADWF = Average Dry Weather Flow
MMF = Maximum 30-Day Flow
MWF = Maximum 7-Day Flow
PDF = Maximum Day Flow
(a) Equalized flow. The RRCSD Treatment Plant Master Plan indicates that Peak Day flows through the WWTP can be equalized to 5.0 mgd with use of existing Emergency Storage Pond. If 0.4 MG EQ basin is also available, flows can be equalized to 4.2 mgd. RRCSD Treatment Plant Master Plan indicates that un-equalized maximum 7-day flow is 3.65 mgd and un-equalized sustained peak flows are 5.2 mgd. These findings may need additional study in light of the recent (January 2026) spill event.

Table 3-4. Projected BOD and TSS Loads for Alternatives 1b, 1c, 2a and 2b

Scenario	BOD Loads, lb/day		TSS Loads, lb/day	
	Average Annual	Maximum 30 day	Average Annual	Maximum 30 day
Projected RRCSD Loads	1,310	2,620	1,310	2,620
Projected GCSD/OCSD Loads	470	680	420	620
Projected FWD Loads	170	270	160	250
Total Loads	**1,950**	**3,570**	**1,890**	**3,490**

3.3 LOCAL FACILITY SCENARIOS

This section describes the three local facility scenarios, as follows:

- Alternative 1a: Two Local Facilities
- Alternative 1b: One Facility at RRCSD
- Alternative 1c: One Facility at FWD

3.3.1 Alternative 1a: Two Local Facilities

This alternative has two different elements, as follows:

1. RRCSD flows treated at the existing RRCSD WWTP, and
2. FWD, GCSD and OCSD flows treated at a combined, upgraded FWD/GCSD WWTP.

Because each element would entail distinct infrastructure needs, these two elements are discussed separately below.

3.3.1.1 RRCSD Flows Treated at RRCSD WWTP

Under this element of Alternative 1a, the existing RRCSD WWTP and associated recycled water system would continue to be used to treat wastewater from the RRCSD service area.

3.3.1.1.1 Treatment Infrastructure Improvements

An analysis of the capacity of the RRCSD WWTP to accommodate the anticipated flows and loads associated with the RRCSD service area was presented in Chapter 2. As discussed, the facility should be able to provide adequate treatment capacity for the anticipated flows and loads from the RRCSD service area. However, the following improvements will be needed:

- An estimated $30 million in condition-related projects, which includes an estimated $3 million in headworks improvements based on West Yost's Headworks, Lift Stations, and Force Main project for Sonoma Water/RRCSD[4], and
- An estimated $0.7 million in hydraulic capacity improvements.

The RRCSD WWTP schematic would remain unchanged from existing conditions shown on Figure 2-4.

3.3.1.1.2 Recycled Water Infrastructure Improvements

Water balances were developed to evaluate recycled water infrastructure needs. In accordance with current Regional Water Board policies, these water balances account for projected influent flows and direct rainfall during a 100-year rainfall year. Additional assumptions applied in this evaluation were as follows:

- Disposal on the Northwood Golf Course would accommodate about 50 AFY, distributed in accordance with historical monthly average values;

[4] The RRCSD also needs to address significant collection system deficiencies. These critical improvements are common to all the alternatives evaluated in this study and are not addressed in this analysis.

- Disposal capacity of the 17-acre of wooded irrigation area of 105 AFY, including 75 AFY of percolation based on estimated percolation rates of 0.6 and 0.3 inches per day for the upper and lower portions[5], respectively, plus 30 AFY of irrigation demand for the overlying grass;
- Storage is limited to current available storage capacity of 3.5 MG (10.7 acre-feet (AF)); and
- Surface water discharge would continue up to a maximum monthly flow rate of no more than 1 percent of Russian River flow.

The following conclusions can be drawn from the water balance analysis:

- Existing summer-month effluent storage and disposal capacities are adequate to accommodate current flows.
- Up to an additional 5 acres of land application area would be needed to accommodate 8 AFY of water[6,7]. It is assumed that RRCSD would be able to obtain the required irrigated space by either expanding the existing 17-acre irrigation property and/or by using a small portion of the 394-acre forested property that was transferred to RRCSD in August 2024[8].

3.3.1.1.3 Conveyance Infrastructure Improvements

No new major conveyance infrastructure would be needed for this part of Alternative 1a.

3.3.1.2 GCSD/OCSD/FWD Flows Treated at Combined FWD/GCSD WWTP

GCSD and FWD staff have expressed an interest in working together to implement zero surface water discharge (i.e., reuse only) in lieu of making treatment improvements to meet the nitrogen effluent limitations that have been prescribed for surface discharge. Moreover, both systems are currently experiencing some difficulties with operation of their filtration and/or disinfection systems. Therefore, for this element of Alternative 1a, GCSD and FWD are assumed to implement a strategy where secondary treatment would continue to be provided at both WWTPs in their respective pond systems, but tertiary treatment and disinfection would be consolidated. Similarly, the existing recycled water storage and recycled water use areas would be combined and shared by both agencies.

[5] Percolation rates were estimated based on historical operations data.

[6]The estimated 5 additional acres of additional area required is based on a conservative assumption that recycled water is applied at agronomic rates with no allowance for additional percolation. Only 17 additional acres would be needed if the 0.6 inch per day percolation rates identified for the upper portions of existing irrigation area is assumed.

[7] The RRCSD Treatment Facility Master Plan had a similar finding, identifying approximately 3-acres of expansion area is required.

[8] RRCSD staff estimate that up to approximately 3 percent of the 394-acre may be available for land application.

3.3.1.2.1 Treatment Infrastructure Improvements

As presented in Chapter 2, the GCSD WWTP pond-based treatment system will need to be modified/upgraded to provide additional treatment capacity.[9] For this analysis, it is assumed the treatment capacity of the GCSD pond system would be increased by upgrading the ponds with a new diffused aeration system, which would provide complete mixing and higher reaction rates for BOD removal. These aeration upgrades would also require installation of blowers. A preliminary analysis demonstrates the effluent BOD treatment target of 30 mg/L could be readily met with these aeration upgrades.

The tertiary filtration facilities at the GCSD and FWD WWTPs are nearing the end of their useful lives. Moreover, GCSD requires a new disinfection system. Therefore, it has been assumed that new tertiary filtration and disinfection facilities would be constructed at the FWD WWTP to provide treatment for the combined FWD/GCSD/OCSD flows. This system would be composed of the following elements:

- A new SAF system for treatment ahead of filtration,
- A new cloth disk filtration system, and
- Expansion of the chlorine contact basins (CCBs)and associated expanded chlorine dosing equipment.

Based on a review of FWD and GCSD operating records, the existing tertiary filtration systems at each plant operate at a maximum flow rate between the maximum 7-day and maximum 30-day flow values. Therefore, it is expected a new combined treatment system would need to treat flows in this same range. The capacity needed at the FWD WWTP for tertiary treatment and advanced disinfection are shown in Table 3-5, with the current FWD WWTP design and operational capacities shown for reference.

Table 3-5. Future Flows to Combined Tertiary Treatment Facilities at FWD WWTP

Flow Scenario	Flow to Tertiary Facilities, mgd	
	Equalize GCSD to Maximum 7 Day Flows	Equalize GCSD to Maximum 30 Day Flows
FWD WWTP Disinfection Capacity	*0.58*	
FWD WWTP Filter Winter-Season Operational Capacity	*0.29*	
Future FWD Flows to Tertiary Facilities (Maximum 7-Day)	0.39	0.25
Future GCSD/OCSD Flows to Tertiary Facilities	1.10	0.64
Total Future Flows to Tertiary Facilities, mgd	**1.49**	**0.89**

The FWD WWTP has limited space available on site for new treatment facilities. Moreover, the existing facilities would need to be kept in service while new facilities are under construction. Therefore, it has been assumed that the existing effluent storage pond area at the FWD WWTP would be repurposed for siting the new treatment facilities. A schematic of the proposed treatment process at the combined FWD/GCSD WWTP is shown on Figure 3-1.

[9] As discussed in Chapter 2, the GCSD pond system does not have adequate capacity to treat projected flow to meet an effluent BOD treatment target of 30 mg/L. However, the FWD WWTP has adequate pond treatment capacity.

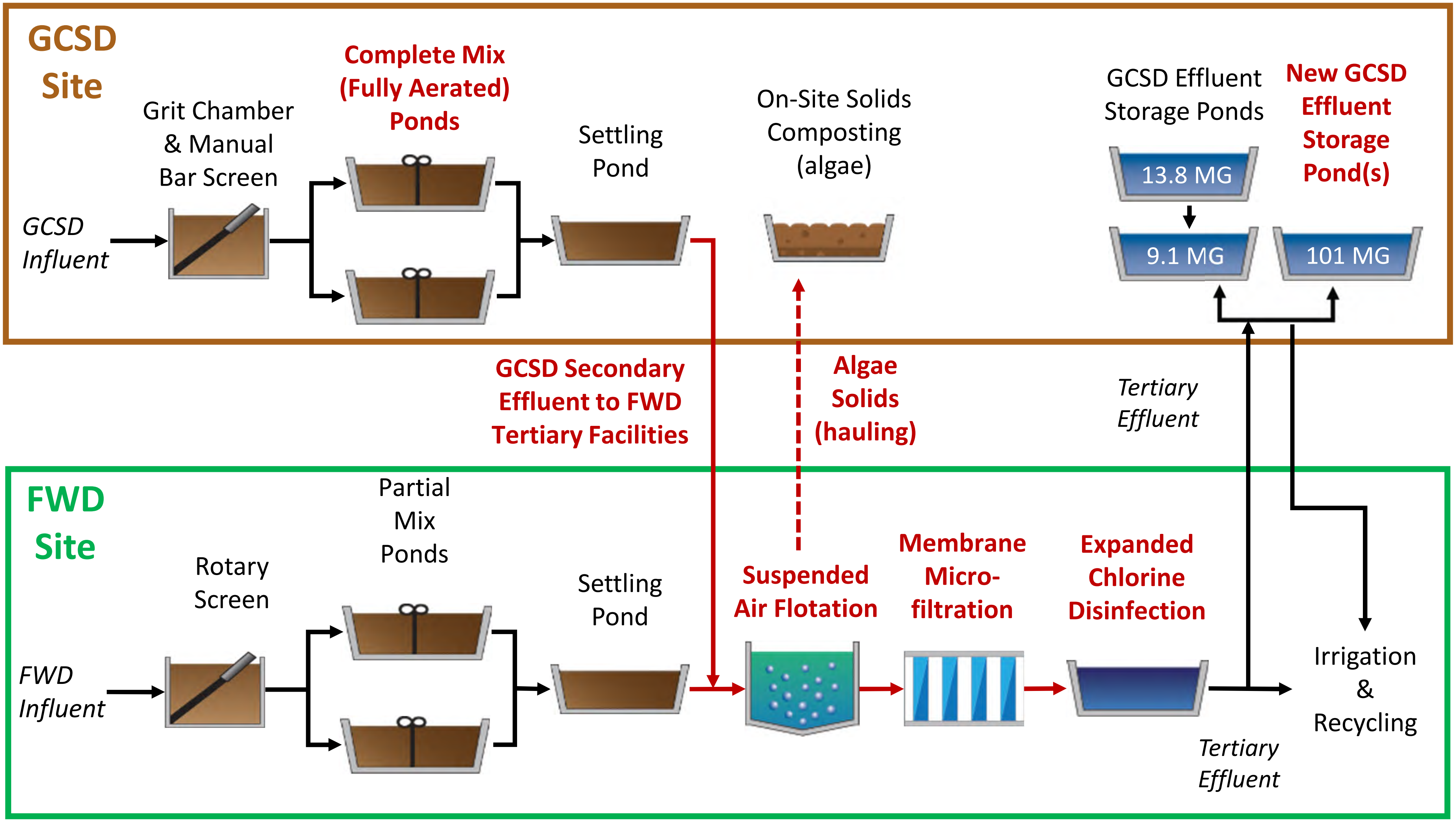


Figure 3-1. Combined FWD/GCSD WWTP Treatment Operation Schematic for Alternative 1a

3.3.1.2.2 Recycled Water Infrastructure Improvements

Water balances were developed for the combined FWD/GCSD system to determine future recycled water infrastructure requirements. In accordance with current Regional Water Board policies, these water balances account for projected influent flows and direct rainfall during a 100-year rainfall year. Additional assumptions applied in this evaluation were as follows:

- Disposal on the 301 acres of vineyards currently served by GCSD and FWD would accommodate up to 440 AFY, distributed in accordance with historical monthly average values;
- Disposal capacity of the existing 24 acres of turf and landscaped areas serviced by FWD would accommodate up to about 50 AFY, distributed in accordance with historical monthly average values;
- The existing 20.5-acre GCSD land application area would be repurposed to provide additional storage, and would no longer be available for disposal;
- The existing GCSD 22.9 MG (70.3 AF) storage capacity is available; and
- There would be no surface water discharge.

The following conclusions can be taken from the water balance analysis:

- The existing irrigation reuse sites would be able to accommodate the combined recycled water flow generated.
- 310 AF of additional storage volume would be required.

The 20.5-acre land application area owned by GCSD would be adequately sized to accommodate the new storage basin if the ponds are at least 30 feet in depth. The FWD recycled water system also includes seasonal storage of 14.7 MG (45 AF) at the Iron Horse Vineyards, which has not been considered as part of this analysis.

3.3.1.2.3 Conveyance Infrastructure Improvements

To accommodate the flow of water between the two facilities the following pipelines and pump stations are needed:

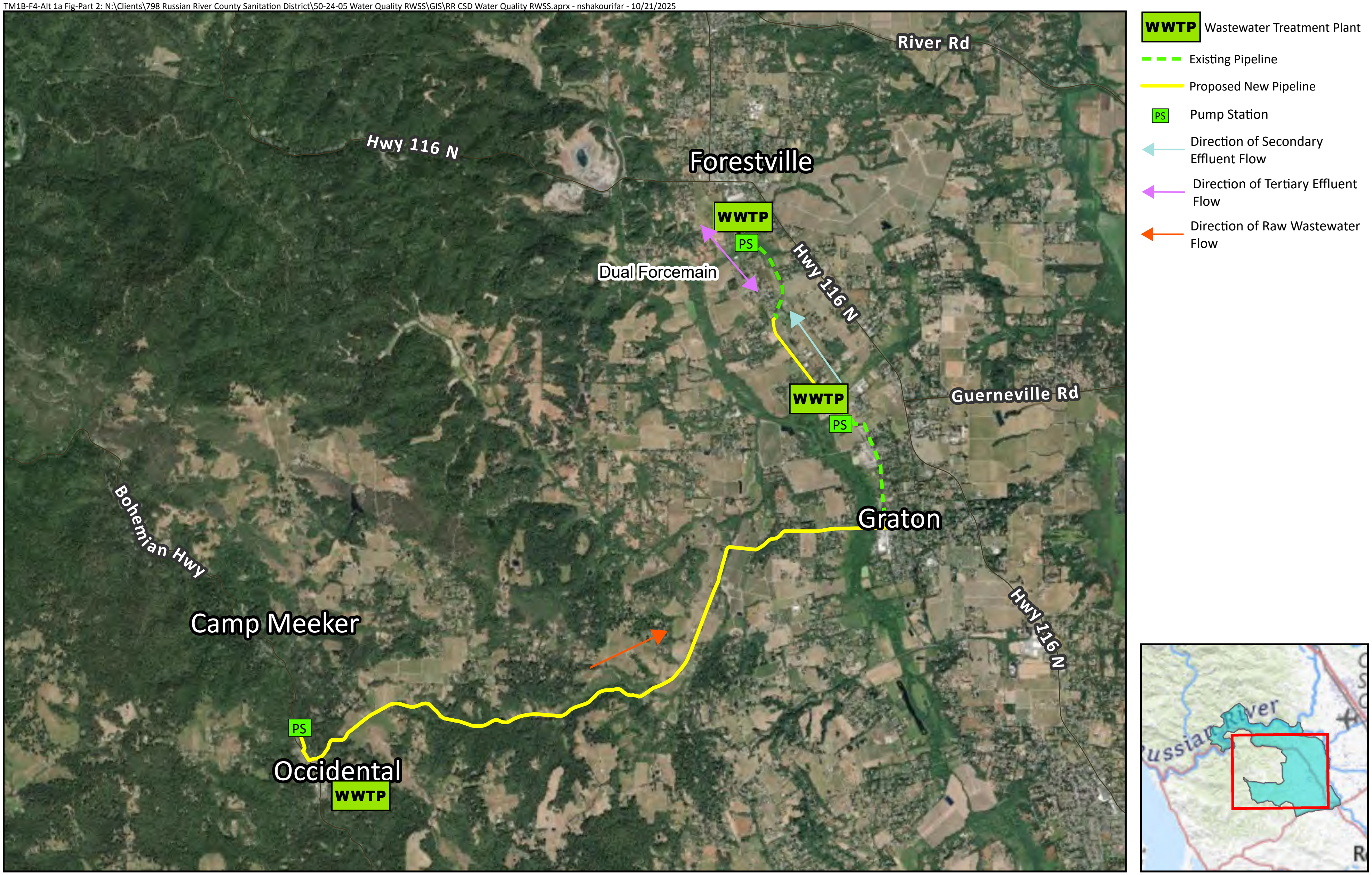
- **Secondary Effluent from GCSD to FWD:**
  - The existing 1.7-mile long, 8-inch diameter DI pipeline between the FWD and GCSD WWTPs would be rehabilitated to allow for transfer of up to 1.1 mgd of GCSD/OCSD secondary effluent from the GCSD WWTP to the FWD WWTP.
  - A new, 1.1 mgd effluent pump station to convey flow from the GCSD is also needed for secondary effluent transfer.[10]

[10] GCSD has identified the need for a new effluent pump station. It is assumed that the facility would be sized to accommodate the proposed use. The new pump station is assumed to be adequately designed to accommodate the effluent flow detailed herein.

- **Tertiary Effluent from FWD to GCSD Storage Ponds and Recycled Water Customers:**
  - A new 0.8-mile, 6-inch pipeline between the GCSD WWTP and the existing 6-inch PVC pipe connecting to the FWD WWTP along with a new, parallel 1.7 mile 6-inch pipeline would be constructed to allow for transfer of 1.5 mgd of tertiary effluent from the FWD WWTP to the storage ponds at the GCSD WWTP (and for distribution to recycled water customers).
  - The existing 0.7 mgd effluent pump station at the FWD WWTP needs to be expanded to 1.5 mgd to allow for transfer of flows from the FWD site to the ponds at the GCSD site.
- **Tertiary Effluent from GCSD Storage Ponds to Recycled Water Customers:**
  - A new, 1.5 mgd recycled water pump station at the GCSD site is needed to distribute recycled water from the storage ponds to recycled water customers.

A conceptual alignment of these conveyance components is shown on Figure 3-2.

TM1B-F4-Alt 1a Fig-Part 2: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/21/2025



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Pipeline Alignments for Alternative 1a

Figure 3-2

3.3.2 Alternative 1b: One Facility at RRCSD

Alternative 1b entails treatment of all West County flows at an expanded RRCSD WWTP, with recycled water returned to the FWD/GCSD systems to allow for continued delivery to the existing recycled water users in this area. Recycled water would also continue to be provided to the Northwood Golf Course.

3.3.2.1.1 Treatment Infrastructure Improvements

The existing aerated treatment ponds at both the FWD and GCSD WWTPs would be converted to EQ. Both facilities would continue to operate an influent screening facility (including the new screening facility planned at the GCSD WWTP). Flows exceeding the discharge pumping capacity would be diverted to the ponds and held there until they can be conveyed to the RRCSD facility. With this approach, the peak flows at the GCSD and FWD facilities could be equalized to the MMF conditions, for a total peak flow of 0.9 mgd. Combined with the equalized peak flow at the RRCSD of 4.2 mgd, the total flow that would be treated through the RRCSD WWTP would be 5.1 mgd.

The projected flows to the RRCSD WWTP with the GCSD and FWD flows incorporated are consistent with the capacities evaluated in the RRCSD WWTP Master Plan. As documented therein, the following capacity improvements at the RRCSD WWTP will be needed:

- An estimated $30 million in condition-related projects, which includes an estimated $3 million in headworks improvements based on West Yost's Headworks, Lift Stations, and Force Main project for Sonoma Water/RRCSD[11], and
- An estimated $0.7 million in hydraulic capacity improvements.

As shown in Table 3-3, the projected combined maximum 30-day BOD loads are approximately 3,600 lb/day. As presented in the Treatment Facilities Master Plan, the aeration basins should be capable of treating up to the maximum month load capacity assumed to be reached in 2033, or approximately 3,650 lb/day. Therefore, the aeration basins should be able to accommodate the additional influent load without requiring an expansion of the biological treatment or solids processing system[12].

The secondary clarifiers were designed to handle a solids loading rate of 20 lb/sf/day for the two, 40-foot diameter clarifiers and 36 lb/sf/day for the 60-foot diameter clarifier. Given these values, a fourth secondary clarifier will not be needed to accommodate the FWD/GCSD flows based on the following analysis:

- At a 3,000 mg/L Mixed Liquor Suspended Solids (MLSS) concentration and a sustained peak flow of 5.1 mgd, the solids loading rates to the clarifiers would be 16 lb/sf/day to the two 40-foot diameter clarifiers and 28 lb/sf/day to the 60-foot diameter clarifier, assuming approximately 3.5 mgd is directed to the 60-foot diameter clarifier. These values are well below the design loading rate values.

[11] The RRCSD also needs to address significant collection system deficiencies. These critical improvements are common to all the alternatives evaluated in this study and are not addressed in this analysis.

[12] This assumes the maximum month load peaking factors used to develop the Treatment Plant Master Plan are overstated and the 2.0 AAL to MML peaking factors defined herein are determined to be more representative.

- At a 3,000 mg/L MLSS concentration and a potential sustained peak flow of 5.9 mgd,[13] the solids loading rates to the clarifiers would be 18 lb/sf/day to the two 40-foot diameter clarifiers and 36 lb/sf/day for the 60-foot diameter clarifier, assuming approximately 4.4 mgd is directed to the 60-foot diameter clarifier. These values are just at the design values.

As presented in Chapter 2 (Table 2-4), the filtration system would need to be expanded to increase the firm capacity above approximately 4.0 mgd. A third, 4 mgd filtration unit is assumed to be installed.

The UV disinfection system would also need to be expanded to accommodate a combined peak flow of 5.1 mgd, as the UV disinfection system capacity rating is expected to be 5 mgd following the current re-rating process. However, because the existing UV equipment is nearing the end of its useful life, it is assumed the existing equipment would be replaced with new equipment having a slightly higher capacity. Therefore, no additional UV channels are needed.

The RRCSD WWTP schematic would also remain unchanged from existing conditions shown on Figure 2-4 under this alternative.

3.3.2.1.2 Recycled Water Infrastructure Improvements

Water balances were developed for the combined FWD/GCSD/OCSD/RRCSD system to determine future recycled water infrastructure requirements. In accordance with current Regional Water Board policies, these water balances account for projected influent flows and direct rainfall during a 100-year rainfall year. Additional assumptions applied in this evaluation were as follows:

- Recycled water would be returned to the GCSD/FWD area for storage and reuse;
- Disposal on the 301 acres of vineyards currently served by GCSD and FWD would accommodate up to 440 AFY, distributed in accordance with historical monthly average values;
- Disposal capacity of the existing 24 acres of turf and landscaped areas serviced by FWD and the existing 20.5-acre GCSD land application area would accommodate up to about 90 AFY, distributed in accordance with historical monthly average values;
- Disposal on the Northwood Golf Course would accommodate about 50 AFY, distributed in accordance with historical monthly average values;
- The existing GCSD 22.9 MG (70.3 AF) storage capacity is available;
- The existing FWD 2.3 MG (7 AF) storage capacity is available;
- The existing RRCSD 3.5 MG (10.7 AF) storage capacity is available; and
- Surface water discharge would continue at a maximum monthly flow rate of up to 1 percent of Russian River flows.

The water balances demonstrate that the combined storage and irrigation reuse areas described above would provide adequate capacity.

[13] Assumes RRCSD peak flows are equalized to 5.0 mgd and FWD/GCSD flows are equalized to a MMF of 0.9 mgd.

3.3.2.1.3 Conveyance Infrastructure Improvements

To accommodate the flow of water between the two facilities the following pipelines and pump stations are needed:

- **Raw Wastewater from GCSD to FWD:**
  - The existing 1.7-mile long, 8-inch diameter DI pipeline between the FWD and GCSD WWTPs would be rehabilitated to allow for transfer of 0.64 mgd of equalized, raw OCSD/GCSD wastewater.
  - A new 0.64 mgd effluent pump station for GCSD is needed for raw wastewater transfer to the FWD WWTP site.[14]
- **Raw Wastewater from FWD to RRCSD:**
  - A new 10.4-mile, 10-inch diameter pipeline to convey the 0.9 mgd equalized, raw FWD/GCSD/OCSD flows. This pipeline would have two river crossings.[15]
  - A new 0.9 mgd, high-head pump station to convey the 0.9 mgd equalized, raw FWD/GCSD/OCSD flows.
- **Recycled Water from RRCSD to FWD:**
  - A new 10.4-mile, 12-inch diameter pipeline to convey an estimated 1.5 mgd tertiary flows to the recycled water storage ponds at the FWD WWTP. This pipeline would have two river crossings.
  - A new 1.5 mgd, high-head pump station to convey tertiary flows to the recycled water storage ponds at the FWD WWTP.
- **Recycled Water from FWD to GCSD:**
  - A new 1.7-mile, 8-inch pipeline between the GCSD WWTP and the FWD WWTP would be constructed to allow for transfer up to 1.0 mgd of tertiary effluent from the storage ponds at the FWD WWTP to the storage ponds at the GCSD WWTP.[16]
  - The existing 0.7 mgd effluent pump station at the FWD site needs to be expanded to 1.0 mgd to allow for transfer of flows from the FWD site to the ponds at the GCSD ponds.
- **Recycled Water from GCSD to Recycled Water Customers:**
  - A new 0.8-mile, 6-inch pipeline between the GCSD WWTP and the existing 6-inch PVC pipe connecting to the FWD WWTP would be constructed to allow for transfer of 0.6 mgd of tertiary effluent from the storage ponds at the GCSD WWTP to recycled water customers.

[14] GCSD has identified the need for a new effluent pump station. It is assumed that the facility would be sized to accommodate the proposed use. The new pump station is assumed to be adequately designed to accommodate the effluent flow detailed herein.

[15] River crossings will require special construction and additional cost over open trench pipeline construction.

[16] Flows will be transferred to the GCSD ponds during the non-discharge season only. A detailed assessment of dry season flows has not been completed, so sizing is based on projected Annual Average flows.

- A new, 0.6 mgd recycled water pump station at the GCSD site is needed to distribute recycled water from the storage ponds to recycled water customers.

These proposed conveyance alignments are shown on Figure 3-3. For the alignment between FWD and the RRCSD, two potential pipeline alignments are shown, as follows:

- A north alignment along the Russian River, which follows Highway 116 through Guerneville and then River Road, until turning south toward the FWD WWTP at Mirabel Road.
- A middle alignment that continues along Highway 116 to Forestville.

While the middle alignment is the most direct, the north alignment passes unsewered communities of interest (Hacienda and Hollydale).

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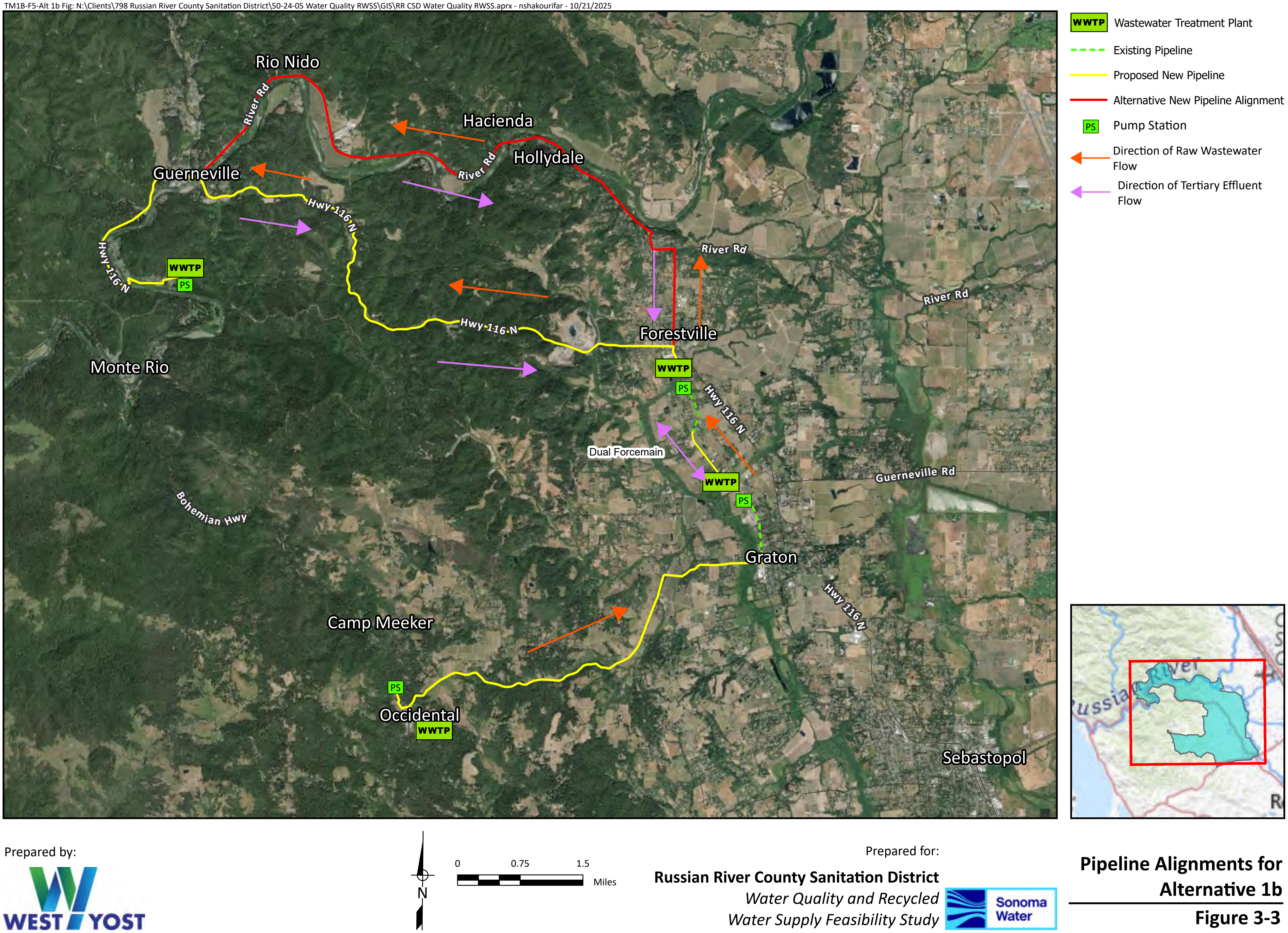

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Pipeline Alignments for Alternative 1b

Figure 3-3

3.3.3 Alternative 1c: One Facility at FWD

Alternative 1c entails treating all West County flows at a new, expanded WWTP at the location of the current FWD WWTP. This treatment system would be designed to remove nitrogen and therefore allow for continued surface water discharge17. However, it is unclear whether the two existing FWD and GCSD outfall sites would provide adequate flow to meet the Basin-Plan mandated 100:1 dilution ratio to ensure. Therefore, it has been assumed that a new outfall to the Russian River would need to be constructed. The alternative also includes use of the combined FWD/GCSD recycled water system for dry season reuse.[18]

3.3.3.1 Treatment Infrastructure Improvements

Under this scenario, the GCSD and FWD treatment ponds and RRCSD storage pond would be reconfigured so they could provide EQ. With this approach, the GCSD and FWD flows could be equalized to the maximum 30-day average values shown in Table 3-3 (i.e., 0.9 mgd) and RRCSD flows could be equalized to the maximum 7-day average flows shown in Table 3-3 (i.e., 3.5 mgd). Like Alternative 1b, all three facilities would have influent screening and conveyance infrastructure to allow flows exceeding the discharge pumping capacity to be diverted to the ponds and held there until they can be conveyed to the new treatment facilities at the FWD site.

While several options are potentially available to provide the level of treatment required for surface water discharge, this analysis assumes a new membrane bioreactor (MBR) treatment plant followed by a new UV disinfection system would be constructed at the FWD site to provide the required treatment. Because of limited space available at the FWD WWTP for these new facilities, the new treatment facilities are assumed to be constructed within the footprint of the existing effluent storage pond. An aerobic solids digester is also assumed to be provided along with dewatering equipment.

The combined treatment operation is shown schematically with new treatment facilities at FWD are on Figure 3-4.

[17] Water balances for this alternative demonstrate that year-round zero discharge would be infeasible due to an excessive volume of recycled water storage that would be required.

[18] Existing recycled water use from RRCSD on the Northwood Golf Course is assumed to cease.

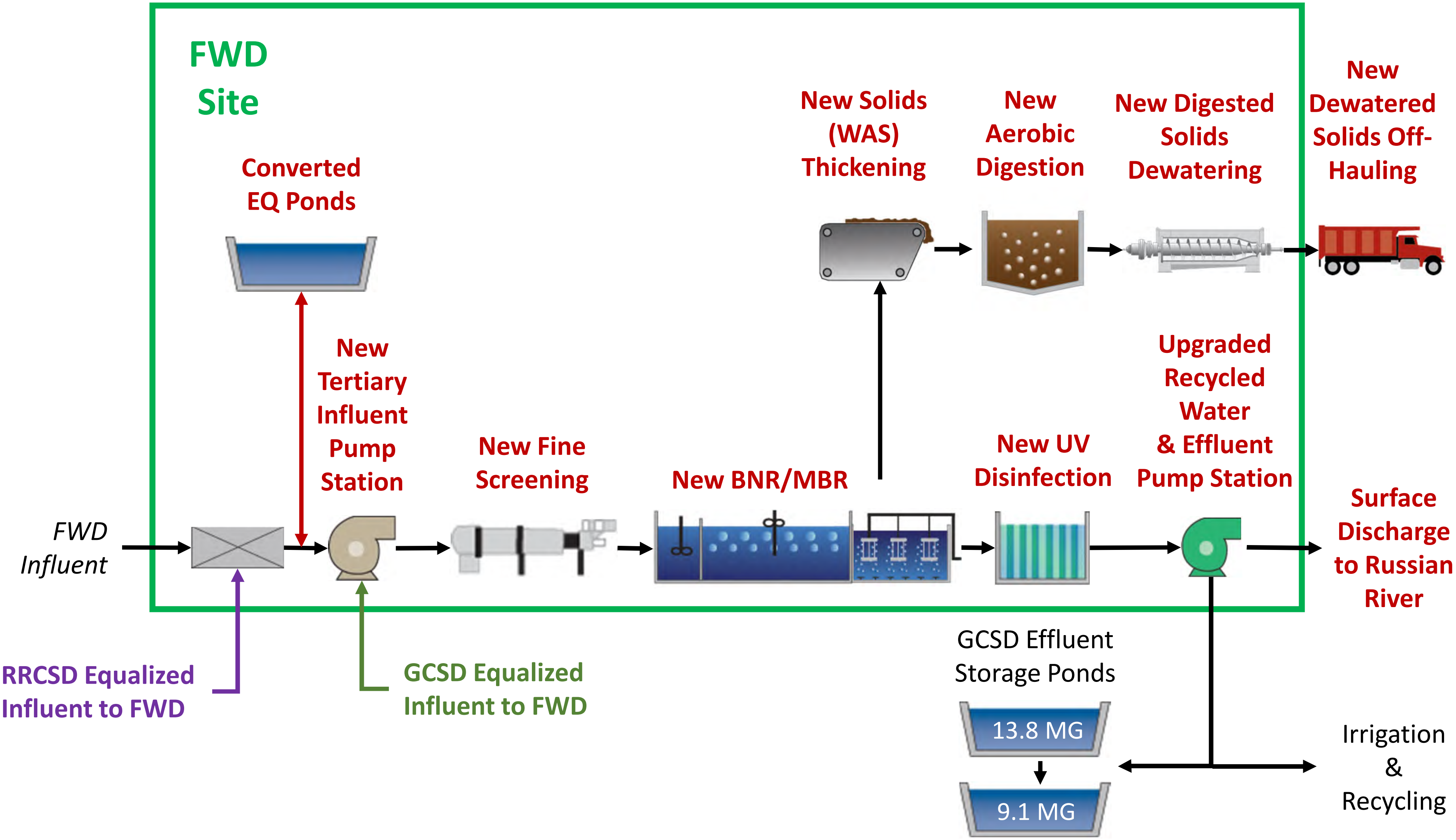

Figure 3-4. Flow Schematic for Alternative 1c

3.3.3.2 Recycled Water Infrastructure Improvements

Water balances were developed for the combined FWD/GCSD/RRCSD system to determine future recycled water infrastructure requirements. In accordance with current Regional Water Board policies, these water balances account for projected influent flows and direct rainfall during a 100-year rainfall year. Additional assumptions applied in this evaluation were as follows:

- Disposal on the 301 acres of vineyards currently served by GCSD and FWD would accommodate up to 440 AFY, distributed in accordance with historical monthly average values;
- Disposal capacity of the existing 24 acres of turf and landscaped areas serviced by FWD and the existing 20.5-acre GCSD land application area would accommodate up to about 90 AFY, distributed in accordance with historical monthly average values;
- The existing GCSD 22.9 MG (70.3 AF) storage capacity is available; and
- Surface water discharge would be maintained at a maximum monthly flow rate of approximately 2.3 mgd.

The water balances demonstrate that the combined storage and irrigation reuse areas described above would provide adequate capacity for the expected flows.

3.3.3.3 Conveyance Infrastructure Improvements

To accommodate the flow of water between the two facilities the following pipelines and pump stations are needed:

- **Raw Wastewater from GCSD to FWD:**
  - The existing 1.7-mile long, 8-inch diameter DI pipeline between the FWD and GCSD WWTPs would be rehabilitated to allow for transfer of 0.64 mgd of equalized, raw OCSD/GCSD wastewater.
  - A new 0.64 mgd effluent pump station for GCSD is needed for raw wastewater transfer to the FWD WWTP site.[19]
- **Raw Wastewater RRCSD to FWD:**
  - A new 10.4-mile, 20-inch diameter pipeline to convey an estimated 3.5 mgd raw wastewater flows to the new facilities at the FWD WWTP. This pipeline would have two river crossings.
  - A new 3.5 mgd, high-head pump station to convey raw wastewater flows to the new facilities at the FWD WWTP.

[19] GCSD has identified the need for a new effluent pump station. It is assumed that the facility would be sized to accommodate the proposed use. The new pump station is assumed to be adequately designed to accommodate the effluent flow detailed in this analysis.

- **Treated Water from FWD to GCSD:**
  - A new, 1.7-mile, 16-inch pipeline between the GCSD WWTP and the FWD WWTP would be constructed to allow for transfer up to 4.4 mgd of tertiary effluent from the FWD WWTP to the GCSD storage ponds and/or the existing discharge location at the GCSD WWTP.
  - A new 4.4 mgd effluent pump station at the FWD site needs to be constructed to allow for discharge to surface waters and/or transfer to the GCSD ponds.
- **Recycled Water from GCSD to Recycled Water Customers:**
  - A new 0.8-mile, 6-inch pipeline between the GCSD WWTP and the existing 6-inch PVC pipe connecting to the FWD WWTP would be constructed to allow for transfer of 0.6 mgd of tertiary effluent from the storage ponds at the GCSD WWTP to recycled water customers.
  - A new, 0.6 mgd recycled water pump station at the GCSD site is needed to distribute recycled water from the storage ponds to recycled water customers.

These proposed conveyance alignments are shown on Figure 3-5. Like Alternative 1b, the alignment between RRCSD and FWD has the potential to pass through unsewered communities of interest (Hacienda and Hollydale). However, that alternative route is not as direct as the alignment along Highway 116.

To ensure discharges from the new facility can meet the Basin-Plan required 100-to-1 dilution ratio, a new 24-inch, 4.1-mile long outfall from the FWD WWTP to the Russian River as assumed to be constructed.[20] The proposed alignment and location of the new outfall is shown on Figure 3-6. While a more direct alignment is feasible, this alignment has been selected so the outfall is located substantially downstream of Sonoma Water's Marabel surface water supply intake facilities.

[20] Additional evaluation of the dilution available at the existing GCSD and FWD discharge locations is needed to confirm the need for a new outfall. It is also likely that the existing FWD and GCSD outfalls would be available to accommodate some of the discharge flow. A lower-cost supplemental discharge site may also be possible. Therefore, the new outfall could potentially be lower cost than what has been assumed for this study.

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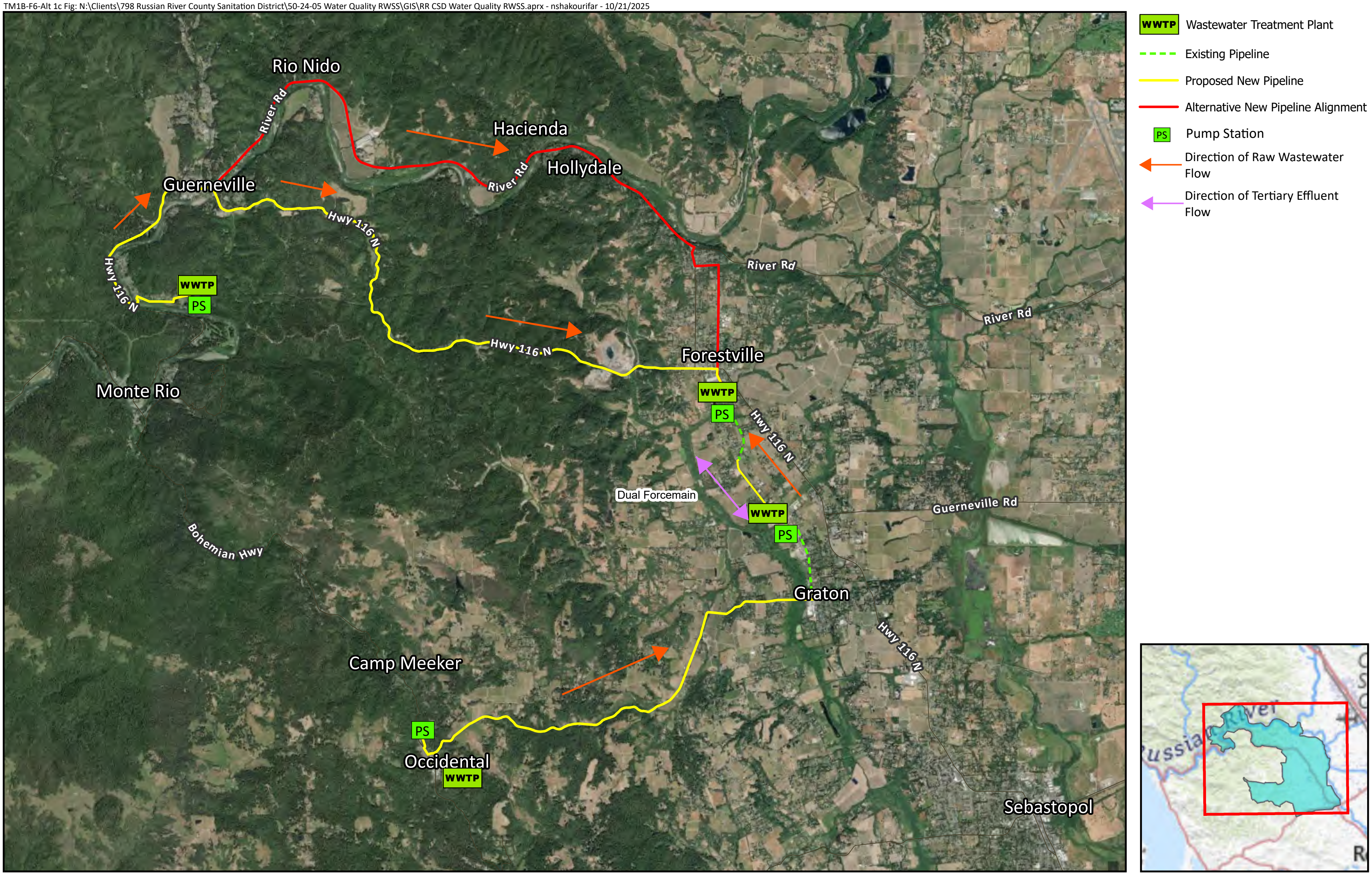

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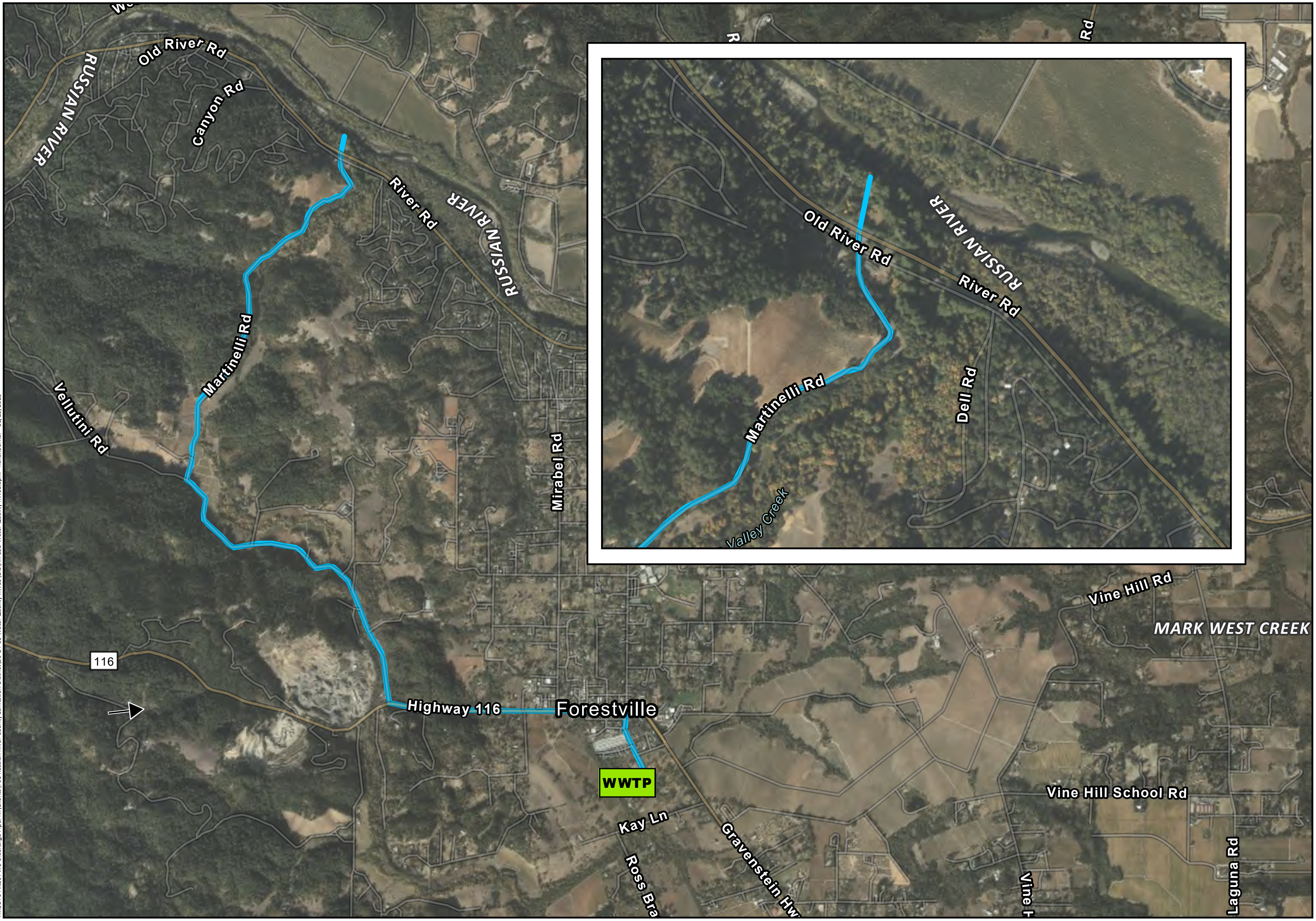
Pipeline Alignments for Alternative 1c

Figure 3-5



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Surface Discharge Pipeline Alignment for Alternative 1c

Figure 3-6

3.4 EXPORT SCENARIOS

This section discusses the three export scenarios, as follows:

- Alternative 2a: Export to Windsor
- Alternative 2b: Export to the Laguna WWTP
- Alternative 2c: Export to Windsor and the Laguna WWTP

3.4.1 Alternative 2a: Export to Windsor

Alternative 2a would entail conveying all untreated wastewater flows from West County to the Windsor WWTP for treatment. With this alternative, no recycled water would be delivered in the West County area.

3.4.1.1 Treatment Infrastructure Improvements

The existing GCSD and FWD treatment ponds and RRCSD storage pond would be reconfigured so they could provide EQ at each site. With this approach, the peak flows would be reduced. Like the previous alternatives, the three facilities would have influent screening and conveyance infrastructure to allow flows exceeding the discharge pumping capacity to be diverted to the ponds and held there until they can be conveyed to Windsor. For purposes of this preliminary analysis, it is assumed that GCSD and FWD flows could be equalized to the maximum 30-day average values shown in Table 3-3 (i.e., 0.9 mgd) and RRCSD flows could be equalized to the maximum 7-day average flows shown in Table 2-2 (i.e., 3.5 mgd).

Windsor is in the process of designing a major WWTP upgrade that is intended to provide up to 2.6 mgd ADWF capacity to accommodate a planned 38 percent growth in Windsor and the Airport-Larkfield-Wikiup Sanitation Zone (Airport) service areas through the year 2040. The design also includes a Membrane Aerated Biofilm Reactor (MABR) process intensification step that could allow for further increases in capacity to allow for up to 110 percent growth in the Airport service area. Future expansion beyond the two design growth scenarios was also integrated into the planning, and space for two additional BNR trains was included.

Based on discussions with Windsor staff, the capacity planned for the new treatment facilities is intended to support growth of the Windsor and Airport service areas. Therefore, the West County agencies would need to fund a project to increase the treatment capacity beyond the current plans. Windsor staff further stated that the details of how the connection fee for West County flows would need to be negotiated. However, as a means of providing an estimate of what these connection fee costs may be, Windsor staff provided capital cost information for the current and planned WWTP projects and indicated that these costs should be used to estimate the cost for this potential expansion to accommodate the West County flows and loads. The estimated cost for expanding the facilities to accommodate West County flows was specifically determined based on the ratio of respective West County flows to the flows/loads that will be treated by Windsor's proposed facilities. The resulting estimate for the West County share was found to be $69.6 million[21].

[21]The analysis and resulting estimated cost was shared with Windsor staff and they concurred it was reasonably representative. It is noted that this estimate is almost twice the cost estimated using Windsor's existing connection

3.4.1.2 Recycled Water Infrastructure Improvements

Windsor has an existing recycled water customer base, including the Geysers Recharge Project in northern Sonoma County. Therefore, this alternative assumes no use of recycled water in the West County area.

Windsor staff have expressed interest in potentially sending tertiary recycled water back to West County, given potentially limited options to expand the existing Windsor recycled water customer base. Further evaluation of returning exported water for West County recycled water use is provided in Chapter 6 of this report.

3.4.1.3 Conveyance Infrastructure Improvements

To accommodate the flow of water between the various facilities, the following pipelines and pump stations are needed:

- **Raw Wastewater from GCSD to FWD:**
  - The existing 1.7-mile long, 8-inch diameter DI pipeline between the FWD and GCSD WWTPs would be rehabilitated to allow for transfer of 0.64 mgd of equalized, raw OCSD/GCSD wastewater.
  - A new 0.64 mgd effluent pump station for GCSD is needed for raw wastewater transfer to the FWD WWTP site.[22]
- **Raw Wastewater from FWD to New Export Pipeline Junction:**
  - A new 1.6-mile, 8-inch diameter pipeline to convey an estimated 0.9 mgd raw wastewater flows from the FWD WWTP to a new export pipeline junction.
  - A new 0.9 mgd, high-head pump station to convey raw wastewater flows to the new export pump station.
- **Raw Wastewater RRCSD to New Export Pipeline Junction:**
  - A new 10.9-mile, 20-inch diameter pipeline to convey an estimated 3.5 mgd raw wastewater flows to the new export pipeline junction. This pipeline would have two river crossings.
  - A new 3.5 mgd, high-head pump station to convey raw wastewater to the export pump station.
- **Raw Wastewater from Export Pipeline Junction to the Windsor WWTP:**
  - A new, 8.0 mile, 24-inch diameter pipeline to convey an estimated 4.4 mgd of raw wastewater flow to the Windsor WWTP. This pipeline would also have five river crossings.

The potential alignments for Alternative 2a are shown on Figure 3-7. With this approach, the export pipeline junction is expected to be located along the northern alignment, making this approach more cost effective. Therefore, this alternative provides the most cost-effective approach for accommodating the unsewered communities along River Road.

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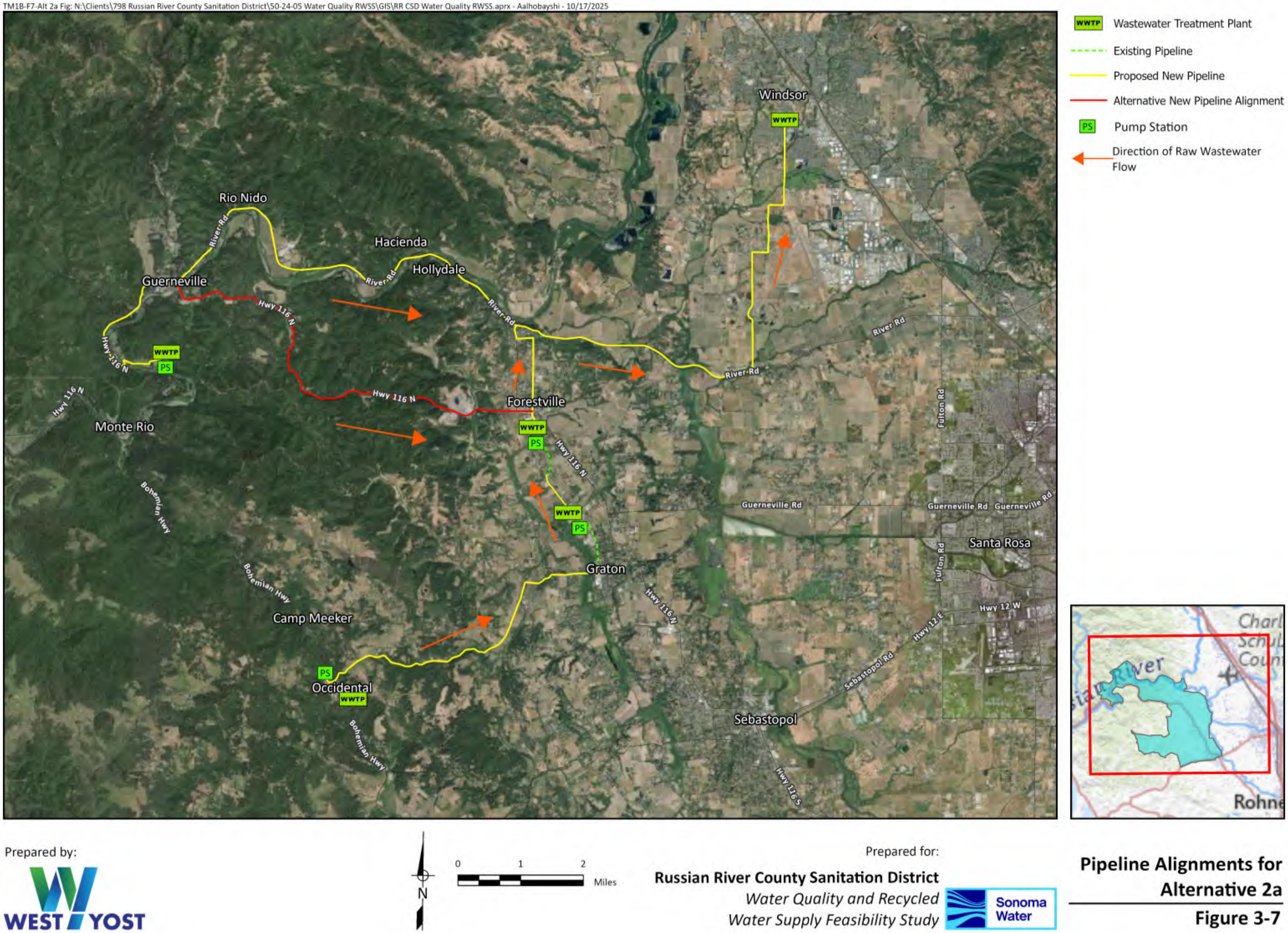
fee calculation spreadsheet, which is approximately $38 million for the future West County ADWF of 0.6 mgd and average BOD and TSS concentrations of 310 mg/L and 300 mg/L, respectively.

[22] GCSD has identified the need for a new effluent pump station. It is assumed that the facility would be sized to accommodate the proposed use. The new pump station is assumed to be adequately designed to accommodate the effluent flow detailed in this analysis.

TM1B-F7-Alt 2a Fig: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - Aalhobayshi - 10/17/2025



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WEST YOST

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Sonoma Water

Pipeline Alignments for Alternative 2a

Figure 3-7

3.4.2 Alternative 2b: Export to the Laguna WWTP

Alternative 2b would entail conveying all untreated wastewater flows from West County to the Laguna WWTP for treatment. With this alternative, no recycled water would be delivered in the West County area.

3.4.2.1 Treatment Infrastructure Improvements

Alternative 2b would have a similar treatment concept as Alternative 2a. As with Alternative 2a, the GCSD and FWD treatment ponds and RRCSD storage pond would be reconfigured so they could provide EQ at each site. With this approach, the peak flows from the GCSD and FWD flows would be equalized to the maximum 30-day average values shown in Table 3-3 (i.e., 0.9 mgd) and RRCSD flows could be equalized to the maximum 7-day average flows shown in Table 2-2 (i.e., 3.5 mgd).

A connection/capacity fee would also be paid to the regional partners of the Laguna WWTP to cover relevant capital costs for treatment and depend on the extent of WWTP improvements required to accommodate West County flows and loads. Based on discussions with Santa Rosa staff, details of the connection fee for West County flows would need to be negotiated. The team was informed the connection fees costs would need to consider Santa Rosa's existing connection fee schedule detailed in the City Code as well as a share of the costs that will be associated with significant improvements needed at the Laguna WWTP. The following elements are therefore included in the estimate:

- The Santa Rosa City code specifies connection fees of $2,099 per 1,000 gallons per month of base flows, or about $64 million per mgd. Using this rate, the connection fee would be $38.1 million for the West County ADWF of 0.59 mgd.
- The improvements needed at the Laguna WWTP may cost as much as $530 million. The Laguna WWTP currently serves about 230,000 customers, and the West County population served by the four agencies is estimated to increase this by 6 percent (or by 13,300 people[23]). Assuming the West County dischargers were to pay 6 percent of this cost based on population served, an additional $30.7 million from the West County agencies may be necessary.

Therefore, the total connection costs could be as high as $68.8 million.

3.4.2.2 Recycled Water Infrastructure Improvements

The Laguna WWTP has an existing recycled water customer base, including the Geysers Recharge Project in northern Sonoma County. Therefore, this alternative assumes no use of recycled water in the West County Area.

However, Santa Rosa staff did express concerns about the need to expand their recycled water storage should they receive additional influent flows from West County. They indicated that some cost to West County users may be incurred for this expansion. A nominal cost of $5 million has been assumed. Further evaluation of returning exported water for West County recycled water use is provided in Chapter 6 of this report.

[23] Applying 5,319 West County ESDs and assuming 2.5 people per ESD.

3.4.2.3 Conveyance Infrastructure Improvements

A review of Santa Rosa's recently completed *Sanitary Sewer Master Plan Update*[24] indicates there is a reasonable connection point to the existing Santa Rosa collection system where a large sewer trunk line is available near the intersection of Hall and Fulton Roads. Conveyance to this connection point is assumed to allow the West County flows to be conveyed to the Laguna WWTP.

To accommodate conveyance of flows via this route to the Laguna WWTP, the following pipelines and pump stations are needed:

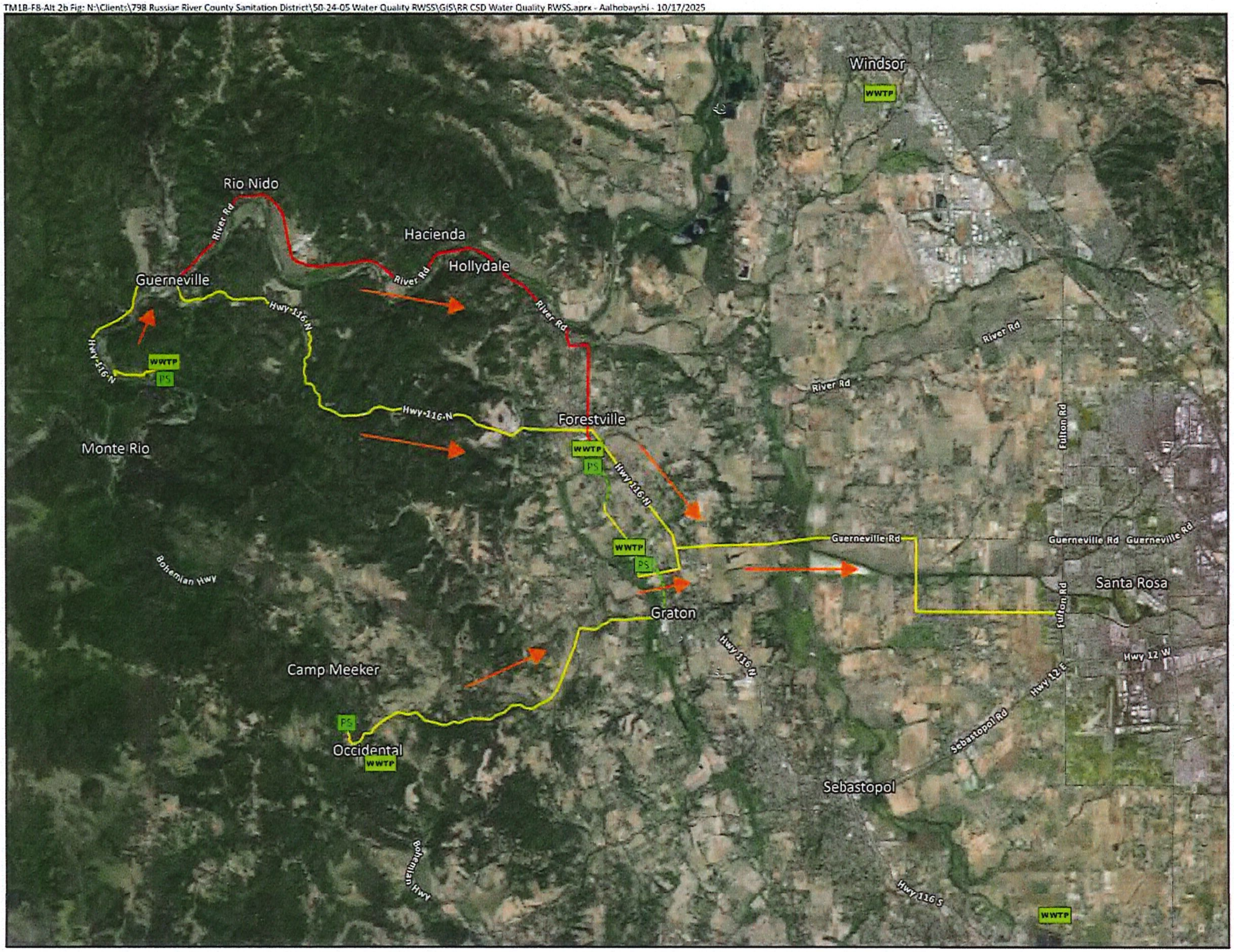
- **Raw Wastewater from GCSD to Export Pipeline Junction:**
  - A new 1.1-mile long, 8-inch diameter pipeline to convey 0.64 mgd of equalized, raw OCSD/GCSD wastewater.
  - A new 0.64 mgd effluent pump station for GCSD is needed for raw wastewater transfer to the Laguna WWTP.[25]
- **Raw Wastewater from RRCSD to FWD:**
  - A new 10.4-mile, 20-inch diameter pipeline to convey an estimated 3.5 mgd raw wastewater flows to the FWD site. This pipeline would have two river crossings.
  - A new 3.5 mgd, high-head pump station to convey raw wastewater to the FWD site.
- **Raw Wastewater from FWD to Export Pipeline Junction:**
  - A new 1.7-mile, 16-inch diameter pipeline to convey an estimated 3.8 mgd raw wastewater flows from the FWD WWTP to the Export Pipeline Junction.
- **Raw Wastewater from Export Pipeline Junction to the Laguna WWTP:**
  - A new, 7.6 mile, 24-inch diameter pipeline to convey an estimated 4.4 mgd of raw wastewater flow to the Laguna WWTP. This pipeline would also have two river crossings.

The potential alignments for Alternative 2b are shown on Figure 3-8. Like Alternatives 1b and 1c, the alignment between RRCSD and FWD has the potential to pass through unsewered communities of interest (Hacienda and Hollydale). However, that route is not as direct as the alignment along Highway 116.

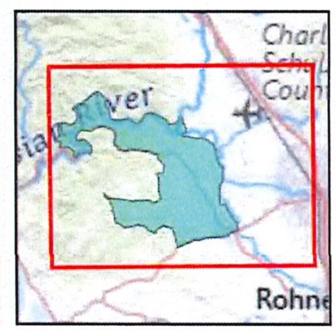
[24] City of Santa Rosa, 2023. *City of Santa Rosa Sanitary Sewer Master Plan Update Final Report*. Prepared by Woodard & Curran. August 2023.

[25] GCSD has identified the need for a new effluent pump station. However, the pump station required under this alternative would require significantly more pumping head than would be provided by a new effluent pump station sized for current GCSD operations.

TM1B-F8-Alt 2b Fig: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - Aalhobayshi - 10/17/2025



WWTP Wastewater Treatment Plant
Existing Pipeline
Proposed New Pipeline
Alternative New Pipeline Alignment
PS Pump Station
Direction of Raw Wastewater Flow



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Pipeline Alignments for Alternative 2b

Figure 3-8

3.4.3 Alternative 2c: Export to Windsor and the Laguna WWTP

Alternative 2c would be a combination of two separate parts from Alternatives 2a and 2b, as follows:

1. Convey untreated wastewater flows from the RRCSD service area to the Windsor WWTP, and
2. Convey FWD/GCSD/OCSD flows to the Laguna WWTP.

Similarly, this alternative assumes no recycled water would be delivered in the West County area.

3.4.3.1 Treatment Infrastructure Improvements

As with Alternatives 2a and 2b, the GCSD and FWD treatment ponds and RRCSD storage pond would be reconfigured so they could provide EQ at each site. With this approach, the peak flows from the GCSD and FWD flows would be equalized to the maximum 30-day average values shown in Table 3-3 (i.e., 0.9 mgd) and RRCSD flows could be equalized to the maximum 7-day average flows shown in Table 2-2 (i.e., 3.5 mgd).

A summary of the capacity of the planned Windsor treatment facilities for key parameters of interest is provided in Table 3-6, along with current flows and loads from the Windsor and Airport service areas and the total project flow and load from the RRCSD. As shown, by limiting wastewater sources to only the RRCSD, the planned facilities would have more capacity to accommodate planned growth within the Windsor and Airport areas.

Table 3-6. Characterization of Future West County Connections to the Windsor WWTP for Alternative 2c

Service Area	ADWF, mgd	PDF, mgd	Maximum 30 day BOD Load, lb/day
Planned Capacity for Windsor WWTP			
Capacity of New Facility	2.6	16.3	12,100
Capacity of New Facility with MABR Intensification	2.9	18.5	14,200
Combined Flows and Loads			
Current Town of Windsor	1.5	8.5	6,700
Current Airport	0.4	3.1	2,800
RRCSD	0.4	3.5	2,900
Total Flow and Load	**2.3**	**15.1**	**12,400**

The estimated connection fees for Windsor and Santa Rosa were calculated using the same methodologies described for Alternatives 2a and 2b and are presented in Table 3-7. The table shows the total connection fees, as well as a breakdown of the two components for the Laguna WWTP connection fee. As shown, these would total $69 million for the combined 0.59 mgd ADWF.

Table 3-7. Estimated Connection Fees for Alternative 2c

Scenario	ADWF, mgd	Connection Fee, $ million
Total Future RRCSD Flows to Windsor WWTP	0.38	45
Total Future FWD/GCSD/OCSD flows to Laguna WWTP	0.21	24
Code connection fee ($2,099 per 1,000 gallons per month)[(a)]		*14*
Estimated fee for additional WWTP improvements[(a)]		*10*
Combined Total Fee		**69**

(a) As described in Section 3.4.2.1, the connection fee for the Laguna WWTP includes two components, one based on the current code and another for potential improvements needed at the Laguna WWTP.

3.4.3.2 Recycled Water Infrastructure Improvements

Like Alternative 2b, Alternative 2c would likely involve some cost to West County users for expansion of the Laguna WWTP recycled water system. A nominal cost of $2.5 million has been assumed. Further evaluation of returning exported water for West County recycled water use is provided in Chapter 6 of this report.

3.4.3.3 Conveyance Infrastructure Improvements

The conveyance infrastructure improvements needed for Alternative 2c are subsets of the conveyance improvements described for Alternatives 2a and 2b. The main distinction is no connecting pipeline between the two systems for Alternatives 2a and 2b. Accordingly, the following pipelines and pump stations are needed:

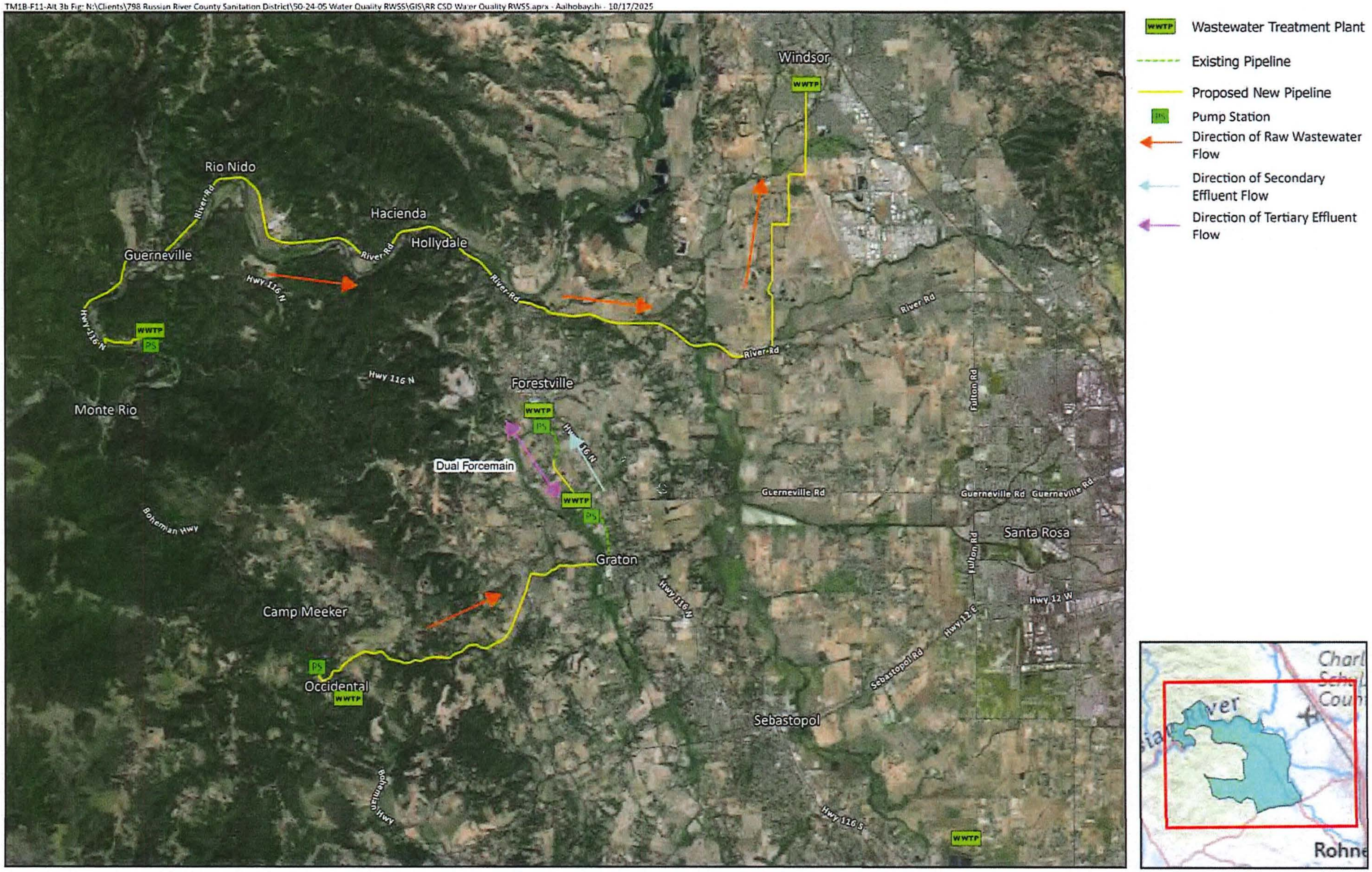
- **Raw Wastewater from GCSD to Laguna WWTP Export Pipeline Junction:**
  - A new 1.1-mile long, 8-inch diameter pipeline to convey 0.64 mgd of equalized, raw GCSD/OCSD wastewater.
  - A new 0.64 mgd effluent pump station for GCSD is needed for raw wastewater transfer to the Laguna WWTP.[26]
- **Raw Wastewater from FWD to Laguna WWTP Export Pipeline Junction:**
  - A new 1.7-mile, 6-inch diameter pipeline to convey an estimated 0.25 mgd raw wastewater flows from the FWD WWTP to a new export pipeline junction.
  - A new 0.25 mgd, high-head pump station to convey raw wastewater flows to the Laguna WWTP.
- **Raw Wastewater from Export Pipeline Junction to the Laguna WWTP:**
  - A new, 7.6 mile, 10-inch diameter pipeline to convey an estimated 0.9 mgd of raw wastewater flow to the Laguna WWTP. This pipeline would also have two river crossings.

[26] GCSD has identified the need for a new effluent pump station. However, the pump station required under this alternative would require significantly more pumping head than would be provided by a new effluent pump station sized for current GCSD operations.

- **Raw Wastewater RRCSD to Windsor:**
  - A new 18.9-mile, 20-inch diameter pipeline to convey an estimated 3.5 mgd raw wastewater flows to the Windsor WWTP. This pipeline would have seven river crossings.
  - A new 3.5 mgd, high-head pump station to convey raw wastewater to the Windsor WWTP.

The proposed pipeline alignments for this alternative are shown on Figure 3-9. As with Alternative 2a, additional unsewered flows could also potentially be picked up along the conveyance route from RRCSD to Windsor.

TM1B-F11-Alt 3b Fig: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - Aalhobayshi - 10/17/2025



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Pipeline Alignments for Alternative 3b

Figure 3-11

3.5 COMBINATION SCENARIOS

This section discusses the two combination scenarios, as follows:

- Alternative 3a: Local RRCSD WWTP and FWD/GCSD/OCSD Flows Export to the Laguna WWTP
- Alternative 3b: Local FWD/GCSD WWTP and RRCSD Flows Export to Windsor WWTP

3.5.1 Alternative 3a: Treat at RRCSD and FWD/GCSD/OCSD Export to the Laguna WWTP

Alternative 3a would include two separate parts from Alternatives 1a and 2c, as follows:

- RRCSD flows would be treated at the existing RRCSD WWTP, and
- FWD/GCSD/OCSD flows would be conveyed to the Laguna WWTP.

3.5.1.1 Treatment Infrastructure Improvements

As previously discussed in this Chapter, the RRCSD facility should be able to provide adequate treatment capacity for the anticipated flows and loads from the RRCSD service area. However, the following improvements will be needed:

- An estimated $30 million in condition-related projects, which includes an estimated $3 million in headworks improvements based on West Yost's Headworks, Lift Stations, and Force Main project for Sonoma Water/RRCSD[27], and
- An estimated $0.7 million in hydraulic capacity improvements.

As with all the export alternatives, the GCSD and FWD treatment ponds would be reconfigured so they could provide EQ at each site prior to discharge to the Laguna WWTP. It is assumed with this approach that the GCSD and FWD flows could be equalized to the maximum 30-day average values shown in Table 3-2 (i.e., 0.9 mgd).

As described in Section 3.4.3.1 (Table 3-7), a $24 million connection fee is envisioned for FWD/GCSD/OCSD flows to be discharged to the Laguna WWTP system. In addition, the existing aerated treatment ponds at the FWD and GCSD WWTPs would be converted to allow for raw wastewater EQ.

[27] The RRCSD also needs to address significant collection system deficiencies. These critical improvements are common to all the alternatives evaluated in this study and are not addressed in this analysis.

3.5.1.2 Recycled Water Infrastructure Improvements

As previously discussed in this Chapter, an additional 5 acres[28] of land application area would be needed to accommodate disposal of 8 AFY of water at the RRCSD site. It is assumed that the required irrigated space could be obtained either by expanding the existing 17-acre land application area or by installing new irrigation facilities on the 394-acre forested property transferred to RRCSD in August 2024[29].

In addition, some additional costs may be incurred for the FWD/GCSD/OCSD communities to support the expansion of the Laguna WWTP recycled water system. A nominal cost of $2.5 million has been assumed.

3.5.1.3 Conveyance Infrastructure Improvements

The FWD/GCSD/OCSD flows would be conveyed to the Laguna WWTP for treatment as described in Alternative 2c, as follows:

- **Raw Wastewater from GCSD to Laguna WWTP Export Pipeline Junction:**
  - A new 1.1-mile long, 8-inch diameter pipeline to convey 0.64 mgd of equalized, raw GCSD/OCSD wastewater.
  - A new 0.64 mgd effluent pump station for GCSD is needed for raw wastewater transfer to the Laguna WWTP.[30]
- **Raw Wastewater from FWD to Laguna WWTP Export Pipeline Junction:**
  - A new 1.7-mile, 6-inch diameter pipeline to convey an estimated 0.25 mgd raw wastewater flows from the FWD WWTP to a new export pipeline junction.
  - A new 0.25 mgd, high- head pump station to convey raw wastewater flows to the Laguna WWTP.
- **Raw Wastewater from Export Pipeline Junction to the Laguna WWTP:**
  - A new, 7.6 mile, 10-inch diameter pipeline to convey an estimated 0.9 mgd of raw wastewater flow to the Laguna WWTP. This pipeline would also have two river crossings.

The proposed pipeline alignments for Alternative 3a are presented on Figure 3-10.

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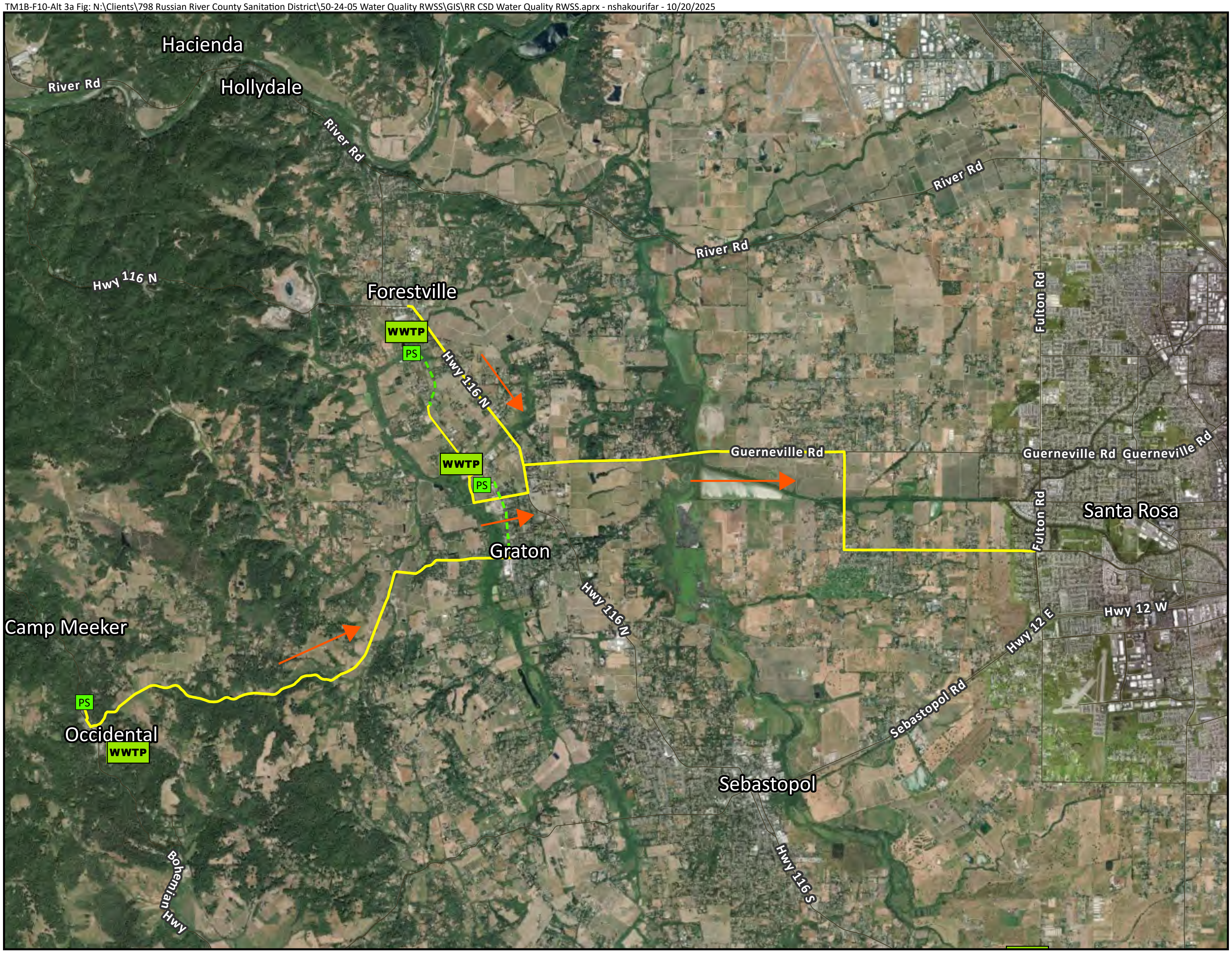
[28]The estimated 5 additional acres of additional area required is based on a conservative assumption that recycled water is applied at agronomic rates with no allowance for additional percolation. Only 17 additional acres would be needed if the 0.6 inch per day percolation rates identified for the upper portions of the existing irrigated property is assumed.

[29] RRCSD staff estimate that up to approximately 3 percent of the 394-acre may be available for land application.

[30] GCSD has identified the need for a new effluent pump station. However, the pump station required under this alternative would require significantly more pumping head than would be provided by a new effluent pump station sized for current GCSD operations.

TM1B-F10-Alt 3a Fig: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/20/2025



WWTP Wastewater Treatment Plant

Existing Pipeline

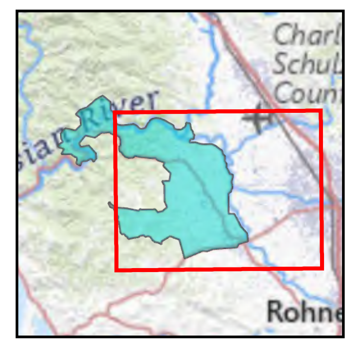
Proposed New Pipeline

PS Pump Station

Direction of Raw Wastewater Flow

Note: The RRCSD WWTP is off the extent of the figure

Note:
Occidental WWTP site is now primarily used for storage.



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Pipeline Alignments for Alternative 3a

Figure 3-10

3.5.2 Alternative 3b: Treat at FWD and Export to Windsor

Alternative 3b would also entail two separate parts from Alternative 1a and Alternative 2c, as follows:

1. FWD/GCSD/OCSD flows would be treated at a combined, upgraded FWD/GCSD WWTP, and
2. RRCSD flows would be exported to the Windsor WWTP.

3.5.2.1 Treatment Infrastructure Improvements

As described in Section 3.3.1.2.1 with Alternative 1a, the following treatment upgrades would be needed for the upgraded FWD/GCSD WWTP:

- The GCSD WWTP partial mix pond treatment system will be upgraded to complete mix system by installing new diffuser aeration system;
- FWD ponds would continue to be used to treat FWD flows; and
- New SAF, tertiary filtration, and disinfection facilities would be constructed at the FWD WWTP to provide treatment for the combined FWD/GCSD/OCSD flows.

As with the several of the previous alternatives, the RRCSD storage pond would be reconfigured so they could provide EQ. With this approach, the peak flows from the RRCSD flows could be equalized to the maximum 7-day average flows shown in Table 2-2 (i.e., 3.5 mgd).

For the RRCSD flows to Windsor, a connection/capacity fee would be paid to Windsor to cover needed treatment capital costs that are proportional to the fees identified under Alternative 2a. For the connection/capacity fee, the estimated cost is $44.8 million.

3.5.2.2 Recycled Water Infrastructure Improvements

As described in Section 3.3.1.2.2, the existing irrigation reuse sites would be able to accommodate the combined recycled water flow generated. However, 310 AF of additional storage volume would need to be constructed on the 20.5-acre land application area owned by GCSD.

3.5.2.3 Conveyance Infrastructure Improvements

To accommodate the flow of water between the GCSD and FWD sites the following pipelines and pump stations are needed:

- **Secondary Effluent from GCSD to FWD:**
  - The existing 1.7-mile long, 8-inch diameter DI pipeline between the FWD and GCSD WWTPs would be rehabilitated to allow for transfer of up to 1.1 mgd of GCSD/OCSD secondary effluent from the GCSD WWTP to the FWD WWTP.
  - A new, 1.1 mgd effluent pump station to convey flow from the GCSD is also needed for secondary effluent transfer.[31]

[31] GCSD has identified the need for a new effluent pump station. It is assumed that the facility would be sized to accommodate the proposed use. The new pump station is assumed to be adequately designed to accommodate the effluent flow detailed in this analysis.

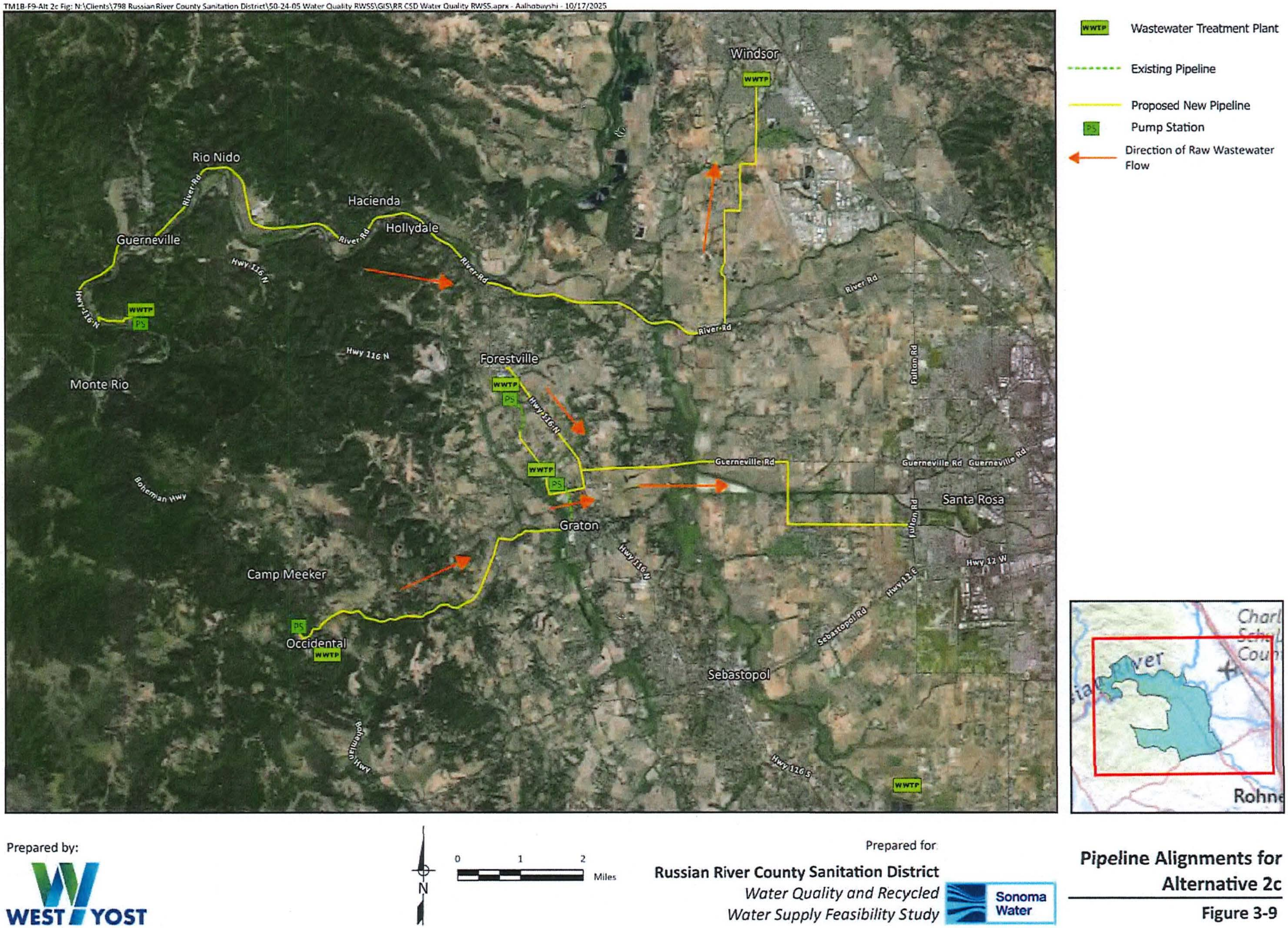
- **Tertiary Effluent from FWD to GCSD Storage Ponds and Recycled Water Customers:**
  - A new 0.8-mile, 6-inch pipeline between the GCSD WWTP and the existing 6-inch PVC pipe connecting to the FWD WWTP along with a new, parallel 1.7 mile 6-inch pipeline would be constructed to allow for transfer of 1.5 mgd of tertiary effluent from the FWD WWTP to the storage ponds at the GCSD WWTP (and for distribution to recycled water customers).
  - The existing 0.7 mgd effluent pump station at the FWD WWTP needs to be expanded to 1.5 mgd to allow for transfer of flows from the FWD site to the ponds at the GCSD site.
- **Tertiary Effluent from GCSD Storage Ponds to Recycled Water Customers:**
  - A new, 1.5 mgd recycled water pump station at the GCSD site is needed to distribute recycled water from the storage ponds to recycled water customers.

In addition, the following infrastructure is needed to convey flows from RRCSD to the Windsor WWTP:

- A new 18.9-mile, 20-inch diameter pipeline to convey an estimated 3.5 mgd raw wastewater flows to the Windsor WWTP. This pipeline would have seven river crossings.
- A new 3.5 mgd, high-head pump station to convey raw wastewater to the Windsor WWTP.

The proposed pipeline alignments for Alternative 3b are presented on Figure 3-11.

TM1B-F9-Alt 2c Fig: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - Aalhobayshi - 10/17/2025



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Pipeline Alignments for Alternative 2c

Figure 3-9

3.6 ALTERNATIVES SCREENING

3.6.1 Infrastructure Needs and Costs

The major infrastructure components required for each Alternative are summarized in Table 3-8. A capital cost range has been defined for each alternative based on preliminary assessment of costs for each infrastructure element shown in Table 3-8. These costs were then used to assign a cost score for each alternative. The estimated cost ranges and associated cost scores are presented in Table 3-9.

Table 3-8. Summary of Major Infrastructure Required

Facility/Component	1a: Two Local Facilities	1b: One Facility at RRCSD	1c: One Facility at FWD	2a: Export to Windsor	2b: Export to Santa Rosa	2c: Export to Windsor and Santa Rosa	3a: Treat at RRCSD; FWD/GCSD Export to Santa Rosa	3b: Treat at FWD/GCSD; RRCSD Export to Windsor
Treatment								
RRCSD	• Condition-related improvements • Hydraulic Capacity Improvements	• Filtration capacity expansion to accommodate all West County flows • Condition-and hydraulic capacity related improvements	• Convert storage ponds to equalization facility	• Convert storage ponds to equalization facility	• Convert storage ponds to equalization facility	• Convert storage ponds to equalization facility	• Condition-related improvements	• Convert storage ponds to equalization facility
FWD	• Expansion of Tertiary Filtration and Disinfection	• Convert treatment ponds to equalization facility	• Construct new nitrogen removal/tertiary treatment facility (MBR)	• Convert treatment ponds to equalization facility	• Convert treatment ponds to equalization facility	• Convert treatment ponds to equalization facility	• Convert treatment ponds to equalization facility	• Expansion of Tertiary Filtration and Disinfection
GCSD	• Headworks Improvements • Convert treatment ponds to complete mix system	• Headworks Improvements • Convert treatment ponds to equalization facility	• Headworks Improvements • Convert treatment ponds to equalization facility	• Headworks Improvements • Convert treatment ponds to equalization facility	• Headworks Improvements • Convert treatment ponds to equalization facility	• Headworks Improvements • Convert treatment ponds to equalization facility	• Headworks Improvements • Convert treatment ponds to equalization facility	• Headworks Improvements • Convert treatment ponds to complete mix system
Windsor	-	-	-	• ~$70 million connection fee	-	• ~$45 million connection fee	-	• ~$45 million connection fee
Santa Rosa	-	-	-	-	• ~$69 million connection fee	• ~$24 million connection fee	• ~$24 million connection fee	-
Conveyance								
Wastewater New Pipelines	-	• 12.1 miles	• 16.2 miles	• 20.5 miles	• 20.8 miles	• 29.3 miles	• 10.4 miles	• 18.9 miles
New Pump Stations	• GCSD (low head) for secondary transfer • GCSD (relatively low head) for tertiary transfer • FWD (relatively low head) for tertiary transfer	• GCSD to FWD (low head) • FWD to GCSD (low head) • GCSD to recycled water customers (low head) • FWD (high head) • RRCSD (high head)	• 2 at GCSD (low head) • RRCSD (high head, high flow) • FWD (low head, high flow)	• GCSD (low head) • FWD (high head) • RRCSD (high head, high flow)	• GCSD (high head) • FWD (high head, high flow) • RRCSD (high head, high flow)	• GCSD (high head) • FWD (high head) • RRCSD (high head, high flow)	• GCSD (high head) • FWD (high head)	• GCSD (low head) for secondary transfer • GCSD (relatively low head) for tertiary transfer • FWD (relatively low head) for tertiary transfer • RRCSD (high head)
River Crossings	--	4 crossings	2 crossings	7 crossings	4 crossings	9 crossings	3 crossings	7 crossings
Other	• Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD	• Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD	• Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD	• Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD	-	-	-	• Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD
Recycled Water Pipelines	• 0.8 mile, 6-inch pipeline • 1.7 mile, 6-inch pipeline	• 0.8 mile, 6-inch pipeline • 1.7 mile, 8-inch pipeline	• 0.8 mile, 6-inch pipeline • 1.7 mile, 16-inch pipeline	-	-	-	-	• 0.8 mile, 6-inch pipeline • 1.7 mile, 6-inch pipeline
Recycled Water								
Land Application Area	• 5 acres (RRCSD)	-	-	-	-	-	• 5 acres (RRCSD)	-
Storage	• 310 AF (GCSD)	-	-	-	• Potential need for additional storage at Santa Rosa	• Potential need for additional storage at Santa Rosa	• Potential need for additional storage at Santa Rosa	• 310 AF (GCSD)
New Pipelines	-	• 12.2 miles of new pipeline from RRCSD to FWD	-	-	-	-	-	-

Table 3-9. Summary of Estimated Capital Costs, $ million								
	Alternatives							
Score Category	1a: Two Local Facilities	1b: One Facility at RRCSD	1c: One Facility at FWD	2a: Export to Windsor	2b: Export to the Laguna WWTP	2c: Export to Windsor and the Laguna WWTP	3a: Treat at RRCSD; Export FWD/GCSD to the Laguna WWTP	3b: Treat at FWD/GCSD; Export RRCSD to Windsor
Treatment	40.0 – 60.0	25.6 – 38.4	53.6 – 80.4	64.0 – 96.0	63.2 – 94.8	63.2 – 94.8	48.0 – 72.0	55.2 – 82.8
Conveyance	8.6 – 12.8	47.8 – 71.6	69.6 – 104.4	103.8 – 155.6	98.6 – 147.8	118.5 – 177.7	34.6 – 51.8	97.7 – 146.5
Recycled Water	6.4 – 9.6	24.1 – 36.1	0	0	4.0 – 6.0	2.4 – 3.6	2.4 – 3.6	6.4 – 9.6
Combined Total	**55.0 – 82.4**	**97.4 – 146.2**	**123.2 – 184.8**	**167.8 – 251.6**	**165.8 – 248.6**	**184.1 – 276.1**	**85.0 – 127.4**	**159.3 – 238.9**
Normalized Score[a]	**5.0**	**2.8**	**2.2**	**1.6**	**1.7**	**1.5**	**3.2**	**1.7**

(a) Combined total costs are normalized by dividing 345 by the costs to have a maximum value of 5.0 to compare with subject criteria scores.

3.6.2 Qualitative Screening Criteria and Scoring

The eight alternatives were also evaluated based on seven subjective screening criteria. The seven subjective screening criteria are described in Table 3-10. The preliminary screening scores for these criteria for each alternative are provided in Table 3-11, along with descriptions of how the scores were assigned. Scores are assigned on a scale of 1 to 5 for each screening criterion based on relative challenges and opportunities, where a higher score indicates fewer challenges and more opportunities for meeting the intent of the criterion.

Table 3-10. Selected Subjective Screening Criteria

Criteria	Description
Reliability/Ease of Operation	Are the proposed infrastructure components relatively simple to operate and maintain for the West County agencies?
Long-Term Regulatory Compliance	Does the alternative entail a long-term reliable treatment solution for meeting effluent quality requirements? Is there more risk for non-compliance?
Flexibility for Adding Unsewered Communities	To what extent does the proposed alignment allow for connections to unsewered, disadvantaged communities of interest?
Local Recycled Water Benefits	Does the alternative support West County recycled water opportunities?
Environmental	Is there potential for impacts to flood plains, wetlands, endangered species, historical and archaeological properties? Are efforts associated with handling wastes minimized? Is the alternative energy efficient and/or minimize power usage?
Resiliency	Is the proposed or retained infrastructure vulnerable to flooding, climate change and/or seismic impacts?
Ease of Implementation	Would the project construction be relatively simple, with regard to both treatment improvements and pipelines? What level of governance structure and agency coordination would be required? Can the project be reasonably phased into smaller elements to increase funding resources?

Table 3-11. Preliminary Screening Criteria Scoring

Criteria	Scoring of Alternative: 1a: Two Local Facilities	1b: One Facility at RRCSD	1c: One Facility at FWD	2a: Export to Windsor	2b: Export to Santa Rosa	2c: Export to Windsor and Santa Rosa	3a: Treat at RRCSD; Export FWD/GCSDD to Santa Rosa	3b: Treat at FWD/GCSD; Export RRCSD to Windsor	Scoring Comments
Reliability/ Ease of Operation	1	2	3	5	5	4	2.5	2.5	• The Export Scenarios (2a, 2b and 2c) involve sending flow to larger, regional facilities and would offer greater reliability and ease of operation for West County agencies. • Alternative 2c was slightly derated because two different export systems would be needed. • The remaining alternatives were scored lower depending on how many, smaller facilities would continue to be operated and whether additional flow equalization would be provided. • The lowest score was assigned to the alternative that continues to have three facilities in operation with no additional equalization for peak flows (1a). • Alternative 1b scored higher because only one facility would need to be operated. However, ongoing operations at RRCSD is complicated by peak flow issues. • Alternative 1c scored the highest of the local facility scenarios, as it provides for equalization at all three existing sites and provides for a new treatment system. • Alternative 3a was slightly derated from Alternative 1c. Management of FWD/GCSD flows would be significantly simplified. However, ongoing management of RRCSD WWTP with no added equalization would continue to provide challenges. • Alternative 3b was also slightly derated from Alternative 1c. The RRCSD system would be similar under both options, but the FWD treatment system would involve two different treatment plants with no additional equalization.
Long-Term Regulatory Compliance	2.5	1	3	5	5	5	2	4	• The Export Scenarios (2a, 2b and 2c) involve sending flow to larger, regional facilities and would offer greater potential for adjusting to future regulatory changes. The local facilities would be operated to provide equalization, which would also help to mitigate compliance concerns related to peak flows. • Alternative 3b scored the second highest because it includes a GSCD/FWD facility that has zero surface water discharge and export from the RRCSD. A zero-surface water discharge approach provides significant resilience to changing regulatory requirements. • The four remaining alternatives all include one local treatment facility that discharges to surface water. – Having all treatment at RRCSD (1b) scored the lowest due to the ongoing compliance issues at this site related to management of peak flows. These issues would only be exacerbated if the facility had to also manage peak flows from other sites. – The other two alternatives that continue to provide treatment for RRCSD flows only at the RRCSD WWTP (1a and 3a) scored higher. While the ongoing peak flow issues would continue at the RRCSD WWTP, they would not be potentially amplified. Alternative 1a scored slightly higher than 3a because having zero surface water discharge at the GCSD/FWD site provides a higher level of regulatory resilience than discharging to the Santa Rosa facility that continues to provide surface water discharge. – Providing all treatment at FWD (1c) scored the highest of the local treatment surface water discharge scenarios. Although all the flow would be discharged to surface waters during the winter months, the new facility would be designed to accommodate this flow and allow for future improvements is regulatory requirements became more restrictive. Moreover, all three of the existing treatment systems would have equalization to help mitigate peak flow concerns reducing potential regulatory risks associated with I&I impacts.
Flexibility for Adding Critical Unsewered Communities	2	1	3	5	3	5	2	5	• Alternative 1b scored the lowest. While the WWTP would have capacity to accommodate the flows and loads from GCSD and FWD, there would not likely be adequate existing capacity to accommodate flows and loads from the entire West County Study Area. Because expansion beyond the existing footprint is not feasible, it is unlikely that this site would be viable as a stand-alone regional system. • Alternatives that involve export to Windsor (2a, 2c and 3b) would include a pipeline alignment along Russian River to pick up critical unsewered communities and received the highest ranking. These larger plants also provide more flexibility for adding flows as small communities develop collection systems. • Scenarios that can be modestly altered to include a pipeline alignment along Russian River to pick up critical unsewered communities (1c and 2b) received a slightly derated scoring. • Scenarios 1a and 3a would require significant, additional piping along Russian River to pick up critical unsewered communities and received the second lowest scoring.

Table 3-11. Preliminary Screening Criteria Scoring

Criteria	Scoring of Alternative								Scoring Comments
	1a: Two Local Facilities	1b: One Facility at RRCSD	1c: One Facility at FWD	2a: Export to Windsor	2b: Export to Santa Rosa	2c: Export to Windsor and Santa Rosa	3a: Treat at RRCSD; Export FWD/GCSDD to Santa Rosa	3b: Treat at FWD/GCSD; Export RRCSD to Windsor	
Local Recycled Water Benefits	4.5	5	4	1	1	1	2.5	3.5	• The local scenarios (1a, 1b and 1c) ranked the highest because they preserve the highest amount of recycled water for local uses. Scenarios 1a and 1b would retain all existing recycled water uses, but 1b scored slightly higher than 1a because it includes export of RRCSD recycled water to the higher use areas near Forestville/Graton. • Alternative 1c would maintain recycled water in West County but would consolidate it only in one area and eliminates existing recycled water use for the Northwood golf course. Therefore, this alternative scored slightly lower than the other two local scenarios. • The export scenarios (2a, 2b and 2c) scored the lowest because they involve loss of all locally available recycled water. • The combination scenarios (3a and 3b) scored lower than the local scenarios because they would retain some local recycled water. 3a scored lower than 3b because recycled water would be maintained only near the Russian River WWTP, which has limited opportunity for reuse, and would export recycled water currently used in the Forestville/Graton area.
Environmental	5	3	1	2	2.5	1.5	3	2.5	• Alternative 1a scored the highest because it requires the least amount of additional construction. It also allows for continued pond-based treatment at the Forestville/Graton plants, which is a relatively low energy-use approach to wastewater treatment. • Alternative 1c involves construction of a new conventional facility at the Forestville WWTP site and a new river outfall. This alternative also involves construction of new, major conveyance pipeline to connect the RRCSD to the FWD WWTP. Therefore, Alternative 1c scored the lowest of all the alternatives. • Alternative 1b involves minimal construction at the RRCSD site, but it does require construction of new, major conveyance pipeline to connect the FWD/GCSD to the RRCSD WWTP. In this sense, Alternatives 1b is similar to Alternatives 2a, 2b and 2c. However, Alternatives 2a, 2b and 2c would include pumping of wastewater to a more remote location for treatment at a large, conventional wastewater facilities that also use significant energy. Therefore, these regional alternatives would require the most energy usage and rank lower than Alternative 1b. Alternative 2a would also require construction along River Road, which could have construction-related environmental impacts. Therefore, 2a scored slightly lower than 2b. Alternative 2c scored the lowest of these three because it would involve construction of two major export pipelines in addition to the above impacts. • Alternative 3a is similar to 2b (both involve export to Santa Rosa) but 3a was scored slightly higher than 2b because RRCSD would continue to be treated at the Russian River WWTP. • Alternative 3b is similar to 2a (both involve export to Windsor) but 3b was scored slightly higher because a significant amount of wastewater would continue to be treated using a lower-energy pond-based treatment system at the FWD/GCSD WWTPs.
Resiliency	2	1	3.5	4	5	4	2.5	3	• The export scenarios (2a, 2b and 2c) will be more resilient because the larger, regional facilities will have more resources to maintain resiliency over the long term. These scenarios therefore scored the highest; with 2a and 2c being slightly derated because of a need for construction of the pipeline along River Road which could be more susceptible to seismic (landslide and liquification) and flooding impacts. • Alternatives that continue to rely on the Russian River WWTP are scored the lowest (1a, 1b, 3a) due to their reliance on a treatment facility that is near the Russian River. As discussed in Chapter 2, the RRCSD WWTP is more vulnerable to seismic (landslide and liquification) impacts than the GCSD and FWD WWTPs. The RRCSD also has the potential for flooding impacts due to its proximity to the Russian River. 1b scored the overall lowest because all treatment would be occurring at the Russian River facility. 3a was rated slightly higher than 1a because export to Santa Rosa would be more resilient than providing all treatment at the existing Forestville/Graton WWTPs. • Alternatives relying partially or fully on the Forestville/Graton WWTPs (1a, 1c and 3b) are considered more resilient than those that rely on the Russian River WWTP. The FWD site is well outside the floodplain of the Green Valley Creek and not in a landslide and liquification risk zone. (It is in a strong to severe earthquake hazard area, which means it may be subject to significant shaking. However, this risk can be mitigated through proper seismic design.) Alternatives 1c and 3b were similar, because export of flow from the Russian River WWTP to a new Forestville/Graton WWTP or to Windsor would have similar levels of resiliency. However, 1c was rated slightly higher because it does not require a major pipeline along River Road.

Table 3-11. Preliminary Screening Criteria Scoring									
	Scoring of Alternative								
Criteria	1a: Two Local Facilities	1b: One Facility at RRCSD	1c: One Facility at FWD	2a: Export to Windsor	2b: Export to Santa Rosa	2c: Export to Windsor and Santa Rosa	3a: Treat at RRCSD; Export FWD/GCSDD to Santa Rosa	3b: Treat at FWD/GCSD; Export RRCSD to Windsor	Scoring Comments
Ease of Implementation	5	3.5	3	1.5	1	1	2	2.5	• Alternative 1a is the most similar to the status quo. It also offers flexibility of phasing the project elements to increase funding potential. Thus, it is considered easiest to implement. • Alternatives 1b and 1c both could be phased to optimize funding opportunities like Alternative 1a. However, both alternatives involve construction of a new major conveyance to connect the two facilities. Alternative 1c would also require constructing new facilities at the FWD WWTP site (including an outfall pipeline), which would significantly increase the implementation complexity over Alternative 1b. (Alternative 1c would not require an expansion of the RRCSD WWTP if only GCSD/FWD flows are to be accepted at this site). Finally, both Alternatives 1b and 1c are slightly derated because they would likely require modifying the existing governance structure for the West County utilities. • The export alternatives (2a, 2b and 2c) are large linear construction projects that would bring some construction complexity. It also would generally not be feasible to phase these projects because the pipeline would need to be constructed that accommodates all future flows. However, Alternative 2c offers some flexibility for phasing as one project could be implemented before the other. These alternatives would also require coordination with the Town of Windsor and/or the City of Santa Rosa for a discharge agreement. Coordinating with the City of Santa Rosa will likely require more negotiation than with the Town of Windsor due to both the uncertainty in costs and a governance structure involving multiple external agencies. Alternative 2c would require coordination with both Windsor and Santa Rosa, so is scored the lowest with Alternative 2b. It is assumed that the governance structure for the West County facilities would not change (each existing agency would still be responsible for management of their collection system). • The two combination scenarios (3a and 3b) would also be relatively simple to construct from a treatment perspective (like 1a). However, the large export pipeline brings added complexity, with the Windsor pipeline being significantly longer. These alternatives also provide less flexibility for phasing than the local treatment alternatives. Finally, 3a is further derated because coordinating with the City of Santa Rosa will likely require more negotiation than with the Town of Windsor.
Average Score	**3.1**	**2.4**	**2.9**	**3.4**	**3.2**	**3.1**	**2.4**	**3.3**	
Total Score	**22.0**	**16.5**	**20.5**	**23.5**	**22.5**	**21.5**	**16.5**	**23.0**	

3.6.3 Scoring Sensitivity Analysis

There are several stakeholders involved with this effort, and the weighting of the evaluation criteria are likely to range depending on the stakeholder's perspective and needs. Therefore, in lieu of assigning one weight to each score, a range of weightings was considered using a Monte Carlo analysis. With this approach total scores were calculated for a range of various weighting assumptions (about 6,100 permutations were developed), as follows:

- Each of the seven subjective categories were evaluated based on a range of weighting between 5 percent to 20 percent each, where a 13 percent weighting would be an even weighting across eight score categories.
- The capital cost scores were evaluated based on a weighting between about 13 percent to 49 percent, where 49 percent is the highest value that could be generated given the ranges of weightings for the other categories.

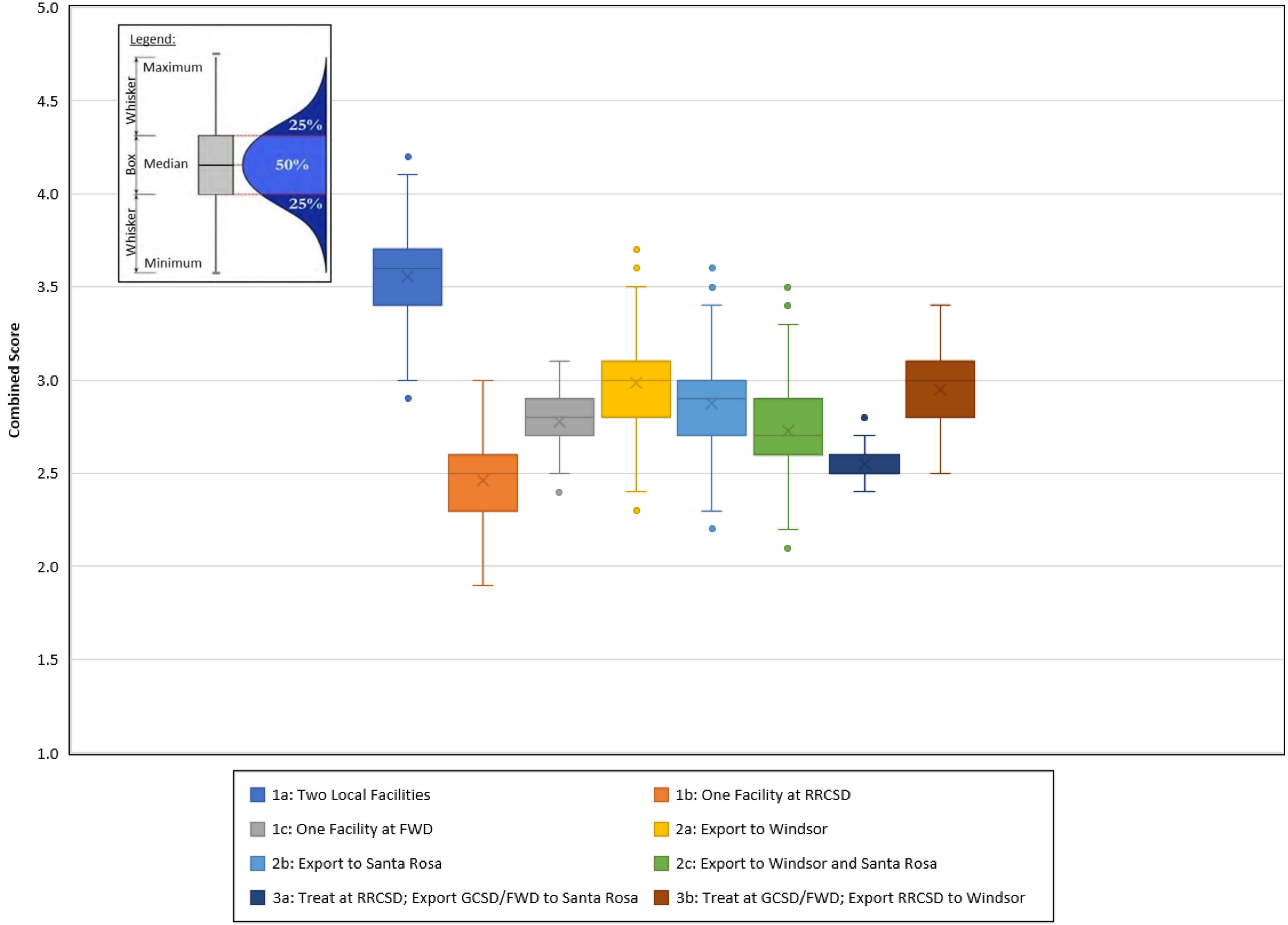
This Monte Carlo analysis results in the box-and-whiskers plot on Figure 3-12. The legend on the figure describes what the boxes and whiskers show.

The results in Figure 3-12 reveal the following:

- Alternative 1a: Two Local Facilities has the highest overall rankings and highest median (3.6).
- Two alternatives have similar rankings as the second highest (medians of 3.0):
  - Alternative 2a: Export to Windsor
  - Alternative 3b: Treat at FWD/GCSD; Export RRCSD to Windsor
- Alternative 2b: Export to Santa Rosa has a lower median (2.9) and ranges a little lower (lower maximum and minimum) than Alternatives 2a and 3b.
- Alternative 1c: One Facility at FWD has the fourth highest median (2.8) similar to Alternative 2b but more limited variability, indicating this approach is less sensitive to potential prioritization of the qualitative criteria.

Based on this information, all five of these alternatives were selected for further evaluation. Chapter 4 includes further definition of the facilities and costs for each of these alternatives.

Figure 3-12. Monte Carlo Analysis Results



CHAPTER 4
Feasible Alternatives

This Chapter presents additional evaluation of the feasible alternatives identified in Chapter 3. The additional evaluation includes refining of the infrastructure needs and capital costs presented in Chapter 3, preparing site layouts, and development of lifecycle costs.[1]

The Chapter is organized around the following sections:

- Alternative 1a
- Alternative 1c
- Alternative 2a
- Alternative 2b
- Alternative 3b
- Comparison of Alternatives

4.1 ALTERNATIVE 1a

Alternative 1a involves providing treatment at two local facilities. Flows from FWD, GCSD, and OCSD would be treated at a combined FWD/GCSD WWTP and recycled water system that is sized to accommodate zero surface water discharge (i.e. in lieu of making treatment improvements to meet the nitrogen effluent limitations that have been prescribed for surface discharge). Flows from the RRCSD service area would continue to be treated at the existing RRCSD WWTP. This section presents a description of the basis of design for the facility improvements, a summary of the required facility improvements, site layout, project costs, O&M costs and total lifecycle cost.

4.1.1 Basis of Design

The flows and loads of interest for design of the new treatment facilities under Alternative 1a are presented in Table 4-1.

[1] Conveyance of the OCSD flows to the GCSD collection system - common to all the alternatives - is excluded from the information presented in this TM. Where relevant, the proposed alignment for the planned OCSD to GCSD pipeline is shown on figures. The conveyance facilities are reported to have capacity for up to 0.26 mgd, and the peak day flows generated from the OCSD service area are 0.13 mgd.

Table 4-1. Alternative 1a FWD/GCSD Treatment Facilities Design Flows and Loads				
Scenario	ADWF, mgd	Relevant Peak Flow Condition	Peak Design Flow, mgd	Maximum 30 Day BOD Load, lb/day
Design Flow for the GCSD Screening System				
GCSD/OCSD	--[(a)]	PDF	1.5	--[(a)]
Design Flows and Loads to the Secondary Treatment Ponds				
GCSD Treatment Ponds	0.15	MMF	0.64	680
FWD Treatment Ponds	0.064	MMF	0.25	270
Design Flows to the Combined Tertiary Filtration and Disinfection Facilities				
Combined GCSD/OCSD/FWD Flows and Loads	0.21	MWF	1.5	--[(a)]

ADWF = Average Dry Weather Flow
MMF = Maximum 30-Day Flow
MWF = Maximum 7-Day Flow
PDF = Maximum Day Flow
(a) Design condition is not relevant to the facility sizing.

4.1.2 Required Facility Improvements

As discussed in Chapters 2 and 3, available RRCSD WWTP planning documents identify several condition and hydraulic capacity-related improvement projects that are necessary for continued long-term treatment at the RRCSD[2]. In addition, 5 acres of new land application area will need to be developed to accommodate approximately 8 AFY of recycled water from the RRCSD WWTP.

Significant improvements are needed for the GSCD/FWD treatment systems to accommodate the projected flows and loads. The specific improvements are as follows:

- The GCSD headworks will be upgraded with a new mechanical screening facility.
- The existing partial mix aerated ponds at GCSD will be converted to a complete mix system. This includes installation of new aerators, a floating cover on the settling pond and construction of a new blower building.
- The effluent storage pond at the FWD site will be filled in to accommodate the expansion of tertiary filtration and disinfection facilities within the existing site footprint.
- A new SAF system and cloth disk filtration system will be installed at the FWD site to accommodate the flows from GCSD and FWD.
- Two additional CCBs will be constructed at the FWD site to accommodate flows from both FWD and GCSD.
- Recycled water (effluent) storage capacity will be expanded by approximately 310 acre-feet (101 million gallons) within an existing 21-acre site north of the GCSD WWTP, resulting in a pond depth of approximately 30 feet.[3]

[2] As noted in Chapter 3, the Master Plan analysis regarding facilities required to accommodate peak flow conditions may need to be revisited based on findings from the January 2026 spill event.

[3] If additional land could be purchased, a shallower pond could likely be constructed at a lower overall cost.

- New pipelines and pump stations will be constructed to convey flows to the FWD and GCSD treatment, storage, and recycled water facilities.

Except for the upgraded pond system at the GCSD WWTP, the new treatment facilities will be sized to accommodate flows and loads defined in Table 4-1. The GCSD WWTP Pond system is assumed to be upgraded to complete mix system, which will provide the treatment capacity summarized in Table 4-2. As shown, the fully mixed treatment ponds should provide more than adequate capacity to accommodate the anticipated flows and loads to the GSCD system.

Table 4-2. GCSD WWTP Upgraded Secondary Treatment Pond Design Capacity

Facility	ADWF, mgd	MMF, mgd	Maximum 30 Day BOD Load, lb/day
GCSD WWTP Upgraded Secondary Treatment Ponds	0.52	2.2	2,390

4.1.3 Site Layouts

As previously stated, no significant site improvements are needed for RRCSD WWTP site, and the existing site layout is expected to be unchanged under this alternative.

Site layouts for GCSD and FWD showing proposed site modifications under Alternative 1a are presented on the following figures:

- Figure 4-1 shows the proposed new infrastructure and treatment systems at the FWD WWTP, along with the existing infrastructure that will be repurposed.
- Figure 4-2 shows the proposed infrastructure improvements and treatment upgrades at the GCSD WWTP.
- Figure 4-3 shows the proposed footprint for the effluent storage pond and modifications to the recycled water facilities at the GCSD WWTP.

F4-1 Alt1a FWD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

Prepared by:

WEST YOST

Prepared for:

Russian River County Sanitation District

Water Quality and Recycled Water Supply Feasibility Study

Sonoma Water

FWD WWTP Site Layout for Alternative 1a

Figure 4-1

F4-2 Alt1a GCSD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

Prepared by:

WEST YOST

Prepared for:

Russian River County Sanitation District

Water Quality and Recycled
Water Supply Feasibility Study

Sonoma Water

GCSD WWTP Site Layout for Alternative 1a

Figure 4-2

F4-3 Alt1a GCSD ReW Layout: N:\Clients\798 Russian River County Sanitation District\SD-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

Prepared by:

WEST YOST

N

0 150 300 Feet

Prepared for:

Russian River County Sanitation District

Water Quality and Recycled Water Supply Feasibility Study

Sonoma Water

Recycled Water Facilities Layout at GCSD for Alternative 1a

Figure 4-3

4.1.4 Project Costs

The Opinion of Probable Capital Cost (OPCC) and Opinion of Probable Total Capital Cost (OPTCC) for Alternative 1a project elements are presented in Table 4-3, which also shows the estimated cost shares for RRCSD and for FWD/GCSD (which also includes costs for processing flows from OCSD). Additional details regarding these costs are provided in a Basis for Cost Estimating Technical Memorandum (TM) in Appendix A and detailed cost tables in Appendix B-1.

Table 4-3. OPCC and OPTCC for Alternative 1a

Facility Component	Components	Cost, $ million		
		RRCSD	FWD/GCSD	Total[(a)]
Treatment		**$23.6**	**$25.7**	**$49.3**
RRCSD	Condition-related improvements and hydraulic capacity improvements	23.6	--	23.6
FWD	New SAF/cloth disk filtration facility and disinfection expansion	--	15.5	15.5
GCSD	Headworks improvements	--	0.8	0.8
	Convert treatment ponds to complete mix system	--	9.4	9.4
Conveyance		**$0.0**	**$13.4**	**$13.4**
New Pump Stations	1.1 mgd pump station at the GCSD WWTP for secondary effluent transfer to FWD	--	2.5	7.6
	2.0 mgd pump station at the GCSD WWTP for tertiary effluent delivery to distribution system	--	2.7	
	1.5 mgd pump station at the FWD WWTP for tertiary effluent transfer to GCSD and delivery to customers	--	2.4	
Pipeline	Pipeline Connections Between FWD/GCSD: • 0.8 mile, 6-inch pipeline extension of existing HDPE pipe • 1.7 mile, 6-inch pipeline • Rehab existing 1.7 mile, 8-inch ductile iron pipeline	--	5.8	5.8
Recycled Water		**$0.2**	**$20.4**	**$20.6**
Land Application Area	5 acres (RRCSD)	0.2	--	0.2
Storage	310 acre-feet (GCSD)	--	20.4	20.4
	Engineer's Preliminary OPCC	**$24**	**$59**	**$83**
Engineering Design, Environmental Planning and Studies, Permitting, Construction Management, ESDC and Legal and Admin Costs, 25 percent of OPCC[(b)]		6	15	21
	Engineer's Preliminary OPTCC	**$30**	**$74**	**$104**

ESDC = engineering services during construction

(a) Project Phase-Level OPCC contingency of 30 percent applied to all elements.

(b) Engineering design, environmental planning and studies, permitting, construction management, ESDC and legal and administrative costs of 25 percent applied to all elements.

4.1.5 Operations and Maintenance Costs

This section provides a summary of the O&M costs, focused on the following elements:

- power costs
- labor costs
- chemical costs
- equipment repair and replacement costs

Additional details regarding these O&M costs are provided in the Basis for Cost Estimating TM in Appendix A and detailed cost tables in Appendix C-1. A 20-year project lifecycle is assumed.

4.1.5.1 Power Costs

The annual power costs for Alternative 1a are summarized in Table 4-4. These costs account for the energy demands of new treatment systems and conveyance infrastructure, as well as projected savings resulting from operational changes at the GCSD and FWD WWTPs. While an upgrade to a complete mix aeration system at the GCSD WWTP increases power demand (reflected in the treatment pond power cost), eliminating tertiary treatment at the GCSD WWTP and membrane filtration at the FWD WWTP results in power savings.

Table 4-4. Annual Power Costs for Alternative 1a

Cost Element	Annual Cost, dollars
Treatment Pond at GCSD WWTP	173,200
GCSD and FWD WWTP Operations[a]	-173,400
Cloth Disk Filtration at FWD WWTP	700
SAF at FWD WWTP	6,400
Conveyance Pumps	38,800
Total	**$45,700**

(a) Assuming elimination of 90 and 60 percent of GCSD and FWD current treatment power costs. A negative cost represents cost savings relative to existing costs.

4.1.5.2 Labor Costs

No change in labor costs is assumed for this alternative, although there may be potential for labor reduction costs if staff labor is consolidated between the two agencies.

4.1.5.3 Chemical Costs

Annual chemical costs for Alternative 1a are summarized in Table 4-5. The bases for these costs are provided in the footnotes to the table.

Table 4-5. Annual Chemical Costs for Alternative 1a

Cost Element	Annual Cost, dollars
SAF floc aid	55,700[a]
CCB: chlorine gas and sulfur dioxide gas	25,900[b]
Current GCSD WWTP Operation	-69,700[c]
Total	**$11,900**

(a) Based on chemical usage at the existing GCSD SAF facility.

(b) Additional chlorine gas and sodium bisulfite required for the expanded CCB at the FWD WWTP are estimated using FWD current design criteria and the projected increase in annual average flow from GCSD.

(c) Assuming elimination of 100 percent of GCSD WWTP chemical costs. A negative cost represents cost savings relative to existing costs.

4.1.5.4 Equipment Repair and Replacement Costs

A summary of the estimated major equipment repair and replacement costs for Alternative 1a is provided in Table 4-6. Replacement costs for equipment with replacement frequencies of more than 20 years were excluded from this analysis (e.g., pumps, which are assumed to need replacement after 25 years).

Table 4-6. Equipment Repair and Replacement Costs for Alternative 1a

Cost Element	Cost, dollars	Assumption
Filter Cloth Replacement	2,200[a]	Annual
Routine O&M[b]	7,800	Annual
Piping and Valve Maintenance and Replacement Cost	60,000	5 percent of mechanical and piping capital costs
Instrumentation Maintenance	45,000	5 percent of instrumentation and controls capital costs, Year 15
Pumps Rebuild and Major Maintenance	46,300	30 percent of pump capital costs, Every 10 Years
10-Year Parts Replacement[c]	2,100	Every 10 Years
Major Parts Replacement[d]	43,200	Every 15 Years
Average Annual Costs	**$78,800[e]**	--

(a) Filter cloth assumed to be replaced every seven years. Annual cost shown is annualized over seven years.

(b) Includes cloth disk filtration routine lubrication of backwash pumps, drive motor and gear box, SAF parts replacement, pond cleaning and pond blower filter/belt/oil changes.

(c) Includes cloth disk filtration main “V-Ring” seal replacement.

(d) Includes aeration equipment replacement.

(e) Total is lower than direct sum of the components because several cost items occur at an irregular frequency. The average annual cost is shown, based on the sum of relevant O&M present worth costs in Appendix C-1, divided by the 20-year project lifetime.

4.1.5.5 Total 20-Year Present Worth of O&M Costs

The total 20-year present worth O&M costs for Alternative 1a are shown in Table 4-7. Additional details are provided in Appendix C-1.

Table 4-7. Present Worth O&M Cost for Alternative 1a

O&M Cost Component	Total 20 Year Cost, $ million
Power	1.0
Labor	0
Chemicals	0.3
Equipment Repair and Replacement	1.7
Total 20-Year Present Worth O&M Costs	**$2.9**

4.1.6 Total Lifecycle Cost

A total lifecycle cost for Alternative 1a is calculated as shown in Table 4-8 using the OPTCC from Table 4-3 and total 20-year O&M costs from Table 4-7.

Table 4-8. Lifecycle Cost for Alternative 1a

Cost Component	Cost, $ million
Total Project Capital Cost (CapEx)	104
Total Present Worth O&M Costs (OpEx)	3
Total Lifecycle Cost	**$107**

4.2 ALTERNATIVE 1c

Alternative 1c involves treating all West County flows at new treatment facilities constructed at the existing FWD WWTP site that provides the level of treatment required to allow for seasonal discharge to the Russian River. The system would also rely on the combined FWD/GCSD recycled water system to provide for dry-season reuse.[4] This section presents a description of the basis of design for the facility improvements, a summary of the required facility improvements, site layout, project costs, O&M costs and total lifecycle cost.

4.2.1 Basis of Design

The flows and loads of interest for design of the new treatment facilities under Alternative 1c are presented in Table 4-9.

Table 4-9. Future West County Flows and Loads Relevant to Alternative 1c

Scenario	ADWF, mgd	Relevant Peak Flow Condition	Peak Flow, mgd	Maximum 30 Day BOD Load, lb/day
Projected RRCSD Flows and Loads	0.38	MWF	3.5	2,620
Projected GCSD/OCSD Flows and Loads	0.15	MMF	0.64	680
Projected FWD Flows and Loads	0.064	MMF	0.25	270
Total West County Flows and Loads	**0.59**	--	**4.4**	**3,570**

4.2.2 Required Facility Improvements

Under this alternative, the following improvements will be required:

- The GCSD headworks will be upgraded with a new mechanical screening facility.
- The existing GCSD and FWD treatment ponds and the RRCSD storage ponds would be reconfigured to provide EQ at each site. With this approach, the GCSD and FWD flows can likely be equalized to the maximum 30-day average values (0.9 mgd combined total) and RRCSD flows equalized to the lower end of the maximum 7-day average flows (i.e. 3.5 mgd). Required infrastructure for this conversion includes:
  - Influent control structures at the RRCSD, GCSD and FWD sites to allow flexible flow direction within each facility (e.g., directing flow to the ponds or pump station, or combining flows)
  - A drain pump for the FWD ponds
  - Additional internal pipelines within the facilities
- A new MBR treatment system providing biological nitrogen removal will be installed at the FWD WWTP, paired with a new UV disinfection system to meet treatment requirements.

[4] Existing recycled water use from RRCSD on the Northwood Golf Course is assumed to cease.

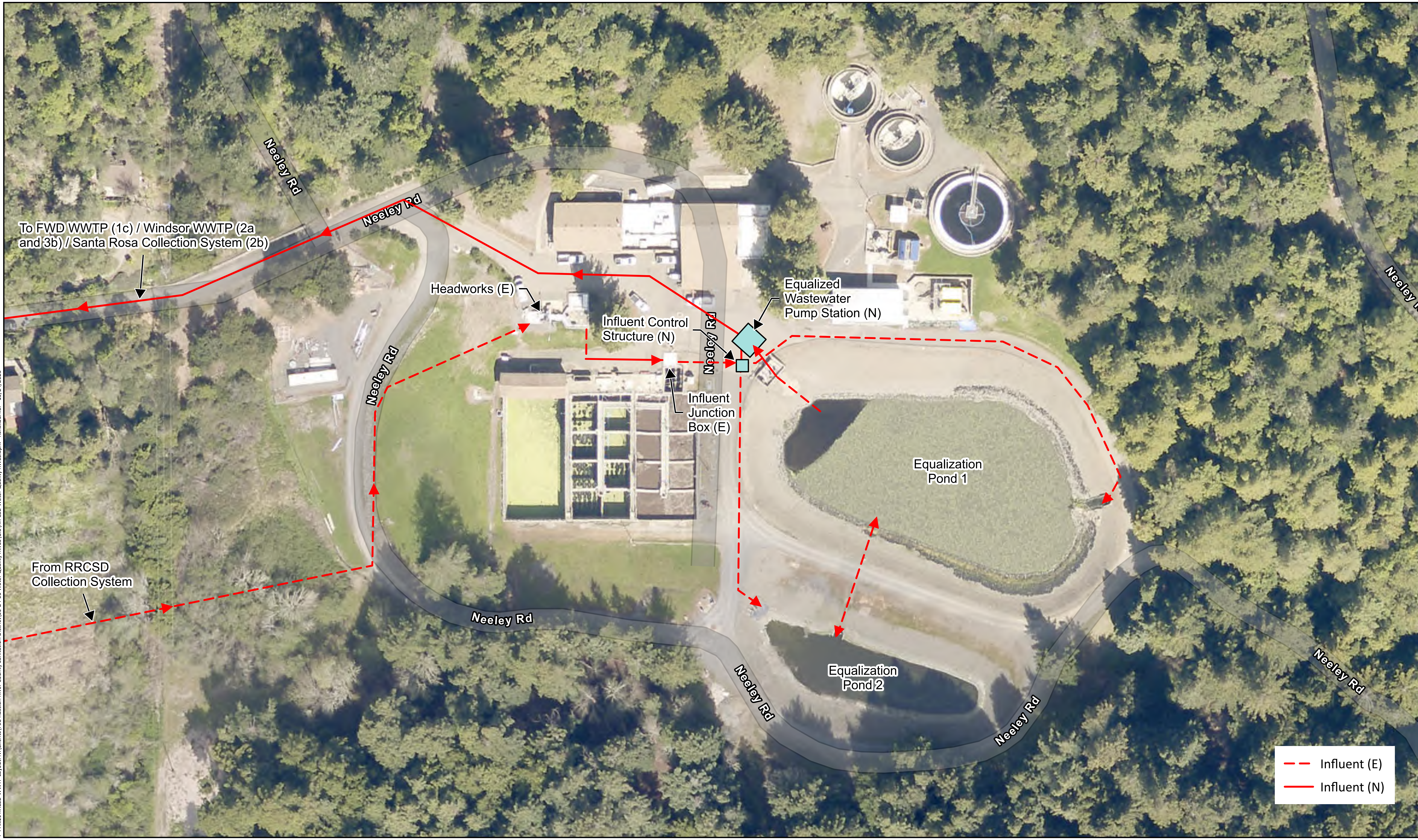
- Fine screening with 2-millimeter openings will need to be installed upstream of the MBR system, as required by membrane manufacturers to protect the membranes from damage.
- An aerobic digestion system will be constructed to treat WAS generated by the MBR process. A new solids-handling building will house mechanical equipment, such as solids thickening and dewatering systems, blowers, and a cake storage room.
- A new 24-inch, 4.1-mile-long outfall from the FWD WWTP to the Russian River.[5]
- A new 4.4 mgd pump station at the RRCSD WWTP to convey exported wastewater to the FWD WWTP site.
- A new 20-inch, 10.4-mile-long pipeline between the RRCSD and FWD WWTP sites.
- New pipelines and pump stations will be constructed between the FWD and GCSD sites to convey flows to the treatment, storage, and recycled water facilities.

4.2.3 Site Layouts

Site layouts showing proposed site modifications under Alternative 1c are presented on the following figures:

- Figure 4-4 shows the layout of the proposed infrastructure improvements to convert the effluent storage ponds at the RRCSD WWTP to EQ ponds.
- Figure 4-5 shows the layout of the proposed infrastructure improvements to convert the existing treatment ponds at the GCSD WWTP to EQ ponds.
- Figure 4-6 shows layout of the proposed new infrastructure and treatment systems at the FWD WWTP, along with existing infrastructure that will be repurposed to provide influent equalization.
- Figure 4-7 shows the layout of the proposed modifications to the recycled water facilities at GCSD for effluent storage.

[5] Additional evaluation of the dilution available at the existing GCSD and FWD discharge locations is needed to confirm the need for a new outfall. It is also likely that the existing FWD and GCSD outfalls would be available to accommodate some of the discharge flow. A lower-cost supplemental discharge site may also be possible. Therefore, the new outfall could potentially be lower cost than what has been assumed for this study.



F4-4 Alt1c RRCSD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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Sonoma Water

RRCSD WWTP Site Layout for Alternative 1c

Figure 4-4

F4-5 Alt1c-2a GCSD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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GCSD WWTP Site Layout for Alternative 1c

Figure 4-5

0 50 100 Feet

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FWD WWTP Site Layout for Alternative 1c

Figure 4-6

F4-7 Alt1c GCSD ReW Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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GCSD WWTP Site Layout for Alternative 1c

Figure 4-7

4.2.4 Project Cost

The OPCC and OPTCC for Alternative 1c project elements are presented in Table 4-10, with cost shares between RRCSD and the other West County agencies. Additional details regarding these costs are provided in a Basis for Cost Estimating TM in Appendix A and detailed cost tables in Appendix B-2.

Table 4-10. OPCC and OPTCC for Alternative 1c

Facility Component	Components	Cost, $ million		
		RRCSD	FWD/ GCSD	Total[(a)]
Treatment		**$53.5**	**$16.9**	**$70.4**
RRCSD	Convert storage ponds to EQ facility	0.3	--	0.3
FWD	Convert treatment ponds to EQ ponds	--	3.7	3.7
	Construct new BNR/MBR facility + UV disinfection + Solids Processing[(b)]	53.2	12.2	65.4
GCSD	Headworks improvements	--	0.8	0.8
	Convert treatment ponds to EQ facility	--	0.2	0.2
Conveyance		**$110.9**	**$16.2**	**$127.1**
New Pump Stations	3.5 mgd pump station at RRCSD for raw wastewater discharge to FWD site	3.5	--	3.5
	0.64 mgd pump stations at GCSD for raw wastewater transfer to FWD and 0.9 mgd pump station at GCSD for discharge of recycled water to customers	--	4.8	4.8
	4.4 mgd pump station at the FWD WWTP for discharge to storage/local reuse	2.5	0.7	3.2
	4.4 mgd pump station at FWD for Russian River discharge	3.0	0.8	3.8
Pipeline	10.4-mile of 20-inch conveyance pipeline between RRCSD and FWD	68.5	--	68.5
	Pipeline Connections Between FWD/GCSD: • 1.7 mile, 16-inch pipeline for tertiary effluent transfer between GCSD and FWD • 0.8 mile, 6-inch pipeline extension of existing HDPE pipe • Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD for raw wastewater transfer	7.5	3.3	10.8
	4.1-mile, 24-inch Conveyance and Outfall to Russian River[(c)]	25.9	6.6	32.5
	Engineer's Preliminary OPCC	**$164**	**$33**	**$197**
Engineering Design, Environmental Planning and Studies, Permitting, Construction Management, ESDC and Legal and Admin Costs, 25 percent of OPCC[(d)]		45	9	54
	Engineer's Preliminary OPTCC	**$209**	**$42**	**$251**

ESDC = engineering services during construction

(a) Project Phase-Level OPCC contingency of 30 percent applied to all elements.

(b) Costs for the new FWD treatment facility are allocated proportional to BOD loading for the pond filling, MBR and solids processing; and proportional to (equalized) peak flow for the influent pumping, screens and UV disinfection system.

(c) Additional evaluation of dilution available at existing GCSD and FWD discharge locations needed to confirm new outfall requirements. A study of potential new outfall locations/alignments is also warranted. If existing FWD and GCSD outfalls are available and can reliably accommodate all planned GCSD/FWD flows, costs applied to GCSD/FWD could be eliminated (an up to $7 million reduction).

(d) Engineering design, environmental planning and studies, permitting, construction management, ESDC and legal and administrative costs of 25 percent applied to all elements, except for the outfall to Russian River, which has a 40 percent factor applied due to possible permitting challenges.

4.2.5 Operations and Maintenance Costs

This section provides a summary of the following O&M cost elements:

- power costs
- labor costs
- chemical costs
- equipment repair and replacement costs
- solids hauling

4.2.5.1 Power Cost

The annual power costs for Alternative 1c are summarized in Table 4-11. These costs account for power for the new tertiary treatment facility, solids handling facility and conveyance infrastructure, as well as anticipated savings from operational changes at the RRCSD, GCSD and FWD WWTPs.

Table 4-11. Annual Power Costs for Alternative 1c

Cost Element	Cost, dollars
Fine Screen	2,000
MBR Treatment System	181,100
Aerobic Digestion	57,600
UV	28,900
Conveyance Pumps	50,200
RRCSD, GCSD and FWD WWTPs Operation[(a)]	-576,600
Total	**-$256,800**

(a) Assuming elimination of 95, 90 and 60 percent, respectively, of RRCSD, GCSD and FWD WWTP current treatment power costs. A negative cost represents cost savings relative to existing costs.

4.2.5.2 Labor Cost

The following labor cost reductions are assumed for this alternative:

- 100 percent increase in labor and administrative costs at the FWD WWTP
- 75 percent reduction in labor costs at the RRCSD WWTP
- 90 percent reduction in labor and a 50 percent reduction in administrative costs at the GCSD WWTP

Based on these assumptions, the estimated annual labor cost savings is $2.9 million.

4.2.5.3 Chemical Cost

Annual chemical costs for Alternative 1c are summarized in Table 4-12. The bases for these costs are provided in the footnotes to the table.

Table 4-12. Annual Chemical Costs for Alternative 1c

Cost Element	Cost, dollars
MBR Treatment System	16,100[(a)]
Aerobic Digestion	21,900[(b)]
RRCSD and GCSD WWTPs Operation	-104,700[(c)]
Total	**-$66,700**

(a) Based on chemical doses provided by manufacturer for system cleaning after organic fouling events
(b) Based on estimated polymer usage for dewatering and thickener units
(c) Assuming elimination of 100 percent of RRCSD and GCSD WWTPs chemical costs. A negative cost represents cost savings relative to existing costs.

4.2.5.4 Equipment Repair and Replacement Cost

A summary of estimated major equipment repair and replacement costs for Alternative 1c is provided in Table 4-13. Replacement costs for equipment with replacement frequencies of more than 20 years were excluded from this analysis (e.g., pumps).

Table 4-13. Equipment Repair and Replacement Costs for Alternative 1c

Cost Element	Cost, dollars	Assumption
UV Equipment Replacement	11,900	Annual
Piping and Valve Maintenance and Replacement Cost	391,000	5 percent of mechanical and piping cost
MBR Membrane Cassette	46,000	Every 7 years, cost shown normalizes to annual cost
Instrumentation Maintenance	185,000	5 percent of instrumentation and controls cost, Year 15
Pumps Rebuild and Major Maintenance	213,000	30 percent of pump cost, Every 10 Years
15-Year MBR Replacements	243,000	Every 15 years
20-Year MBR Replacement	601,000	Every 20 years
20-Year Major Equipment Replacement (fine screens)	666,000	Every 20 years
RRCSD and GCSD Operations[(a)]	-948,600	Annual
Average Annual Costs	**-$399,000**[(b)]	--

(a) Assumes a 90 percent cost reduction for parts replacement, permitting, and testing/analysis at the RRCSD WWTP; a 50 percent reduction in SCADA-related costs at RRCSD; and an 80 percent reduction in equipment maintenance costs at the existing GCSD WWTP.
(b) Total is lower than sum of the components because several cost items occur at an irregular frequency. The average annual cost is shown, based on the sum of relevant O&M present worth costs in Appendix C-2, divided by the 20-year project lifetime.

4.2.5.5 Solids Hauling

Alternative 1c would include new solids processing equipment at the FWD WWTP, which is assumed to have associated solids hauling. A unit hauling cost of $70 per wet ton and an annual biosolids production of 1,800 wet tons are assumed. Based on these assumptions, the estimated annual solids hauling costs are $126,000.

4.2.5.6 Total 20-Year Present Worth of O&M Costs

The total 20-year present worth O&M costs for Alternative 1c are shown in Table 4-14. Additional details are provided in Appendix C-2.

Table 4-14. Present Worth O&M Cost for Alternative 1c

O&M Cost Component	Total 20 Year Cost, $ million
Power	-5.4
Labor	-62.6
Chemicals	-1.4
Equipment Repair and Replacement	-8.4
Dewatered Solids Hauling	2.7
Total 20-Year Present Worth O&M Costs	**-$75**

4.2.6 Total Lifecycle Cost

A total lifecycle cost for Alternative 1c is calculated as shown in Table 4-15 using the OPTCC from Table 4-10 and total 20-year O&M costs from Table 4-14.

Table 4-15. Lifecycle Cost for Alternative 1c

Cost Component	Cost, $ million
Total Project Capital Cost (CapEx)	251
Total Present Worth O&M Costs (OpEx)	-75
Total Lifecycle Cost	**$176**

4.3 ALTERNATIVE 2a

Alternative 2a involves conveying all untreated wastewater flows from the four West County service areas to the Windsor WWTP for treatment. No return of recycled water is assumed for use within West County under this alternative. This section presents a description of the basis of design for the facility improvements, a summary of the required facility improvements, site layout, project costs, O&M costs and total lifecycle cost.

4.3.1 Basis of Design

The flows and loads of interest for design of the new treatment facilities under Alternative 2a are the same as for Alternative 1c with the difference being ultimate conveyance to and treatment at the Windsor WWTP instead of the FWD WWTP. These flows and loads of interest were presented in Table 4-9. These flows and loads reflect contributions from 5,319 ESDs.

4.3.2 Required Facility Improvements

The major capital cost components for Alternative 2a are the following:

- The GCSD headworks will be upgraded with a new mechanical screening facility.
- The existing GCSD and FWD treatment ponds and the RRCSD storage ponds would be reconfigured to provide EQ at each site. With this approach, the GCSD and FWD flows can likely be equalized to the maximum 30-day average values (0.9 mgd combined total) and RRCSD flows equalized to the lower end of the maximum 7-day average flows (i.e. 3.5 mgd). Required infrastructure for this conversion includes:
  - New influent control structures at both the RRCSD and GCSD sites
  - A new drain pump for the FWD ponds
  - A new flow control structure at the FWD site to allow flexible flow direction within the facility (e.g., directing flow to the ponds or pump station, or combining flows)
  - Additional internal pipelines within the facilities
- New 4.3 mgd , 0.9 mgd and 1.4 mgd discharge pump stations would be constructed at the RRCSD, GCSD and FWD facilities, respectively, for raw wastewater export.
- A new 20- to 24-inch diameter, 8-mile pipeline would be constructed between the RRCSD and FWD/GCSD junction point to the Windsor WWTP. The cost of this conveyance pipeline would be shared between RRCSD and FWD/GCSD facilities, based on the proportion of flow each contributes to the combined conveyance system beyond the junction.
- Construction of new pipelines for RRCSD/FWD/GCSD for conveyance of raw wastewater, as well as rehabilitation of the existing 8-inch ductile iron pipeline between the GCSD and FWD WWTPs for the same.
- An estimated connection/capacity fee of $69.6 million will need to be paid to increase the capacity in the Windsor WWTP. These costs would be split between RRCSD and FWD/GCSD in proportion to their ADWF values.

4.3.3 Site Layouts

The infrastructure required to convert the existing ponds at the RRCSD and GCSD WWTPs into EQ ponds is similar to Alternative 1c and is illustrated on Figure 4-4 and Figure 4-5 in the previous sections. The proposed infrastructure improvements to convert the existing treatment ponds at the FWD WWTP to EQ ponds are shown on Figure 4-8. RRCSD raw wastewater is pumped to the export pipeline junction near the intersection of River Road and Trenton Road (as was shown on Figure 3-7). At the junction, the RRCSD wastewater combines with FWD and GCSD wastewater from FWD before flowing to the Windsor WWTP.

F4-8 Alt2a FWD WWTP Layout: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/24/2025

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Russian River County Sanitation District

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Sonoma Water

FWD WWTP Site Layout for Alternative 2a

Figure 4-8

4.3.4 Project Costs

The OPCC and OPTCC for Alternative 2a is provided in **Error! Reference source not found.**, with cost shares between RRCSD and the other West County agencies. Additional details regarding these costs are provided in a Basis for Cost Estimating TM in Appendix A and detailed cost tables in Appendix B-3.

Table 4-16. OPCC and OPTCC for Alternative 2a

Facility Component	Components	Cost, $ million		
		RRCSD	FWD/GCSD	Total(a)
Treatment		**$44.8**	**$29.5**	**$74.3**
RRCSD	Convert storage ponds to EQ facility	0.3	--	0.3
FWD	Convert treatment ponds to EQ facility	--	3.4	3.4
GCSD	Headworks improvements	--	0.8	0.8
	Convert treatment ponds to EQ facility	--	0.2	0.2
Windsor Connection Fee(b)		44.5	25.1	69.6
Conveyance		**$135.8**	**$27.3**	**$163.1**
New Pump Stations	0.64 mgd pump station at GCSD for secondary effluent transfer to FWD	--	2.4	
	0.9 mgd pump station at FWD for wastewater transfer to Windsor	--	2.7	8.5
	3.5 mgd pump station at RRCSD for wastewater transfer to Windsor	3.5	--	
Pipeline	18.9 miles of 20 to 24-inch conveyance pipeline	132.3	20.5	152.8
	Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD	--	1.8	1.8
	Engineer's Preliminary OPCC	**$181**	**$57**	**$237**
Engineering Design, Environmental Planning and Studies, Permitting, Construction Management, ESDC and Legal and Admin Costs, 25 percent of OPCC(c)		45	14	59
	Engineer's Preliminary OPTCC	**$226**	**$71**	**$297**

ESDC = engineering services during construction

(a) Project Phase-Level OPCC contingency of 30 percent applied to all elements.

(b) Connection fee for Windsor based on discussion with Town of Windsor staff, as discussed in Chapter 3.

(c) Engineering design, environmental planning and studies, permitting, construction management, ESDC and legal and administrative costs of 25 percent applied to all elements.

4.3.5 Operations and Maintenance Costs

This section provides a summary of the following O&M cost elements:

- power costs
- labor costs
- chemical costs
- equipment repair and replacement costs
- Windsor O&M rate costs

4.3.5.1 Power Cost

The annual power costs for Alternative 2a are summarized in Table 4-17. These cost account for power for the new raw wastewater pump stations, as well as anticipated savings from operational changes at the RRCSD, GCSD and FWD WWTPs.

Table 4-17. Annual Power Costs for Alternative 2a

Cost Element	Cost, dollars
Conveyance Pumps	29,300
RRCSD, GCSD and FWD WWTPs Operation[a]	-614,800
Total	**-$585,500**

(a) Assuming 95 percent of the current treatment power costs at RRCSD and 90 percent at FWD/GCSD would be eliminated.

4.3.5.2 Labor Cost

Under this alternative, similar to Alternative 1c, the following labor reductions are assumed:

- 75 percent reduction at RRCSD WWTP
- 90 percent reduction in operations labor and 50 percent reduction in administrative costs at the GCSD WWTP
- 80 percent reduction at the FWD WWTP

Based on these assumptions, the estimated annual labor cost savings is $3.6 million.

4.3.5.3 Chemical Cost

As shown in Table 4-18, since treatment processes are eliminated at the facilities, all existing chemical costs would be entirely saved for Alternative 2a.

Table 4-18. Annual Chemical Costs for Alternative 2a

Cost Element	Cost, dollars
RRCSD, GCSD and FWD WWTPs Operation[a]	-154,700

(a) Assuming elimination of 100 percent of chemical costs at RRCSD, GCSD and FWD WWTPs

4.3.5.4 Equipment Repair and Replacement Cost

A summary of the major equipment repair and replacement costs for Alternative 2a is provided in Table 4-19. Replacement costs for equipment with replacement frequencies of more than 20 years were excluded from this analysis (e.g., pumps).

Table 4-19. Equipment Repair and Replacement Costs for Alternative 2a

Cost Element	Cost, dollars	Assumption
Piping and Valve Maintenance and Replacement Cost	297,000	5 percent of mechanical and piping cost
Pumps Rebuild and Major Maintenance	79,000	30 percent of pump cost, Every 10 Years
RRCSD, GCSD and FWD WWTPs Operation[(a)]	-996,000	Annual
Total Annual Costs[(b)]	**-$691,000**	--

(a) Assumes a 90 percent cost reduction for parts replacement, permitting, and testing/analysis at the RRCSD WWTP, a 50 percent reduction in SCADA-related costs at RRCSD, 80 percent reduction in equipment maintenance costs at the existing GCSD WWTP, and 60 percent reduction in existing equipment maintenance costs at the FWD WWTP.

(b) Total is lower than sum of the components because several cost items occur at an irregular frequency. The average annual cost is shown.

4.3.5.5 Windsor O&M Rate Costs

The estimated annual rates for 0.96 mgd average annual flow equal to $4.2 million, based on the rate currently paid for Sonoma Water discharges from the Airport area. These rates are expected to increase significantly over the next several years, likely to support the construction of new treatment facilities. However, the current analysis accounts for new facility capital costs within the connection fee.

4.3.5.6 Total 20-Year Present Worth of O&M Costs

The total 20-year present worth O&M costs for Alternative 2a are shown in Table 4-20. Additional details are provided in Appendix C-3.

Table 4-20. Present Worth O&M Cost for Alternative 2a

O&M Cost Component	Total 20 Year Cost, $ million
Power	-12.3
Labor	-74.8
Chemicals	-3.3
Equipment Repair and Replacement	-14.5
Windsor O&M Rates	88.2
Total 20-Year Present Worth O&M Costs	**-$17**

4.3.6 Total Lifecycle Cost

The lifecycle cost for Alternative 2a was calculated and shown in Table 4-21 using the present worth of the capital cost and annualized O&M costs over the planning period.

Table 4-21. Lifecycle Cost for Alternative 2a

Cost Component	Cost, $ million
Total Project Capital Cost (CapEx)	297
Total Present Worth O&M Costs (OpEx)	-17
Total Lifecycle Cost	**$280**

4.4 ALTERNATIVE 2b

Alternative 2b involves conveying all untreated wastewater flows from the four West County service areas to the Laguna WWTP for treatment. For the current evaluation, no return of recycled water is assumed for use within West County under this alternative. This section presents a description of the basis of design for the facility improvements, a summary of the required facility improvements, site layout, project costs, O&M costs and total lifecycle cost.

4.4.1 Basis of Design

The flows and loads of interest for design of the new treatment facilities under Alternative 2b are the same as for Alternative 1c with the difference being ultimate conveyance to and treatment at the Laguna WWTP instead of the FWD WWTP. These flows and loads of interest were presented in Table 4-9. These flows and loads reflect contributions from 5,319 ESDs.

4.4.2 Required Facility Improvements

The major capital cost components for Alternative 2b are the following:

- The GCSD headworks will be upgraded with a new mechanical screening facility.
- The existing GCSD and FWD treatment ponds and storage ponds will be repurposed as EQ at each site, similar to Alternative 2a. Required infrastructure for this conversion includes:
  - New influent control structures at both the RRCSD and GCSD sites
  - A new drain pump for the FWD ponds
  - A new flow control structure at the FWD site to allow flexible flow direction within the facility (e.g., directing flow to the ponds or pump station, or combining flows)
  - Additional internal pipelines within the facilities
- New 3.5 mgd, 0.64 mgd and 3.8 mgd discharge pump stations would be constructed at the RRCSD, GCSD and FWD facilities, respectively. for raw wastewater export.
- A new 24-inch diameter, 7.6-mile pipeline would be constructed between the RRCSD and FWD/GCSD junction point to the Santra Rosa collection system near the intersection of Hall and Fulton Roads. The cost of this conveyance is shared between RRCSD and FWD/GCSD facilities, based on the proportion of flow each contributes to the combined conveyance system beyond the junction.

- An estimated connection/capacity fee of $68.8 million will need to be paid to buy capacity in the Laguna WWTP, and a $5 million nominal cost for expansion of Santa Rosa recycled water storage is assumed. These costs would be split between RRCSD and FWD/GCSD in proportion to their ADWF values.
- Construction of new pipelines for RRCSD/FWD/GCSD for conveyance of raw wastewater.

4.4.3 Site Layouts

The proposed infrastructure upgrades needed to convert the facilities into EQ facilities are similar to those described under Alternative 2a and are illustrated in the site layouts shown on Figure 4-4, Figure 4-5 and Figure 4-8 in the previous sections. GCSD raw wastewater is pumped to the export pipeline junction near the intersection of Highway 116 and Guerneville Road east of the GCSD WWTP (as was shown on Figure 3-8). At the junction, the GCSD wastewater combines with RRCSD and FWD wastewater from FWD before flowing to the Santa Rosa collection system.

4.4.4 Project Costs

The OPCC and OPTCC for Alternative 2b is provided in Table 4-22, with the estimated cost shares between RRCSD and the other West County agencies. Additional details regarding these costs are provided in a Basis for Cost Estimating TM in Appendix A and detailed cost tables in Appendix B-4.

Table 4-22. OPCC and OPTCC for Alternative 2b

<table>
<tr><th rowspan="2">Facility Component</th><th rowspan="2">Components</th><th colspan="3">Cost, $ million</th></tr>
<tr><th>RRCSD</th><th>FWD/GCSD</th><th>Total(a)</th></tr>
<tr><td colspan="2">Treatment</td><td>$44.3</td><td>$29.2</td><td>$73.5</td></tr>
<tr><td>RRCSD</td><td>Convert storage ponds to EQ facility</td><td>0.3</td><td>--</td><td>0.3</td></tr>
<tr><td>FWD</td><td>Convert treatment ponds to EQ facility</td><td>--</td><td>3.4</td><td>3.4</td></tr>
<tr><td rowspan="2">GCSD</td><td>Headworks improvements</td><td>--</td><td>0.8</td><td>0.8</td></tr>
<tr><td>Convert treatment ponds to EQ facility</td><td>--</td><td>0.2</td><td>0.2</td></tr>
<tr><td colspan="2">Santa Rosa Connection Fee(b)</td><td>44.0</td><td>24.8</td><td>68.8</td></tr>
<tr><td colspan="2">Conveyance</td><td>$130.8</td><td>$18.7</td><td>$149.5</td></tr>
<tr><td rowspan="3">New Pump Stations</td><td>0.64 mgd pump station at GCSD for wastewater transfer to Santa Rosa collection system</td><td>--</td><td>2.6</td><td rowspan="3">9.7</td></tr>
<tr><td>3.8 mgd pump station at FWD for wastewater transfer to Santa Rosa collection system</td><td>2.9</td><td>0.7</td></tr>
<tr><td>3.5 mgd pump station at RRCSD for wastewater transfer to FWD</td><td>3.5</td><td>--</td></tr>
<tr><td>Pipeline</td><td>18.0 miles of 16 to 24-inch conveyance pipeline</td><td>124.4</td><td>15.4</td><td>139.8</td></tr>
<tr><td colspan="2">Recycled Water</td><td>$3.2</td><td>$1.8</td><td>$5.0</td></tr>
<tr><td>Storage</td><td>Nominal cost assumed for Santa Rosa</td><td>3.2</td><td>1.8</td><td>5.0</td></tr>
<tr><td colspan="2">Engineer's Preliminary OPCC</td><td>$178</td><td>$50</td><td>$228</td></tr>
<tr><td colspan="2">Engineering Design, Environmental Planning and Studies, Permitting, Construction Management, ESDC and Legal and Admin Costs, 25 percent of OPCC(c)</td><td>45</td><td>12</td><td>57</td></tr>
<tr><td colspan="2">Engineer's Preliminary OPTCC</td><td>$223</td><td>$62</td><td>$285</td></tr>
</table>

ESDC = engineering services during construction
(a) Project Phase-Level OPCC contingency of 30 percent applied to all elements.
(b) Connection fee for Santa Rosa based on discussion with Santa Rosa staff, as discussed in Chapter 3.
(c) Engineering design, environmental planning and studies, permitting, construction management, ESDC and legal and administrative costs of 25 percent applied to all elements.

4.4.5 Operations and Maintenance Costs

This section provides a summary of the following O&M cost elements:

- power costs
- labor costs
- chemical costs
- equipment repair and replacement costs
- Laguna WWTP O&M rate costs

4.4.5.1 Power Cost

The annual power costs for Alternative 2b are summarized in Table 4-23. As with Alternative 2a, these costs account for power requirements for the new raw wastewater pump stations, as well as anticipated savings from operational changes at the RRCSD, GCSD and FWD WWTPs.

Table 4-23. Annual Power Costs for Alternative 2b

Cost Element	Cost, dollars
Conveyance Pumps	52,600
RRCSD, GCSD and FWD WWTPs Operation[a]	-614,800
Total	**-$562,200**

(a) Assuming 95 percent of the current treatment power costs at RRCSD and 90 percent at FWD/GCSD would be eliminated.

4.4.5.2 Labor Cost

The same labor cost reductions are assumed as under Alternative 2a, with the same estimated annual labor cost savings of $3.6 million.

4.4.5.3 Chemical Cost

The same reduction in chemical costs is assumed as under Alternative 2a ($154,700 a year savings).

4.4.5.4 Equipment Repair and Replacement Cost

A summary of the major equipment repair and replacement costs for Alternative 2b is provided in Table 4-24. As with other alternatives, replacement costs for equipment with replacement frequencies of more than 20 years were excluded from this analysis (e.g., pumps). The reduction in equipment repair and replacement costs is notably less than under Alternative 2a ($663,000 annual savings). The lower savings is a function of slightly longer pipelines and larger total pumping capacity, resulting in higher piping maintenance and pump rebuild/major maintenance costs, respectively.

Table 4-24. Equipment Repair and Replacement Costs for Alternative 2b		
Cost Element	Cost, dollars	Assumption
Piping and Valve Maintenance and Replacement Cost	308,000	5 percent of mechanical and piping cost
Pumps Rebuild and Major Maintenance	103,000	30 percent of pump cost, Every 10 Years
RRCSD, GCSD and FWD WWTPs Operation[(a)]	-996,000	Annual
Total Annual Costs[(b)]	**-$678,000**	--

(a) Assumes a 90 percent cost reduction for parts replacement, permitting, and testing/analysis at the RRCSD WWTP, a 50 percent reduction in SCADA-related costs at RRCSD, 80 percent reduction in equipment maintenance costs at the existing GCSD WWTP, and 60 percent reduction in existing equipment maintenance costs at the FWD WWTP.
(b) Total is lower than sum of the components because several cost items occur at an irregular frequency. The average annual cost is shown.

4.4.5.5 Laguna WWTP O&M Rate Costs

The estimated annual rates for 0.59 mgd average dry weather flow equal to $5.6 million, based on a review of published wastewater rates and discussions with Santa Rosa staff.

4.4.5.6 Total 20-Year Present Worth of O&M Costs

The total 20-year present worth O&M costs for Alternative 2a are shown in Table 4-25. Additional details are provided in Appendix C-4.

Table 4-25. Present Worth O&M Cost for Alternative 2b	
O&M Cost Component	Total 20 Year Cost, $ million
Power	-11.8
Labor	-74.8
Chemicals	-3.3
Equipment Repair and Replacement	-14.2
Santa Rosa Rate	117.6
Total 20-Year Present Worth O&M Costs	**$14**

4.4.6 Total Lifecycle Cost

The lifecycle cost for Alternative 2b was calculated as shown in Table 4-26 using the OPTCC from Table 4-22 and annualized O&M costs over the planning period from Table 4-25.

Table 4-26. Lifecycle Cost for Alternative 2b	
Cost Component	Cost, $ million
Total Project Capital Cost (CapEx)	285
Total Present Worth O&M Costs (OpEx)	14
Total Lifecycle Cost	**$299**

4.5 ALTERNATIVE 3b

Alternative 3b involves conveying all untreated wastewater flows from the RRCSD service areas to the Windsor WWTP for treatment. Flows from FWD, GCSD, and OCSD would be treated at a combined FWD/GCSD WWTP and recycled water system that is sized to accommodate zero surface water discharge (i.e. in lieu of making treatment improvements to meet the nitrogen effluent limitations that have been prescribed for surface discharge). This section presents a description of the basis of design for the facility improvements, a summary of the required facility improvements, site layout, project costs, O&M costs and total lifecycle cost.

4.5.1 Basis of Design

The relevant design flows and loads for Alternative 3b are presented in Table 4-27 for the respective components to the Windsor and FWD WWTPs.

Table 4-27. Future West County Flows and Loads Relevant to Alternative 3b

Scenario	ADWF, mgd	Relevant Peak Flow Condition	Peak Flow, mgd	Maximum 30 Day BOD Load, lb/day
Flows and Loads to Windsor WWTP				
Projected RRCSD Flows and Loads	0.38	PDF	3.5	2,620
Flows and Loads to FWD/GCSD WWTPs				
Projected GCSD/OCSD Flows and Loads	0.15	MMF/MWF	0.64/1.1	680
Projected FWD Flows and Loads	0.064	MMF/MWF	0.25/0.39	270
Combined GCSD/OCSD/FWD Flows and Loads	**0.21**	**MWF**	**1.49**	**80[(a)]**

(a) The combined GCSD/OCSD/FWD BOD load represents the load to the FWD tertiary system following secondary treatment, which is the relevant design criteria for the proposed system.

4.5.2 Required Facility Improvements

The required facility improvements for the RRCSD entail the following:

- The existing RRCSD storage ponds would be reconfigured to provide EQ. With this approach, the RRCSD flows will be equalized to the lower end of the maximum 7-day average flows (i.e. 3.5 mgd). Required infrastructure for this conversion includes:
  - New influent control structures
  - Additional internal pipelines
- A new 3.5 mgd discharge pump station would be constructed at the RRCSD for raw wastewater export.
- A new, 20-inch diameter, 18.9-mile pipeline would be constructed between the RRCSD site and Windsor WWTP.
- A $44.8 million connection/capacity fee will be paid to Windsor to increase the capacity in the Windsor WWTP. These costs would be incurred by RRCSD.

The major infrastructure required for the FWD and GCSD sites under Alternative 3b is the same as for these sites under Alternative 1a, detailed in Section 4.1.2.

4.5.3 Site Layouts

The proposed infrastructure improvements for the RRCSD WWTP were presented on Figure 4-4. The only distinctions are that conveyance would be to the Windsor WWTP instead of the FWD WWTP, and the wastewater pump station at the RRCSD site would be designed accordingly.

The proposed new treatment systems and infrastructure improvements for the FWD and GCSD WWTPs are to the same as those already described under Alternative 1a, with site layouts as presented on Figure 4-1 and Figure 4-2 for the respective sites.

4.5.4 Project Costs

Capital costs for Alternative 3b are summarized in Table 4-28, with cost shares between RRCSD and the other agencies. Additional details regarding these costs are provided in a Basis for Cost Estimating TM in Appendix A and detailed cost tables in Appendix B-5.

Sonoma Water

Table 4-28. OPCC and OPTCC for Alternative 3b

Facility Component	Components	Cost, $ million		
		RRCSD	FWD/GCSD	Total[(a)]
Treatment		**$45.1**	**$25.7**	**$70.8**
RRCSD	Convert storage ponds to EQ facility	0.3	--	0.3
	Windsor connection fee[(b)]	44.8	--	44.8
FWD	Expansion of tertiary filtration and disinfection	--	15.5	15.5
GCSD	Headworks improvements	--	0.8	0.8
	Convert treatment ponds to complete mix system	--	9.4	9.4
Conveyance		**$149.6**	**$13.2**	**$162.8**
New Pump Stations	1.1 mgd pump station at GCSD for secondary effluent transfer to FWD	--	2.5	10.9
	1.5 mgd pump station at GCSD for tertiary effluent delivery to distribution system	--	2.5	
	1.5 mgd pump station at FWD for tertiary effluent transfer GCSD and delivery to customers	--	2.4	
	3.5 mgd pump station at RRCSD for wastewater transfer to Windsor	3.5	--	
Pipeline	• 0.8 mile, 6-inch pipeline; 1.7 mile, 6-inch pipeline • Rehab existing 1.7 mile, 8-inch pipeline between GCSD and FWD	--	5.8	151.9
	18.9 miles of 20-inch conveyance from RRCSD to Windsor WWTP	146.1	--	
Recycled Water		**$0.0**	**$20.4**	**$20.4**
Storage	310 acre-feet (GCSD)	--	20.4	20.4
	Engineer's Preliminary OPCC	**$195**	**$59**	**$254**
Engineering Design, Environmental Planning and Studies, Permitting, Construction Management, ESDC and Legal and Admin Costs, 25 percent of OPCC[(c)]		49	15	64
	Engineer's Preliminary OPTCC	**$243**	**$74**	**$318**

ESDC = engineering services during construction
(a) Project Phase-Level OPCC contingency of 30 percent applied to all elements.
(b) Connection fee for Windsor based on discussion with Town of Windsor staff.
(c) Engineering design, environmental planning and studies, permitting, construction management, ESDC and legal and administrative costs of 25 percent applied to all elements.

4.5.5 Operations and Maintenance Costs

This section provides a summary of the following O&M cost elements:

- power costs
- labor costs
- chemical costs
- equipment repair and replacement costs
- Windsor O&M rate costs

4.5.5.1 Power Costs

The annual power costs for Alternative 3b are summarized in Table 4-29. These costs account for the energy demands of new treatment systems and conveyance infrastructure, as well as projected savings resulting from operational changes at the GCSD and RRCSD WWTPs.

Table 4-29. Annual Power Costs for Alternative 3b

Cost Element	Annual Cost, dollars
Treatment Pond at GCSD WWTP	173,200
RRCSD, GCSD and FWD WWTPs Operation[a]	-565,800
Cloth Disk Filtration	700
SAF	6,400
Conveyance Pumps	106,900
Total	**-$278,600**

(a) Assuming elimination of 90 percent of GCSD and 95 percent of RRCSD current treatment power costs.

4.5.5.2 Labor Costs

As with Alternative 1a, no additional labor costs are included. A 75 percent reduction in labor costs at the RRCSD WWTP is assumed, resulting in an estimated annual savings of $3.0 million.

4.5.5.3 Chemical Costs

The chemical costs for the new treatment systems at FWD, as well as the savings at GCSD, are similar to those presented for Alternative 1a in Section 0. Additionally, further chemical cost savings will occur at RRCSD due to the elimination of treatment at that facility. A summary of estimated annual chemical cost Is provided in Table 4-30.

Table 4-30. Annual Chemical Costs for Alternative 3b

Cost Element	Annual Cost, dollars
SAF	55,700[a]
CCB	25,900[b]
RRCSD and GCSD WWTPs Operation	-104,700[c]
Total	-$**23,100**

(a) Based on chemical usage at the existing GCSD SAF facility.
(b) Additional chlorine gas and sodium bisulfite required for the expanded CCB at the FWD WWTP are estimated using FWD current design criteria and the projected increase in annual average flow from GCSD.
(c) Assuming elimination of 100 percent of GCSD and RRCSD chemical costs.

4.5.5.4 Equipment Repair and Replacement Costs

A summary of the equipment repair and replacement costs for Alternative 3b is shown in Table 4-31.

Table 4-31. Equipment Repair and Replacement Costs for Alternative 3b

Cost Element	Cost, dollars	Assumption
Filter Cloth Replacement	2,200	Annual
Routine O&M[(a)]	7,800	Annual
Piping and Valve Maintenance and Replacement Cost	72,000	5 percent of mechanical and piping cost
Instrumentation Maintenance	54,000	5 percent of instrumentation and controls cost, Year 15
Pumps Rebuild and Major Maintenance	49,000	30 percent of pump cost, Every 10 Years
10-Year Equipment Replacement[(b)]	2,100	Every 10 years
Major Equipment Replacement	43,200	Every 15 Years
RRCSD WWTP Operation[(c)]	-853,600	Annual
Total Annual Costs[(d)]	**-$762,000**	--

(a) Includes cloth disk filtration routine lubrication of backwash pumps, drive motor and gear box, SAF parts replacement, pond cleaning, pond blower filter/belt/ oil changes.

(b) Includes cloth disk filtration main “V-Ring” seal replacement.

(c) Assumes a 90 percent cost reduction for parts replacement, permitting, and testing/analysis at the RRCSD WWTP and a 50 percent reduction in SCADA-related costs at RRCSD.

(d) Total is lower than sum of the components because several cost items occur at an irregular frequency. The average annual cost is shown.

4.5.5.5 Windsor O&M Rate Costs

The annual rates for 0.66 mgd from the RRCSD WWTP to the Windsor WWTP are estimated to be $2.7 million, based on the rate currently paid for discharges from the Airport area, with an adjustment to reflect the smaller flow for RRCSD. As noted with discussion of these rates with Alternative 2a, the Airport rates are expected to increase significantly in the coming years, likely to support the construction of new treatment facilities, but the current analysis accounts for new facility capital costs within the connection fees.

4.5.5.6 Total 20-Year Present Worth of O&M Costs

The total 20-year present worth O&M costs for Alternative 3b are shown in Table 4-32. Additional details are provided in Appendix C-5.

Table 4-32. Present Worth O&M Cost for Alternative 3b

O&M Cost Component	Total 20 Year Cost, $ million
Power	-5.9
Labor	-62.2
Chemicals	-0.5
Equipment Repair and Replacement	-16.0
Windsor Rate	54.0
Total 20-Year Present Worth O&M Costs	**-$31**

4.5.6 Total Lifecycle Cost

A total lifecycle cost for Alternative 3b is calculated as shown in Table 4-33 using the OPTCC from Table 4-28 and present worth annualized O&M costs over the 20-year planning period from Table 4-32.

Table 4-33. Lifecycle Cost for Alternative 3b

Cost Component	Cost, $ million
Total Project Capital Cost (CapEx)	318
Total Present Worth O&M Costs (OpEx)	-31
Total	**$287**

4.6 COMPARISON OF ALTERNATIVES

4.6.1 Summary of Estimated Project Lifecycle Costs

The estimated project lifecycle costs for all five feasible alternatives are summarized in Table 4-34, which shows capital costs, 20-year present worth O&M costs, and total 20-year lifecycle costs. The capital cost share between RRCSD and FWD/GCSD is also shown.

Table 4-34. Summary of Estimated Lifecycle Costs, $ million

Estimated Cost Component	Alternative 1a	Alternative 1c	Alternative 2a	Alternative 2b	Alternative 3b
Capital Cost (CapEx)	104	251	297	285	318
RRCSD Share	*30*	*209*	*226*	*223*	*243*
FWD/GCSD Share	*74*	*42*	*71*	*62*	*74*
20-Year Present Worth O&M (OpEx)	3	-75[(a)]	-17[(a)]	14	-31[(a)]
Estimated Total 20-Year Lifecycle Cost	**107**	**176**	**280**	**299**	**287**
(a) A negative cost represents cost savings relative to existing costs.					

The project costs presented in Table 4-34 reveal Alternative 1a as the least cost alternative. Although Alternative 1a has the second highest operating costs, the significantly lower capital costs nevertheless results in a significantly lower total 20-year project cost. In contrast, Alternative 2b represents the highest-cost scenario, driven by (1) a relatively high capital cost and (2) the highest operating costs. Alternative 3b is slightly lower, driven by (1) the highest capital cost and (2) operating savings in the middle of other alternatives.

4.6.2 Screening Criteria Scoring

Chapter 3 includes discussion of seven qualitative screening criteria that were used to evaluate the alternatives. A summary of the previously defined screening scores is provided in Table 4-35.[6]

Table 4-35. Summary of Screening Criteria Scoring

Criteria	Alternative 1a	Alternative 1c	Alternative 2a	Alternative 2b	Alternative 3b
Reliability/ Ease of Operation	1.0	3.0	5.0	5.0	2.5
Long-Term Regulatory Compliance	2.5	3.0	5.0	5.0	4.0
Flexibility for Adding Critical Unsewered Communities	1.0	3.0	5.0	3.0	5.0
Local Recycled Water Benefits	4.5	4.0	1.0	1.0	3.5
Environmental	5.0	2.0	2.0	3.0	2.5
Resiliency	2.0	3.0	4.0	5.0	3.0
Ease of Implementation	5.0	3.0	1.5	1.0	2.5
Average Score	**3.0**	**3.0**	**3.4**	**3.3**	**3.3**
Total Score	**21.0**	**21.0**	**23.5**	**23.0**	**23.0**

To compare alternatives in terms of both costs and qualitative criteria scores, a plot of the average (or total) screening scores against the estimated lifecycle costs was prepared, shown on Figure 4-9.

[6] The criteria scores were found to be adequate with the refined analysis, so no changes were made.

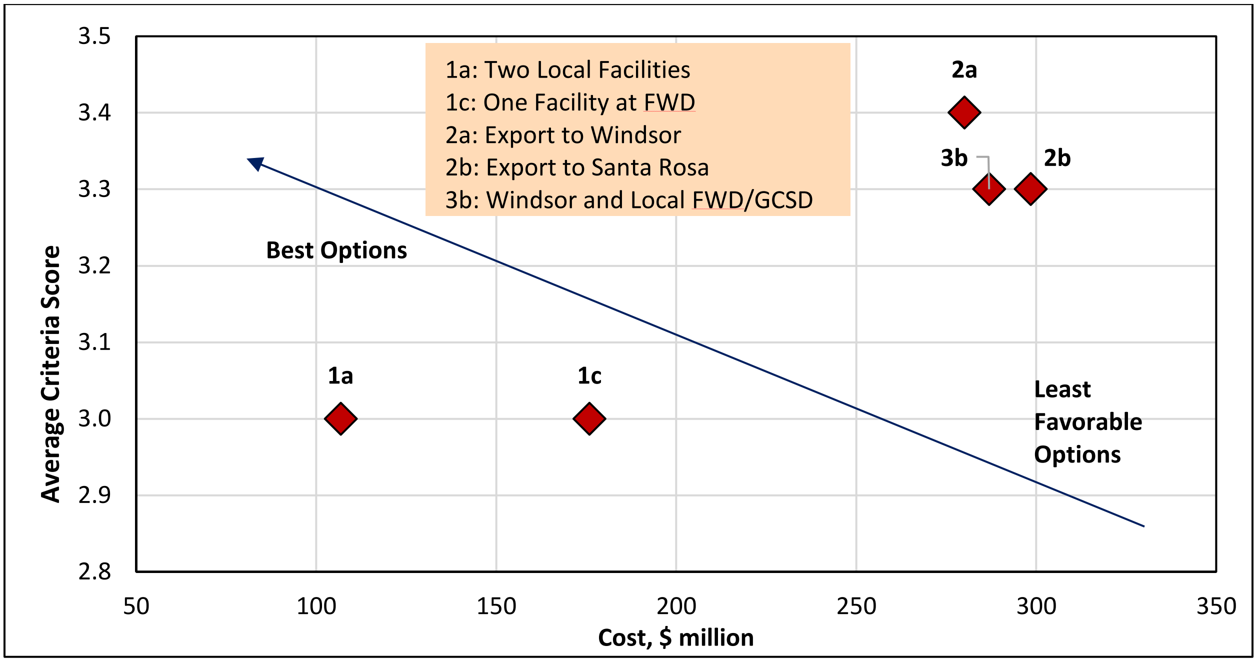

Figure 4-9. Comparison of Alternatives based on Average Criteria Score vs. 20-Year Lifecycle Cost

The results on Figure 4-9 do not reveal an obvious best alternative. While Alternative 1a has the lowest estimated lifecycle cost, it is also tied for the lowest average criteria score with Alternative 1c. The alternatives with export components (2a, 2b and 3b) have notably higher criteria scores but also significantly higher lifecycle costs.

Stakeholders were asked to rank the screening criteria in order of importance during a stakeholder meeting on May 14, 2025. Average stakeholder rankings have been calculated from these results as presented in Table 4-36 (where a ranking of 1 represents a higher importance).

Table 4-36. Weighting of Screening Criteria Scores

Screening Criteria	Average Stakeholder Ranking	Weighting,(a) percent
Reliability/ Ease of Operation	3.43	13.2
Long-Term Regulatory Compliance	3.57	12.7
Flexibility for Adding Critical Unsewered Communities	2.43	18.7
Local Recycled Water Benefits	3.43	13.2
Environmental	3.00	15.1
Resiliency	3.29	13.8
Ease of Implementation	3.43	13.2

(a) Weighting calculated from ratio of inverted average ranking value to sum of all inverted average rankings

The weighted scores are plotted on Figure 4-10 against the same estimated lifecycle costs to reflect stakeholder input on the screening criteria importance. The scores for Alternatives 1a and 3b have changed slightly after applying the weightings, with Alternative 1a decreasing slightly, and Alternative 3b increasing slightly. Even with the revised weighting, however, an obvious best alternative does not emerge. Based on this analysis, all five alternatives were selected to be included in the next phase of the evaluation.

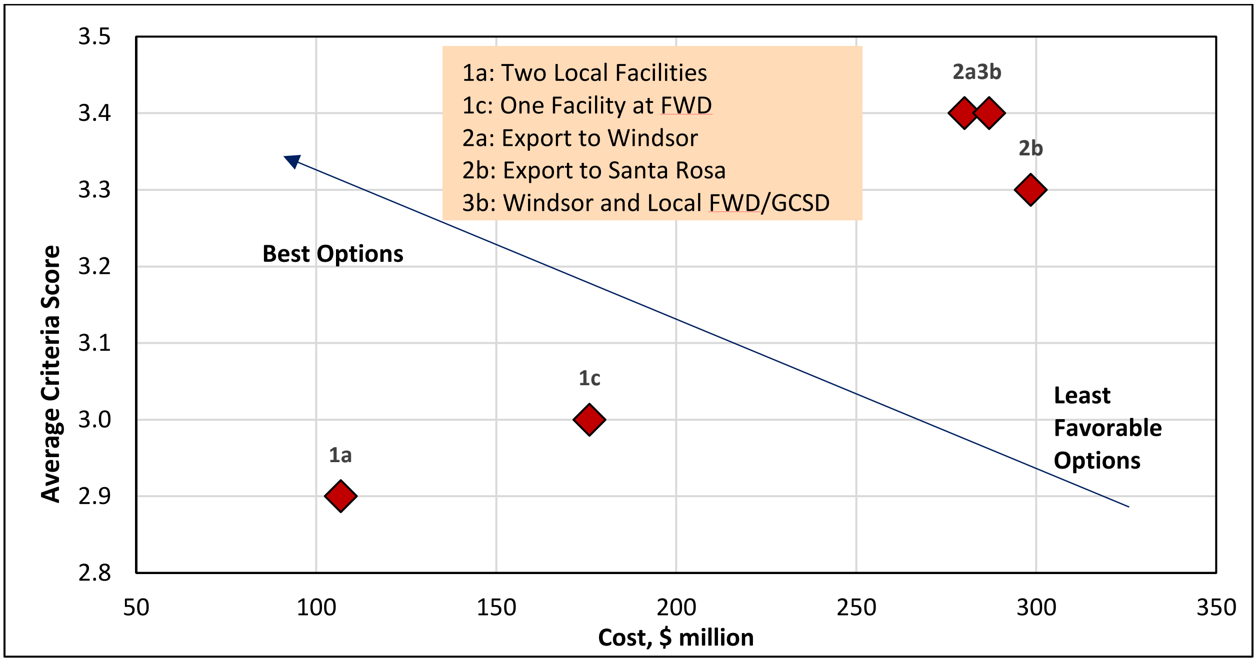

Figure 4-10. Comparison of Alternatives based on Weighted Average Criteria Score vs. 20-Year Lifecycle Cost

CHAPTER 5
Unsewered Areas Characterization

This chapter provides the results of an analysis used to identify the unsewered community clusters within the West County area that have been included in this wastewater regionalization feasibility evaluation. The topics addressed are as follows:

- Risk and Opportunity Analysis Scoring Approach
- Risk and Opportunity Analysis Ranking
- Selected Community Clusters
- Estimated Community Cluster Wastewater Flow and Load Generation Rates

5.1 RISK AND OPPORTUNITY ANALYSIS SCORING APPROACH

GIS data collected and developed by Sonoma County was used to complete an analysis to identify the areas that should be prioritized for incorporation into a potential regional wastewater system for the West County area. All the unsewered parcels within the Project Study Area, which was defined in Chapter 2 (see Figure 5-1), were included in this evaluation.

As noted in Chapter 1, the Monte Rio Study Report included a separate evaluation of strategies for management of wastewater within the Monte Rio/Villa Grande area and is therefore not included in the Study Area for this project. However, to integrate the Monte Rio/Villa Grande area into this current study, it is included as a selected community cluster for this analysis.

For each parcel within the Study Area, the relative ranking was determined by assessing an opportunity score and a likelihood/consequence of failure score.[1] Opportunities evaluated include the following:

- Proximity to an existing sanitation district service area boundary
- Proximity to major roadways
- Parcel density, with higher-density areas scored higher than lower-density areas[2]

Likelihood of OWTS failure or potential consequences of failure were evaluated based on the following:

- Slope of parcel, with steeper parcels scoring higher as being less likely to have adequate space for a properly sized septic system
- Rating for septic tank absorption
- Proximity to rivers or streams
- Proximity to the 100-year floodplain
- Proximity to drinking water wells

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[1] A parcels ranking analysis was completed for this study to identify potential clusters of parcels that could be connected to a future regional wastewater system. The ranking is not meant to define what parcels/communities will be part of a future regional project or to imply priority of connection. The only purpose is to provide a general framework for the current Feasibility Study.

[2] Parcel density also can be viewed as a likelihood/consequence of failure criteria, as more densely clusters parcels have a higher likelihood of causing impacts due to failures.

Specific scores between 1 and 4 were assigned for each criterion, based on the information presented in Table 5-1.

Table 5-1. GIS Scoring Criteria for Unsewered Parcels

Criteria Descriptions	Score			
	1	2	3	4
Opportunities				
Proximity to existing sanitation district service area boundary	Outside > 3.0 miles	Outside 1.5 - 3.0 miles	Outside < 1.5 miles	Inside boundary (Distance of 0)
Proximity to major roads/highways (Highway 116/Bohemian Highway, River Rd., Graton Rd., Mirabel Rd.)	> ½ mile (2,640 feet)	500 feet - ½ mile	250 - 500 feet	< 250 feet
Parcel density, acres per parcel	> 10	2 - 10	0.25 - 2	≤ 0.25
Failure Likelihood/Consequences (Risk)				
Slope of parcel	Acceptable (< 25 percent)	-	-	Not Acceptable (> 25 percent)
Rating for Septic Tank Absorption	-	-	Somewhat limited	Very limited
Proximity to Russian River or other surface water body, feet	> 1,000	500 - 1,000	250 - 500	< 250
Proximity to 100-year floodplain	Outside > 600 feet	Outside by 200-600 feet	Outside < 200 feet	In floodplain
Proximity to water wells	No wells within 100 feet	-	-	Wells within 100 feet

Numeric scores were then assigned to each parcel within the Study Area based on the criteria listed in Table 5-1. The distribution of the individual scores, presented as the percentage of parcels assigned each score, is provided in Table 5-2.

Table 5-2. Percentage of Parcels for Each Score

Criteria Descriptions	Score 1	Score 2	Score 3	Score 4
Opportunities				
Proximity to existing sanitation district service area boundary	< 1	36	60	4
Proximity to major roads/highways (Highway 116/Bohemian Highway, River Rd., Graton Rd., Mirabel Rd.)	33	43	9	15
Parcel density, acres per parcel	7	24	41	28
Failure Likelihood/Consequences (Risk)				
Slope of parcel	86	-	-	14
Rating for Septic Tank Absorption	-	-	6	94
Proximity to Russian River or other surface water body, feet	44	21	13	22
Proximity to 100-year floodplain	69	11	8	12
Proximity to water wells	83	-		17

As shown in Table 5-2, a significant percentage of parcels do not exhibit features that have a high likelihood/consequence of failure, indicating most parcels in the Study Area have limited risks associated with a potential septic tank failure. One notable exception is the septic tank absorption rating, which has almost all (94 percent) parcels receiving a score of 4 (relative high risk). This rating is based on the underlying soil, and is a function of properties like permeability, depth to water table and flooding. The opportunities scores are more evenly distributed across the study area.

5.2 RISK AND OPPORTUNITY ANALYSIS RANKING

The total scores for each parcel were used to rank the estimated risk and opportunity level for inclusion in a potential regional wastewater project as follows:

- Green – Low Risk and Opportunity
- Yellow – Low to Medium Risk and Opportunity
- Orange – Medium to High Risk and Opportunity
- Red – High Risk and Opportunity

The results of the risk and opportunity analysis are shown in Table 5-3 as a percentage of OWTS parcels within each combination of scores for opportunities and likelihood/consequences.

Table 5-3. Percentage of Unsewered Parcels by Opportunity and Likelihood/Consequence Scores									
Combined Likelihood/ Consequence Score	Combined Opportunities Score								
	4	5	6	7	8	9	10	11	12
7-8	< 1	2	4	7	8	4	2	< 1	< 1
9-10	< 1	2	4	4	3	4	3	< 1	(a)
11-12	< 1	3	7	6	5	5	4	2	< 1
13-14	< 1	1	2	2	4	3	2	< 1	< 1
15-16	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1
17-18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
19-20			< 1	< 1	< 1	< 1			

(a) Score combinations shown in gray had no results.

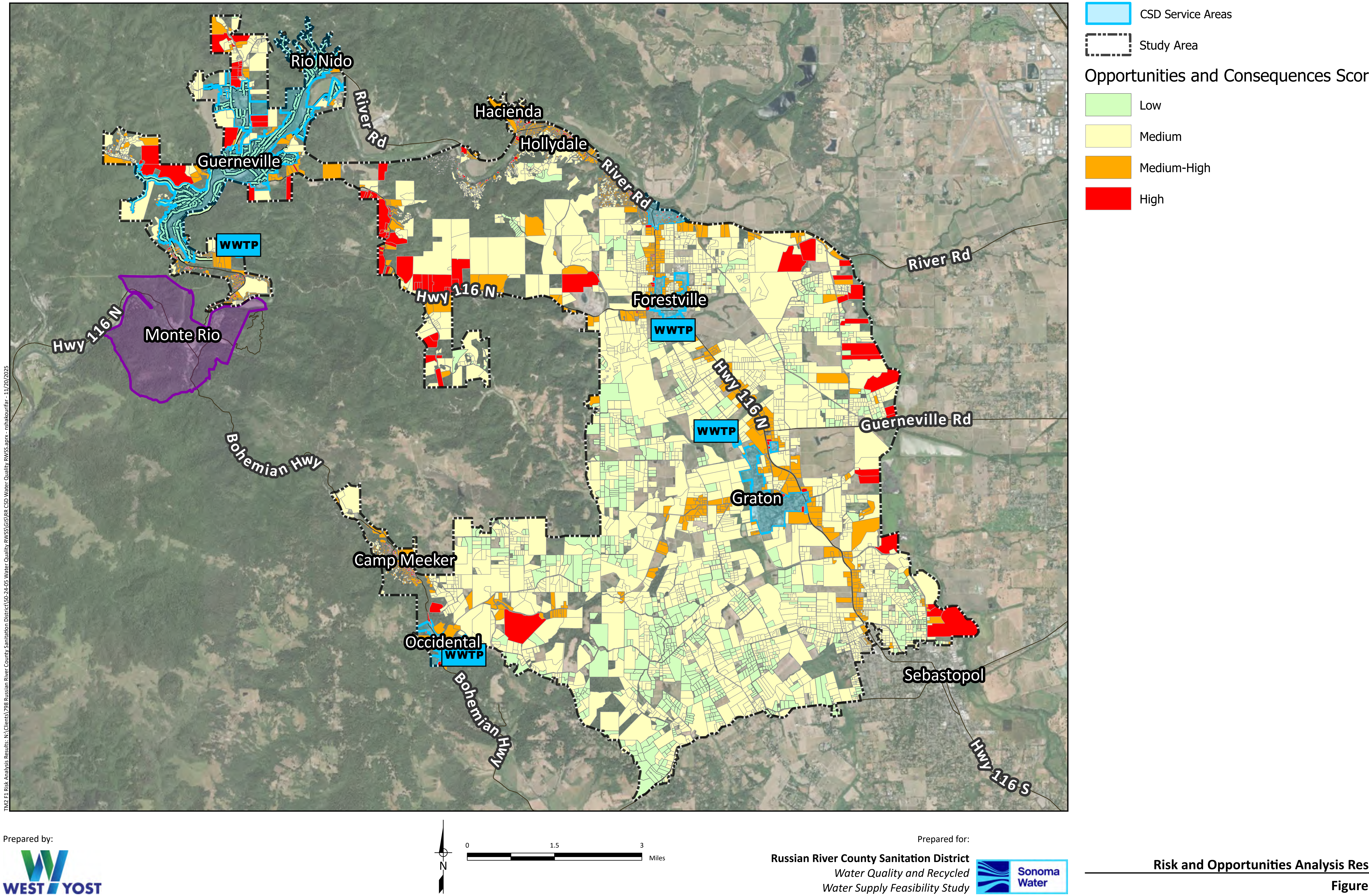
The number of parcels within each of the four categories are summarized in Table 5-4, which also shows the percentage of total parcels for each category. As shown, the two highest categories (orange and red colors) represent about a third of all parcels.

Table 5-4. Summary of Parcel Counts by Score Level

Relative Score	Total Number or Parcels	Percentage of Total Parcels
Low	788	12
Medium	3,469	53
Medium-High	1,835	28
High	428	7

The risk and opportunity analysis results are shown on Figure 5-1 for each parcel with a known or suspected OWTS within the Study Area. The following conclusions can also be drawn from the information presented on the figure:

- The red parcels are generally smaller parcels and surround major roadways and/or the Russian River.
- Groupings of red and orange parcels are located near the boundary of the existing West County service area and on both sides of the Russian River.



TM2 F1 Risk Analysis Results: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 11/20/2025

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Sonoma Water

Risk and Opportunities Analysis Results

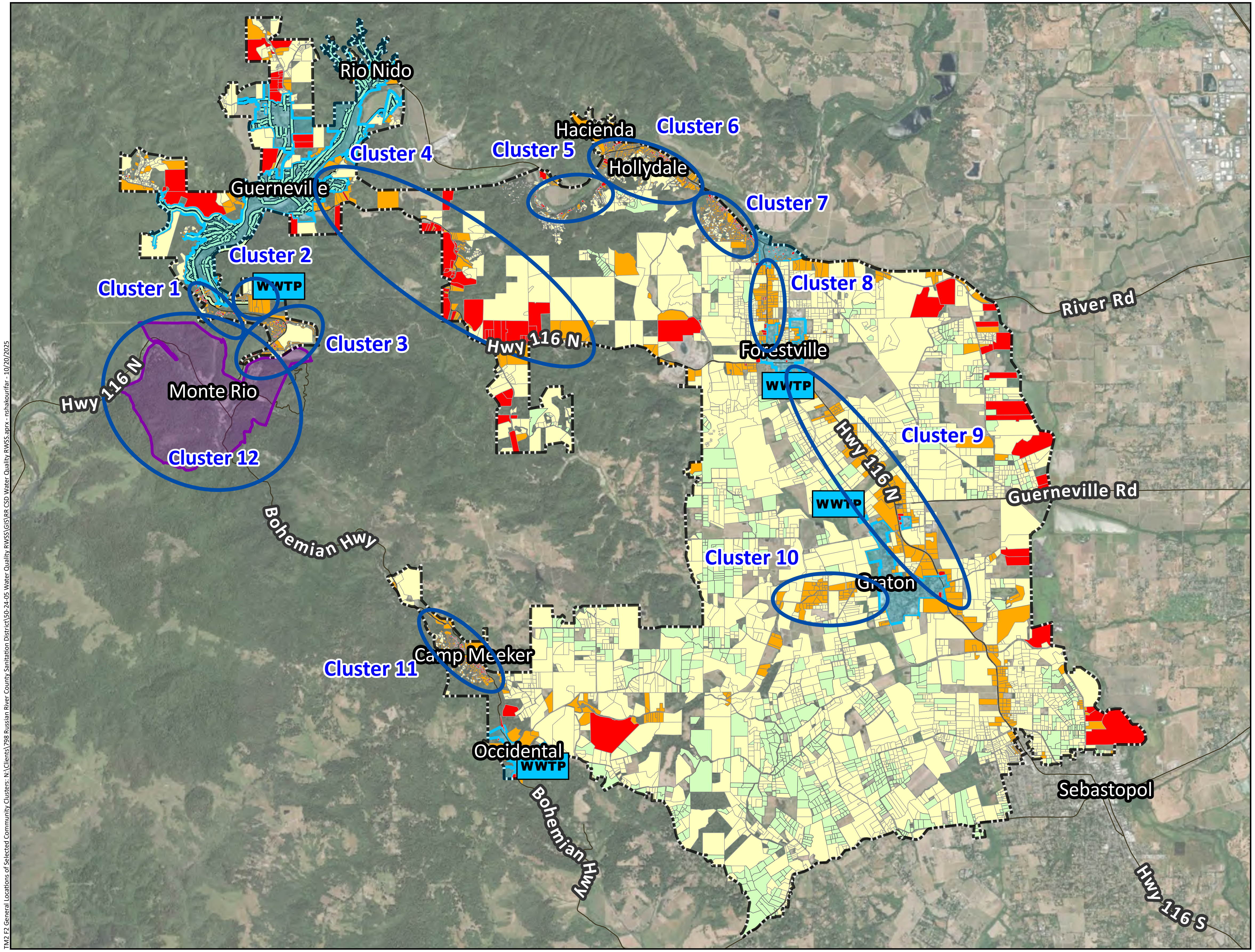
Figure 5-1

5.3 IDENTIFICATION OF COMMUNITY CLUSTERS

Groupings of at least 50 red and orange parcels were identified to define the locations of the selected community clusters. These cluster locations are shown on Figure 5-2.[3] As indicated, eleven clusters were identified in addition to the Monte Rio/Villa Grande study area, which for this study is included as Cluster 12.

The cluster boundaries were then defined by first laying out a conceptual framework for the cluster collection system infrastructure that would be needed to incorporate the red and orange parcels within each cluster area. All parcels that would have reasonable access to the conceptual system (regardless of risk and opportunity analysis result) were then included in the cluster boundary. The defined boundaries are shown on Figure 5-3. Additional descriptions of the clusters are provided in Table 5-5, which also defines the total number of parcels assumed to be included in each cluster.

[3] Location and refined boundary for Monte Rio/Villa Grande (Cluster 12) shown on Figure 5-2 and Figure 5-3 for completeness, but the parcel ranking analysis did not include evaluation of that area. The area has been separately studied and identified as a community of concern.



CSD Service Areas

Study Area

Cluster Location

Opportunities and Consequences Score

Low

Medium

Medium-High

High

ID	Name
1	Guerneville South of River
2	Guerneville North of River
3	Northwood
4	Hwy 116 East of Guerneville
5	Summerhome Park Road
6	Hacienda and Hollydale
7	River Road North of Forestville
8	Forestville
9	Hwy 116 between Forestville and Graton
10	Graton West
11	Camp Meeker
12	Monte Rio/Villa Grande

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N

0 1.5 3 Miles

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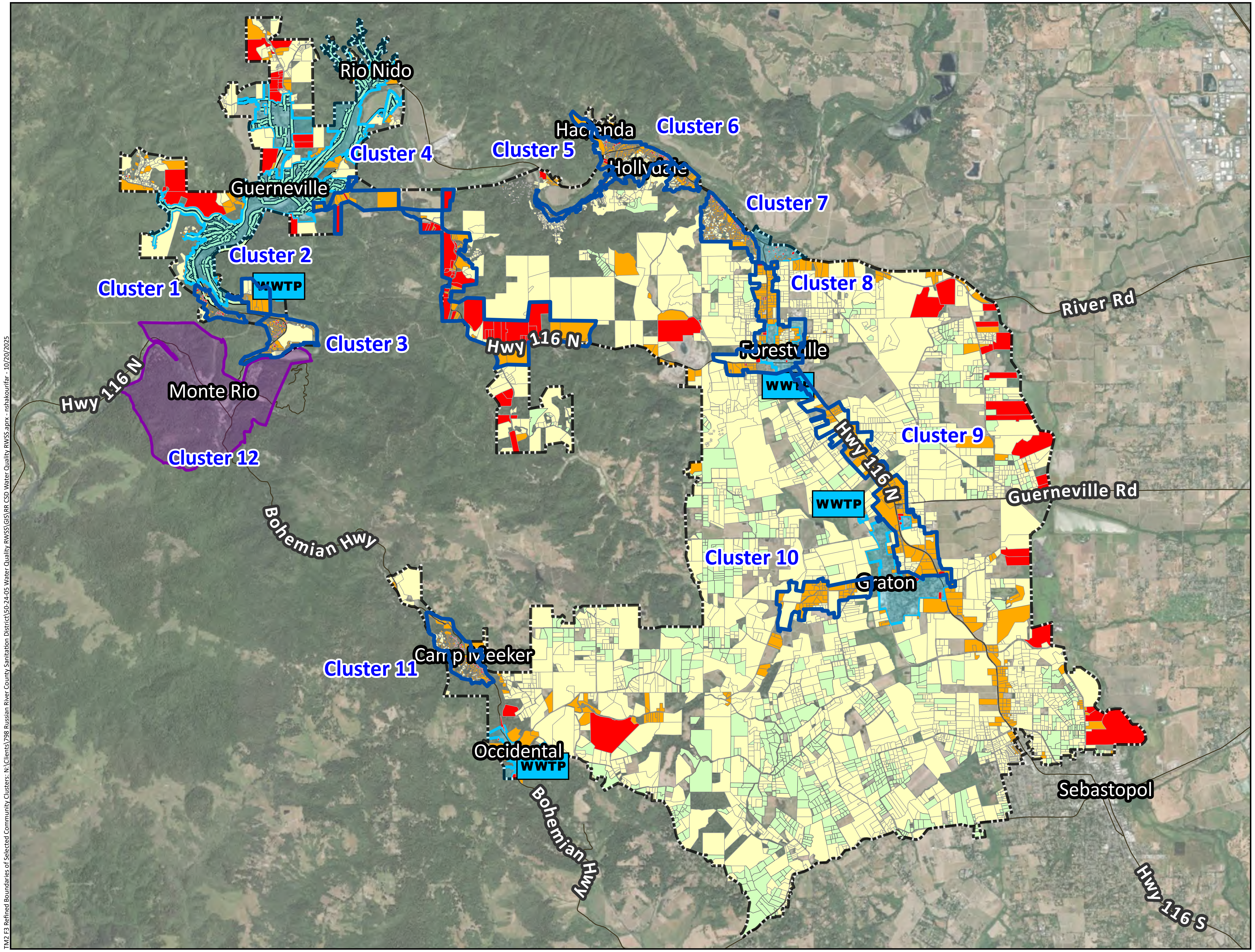
General Locations of Selected Community Clusters

Figure 5-2



TM2 F3 Refined Boundaries of Selected Community Clusters: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/20/2025

CSD Service Areas

Study Area

Cluster Boundaries

Opportunities and Consequences Score

Low

Medium

Medium-High

High

ID	Name
1	Guerneville South of River
2	Guerneville North of River
3	Northwood
4	Hwy 116 East of Guerneville
5	Summerhome Park Road
6	Hacienda and Hollydale
7	River Road North of Forestville
8	Forestville
9	Hwy 116 between Forestville and Graton
10	Graton West
11	Camp Meeker
12	Monte Rio/Villa Grande

0 1.5 3 Miles

N

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Refined Boundaries of Selected Community Clusters

Figure 5-3

Table 5-5. Description of Selected Community Clusters

ID	Name	Description	Number of Parcels
1	Guerneville S. of River	These clusters are located near the existing Russian River Community Services District service area. These are separated into two clusters because of Russian River provides a potential barrier for conveyance infrastructure.	50
2	Guerneville N. of River		60
3	Northwood	This cluster includes all parcels for the Northwood Golf Course community, most of which are identified at an orange or red.	190
4	Hwy 116 E. of Guerneville	This cluster incorporates approximately 55 orange and red parcels along Highway 116 east of, and relatively close to, the Russian River CSD service area boundary.[(a)]	110
5	Summerhome Park Road	This cluster captures parcels southwest of the Hollydale community, along Summerhome Park Road and adjacent to the Russian River.	100
6	Hacienda and Hollydale	The cluster incorporates approximately 300 red and orange parcels within the Hacienda and Hollydale area. Due to their proximity, this area was identified as one community cluster.	440
7	River Road North of Forestville	The cluster incorporates approximately 390 red and orange parcels in the area northwest of the FWD service area boundary and along River Road and/or within the proximity of to the Russian River.	450
8	Forestville	The cluster incorporates approximately 150 red and orange parcels that are within the FWD service area, but do not receive wastewater services.[(b)]	170
9	Hwy 116 between Forestville and Graton	This cluster includes all of the 115 parcels identified as orange or red level that are grouped around Highway 116 between the FWD and Graton CSD service are boundaries. Likely, these would be served by one conveyance pipeline and are thus grouped together in one community cluster.[(c)]	140
10	Graton West	This cluster incorporates approximately 60 orange parcels that are west of, and relatively close to, the Graton CSD service area boundary and Highway 116, and are in proximity of Atascadero and Green Valley Creeks.[(d)] There are no red parcels in this area.	70
11	Camp Meeker	This cluster incorporates approximately 340 red and orange parcels that are in the Camp Meeker community, which is north of the Occidental CSD service area.	370
12	Monte Rio/Villa Grande	The separately defined Monte Rio/Villa Grande study area is included its entirety.	780
		Total	**2,930**

(a) An additional ~20 parcels along Highway 116 were identified at a red level but were not identified as a cluster for the study due the number and location of the parcels. Connecting some of these parcels to a regional wastewater system may be possible if an adequately sized wastewater transmission pipeline is constructed along Highway 116.

(b) As noted in TM 1A, FWD has identified potential for connecting 30 additional parcels within their service area, which has been included in defining future flows for FWD. It is assumed that 20 of these additional planned parcels overlap with the Forestville cluster, and they have thus been excluded from the parcel count.

(c) There are several potential groupings of yellow and green parcels in the areas between, and west of, Graton and Forestville that are also in close proximity to Green Valley and Atascadero Creeks. These areas were not flagged as orange or red parcels primarily due to their limited accessibility. However, it may be reasonable to connect some of these parcel groupings to a regional wastewater system if an adequately sized wastewater transmission pipeline is constructed between the Graton CSD and FWD treatment plants.

(d) Several smaller (< 50 parcels) groupings of orange and red parcels were identified along Graton Road but were not identified as clusters due the number and location of the parcels. Connecting some of these groupings to a regional wastewater system may be possible if the wastewater transmission pipeline that is planned along Graton Road between Graton and Occidental is adequately sized.

5.4 ESTIMATED COMMUNITY CLUSTER FLOWS AND LOADS

The flow and load conditions of interest for this study are the average flows, peak flows and maximum 30-day BOD loads. The Monte Rio Study Report defines average and peak wastewater flow generation rates for the four land use/connection types within the Monte Rio/Villa Grande area. These unit average flows per connection are summarized in Table 5-6.

Table 5-6. Wastewater Generation Estimates

Connection Type	Average Wastewater Generation per Connection, gpd	Peak Wastewater Generation per Connection[a], gpd
Single Family Dwelling	158	632
Multi-Family Dwelling	390	1,560
Commercial	420	1,680
Public	1,356	5,424

(a) Based on an assumed average to peak flow factor of 4. Actual peaking factors could possibly be lower depending on the collection system design and age.

Maximum 30-day BOD loads were developed using the following methodology:

- Average annual BOD loads were calculated based on average flows and an assumed average BOD concentration of 240 mg/L.[4]
- Maximum 30-day BOD loads were defined by multiplying the calculated average annual loads by a factor of 1.5.

Table 5-7 presents the average and peak flows and maximum 30-day BOD loads calculated for each cluster.

Table 5-7. Wastewater Flow Estimates for Community Clusters

ID	Name	Total Average Flow, mgd	Total Peak Flow, mgd	Maximum 30 Day BOD Load, lb/day
1	Guerneville South of River	0.009	0.035	30
2	Guerneville North of River	0.009	0.037	30
3	Northwood	0.031	0.124	90
4	Hwy 116 East of Guerneville	0.012	0.048	40
5	Summerhome Park Road	0.016	0.065	50
6	Hacienda and Hollydale	0.070	0.280	210
7	River Road North of Forestville	0.072	0.287	220
8	Forestville	0.027	0.109	80
9	Hwy 116 between Forestville and Graton	0.025	0.102	80
10	Graton West	0.011	0.044	30
11	Camp Meeker	0.059	0.238	180
12	Monte Rio/Villa Grande	0.149	0.596	450
	Total	**0.49**	**1.96**	**1,490**

[4] This value is calculated from the projected RRCSD influent average annual flow and BOD load values used for the Master Plan under development.

CHAPTER 6
Recycled Water Opportunities and Constraints

This Chapter provides a summary of existing and potential future uses (market opportunities) for recycled water in and near the West County Study Area, focused on the following topics:

- Purpose of This Analysis
- Summary of Initial Recycled Water Findings
- Potential Recycled Water Opportunities
- Recycled Water Market Analysis
- Return of Exported Water
- Allowable Discharge Flows in Dry Years

6.1 PURPOSE OF THIS ANALYSIS

Recycled water is an important component of the Feasibility Study because the Regional Water Board's *Water Quality Control Plan for the North Coast Region* (hereinafter Basin Plan) prohibits point source waste discharges for the Russian River and its tributaries during the period of May 15 through September 30. In the first phase of the Feasibility Study, eight potential alternatives were developed and screened to define five preferred alternatives. For this first phase, recycled water opportunities were evaluated based on information provided by each wastewater agency, as is described in Chapter 2. In the second phase of the Feasibility Study, the five preferred alternatives were further evaluated with respect to the infrastructure required to incorporate flows from unsewered community clusters. To support this second phase of analysis, additional assessment of the recycled water market opportunities was completed.

During the first phase of the evaluation, alternatives that involved export to the Windsor WWTP and Laguna WWTP were evaluated. As part of this effort, Windsor staff expressed interest in potentially sending recycled water back to the West County area for reuse due to limited availability for reuse in their region, and Santa Rosa staff had expressed concerns about needing to expand the Santa Rosa recycled water storage should they receive additional influent flows. Therefore, an assessment of potential recycled water infrastructure needs related to expansion of the recycled water use areas for these two agencies by connecting them to the existing FWD/GCSD recycled water system was also evaluated.

Finally, the Basin Plan also mandates that the receiving stream's flow must be at least 100 times greater than the waste discharge flow unless an exception to the requirement is granted by the Regional Water Board. In the first phase of the analysis, the water balance analyses relied on average year river flows with 100-year annual rainfall conditions to provide a conservative estimate of the storage and recycled water land application needs for each alternative. However, due to the flow restrictions during the discharge period, it is also prudent to consider extremely dry years when flow in the Russian River could limit discharge to confirm this condition does not push the need for additional recycled water infrastructure.

6.2 SUMMARY OF INITIAL RECYCLED WATER FINDINGS

As mentioned above, the first phase of the Feasibility Study presented an initial recycled water analysis based on information provided by each wastewater agency (as described in Chapter 2). A summary of the major assumptions and findings for the initial analysis of the preferred alternatives is provided below.

6.2.1 Alternative 1a

Major assumptions applied to the RRCSD WWTP recycled water analysis were as follows:

1. Reuse on the Northwood Golf Course would accommodate about 50 AFY, distributed in accordance with historical monthly average values.
2. Disposal capacity of the forested District property surrounding the WWTP of 105 AFY, including:
   - 75 AFY of percolation based on estimated percolation rates of 0.6 and 0.3 inches per day for the Upper and Lower portions, respectively; and
   - 30 AFY of irrigation demand for the overlying grass during a 100-year rainfall year.
3. Storage is limited to current available recycled water storage capacity of 3.5 MG (10.7 AF).
4. Surface water discharge would continue up to a maximum monthly flow rate of no more than 1 percent of Russian River flow.
5. RRCSD would be able to accommodate additional irrigation areas on either the existing forested District property or on the additional 394-acre forested property acquired in August 2024.

The following conclusions were drawn from the RRCSD WWTP recycled water analysis:

- Existing storage and disposal capacities are adequately sized to accommodate current RRCSD flows.
- To accommodate projected RRCSD flows, an additional 5 acres of land application area (on either the existing forested District property or on the additional 394-acre forested property) would be needed to accommodate 8 AFY of water.[1]

Major assumptions applied in the analysis of recycled water needs for the combined FWD/GCSD WWTPs were as follows:

- The combined FWD/GCSD facility would have zero surface water discharge, thus requiring a recycled water system that could accommodate all recycled water generated by the two agencies.
- The 300 acres of vineyards currently served by GCSD and FWD would accommodate up to 440 AFY for recycled water during a 100-year rainfall year based on information provided by the agencies.
- The existing 24 acres of turf and landscaped areas serviced by FWD would accommodate up to about 50 AFY during a 100-year rainfall year based on information provided by the agencies.

[1] The amount of land application area could potentially be decreased if storage capacity were increased.

- The existing 20.5-acre GCSD land application area would be repurposed to provide additional storage and would no longer be available for land application.
- The existing GCSD 22.9 MG (70.3 AF) recycled water storage pond is available.
- The existing FWD 2.3 MG (7.1 AF) storage capacity would be filled so the area could be used to construct new treatment facilities.

The following conclusions regarding recycled water needs for the combined FWD/GCSD WWTPs were as follows:

- The existing irrigation reuse sites would be able to accommodate the combined recycled water flow generated.
- 310 AF of additional storage volume would be required.
- New recycled water storage ponds would need be at least 15-feet deep to allow for construction within the 20.5-acre land application area owned by GCSD.

6.2.2 Alternative 1c

Major assumptions applied in the analysis of recycled water needs for the new combined WWTP at the FWD site were as follows:

- RRCSD flows would be exported to the FWD site and reuse at the RRCSD site would be eliminated.
- The combined facility would discharge to a new outfall in Russian River in the winter months up to a maximum monthly flow rate of no more than 1 percent of Russian River flow.
- The 300 acres of vineyards currently served by GCSD and FWD would accommodate up to 440 AFY for recycled water during a 100-year rainfall year based on information provided by the agencies.
- The existing 24 acres of turf and landscaped areas serviced by FWD would accommodate up to about 50 AFY during a 100-year rainfall year based on information provided by the agencies.
- The existing 20.5-acre GCSD land application area would accommodate land application of up to about 40 AFY during a 100-year rainfall year.
- The existing GCSD 22.9 MG (70.3 AF) storage capacity is available.
- The existing FWD 2.3 MG (7.1 AF) storage capacity would be filled so the area could be used to construct new treatment facilities.

The conclusions drawn from the analysis recycled water needs for the new combined WWTP at the FWD site were as follows:

- The existing irrigation reuse sites would be able to accommodate the combined recycled water flow generated.
- No additional storage volume would be required.

6.2.3 Alternatives 2a and 2b

For the first phase of the analysis, it was assumed that wastewater directed to the Windsor and Santa Rosa treatment facilities would be used within the recycled water systems operated by the respective agency. Therefore, these alternatives were assumed to result in the elimination of the existing recycled water uses in the West County Study Area.

6.2.4 Alternative 3b

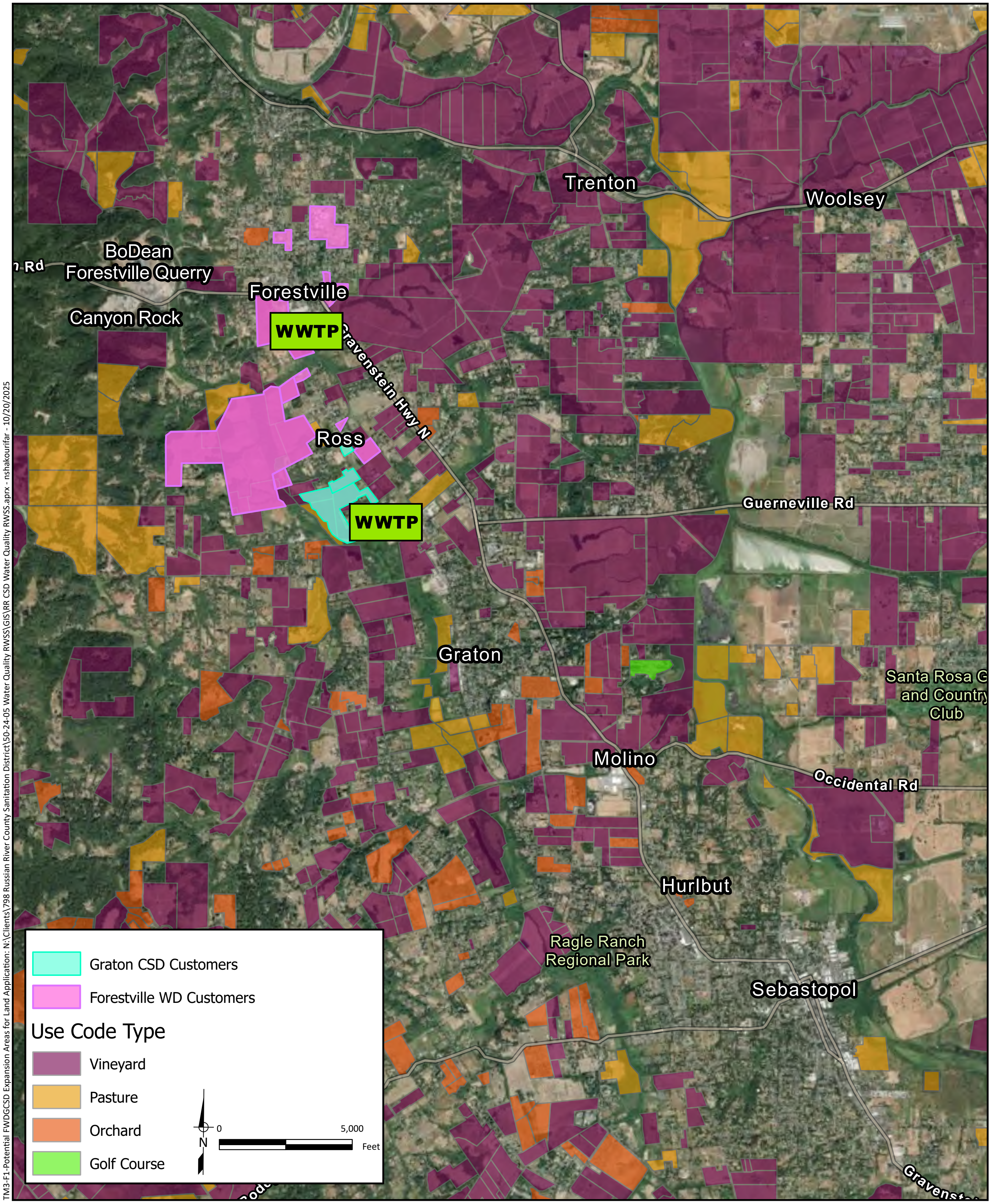
The alternative combined elements of Alternative 1a and 2a. Therefore, the analysis and findings were the same as described above.

6.3 POTENTIAL RECYCLED WATER OPPORTUNITIES

GIS agricultural land use data developed by Sonoma County was reviewed to identify potential recycled water users near the FWD/GCSD facilities. This land use information is shown on Figure 6-1 along with the existing recycled water use areas within the FWD/GCSD system. As shown, vineyards comprise almost all (about 95 percent) of the agricultural land near the FWD/GCSD sites that is not already receiving recycled water. Based on this information, a major expansion of the FWD/GCSD recycled water system will likely need to depend largely on reuse at larger vineyard sites.

Figure 6-1 also shows locations of two rock quarries that could also serve as future recycled water customers. Given their proximity to the FWD WWTP site, these potential uses have been evaluated further. Other uses that could be considered near the FWD/GCSD are expansion of municipal reuse (i.e., irrigation of parks and public open spaces). However, given the relatively limited population of the Graton and Forestville communities, opportunities for additional municipal reuse are limited. If significant expansion of the recycled water system were required, FWD/GCSD could consider partnering with the City of Sebastopol to provide recycled water for municipal uses within that community. However, assessment of this option is beyond the effort of this current Feasibility Study.

Figure 6-2 provides the agricultural land use information near the RRCSD WWTP. As shown, no major agricultural demands exist near the RRCSD WWTP site. Similar to the FWD/GCSD areas, there are limited options for municipal reuse in this area due to the relatively small population. For these reasons, expansion of land application on the existing forested District property or on the 394-acre forested property acquired in August 2024 are likely the best options for accommodating additional flows through the Russian River CSD WWTP.



TM3-F1-Potential FWDGCSD Expansion Areas for Land Application: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/20/2025

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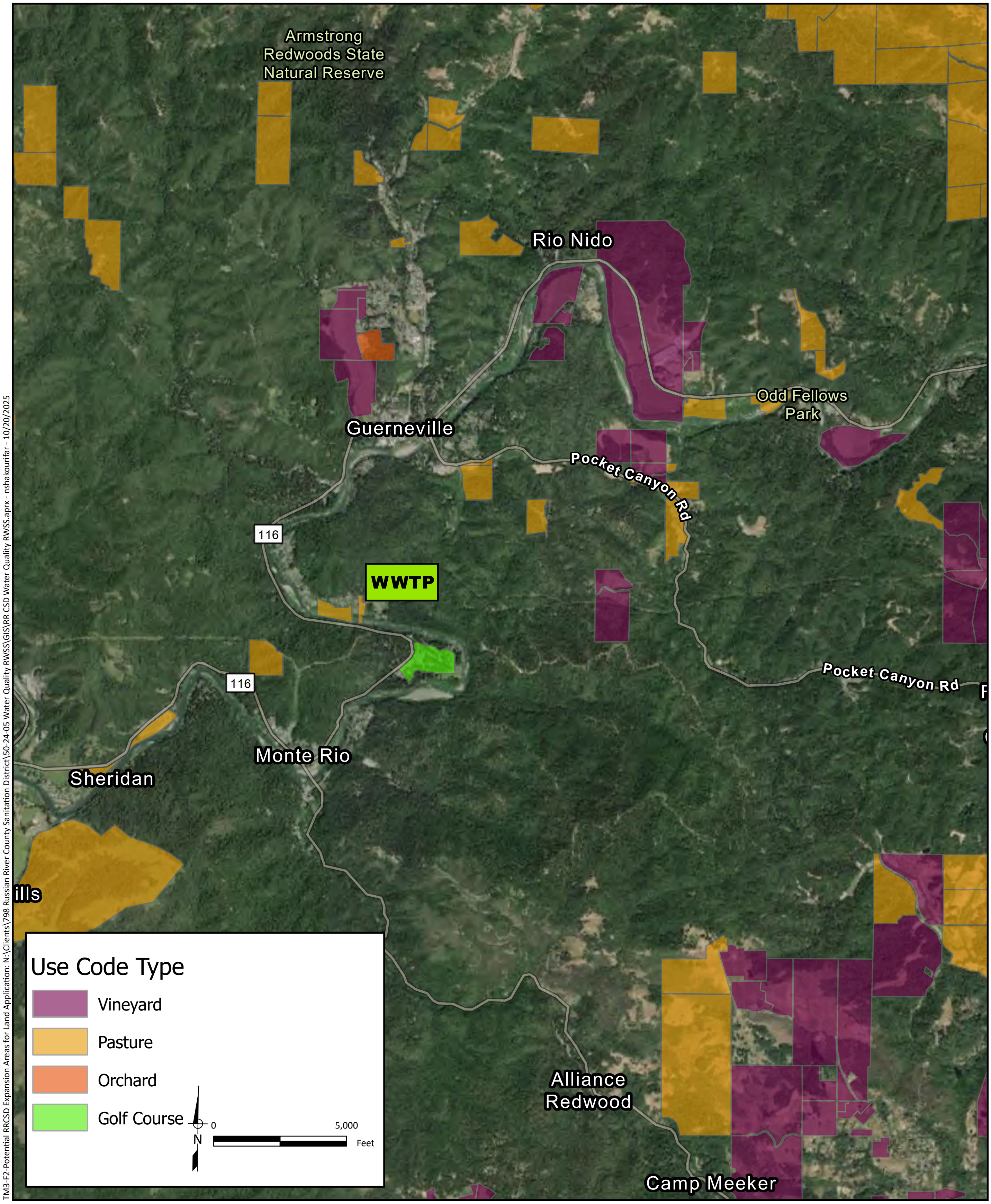
Potential FWD/GCSD Expansion Areas for Land Application

Figure 6-1



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Potential RRCSD Expansion Areas for Land Application

Figure 6-2

6.4 RECYCLED WATER MARKET ANALYSIS

A recycled water market analysis was completed to identify and confirm the demands for recycled water near the FWD/GCSD service areas. The results of this analysis are presented under the following headings:

- Vineyard Water Demands
- Rock Quarry Demands
- Other Demands near the FWD/GCSD Service Area

Notes captured from these discussions are provided in Appendix D.

6.4.1 Vineyard Water Demands

Discussions with existing vineyards served by the FWD/GCSD recycled system have confirmed that these users are effectively at capacity for recycled water use. They indicated that there may be some years or conditions where additional recycled water would be useful, but in most years, they are able to meet their water supply needs with current recycled water deliveries.

Discussions with representatives from Santa Rosa Junior College's Shone Farm, which is a working farm and college campus north of Forestville, also indicate that vineyards in the area need very little water. The Shone Farm team indicated that vineyards use no more than about 4.5 inches per acre of irrigation water during the irrigation season of May to September, which translates to a crop coefficient of 0.16 for defining vineyard demands, based on a local reference evapotranspiration for those months of 28 inches. The Shone Farm staff also noted that many vineyards in the County are not currently being regularly pruned, planted, or otherwise productive due to economic pressures on the wine industry.

A comparison of current water demands for the vineyards served by the FWD/GCSD recycled system to the theoretical demands provided by Shone Farms demonstrates that the demands generally match the estimates provided by Shone Farms. Based on this information, the 300 acres of vineyards currently served by GCSD and FWD should only accommodate 65 AFY for recycled water during a 100-year rainfall year[2] instead of the 440 AFY reported by GCSD and FWD.

6.4.2 Rock Quarry Water Demands

Two rock quarries are located about two miles west of the FWD WWTP: Canyon Rock Quarry and BoDean Forestville Quarry. The Canyon Rock Quarry currently receives potable water from FWD.

The following findings were identified based on discussions with Canyon Rock Quarry staff:

- Approximately 10.6 MG per year (33 AFY) of potable water is used; and approximately 80 percent of this could be offset by a recycled water supply (8.5 MG per year).
- Approximately 18 MG per year of stormwater is captured in an onsite pond and used for aggregate wash water. All this water could be offset by a recycled water supply.

[2] In a 1-in-100 rainfall year, rainfall would contribute a portion of the estimated 4.5 inches per acre demand.

Based on these findings, it was determined that 26.5 MG per year of recycled water could potentially be used by this quarry. Monthly distribution of the demands is assumed to follow the pattern of recent years' water usage as reported by FWD.

The following findings were identified based on discussions with BoDean Forestville Quarry staff:

- They mostly rely on stormwater runoff also captured in an onsite pond, with groundwater well water as a supplemental water supply.
- Approximately 4 MG per year (12 AFY) of stormwater is captured in an onsite pond and used for washing rocks and primarily dust suppression and dust abatement. They do not envision any of the stormwater use being offset by recycled water.
- Approximately 0.075 MG per year (0.23 AFY) of groundwater is used onsite as supplemental source for the operational water use. Potentially all of this water could be offset by a recycled water supply.

Based on these findings, it was determined that 0.075 MG per year (0.23 AFY) of recycled water could potentially be used by this quarry. Although this is a relatively small amount, it is assumed that the cost to deliver recycled water to this site would be minimal given it is located across the road from the Canyon Rock facility.

Both quarry sites are also noted as having significant stormwater storage onsite that could potentially serve as recycled water storage. Further investigations could consider whether this storage could be used to offset other recycled water storage needs. Such investigations are beyond the effort of this Feasibility Study.

6.4.3 Other Demands near the FWD/GCSD Service Area

A local sports youth park in the FWD service area currently irrigates about 3 acres with recycled water and reported they could potentially double their current usage. With this change the irrigation demand will increase by approximately 2 MG a year (6 AFY) in a 1-in-100 rainfall year. Although this is a relatively small amount, it is assumed that this expansion would occur since the site is already receiving recycled water.

6.5 RETURN OF EXPORTED WATER FROM POTENTIAL REGIONAL FACILITIES

As noted previously, Windsor and Santa Rosa staff both expressed concerns related to having adequate capacity to recycle the wastewater generated within the West County Study Area. Regional Water Board staff also raised concerns related to elimination of existing recycled water uses in the region. Therefore, analysis has been completed to define the feasibility of returning recycled water from either Windsor or Santa Rosa for use in the area of FWD/GCSD existing recycled water facilities.[3]

[3] Due to both the distance and limited potential for water recycling in the area, returning recycled water to the Russian River CSD service area/recycled water customers is not recommended.

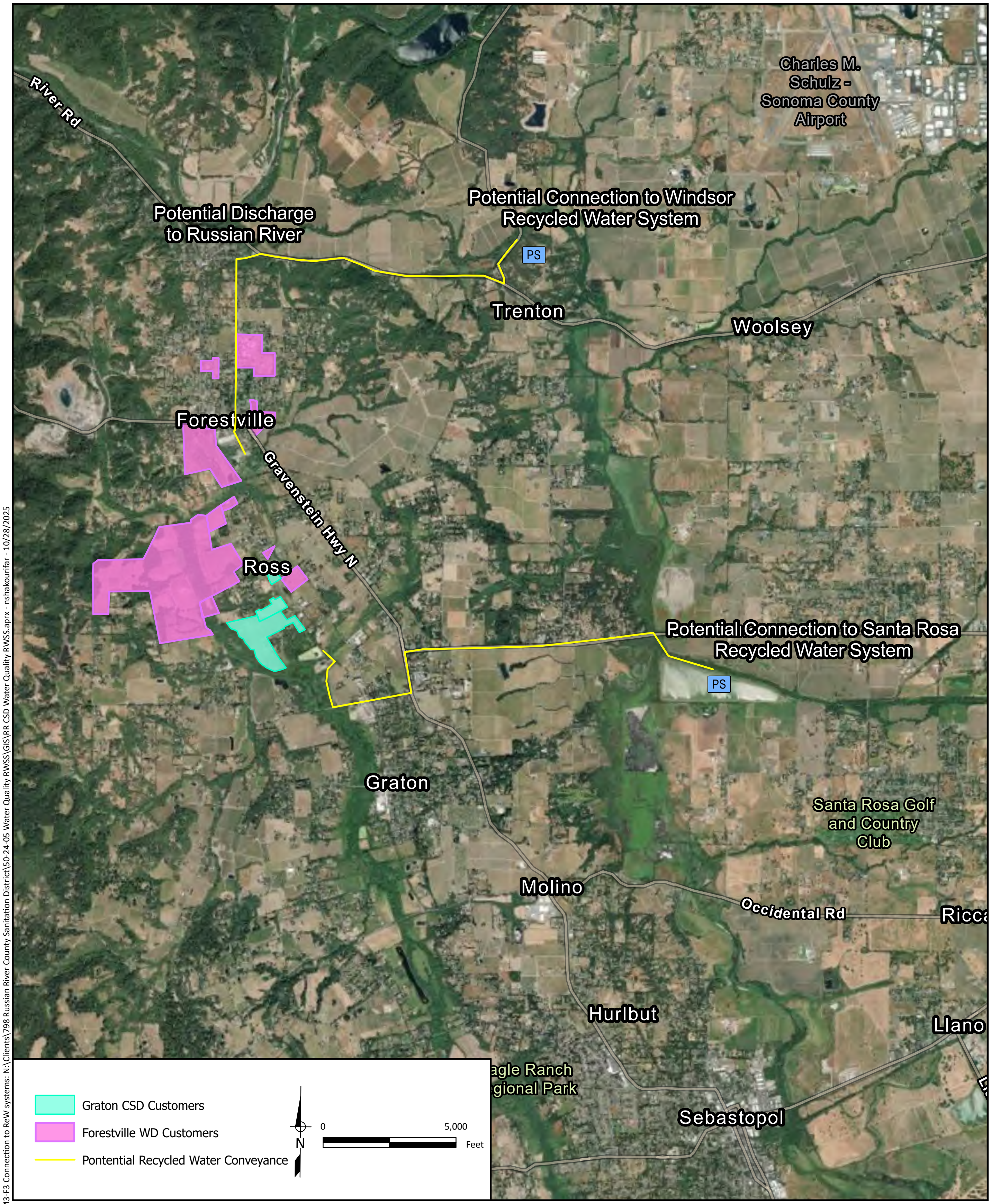
For Windsor, the current discharge location for the WWTP is into Mark West Creek at the Trenton-Healdsburg Road Bridge, which is approximately three miles from the FWD WWTP. Discussions with Windsor also indicate that relocating their discharge from Mark West Creek to the Russian River would be beneficial if they were to become a regional facility due to the 100 to 1 dilution requirements for surface water discharge to the Russian River and all Russian River tributaries. If a pump station and pipeline were constructed to relocate the Windsor WWTP outfall to Russian River, another relatively small segment of pipeline could be constructed to bring treated effluent to the existing FWD WWTP, where it could then be pumped to the FWD/GCSD recycled water system.

For Santa Rosa, their existing recycled water system includes a storage facility located along Santa Rosa Creek near Guerneville Road which is approximately two miles directly west of the Graton CSD WWTP. If a pump station and pipeline were constructed to transfer recycled water from this storage facility to the Graton CSD WWTP site, the transferred recycled water could be supplied to the FWD/GCSD recycled water system.

Figure 6-3 provides an overview of the facilities that would be required to incorporate the existing GSCD/FWD recycled water system into a regional project with either Santa Rosa or Windsor. A summary of these infrastructure needs is also summarized as follows:

- For the Windsor system (Alternatives 2a and 3b):
  - A 3.0 mgd pump station located near the existing outfall in Mark West Creek, to accommodate estimated peak day recycled water flow.
  - A 3.7-mile pipeline that extends southward down Trenton-Healdsburg Road from the bridge, then turns westward along River Road to Trenton Road,[4] then along Trenton Road to Covey Road, and then southward along Covey Road/Forestville Street, terminating at the FWD WWTP recycled water pump station wet well.
- For the Santa Rosa system (Alternative 2b):
  - A 3.0 mgd pump station located near the existing recycled water storage pond adjacent to Santa Rosa Creek, to accommodate estimated peak day recycled water flow.
  - A 3.6-mile pipeline that extends westward to reach Guerneville Road, then continues westward along Guerneville Road to Highway 116, then loops down Highway 116, along Green Valley Road, and up the West County trail, terminating at the GCSD recycled storage ponds.

[4] The new Windsor outfall to Russian River could be accommodated at this location but is not assumed to be included in this analysis. If a regional project were to be implemented with Windsor, construction of a new outfall and the associated recycled water extension should be evaluated. Windsor staff have noted that if an outfall were to be constructed as part of the project, these costs could potentially offset some of the connection fees that have been identified by the Town.



TM3-F3 Connection to ReW systems: N:\Clients\798 Russian River County Sanitation District\50-24-05 Water Quality RWSS\GIS\RR CSD Water Quality RWSS.aprx - nshakourifar - 10/28/2025

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Potential Conveyance to FWD WWTP from Windsor and Santa Rosa Recycled Water Systems

Figure 6-3

6.6 ALLOWABLE DISCHARGE FLOWS IN DRY YEARS

In accordance with the Basin Plan, the current discharge permits for the West County agencies limit surface water discharges to no more than one percent of the receiving water flow between October 1 and May 15. (No surface water discharges are allowed between May 15 and September 30.) In the first phase of the analysis, the water balance combined average year river flows with 100-year annual rainfall conditions[5] to provide a conservative estimate of the total storage and recycled water land application needs to accommodate these discharge restrictions for each alternative.

Due to the flow restrictions during the discharge period (October 1-May 14), it is also prudent to consider whether the identified storage is adequate during extremely dry years when flow in the Russian River could limit discharge. Data from the Russian River gauge at the Hacienda Bridge[6] - located upstream of the RRCSD WWTP about halfway between Guerneville and Forestville - was used to evaluate allowable discharges during dry years. The total annual Russian River flow volumes in each Water Year[7] are presented on Figure 6-4. The figure shows the following information:

- The average annual Russian River volume measured at the gauge is 509,000 MG.
- The driest year on record was in Water Year 1977, where the total annual volume was about 20,000 MG.
- The second driest year on record was in Water Year 2021, where the total annual volume was about 50,000 MG.
- The third driest year on record was Water Year 1976, where the total annual volume was 90,000 MG.

The ability to discharge during these three driest years was evaluated using a water balance assuming average year rainfall. The goal of this analysis was to determine if extreme dry conditions could impact the wet-year water balance conclusions regarding storage needs. The analysis shows that for the driest and second driest water years, the limitations on discharge to the Russian River would require a significant expansion of the recycled water storage facilities (and subsequently irrigation areas). However, application of the third driest year did not result in the need for additional recycled water infrastructure over what was identified in the initial analysis of wet year conditions. For this analysis, it has been assumed that the Regional Water Board would allow for exceptions to the prohibitions on discharge flow rates above one percent of the receiving water flow rate in extremely dry years, such that the recycled water infrastructure would not need to be sized for these extreme conditions.

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[5] The Regional Board requires that water balances be developed under 100-year rainfall conditions to define the storage needed during years when the least amount of irrigation water is required.

[6] Daily flow data from this gauge is available starting from October 1939, the start of Water Year 1940.

[7] The Water Year is defined as October 1 through September 30.

Figure 6-4. Water Year Annual Total Volumes of Russian River Flow, Water Years 1940-2024