Santa Ynez Community Services District

Recycled Water Facilities Plan

FINAL

May 2017

National Experience. Local Focus.

Santa Ynez Community Services District Recycled Water Facilities Plan

Final

Prepared by:

RMC water and environment

WOODARD & CURRAN

National Experience. Local Focus.

State Water Resources Control Board
Water Recycling Funding Program
Project No. WRFP 3328-010

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List of Abbreviations

AACE	Association for Advancement of Cost Estimating International
ADWF	Average day dry weather flow
AF	Acre-feet
AFY	Acre-feet per year
Alluvium Basin	Santa Ynez River Alluvium Basin
AO	Advanced oxidation
AWT	Advanced water treatment
Basin Plan	RWQCB Water Quality Control Plan
BOD	Biochemical Oxygen Demand
CAS	Conventional Activated Sludge
CCI	Construction Cost Index
CCWA	Central Coast Water Authority
CDPH	California Department of Public Health
CECs	Constituents of emerging concern
CEQA	California Environmental Quality Act
cf	Cubic feet
CFS	Cubic feet per second
Chumash	Santa Ynez Band of Chumash Indians
cm	centimeter
COMB	Cachuma Operation and Maintenance Board
Community Plan	Santa Ynez Valley Community Plan
CTR	California Toxics Rule
CWC	California Water Code
DDW	Division of Drinking Water
District	Santa Ynez Community Services District
DO	Dissolved oxygen
ENR	Engineering News Record
EPA	U.S. Environmental Protection Agency
ET	Evapotranspiration
F:M	Food-to-microorganism ratio
Facilities Plan	Recycled Water Facilities Plan
Floc	Flocculent sludge
gpd	gallons per day

GWR	Groundwater recharge
hp	Horsepower
HRT	Hydraulic retention time
ID#1	Santa Ynez River Water Conservation District, Improvement District No. 1
IE	Irrigation Efficiency
IRWM Plan	Santa Barbara County Integrated Regional Water Management Plan 2013
lbs	pounds
Kc	Crop coefficient
LF	Linear feet
MBR	Membrane Bioreactor
MCL	Maximum Contaminant Level
mg/L	Milligrams per liter
MGD	Million gallons per day
mJ	Millijoule
mL	Milliliters
MLE	Modified Ludzack-Ettinger
MLR	Mixed liquor recycle
MLSS	Mixed liquor suspended solids
mm	Millimeters
MPN	Most probable number
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Unit
O&M	Operations and maintenance
Order	Waste Discharge Requirements Order No. R3-2007-0069
PDWF	Peak day dry weather flow
PHF	Peak hourly flow
PWWF	Peak day wet weather flow
PVC	Polyvinyl chloride
RAS	Return activated sludge
Resort	Chumash Casino Resort
RO	Reverse osmosis
RRT	Response retention time
RWC	Recycled water contribution
RWQCB	Regional Water Quality Control Board

SAT	Soil aquifer treatment
SBR	Sequencing batch reactor
sf	Square feet
SGMA	Sustainable Groundwater Management Act
SIP	SWRCB Policy for Implementation of Toxics Standards
SNMPs	Salt and Nutrient Management Plans
SRF	State Revolving Fund
SRT	Solids retention time
SWP	State Water Project
SWRCB	State Water Resources Control Board
SYCSD	Santa Ynez Community Services District
SYRWCD	Santa Ynez River Water Conservation District
TDH	Total dynamic head
TDS	Total Dissolved Solids
Title 22	California Code of Regulations Title 22, Division 4, Chapter 3, Article 7
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total organic carbon
TSS	Total Suspended Solids
ug/L	Micrograms per liter
Uplands Basin	Santa Ynez Uplands Groundwater Basin
USBR	United States Bureau of Reclamation
UV	Ultraviolet
WAS	Waste activated sludge
WDR	Waste Discharge Requirements
WRF	Water Reclamation Facility
WRFP	Water Recycling Funding Program
WRR	Water Recycling Requirements
WRRF	Water Resource Recovery Facility
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Chapter 1 Introduction

Santa Ynez Community Services District (SYCSD, District) has identified the need to develop a recycled water facilities plan (Facilities Plan) for the District's service area along with the City of Solvang and communities of Ballard and Los Olivos. Developing new wastewater treatment and reuse opportunities could have significant benefits to SYCSD by creating local, sustainable wastewater management and enhancing water supply reliability for the area. However, implementing these new opportunities will require a feasibility analysis of alternatives, facilities planning, and coordination with potential customers as well as local and regional agencies with water and wastewater responsibilities, such as the City of Solvang, Santa Ynez River Water Conservation District (SYRWCD), Santa Ynez River Water Conservation District - Improvement District No. 1 (ID#1), and Santa Barbara County. Roles and responsibilities of each agency entail:

- **SYCSD:** Formed in 1971, the Santa Ynez Community Services District provides wastewater collection in the Santa Ynez Township. SYCSD owns 0.30 million gallons per day (MGD) of capacity in the City of Solvang's 1.5 MGD wastewater treatment plant. The Chumash Indians have a contract for 88,000 gallons per day (gpd) of SYCSD's capacity. SYCSD is under contract to maintain the Chumash Water Reclamation Facility (WRF) and collection system.
- **Santa Ynez Band of Chumash Indians (Chumash):** The Chumash WRF serves approximately 6,450 people on the Santa Ynez Reservation, Casino & Hotel Complex, Administration Buildings and Health Clinic, including about 350 residents, 100 employees, and 6,000 patrons per day.
- **City of Solvang:** The City owns and operates a municipal wastewater collection system, wastewater treatment plant, and disposal system that serves the City of Solvang and the SYCSD. The City provides water service to a population of approximately 5,500 from a combination of groundwater, the State Water Project (SWP), and an interconnection with ID#1.
- **SYRWCD:** The district is a California independent special district charged with protecting the downstream water rights and supplies of its constituents in the Santa Ynez River Valley. Historically, SYCSD's primary activity has dealt with protecting and augmenting (with water rights releases) the underflow of the Santa Ynez River and groundwater on the Lompoc Plain.
- **ID#1:** The district is a public water purveyor operating under a permit issued by the State Water Resources Control Board (SWRCB), Division of Drinking Water (DDW) and supplies water to the communities of Santa Ynez, Los Olivos, Ballard, the City of Solvang, and the Santa Ynez Band of Chumash Indians. ID#1 owns and operates various pipelines, pumping stations, water production wells, chlorination facilities, and reservoirs. ID#1 also has an agreement with the City of Solvang to provide water from the SWP.

The purpose of this Facilities Plan is to identify the feasibility and benefits of a recycled water treatment system by developing an understanding of the source wastewater flows, the needs for infrastructure and treatment, and the cost-effectiveness of a recycled water program. The plan also lays out the steps to implement a program. This Facilities Plan was partially funded by a grant from the SWRCB Water Recycling Funding Program (WRFP). The completion of this Facilities Plan and acceptance by SWRCB will allow SYCSD to seek construction grants and low interest loans through this program.

1.1 Background

SYCSD owns and operates the wastewater collection system for their service area. SYCSD collects approximately 0.14 MGD of wastewater, which is conveyed to the City of Solvang for treatment. The City of Solvang Wastewater Treatment Plant (WWTP) can collect and treat up to 1.50 MGD of wastewater from within the Solvang city limits and the SYCSD service boundary. Contractually, SYCSD can send up to 0.30 MGD of wastewater to the City of Solvang (AECOM, 2013).

The District is looking provide sustainable wastewater treatment services for its ratepayers by investigating the feasibility of a new water resource recovery facility (WRRF) that would benefit local water suppliers. A new WRRF would provide cost control and stability for wastewater treatment services that are currently provided by the City of Solvang. A new water local water supply could relieve the stressed Santa Ynez Uplands Groundwater Basin (Uplands Basin) and/or reduce the need for reliance of surface water supplies from the Cachuma Project and SWP. In addition, the WRRF could serve "Special Problem Areas" – designated by Santa Barbara County due to constraints and/or historic problems with the use of onsite wastewater disposal systems – that include the communities of Los Olivos, Ballard, Janin Acres, and west of Santa Ynez.

Developing a new, local WRRF that includes reuse of effluent would:

1. **Provide Wastewater Sustainability:** Provide high quality wastewater treatment with cost control and stability into the future.
2. **Improve Centralized Wastewater Treatment Effluent Quality:** Improve wastewater discharge quality and reduce nutrient loadings to the local watershed.
3. **Reduce Surface and Groundwater Discharges from Septic Systems:** Conversion of septic systems to a centralized treatment facility would reduce discharges to existing drinking water sources that contain increasing nitrate concentrations.
4. **Reduce Dependence on Surface Water Supplies**: Surface water from the Cachuma Project and SWP represents approximately half of local municipal water supplies.
5. **Improve Water Supply Reliability**: Recycled water supply is generally not affected by hydrologic conditions; therefore, it provides additional dry year reliability compared with surface water supplies.
6. **Preserve Potable Water Supplies**: Using recycled water to serve non-potable demands, such as irrigation demands, will preserve high-quality drinking water supplies for potable needs.

No previous recycled water studies have been completed in this area.

1.2 Facilities Plan Organization

This Facilities Plan consists of seven chapters and is organized as follows:

- **Chapter 1 – Introduction:** This section describes the need for developing the use of recycled water for the District and provides an overview of the Plan.
- **Chapter 2 – Project Setting:** This section characterizes the study area, water supply and use, and wastewater treatment and disposal.
- **Chapter 3 – Regulatory, Permitting, and Legal Requirements:** This section identifies the regulatory, permitting, and legal requirements for implementing recycled water projects.
- **Chapter 4 – Market Assessment:** This section identifies potential recycled water uses and provides estimates of recycled water demand.
- **Chapter 5 – Recycled Water Treatment Options:** This section defines treatment alternatives to provide recycled water to meet requirements defined in Chapter 3 as well as potential WRRF site locations.
- **Chapter 6 – Project Alternatives Analysis:** This section discusses the methodology for developing and evaluating various recycled water project alternatives. It defines design criteria and assumptions and provides a detailed description of each project alternative.
- **Chapter 7 – Recommended Project:** This section describes the recommended facilities, including operational strategy, cost, implementation plan, and construction financing plan.

Chapter 2 Project Setting

This section provides a characterization of the study area, water supply and use, and wastewater treatment and disposal.

2.1 Study Area Characteristics

2.1.1 Study Area Description

The study area, as shown on **Figure 2-1**, consists of the SYCSD service area along with the City of Solvang and communities of Ballard and Los Olivos. The SYCSD service area covers approximately 1.8 square miles (or 1,100 acres) and has a population of approximately 4,300. The service area is within the Santa Ynez River Basin Watershed, which covers 900 square miles. The watershed is bounded by the San Rafael Mountains to the northeast, the Purisima Hills to the north, and the Santa Ynez Mountains to the south.

The terrain south of the Santa Ynez River rises relatively steeply to the crest of the Santa Ynez Mountains, and gradually over upland terraces and hilly areas north of the river. The Santa Ynez River flows northwesterly and westerly across the Lompoc Plain to the Pacific Ocean. The river carries flows from tributary watershed land downstream of the Bradbury Dam, as well as spills and releases of water from Lake Cachuma (Stetson, 2014).

The major occurrences of groundwater are in the alluvial deposits of the Santa Ynez River and Lompoc Plain, and in the older unconsolidated deposits of the Santa Ynez Upland, Lompoc Upland, Buellton Upland, Santa Rita Upland, and the Lompoc Terrace basins (Stetson, 2014).

2.1.2 Land Use

Existing land use within the study area is shown in **Figure 2-2**. Land use within the service area includes agriculture, recreation, residential, commercial, and community/educational facilities. Agricultural crops include vineyards, orchards, food crops, pasture/rangeland, and nurseries.

2.1.3 Population Projections

Based on the 2012 Santa Barbara County Association of Governments Regional Growth Forecast (shown in **Table 2-1**), the population of Santa Ynez Valley unincorporated area is projected to grow at an annual rate of 0.67 percent from 2010 to 2040, and the City of Solvang is projected to grow at an annual rate of 0.44 percent over the same interval. Populations in 2010 for communities (as designated by the Census Bureau) within the Santa Ynez Valley unincorporated areas were Santa Ynez (4,418), Los Olivos (1,132), and Ballard (467).

Table 2-1: Historical and Projected District Population

Area	2010	2020	2035	2040
Santa Ynez Valley Unincorporated	12,633	12,646	15,110	15,426
City of Solvang	5,230	5,333	5,922	5,958

Source: Santa Barbara County Association of Governments Regional Growth Forecast (2012)

2.2 Water Supply Characteristics and Facilities

2.2.1 Potable Water Supply Characteristics and Facilities

ID#1 supplies water for domestic, municipal, industrial and agricultural purposes for the communities of Santa Ynez, Los Olivos, Ballard, and the Chumash Reservation. The service area for ID#1 is a mixture of agricultural, rural residential, and suburban development. ID#1 employs a conjunctive use strategy utilizing all of its supplies to provide reliable service to its constituents in a wide range of hydrologic conditions:

- Groundwater from the Santa Ynez Uplands Groundwater Basin (referred to as Uplands Basin)
- Groundwater from the Santa Ynez River Alluvium Basin (referred to as Alluvium Basin)
- Surface water from the Cachuma Project in the Santa Ynez watershed
- Imported SWP water from Central Coast Water Authority

The mix of supplies from the past four years is summarized in **Table 2-2** and the mix of end uses is summarized in **Table 2-3**. The use of groundwater has increased in recent years due to the ongoing severe drought conditions that reduced available Cachuma and SWP water supplies. ID#1 anticipates returning to historical supply mixes (e.g., less groundwater use than in recent years) once surface water supplies return to historical availability.

Table 2-2: ID#1 Produced Water Supplies

Water Source	2012	2013	2014	2015	Average
Groundwater	2,310	3,240	4,104	2,821	**3,119**
Surface Water	2,771	2,344	846	1,528	**1,872**
Purchased	420	245	59	0	**181**
Total	**5,501**	**5,829**	**5,009**	**4,349**	**5,172**

Source: 2012 to 2015 DWR Public Water System Statistics reports

Table 2-3: ID#1 Metered Water Deliveries

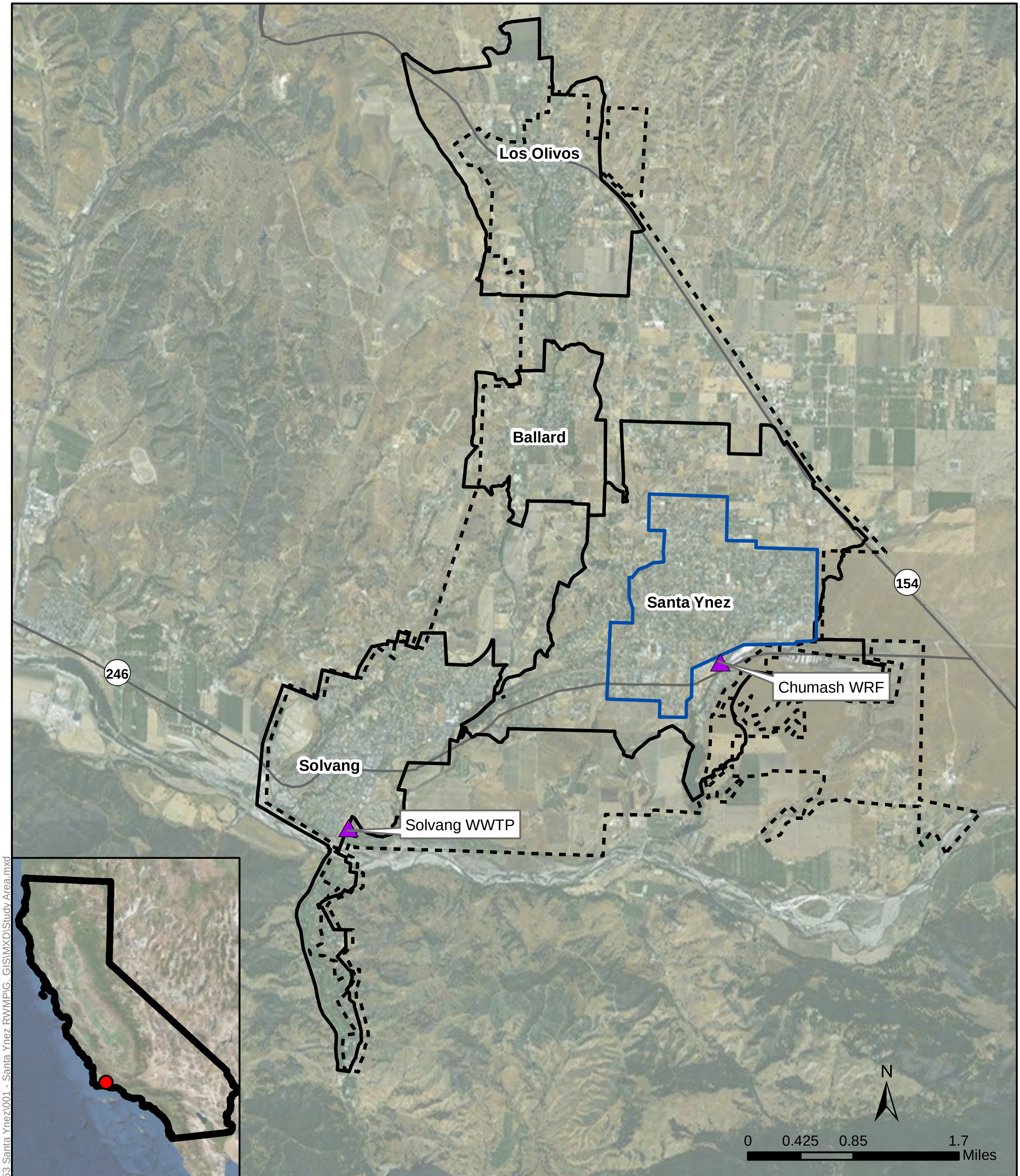
End Use	2012	2013	2014	2015	Average
Residential	2,498	2,475	1,945	1,665	**2,146**
Other (Park)	104	81	31	30	**61**
Agricultural	2,581	2,756	2,489	2,314	**2,535**
Wholesale	56	107	0	28	**48**
Total	**5,239**	**5,419**	**4,465**	**4,038**	**4,790**

Source: 2012 to 2015 DWR Public Water System Statistics reports
Note: Total metered deliveries are less than produced water supplies in Table 2-2 due to system losses.

Solvang uses a mix of SWP water and groundwater from the Alluvium Basin and Uplands Basin. Remaining water use in the study area is by private pumpers of groundwater from the Alluvium Basin and Uplands Basin.

Groundwater Basins

The Santa Ynez River Valley Groundwater Basin consists of the four basins: Uplands Basin, Buellton Uplands Groundwater Basin, Lompoc Groundwater Basin, and the Alluvium Basin. As shown on **Figure 2-3**, SYCSD is within the Uplands Basin, ID#1 pumps from the Uplands Basin and Alluvium Basin, and Solvang pumps from the Uplands Basin (though not currently) and Alluvium Basin.



RMC water and environment

WWTP
Cities/Communities
Santa Ynez River Water Conservation ID1
SYCSD Sphere of Influence

Figure 2-1: Santa Ynez Study Area

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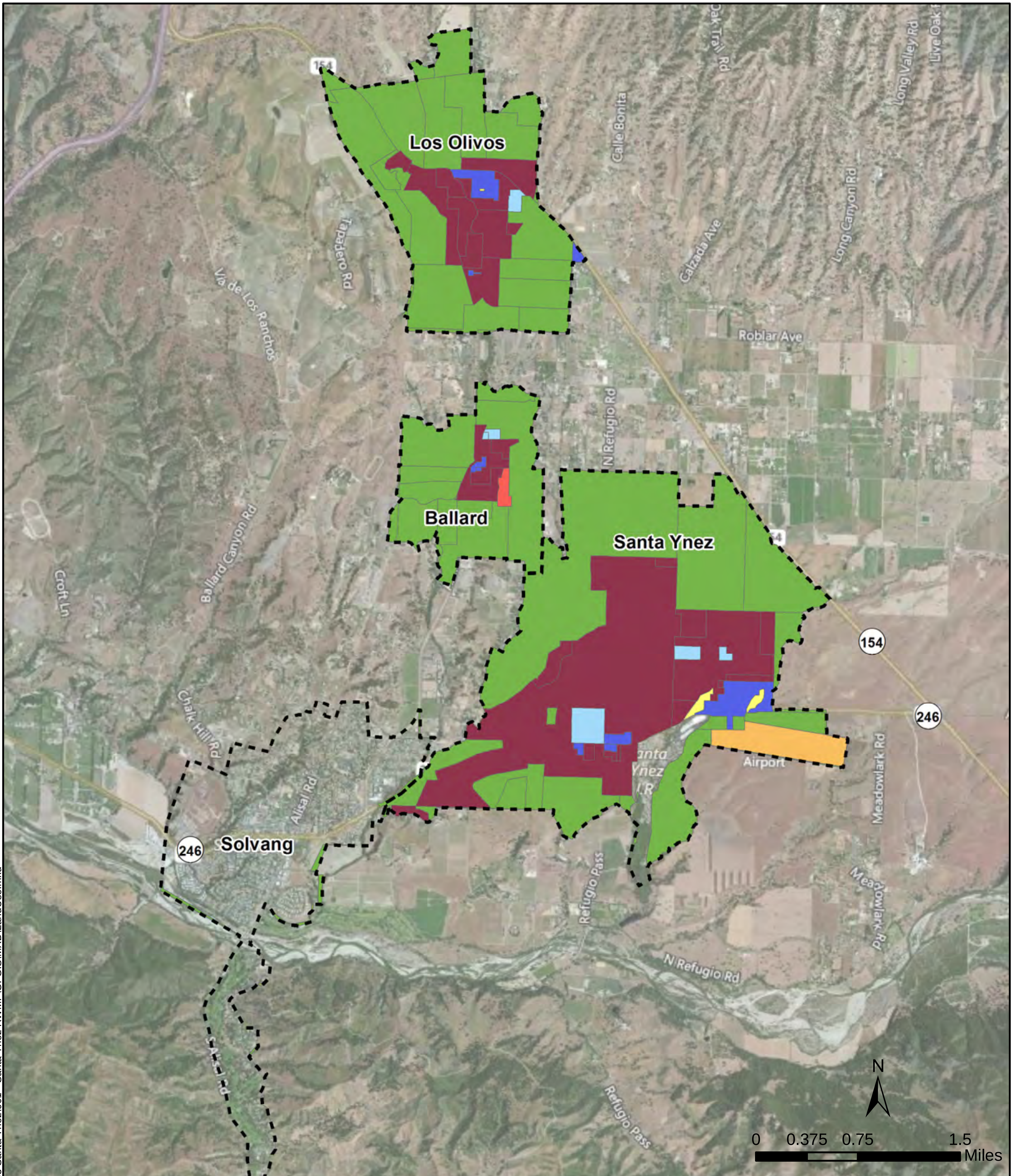

RMC water and environment

Cities/Communities

Land Use

Agriculture

Commercial

Community Facility

Educational Facility

Institutional

Recreation

Residential

Figure 2-2: Study Area Land Use

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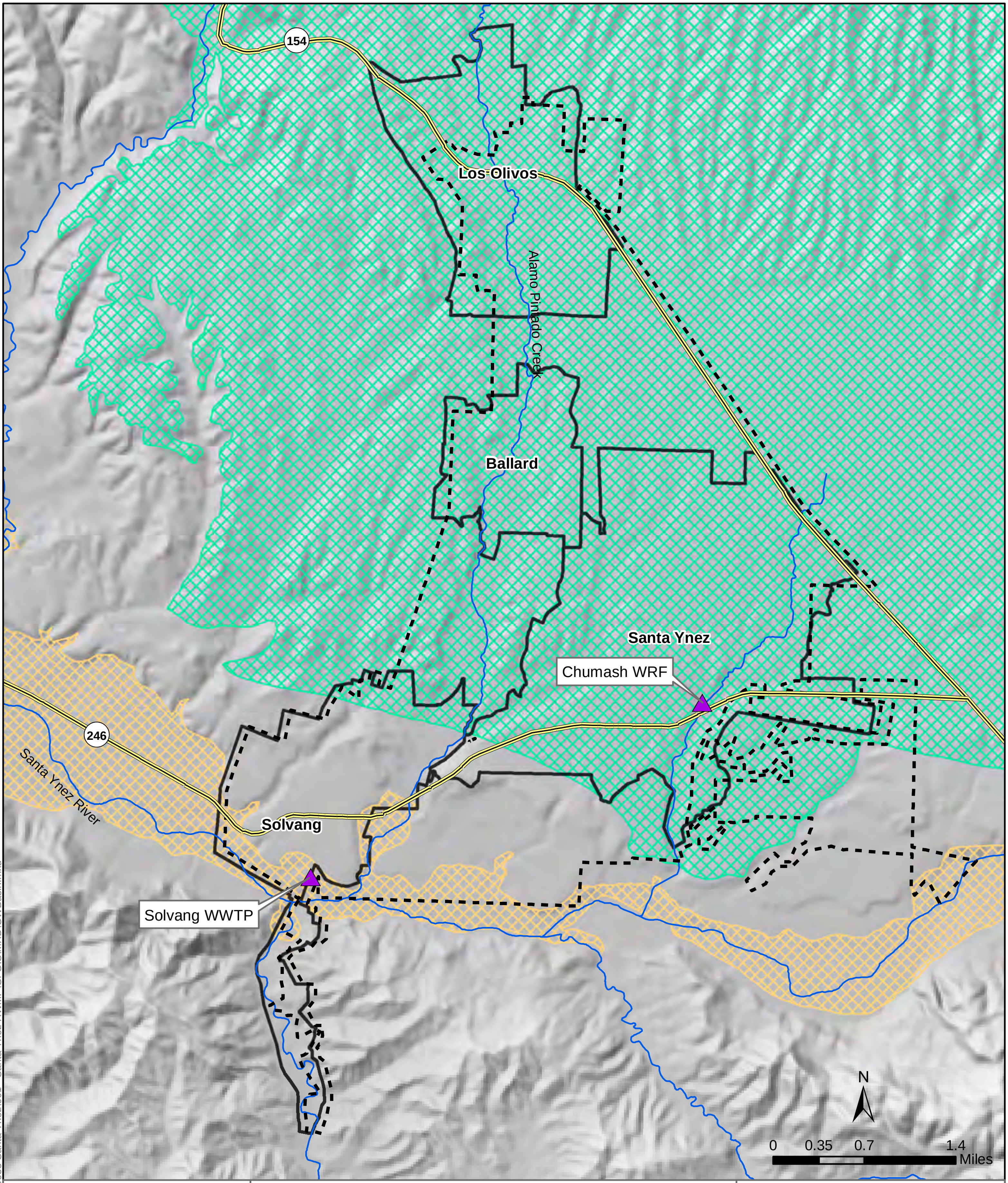

RMC water and environment

Legend

- WWTP
- Waterways
- Cities/Communities
- Santa Ynez Uplands Basin
- Santa Ynez River Alluvial Basin
- SYRWCD ID#1

Figure 2-3: Study Area Groundwater Basins

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Uplands Basin

The Uplands Basin is 83,200 acres and underlies 130 square miles located about 25 miles east of Point Arguello and north of the Santa Ynez River. The Paso Robles formation is the major aquifer in the Uplands Basin and the formation consists of poorly consolidated gravel, sand, silt, and clay. Available storage within the Uplands Basin is estimated to be about 900,000 acre-feet (AF); the safe yield for gross pumpage (perennial yield) is estimated to be about 11,500 acre-feet per year (AFY); the safe yield for net pumpage (net yield) is estimated to be about 9,000 AFY; and pumping from the basin is estimated to be 11,000 AFY (Santa Barbara County, 2012). Groundwater supplies about 85% of the water demand within the basin and Agriculture accounts for about 75% of the water demand within the basin. ID#1 is the largest municipal pumper in the basin.

The Uplands Basin is pumped by ID#1, several small mutual water companies, and private agricultural and domestic users. ID#1 pumped an average of 4,300 AFY from 2003 to 2013 (Stetson, 2014) and the balance of pumping was from private pumpers.

Santa Ynez River Alluvium Basin

Groundwater in the Alluvium Basin is in direct hydraulic communication with the surface flow of the river. Inflow to the basin is from infiltration of river flow, direct percolation from rainfall, underflow from adjacent basins (Santa Ynez Uplands and Buellton Uplands), and percolation from wastewater ponds in Solvang and Buellton. In accordance with existing requirements included in SWRCB Water Rights Decisions, water is released from Cachuma Reservoir to recharge the Alluvium Basin based on water levels in monitoring wells and "credits" of water held in reservoir storage. In addition, small amounts of recharge to the Alluvium Basin can occur when water is released from Lake Cachuma to the riverbed for Endangered Species Act purposes under certain hydrological conditions. Thus, the Cachuma Project at certain times controls basin water levels. This basin is not subject to overdraft because the average annual flow to the Santa Ynez River is greater than the volume of the basin. Water is extracted from this basin by many public and private entities for municipal and agricultural uses (Santa Barbara County, 2012).

Water extraction in the Alluvium Basin is governed by riparian rights and appropriative rights. Riparian rights are based on owning a parcel of land that is adjacent to a source of water and do not require permits, licenses, or government approval; but they apply only to the water which would naturally flow in the stream. Article X, Section 2 of the California Constitution requires all use of water to be “reasonable and beneficial.” These “beneficial uses” have commonly included municipal and industrial uses, irrigation, hydroelectric generation, and livestock watering. More recently, the concept has been broadened to include recreational use, fish and wildlife protection, and enhancement and aesthetic enjoyment. Riparian rights have a higher priority than appropriative rights and the priorities of riparian right holders generally carry equal weight; during a drought all share shortage allocations equally. (SWRCB)[1]

Appropriative rights are based on the maximum amount that would ultimately be needed by the proposed use for as long a time as the project is deemed reasonable and diligently pursued. ID#1 and Solvang have appropriative rights to the underflow of the Santa Ynez River. ID#1 has the right to take 515 AFY (maximum diversion rate of 1.73 cubic feet per second [CFS]) under License #10415, 1,776.4 AFY (maximum diversion rate of 4.0 CFS) under License #013869, and 3,291.3 AFY (maximum diversion rate of 6.0 CFS) under License #013870. ID#1 use of underflow varies and depends on the condition of river underflow, demand, infrastructure constraints, and other water management practices (Santa Barbara County, 2009a). Solvang has the right to take 3,600 AFY (maximum diversion rate of 5.0 CFS) under Permit #015878.

[1] http://www.waterboards.ca.gov/waterrights/board_info/water_rights_process.shtml

Water Quality

Water quality within the Uplands Basin is generally adequate for most agricultural and domestic purposes. Possible contaminating activities in the basin may include septic systems and agricultural drainage. Contaminant sources that have the potential to contaminate the Alluvium Basin include septic systems, agricultural drainage, other wells that may be active and abandoned, upstream contaminant sources, application of agricultural chemicals, and surface runoff from roads. In 2014, nitrate concentrations in the Uplands Basin ranged from non-detect to 4.2 milligrams per liter (mg/L) as nitrogen (N). Nitrate was also detected in the active wells in the Santa Ynez River, which ranged from non-detect to 2.7 mg/L. To ensure that the water supply wells remain below the Maximum Contaminant Level (MCL) of 10 mg/L for nitrate, annual monitoring will be required (ID#1, 2014).

Chromium 6

DDW regulations that took effect in 2014 reduced the MCL for Chromium 6 from 50 micrograms per liter (ug/L) to 10 ug/L. As a result, ID#1 lost the use of three of its eight wells. ID#1 has estimated the need for up to $25 million for new treatment facilities (Dudek, 2014). ID#1 is currently working on a plan for compliance with the MCL by January 1, 2020.

Cachuma Project

In the early 1950s, the United States Bureau of Reclamation (USBR) constructed Bradbury Dam, which created Lake Cachuma, the largest reservoir on the Santa Ynez River. Lake Cachuma is used to store local surface and imported water to supply cities and communities within the Santa Ynez River watershed through releases from the dam and diversions to cities and communities along the south coast of Santa Barbara County. Water supply from Lake Cachuma is used both directly and for downstream groundwater recharge.

The primary features of the Cachuma Project are Lake Cachuma, Bradbury Dam, Tecolote Tunnel, South Coast Conduit, and related distribution systems. Water diverted from Lake Cachuma passes through the Tecolote Tunnel, which brings water through the Santa Ynez Mountains to the South Coast Conduit. The Tecolote Tunnel, South Coast Conduit, and the regulating reservoir facilities are operated by the Cachuma Operation and Maintenance Board (COMB). Five water purveyors including Montecito Water District, the City of Santa Barbara, Carpinteria Valley Water District, Goleta Water District, and ID#1 take water from Lake Cachuma. Goleta Water District supplies are treated at the Corona Del Mar Water Treatment Plant (WTP); and the Cater WTP, which is owned and operated by the City of Santa Barbara, supplies the remaining south coast purveyors.

Table 2-4: Cachuma Project Entitlements (AFY)

ID#1	Goleta Water District	City of Santa Barbara	Montecito Water District	Carpinteria Water District	Total
2,652	9,321	8,277	2,651	2,813	25,714

It is important to note that ID#1 does not receive actual Cachuma Project water, but is delivered an equivalent volume of SWP water through an Exchange Agreement with the South Coast members of the Cachuma Project. By the terms of this agreement, ID#1's share of Cachuma Project water is delivered to other Cachuma Project members on the South Coast.

State Water Project

The Central Coast Water Authority (CCWA) is a public entity that was formed in 1991 to finance, construct, manage, and operate the SWP facilities in Santa Barbara County. CCWA owns and operates a water treatment plant and pipeline that delivers water from the SWP to project participants in Santa Barbara and San Luis Obispo Counties. Construction of the facilities to import SWP water to Santa Barbara County began in 1994, including a 42-mile extension of the SWP water pipeline, pumping plants, and a regional treatment plant (Polonio Pass WTP). The distribution system consists of an approximate 130-mile-long pipeline, treated water tanks at the water treatment plant, three interim storage facilities, one energy dissipation facility, nine turnouts, four isolation valve facilities, a chloramines removal and water pumping facility, and the Lake Cachuma inlet monitoring facility (CCWA, 2016).

ID#1 holds a SWP water "Table A" allocation of 2,000 AFY and a 200 AFY drought buffer. Solvang has a contractual agreement with ID#1 for 1,500 AFY of Table A allocation. Drought buffer does not have a pipeline or treatment plant capacity associated with it, thus it serves for increased reliability only. They receive the SWP water through their own turnout as well as a potable water system interconnection with ID#1.

Table 2-5: State Water Project Entitlements (AFY)

Project Participant	Table A	Drought Buffer	Total Table A
ID#1	500	200	**700**
Solvang	1,500	--	**1,500**

Note: Solvang's entitlement is through a contractual agreement with ID#1. ID#1's total entitlement is for 2,000 AFY.

2.2.2 Water Use Trends

ID#1 customers include single and multi-family, commercial, industrial, institutional, and agricultural. Most growth in the number of connections through 2035 will be in the residential sector. ID#1 does not have published water demands projections so future demands were estimated assuming residential demand increased with population growth (0.67% per year; see Section 2.1.3) and the agricultural portion of demand remains constant into the future. **Table 2-6** presents an estimate of water demand through 2040.

Table 2-6: ID#1 Demand Projections (AFY)

Use Type	2015	2020	2025	2030	2035	2040
Residential [a]	2,500	2,580	2,670	2,760	2,850	2,950
Agricultural [b]	3,000	3,000	3,000	3,000	3,000	3,000
Total	**5,500**	**5,580**	**5,670**	**5,760**	**5,850**	**5,950**

Notes:

a. Assumes residential demand growth at the same rate as projected population growth (0.67% per year).
b. Assumes agricultural demand is constant.

2.2.3 Regional Water Resources Planning

This facility planning effort is occurring in the context of several water and wastewater regional planning efforts. The efforts are introduced here, referred to during applicable alternatives development and analysis, and addressed in the recommended project implementation plan (in Chapter 7). The efforts discussed here include:

- Santa Ynez Valley Community Plan
- Santa Barbara County Integrated Regional Water Management
- Sustainable Groundwater Management Act

Santa Ynez Valley Community Plan

The Santa Ynez Valley Community Plan (Community Plan) (Santa Barbara County, 2009) provides policy direction for issues and development trends specific to the plan area, which covers approximately 72 square miles of the Santa Ynez Valley including three unincorporated townships (Santa Ynez, Ballard, and Los

Olivos). The two incorporated cities (Buellton and Solvang) are not part of the planning area. The Community Plan contains new development policies specific to the Santa Ynez Valley along with measures to implement those policies.

Goals and policies in the Community Plan that were associated with wastewater include:

- GOAL WW-SYV: Ensure adequate wastewater treatment and disposal throughout the planning area.
- Policy WW-SYV-1: Development and infrastructure shall achieve a high level of wastewater treatment, in order to best serve the public health and welfare.
- Policy WW-SYV-2: Pollution of surface and groundwater shall be avoided. Where contribution of potential pollutants of any kind is not prohibited and cannot be avoided, such contribution shall be minimized to the maximum extent practical.
- Policy WW-SYV-3: Annexation of inner-rural and rural area(s) to a sanitary district or extensions of sewer lines into inner-rural and rural area(s) as defined on the land use plan maps shall not be permitted unless required to prevent adverse impacts on an environmentally sensitive habitat or to protect public health.

Goals and policies in the Community Plan that were associated with water include:

- GOAL WAT-SYV-1: Protect the quality of surface and ground waters from degradation; maintain adequate, safe water supplies; and protect groundwater basins from prolonged overdraft.
- Policy WAT-SYV-1: Development in the Santa Ynez Valley Planning Area shall incorporate appropriate water efficient design, technology and landscaping.
    - Action WAT-SYV-1.1: The County Water Agency shall work with the SYRWCD ID #1 to promote educational programs that encourage efficient water use.
- Policy WAT-SYV-2: Existing and future water supply and quality shall continue to be periodically evaluated with specific measures identified to maintain adequate supply levels and quality, if deemed necessary.
    - Action WAT-SYV-2.1: The County will continue to work with local water purveyors to assess water demand under Plan buildout conditions and identify the necessary infrastructure improvements to serve that demand and/or identify new sources of water or improved treatment facilities that may be necessary to meet demand.

Santa Barbara County Integrated Regional Water Management

The Santa Barbara County Integrated Regional Water Management Plan (IRWM Plan) (RMC, 2013) is the main integrated regional water management planning document for Santa Barbara County. The IRWM Plan emphasizes multi-agency collaboration, stakeholder involvement and collaboration, regional approaches to water management, water management involvement in land use decisions, and project monitoring to evaluate results of current practices.

The latest IRWM Plan identifies regionally and locally focused projects that help achieve regional objectives and targets while working to address water-related challenges within the region. Regional objectives include: conserving, protecting, and augmenting water supplies; protecting, managing, and increasing groundwater supplies; practicing balanced natural resource stewardship; protecting and improving water quality; maintaining and enhancing water and water infrastructure; ensuring the equitable distribution of benefits; improving flood management; improving emergency preparedness, and addressing climate change issues.

Issues and challenges applicable to the Santa Ynez Valley include:

- Poor water quality in shallow groundwater;

- Elevated nitrate in groundwater from septic systems in Los Olivos;
- Compliance with existing and emerging wastewater discharge standards;
- Lack of diversity of supply in the City of Solvang;
- Risk of damage from wildfires to habitat and resulting erosion that could adversely affect reservoir storage and water quality at Cachuma and Gibraltar reservoirs;
- The need for regional collaboration for conjunctive groundwater management;
- A pending SWRCB decision on Cachuma Project water rights permits that support the Cachuma Project Settlement Agreement that will facilitate integration of water supply, downstream water rights, and public trust resources, and
- Development of Total Maximum Daily Loads (TMDLs) that may require changes in water use and water management.

Sustainable Groundwater Management Act

The Sustainable Groundwater Management Act (SGMA), provides for certain agencies to become Groundwater Sustainability Agencies and adopt Groundwater Sustainability Plans to manage and regulate groundwater in underlying basins. SYRWCD is leading implementation of SGMA for the Santa Ynez River Valley Groundwater Basin and has developed a tentative implementation plan. The basin is a medium priority groundwater basin under the state's CASGEM Program and, therefore, must have an approved Groundwater Sustainability Agency by June 30, 2017, and an approved Groundwater Sustainability Plan by January 31, 2022.

Implementation of a new WRRF would change the discharge location of existing wastewater from the City of Solvang WWTP and septic systems to the WRRF discharge location. Reuse of WRRF effluent would offset use of existing water – either delivered by a water purveyor or from private wells. These impacts should be considered as part of the local SGMA discussion.

2.2.4 Potable Water Rates

Potable water rates for ID#1 for 2017 (effective February 1, 2017) are summarized in **Table 2-7**. In addition to the water rates, ID#1 applies several monthly meter charges depending on type of use and meter size.

Table 2-7: 2017 ID#1 Water Rates ($ per 100 CF)

Domestic	Rural Residential / Limited Ag	Agriculture	On-Demand	Temporary	Cachuma Park
$4.30	First 125 Units: $4.30 Over 125 Units: $1.65	$0.77	$6.60	$12.90	$1.48

Source: http://www.syrwd.org/water-rates

Duplication of Service

If the local water purveyor does not want to own and operate a recycled water system, the Service Duplication Act (California Public Utilities Code, Section 1501) requires the recycled water agency supplying users within a water agency's boundaries to compensate that agency for the loss of customer revenue. As a result, recycled water projects implemented within the ID#1 or Solvang service areas could include duplication of service fees to recover lost revenue if the water purveyors do not realize a compensatory monetary benefit from the reuse project. The fees which could make supplying recycled water to some users economically infeasible unless reasonable agreements can be reached.

Considering recent drought conditions and reduced reliability of surface water supplies, recycled water could represent a new water supply that avoids the need for the water purveyors to acquire more expensive water or less reliable supplies. In either scenario, a successful recycled water project must address the duplication of service issue to enable implementation.

2.3 Wastewater Characteristics and Facilities

2.3.1 Solvang WWTP

The Solvang WWTP serves the City of Solvang and the SYCSD; and the Solvang WWTP has a capacity of 1.50 MGD that is contractually allocated between the City of Solvang and SYCSD. Currently, an average of 0.14 MGD of wastewater collected by SYCSD is diverted to the Solvang WWTP for treatment, but contractually the agency can send up to 0.29 MGD of wastewater to the WWTP. SYCSD collects and diverts the wastewater from their service area to the Solvang WWTP by operating one lift station and approximately 15.2 miles of sanitary sewer collection system.

Table 2-8: Historical Average Annual Daily Flows (MGD)

	2010	2011	2012	2013	2014	2015	Average
Solvang	0.60	0.68	0.61	0.59	0.54	0.51	0.59
SYCSD	0.14	0.14	0.14	0.14	0.14	0.12	0.14
Total	**0.74**	**0.82**	**0.75**	**0.73**	**0.68**	**0.63**	**0.73**

Source: Cannon, 2016

At the Solvang WWTP, the wastewater treatment processes include a mechanical bar screen, screenings compactor and washer, vortex grit separator, and a sequencing batch reactor (SBR) wherein the wastewater is mixed, aerated, and settled. Waste sludge from the SBR is pumped to the digester where it is aerobically digested. After digestion, sludge is dewatered by a belt press. Biosolids accumulate in roll-off bins and are hauled away by an offsite composting contractor. Wastewater from the belt press is routed back to the headworks. The treated wastewater is disposed of to a polishing pond, which then drains to one of two percolation ponds located within the Santa Ynez River floodplain. On high flow days or during significant rain events, the large percolation pond overflows into a small percolation pond for additional storage.

Surface water and groundwater quality objectives for the Solvang WWTP are stated in the adopted Waste Discharge Requirements Order No. R3-2007-0069 (Order). The Order specifies the effluent discharge requirements for the evaporation/percolation ponds**.** Recently, the City of Solvang has seen a rise in the annual average values for TDS, sodium, and chloride. This is partly due to purchasing less SWP water and utilizing more well water from the Alluvium Basin (Solvang, 2015). Potential sources of the constituents in the system are source water itself, self-regenerating water softeners, and domestic consumption. Source control measures that can reduce the amount of salt constituents in the system include blending the source water supply, eliminating and/or replacing the softening systems, and public education on excessive amounts of salt consumption (Cannon, 2011).

WWTP Capacity Analysis

The City of Solvang completed a WWTP Remaining Capacity TM (Cannon, 2016) that considered existing and projected flows for Solvang and SYCSD through buildout (based on general plan) and annexation of sphere of influence areas. The TM noted that SYCSD's agreement for 0.30 MGD of the 1.5 MGD total WWTP capacity ends up equating to 0.20 MGD once two items are accounted for: 1) agreement limits available capacity to 95% of the purchase capacity (0.285 MGD); and 2) 0.088 MGD of SYCSD's capacity is reserved for the Santa Ynez Band of Mission Indians.

As shown in **Table 2-9**, SYCSD reaches its adjusted capacity limit of 0.20 MGD upon reaching General Plan buildout, and annexation within its sphere of influence would require the purchase of additional WWTP capacity.

Table 2-9: Flow Projections (MGD)

	Existing	General Plan Buildout	Sphere of Influence
Solvang	0.58	0.67	0.73
SYCSD	0.15	0.19	0.29
Total	**0.73**	**0.86**	**1.02**

Source: Cannon, 2016

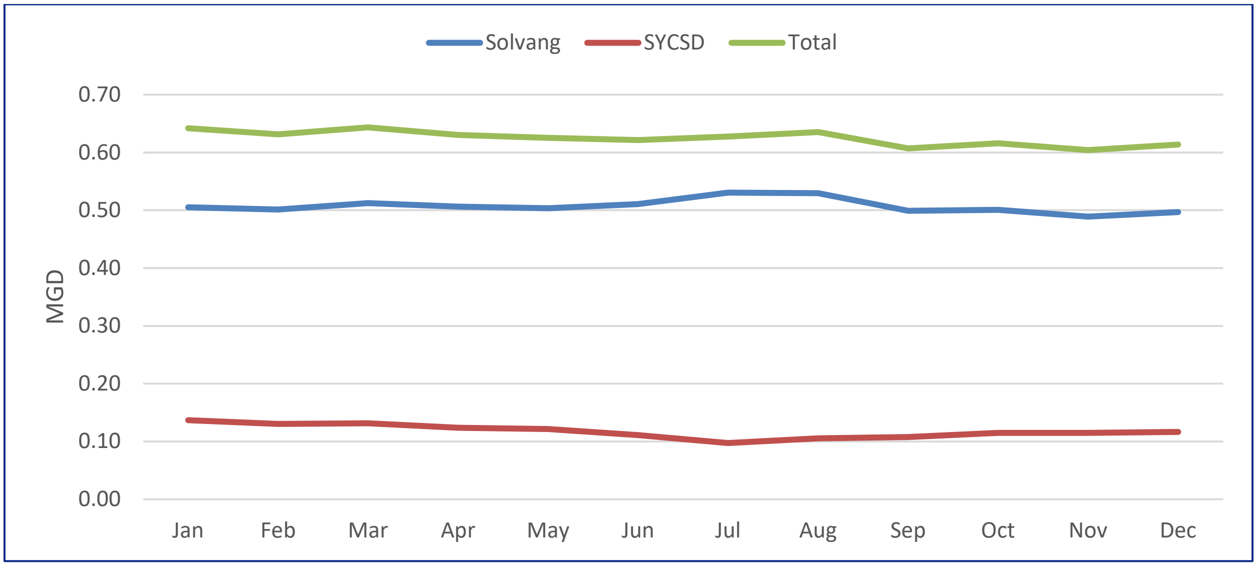
In addition, Solvang identifies the most significant "trigger point" when the Solvang WWTP can no longer accept additional flow or must begin significant planning and engineering for expansion. It is defined as the point when the monthly average daily flow has reached 1.2 MGD or when the City anticipates reaching 1.5 MGD within 4 years, whichever occurs first. The trigger is based on the Regional Water Quality Control Board (RWQCB) WDR Standard Provisions Item C(9), which states that the City must submit a report to the RWQCB estimating when the monthly average daily flow will equal the design capacity. The provision also requires a schedule for studies, design, and other steps needed to provide additional capacity within 120 days upon determination that the WWTP monthly average daily flow: 1) has reached 80% of design capacity; 2) or will reach the design capacity within 4 years.

The most recent Central Coast RWQCB WDR standard provisions[2] includes the 4-year provision but does not include the 80 percent provision. In either case, the provision should not require the Solvang WWTP to expand beyond 1.5 MGD if buildout flows are not projected to exceed 1.5 MGD. Also, Solvang would have the ability to deny connections that would increase flows above 1.5 MGD. Therefore, the "trigger point" should not prevent the Solvang WWTP from accepting flows up to 1.5 MGD as long as increases beyond this point are not projected.

Seasonal Flow Variations

As shown in **Figure 2-4**, Solvang WWTP influent flows are consistent throughout the year. Solvang produces a slight increase in the summer while SYCSD's flows are consistent.

Figure 2-4: 2015 Average Daily Flows by Month (MGD)



[2] Resolution No. R3-2013-0052: Updating Standard Provisions and Reporting Requirements for Waste Discharge Requirements

2.3.2 Septic Areas

SYCSD is currently in the process of converting several existing areas on septic tanks to the central collection system. These areas requested conversion due to a variety of issues associated with the septic systems, such as being in flood prone areas.

In addition, Santa Barbara County Public Health Department Environmental Health Services designated four "Special Problem Areas" due to constraints and/or historic problems with the use of septic systems: Los Olivos, Ballard, Janin Acres, and west of Santa Ynez. Septic systems raise public health and safety concerns regarding the potential threat of impacts to both surface and groundwater resources and represent land use and economic constraints limiting the development of both residential and commercial uses in the areas (Santa Barbara County, 2009a).

Los Olivos and Ballard

Los Olivos and Ballard are entirely served by septic systems. Los Olivos has over 340 residential and commercial parcels. In addition, the area is underlain with high groundwater and the soils are not conducive to wastewater disposal. This poses a significant constraint for septic system usage especially in the commercial core. Ballard has over 120 parcels (nearly all) with private septic systems. (Santa Barbara County, 2009a)

Los Olivos and Ballard overlie the Santa Ynez Uplands Groundwater Basin which is used extensively as a source of agricultural and domestic-municipal water supply. The groundwater basin has been identified by the Central Coast RWQCB as one of three basins in Santa Barbara County experiencing an increase in groundwater nitrate concentrations, and it has been recommended for further investigation with respect to sources and corrective strategies. The Basin Plan identifies Los Olivos and Ballard as urbanizing areas that need wastewater management. (Santa Barbara County, 2009a)

Constraints affecting septic system performance in Los Olivos include the large number and very high density of septic systems, lack of favorable soil and groundwater conditions, and the age and non-conforming design of the systems. Despite relatively good soil conditions for septic systems throughout most of Ballard, the township exhibits similar septic system constraints to those found in Los Olivos. Water quality sampling in Alamo Pintado Creek indicates consistently high levels of bacteria within and downstream of Los Olivos. In 1991, the RWQCB adopted a policy that restricts new commercial development to a design wastewater flow equivalent to one single family residence per acre, or no more than 375 gallons per acre per day. Because of this restrictive standard, commercial projects in Los Olivos are limited to very low water uses and many proposed projects are eventually withdrawn. The septic system constraints within Los Olivos and Ballard pose an existing and continuing threat of impacts to both surface and groundwater resources in the area. (Santa Barbara County, 2009a)

Janin Acres

The Janin Acres subdivision, located between Solvang and Santa Ynez, was developed in the late 1960s and obtains its water supply from two local wells owned and operated by the Rancho Marcelino Water Company. Many of the parcels in the subdivision utilize deep trenches or drywells for onsite sewage disposal. Sampling of the Rancho Marcelino water wells over the past 40 years has indicated a significant increase in nitrate concentration that coincides with the development of the subdivision and the use of onsite sewage disposal systems in the area. The nitrate concentrations found in the wells has increased from less than 10 mg/l to over 50 mg/L (i.e., exceeding the drinking water limit) during this period. The data show a strong correlation between groundwater quality degradation and the installation and use of septic systems in the Janin Acres subdivision and neighboring areas in Santa Ynez (to the north). (Santa Barbara County, 2015)

2.3.3 Flow Scenarios

SYCSD Scenarios

Two projected flows for the District were defined as follows:

- Scenario 1A (SYCSD Near-Term)
- Scenario 1B (SYCSD Ultimate)

Scenario 1A consists of flows currently being conveyed to the Solvang WWTP and anticipated flows to be generated from the conversion of approximately 500 homes from septic tank systems to sewer service within the SYCSD service area, which is currently underway. Existing average dry weather flows (ADWF) are 0.14 MGD for 688 connections. The conversion is anticipated to add approximately 0.11 MGD based on an estimated ADWF of 215 gpd per connection, which is consistent with the planning value used for the Santa Ynez Valley 2009 Community Plan Environmental Impact Report (Santa Barbara County, 2009b). Therefore, total near-term flows are estimated to be 0.25 MGD for approximately 1,200 connections.

Scenario 1B is based on further annexation of approximately 250 parcels for a total of 1,450 parcels and a total projected ADWF of 0.31 MGD. "In-fill" development within the existing distribution system are expected to be offset by increased indoor conservation, which reduced existing use below 215 gpd per connection.

Regional Scenarios

Two projected scenarios for regional flows, which include Los Olivos and Ballard, were defined as follows:

- Scenario 2A (Regional Near-Term)
- Scenario 2B (Regional Ultimate)

Scenario 2A consists of Scenario 1A flows plus flows from the communities of Los Olivos and Ballard.[3] The Los Olivos Wastewater System Preliminary Engineering Report (AECOM, 2013) estimated an ADWF of 0.14 MGD for Los Olivos and 0.04 MGD for Ballard, which results in a total ADWF of 0.43 MGD. The estimates were based on 215 gpd for each residential connection and 0.056 gpd per square foot for commercial connections.

Scenario 2B consists of Scenario 1B flows plus the new flows from Los Olivos and Ballard in Scenario 2A for a total of 0.49 MGD. Note that increased flows from in-fill within the existing distribution system are expected to be offset by increased indoor conservation.

Summary

Based on the phasing established above, projected flows for the SYCSD service area are presented in **Table 2-10**.

[3] Connecting to a joint system with Ballard conflict with the Santa Ynez Valley Community Plan policy WW-SYV-3, which discourages annexation or extension of sewer lines into other jurisdictions due to growth-inducing impacts. However, a regional scenario is defined since it was not previously evaluated for comparison with other septic conversion alternatives.

Table 2-10: Projected Wastewater Flows, SYCSD

Condition	Existing SYCSD (MGD)	Scenario 1A (MGD)	Scenario 1B (MGD)	Scenario 2A (MGD)	Scenario 2B (MGD)
		"Local" Scenarios		"Regional" Scenarios	
Minimum Diurnal Flow [a]	0.03	0.05	0.07	0.09	0.11
Average Day Dry Weather Flow (ADWF) [b]	0.14	0.25	0.31	0.43	0.49
Peak Day Dry Weather Flow (PDWF) [c]	0.25	0.45	0.56	0.77	0.88
Peak Hourly Flow (PHF) [d]	0.56	1.00	1.24	1.72	1.96
Peak Day Wet Weather Flow (PWWF) [e]	0.34	0.61	0.76	1.05	1.20

Notes:

a. Existing minimum diurnal flow is based on diurnal flow data for SYCSD (July and December 2015). Minimum diurnal flows for remaining scenarios are based on proportional increase in corresponding ADWFs (ADWF/MDF of 4.6).
b. ADWF basis:
   i. Existing ADWF is based on 2015 SYCSD flow data.
   ii. Scenario 1A converts 500 homes at 215 gpd/connection to the existing ADWF.
   iii. Scenario 1B assumes 250 new connections are made through buildout.
   iv. Scenario 2A adds Los Olivos and Ballard septic conversion flows to Scenario 1A.
   v. Scenario 2B adds Scenario 1B flows to the new Scenario 2A flows.
c. Existing PDWF based on diurnal flow data for SYCSD (July and December 2015). PDWFs for remaining scenarios are calculated using a PDWF/ADWF peaking factor of 1.80, based on existing diurnal data.
d. For populations less than 5,000 persons, recommended PHF/ADWF peaking factor is 4.0 (Metcalf & Eddy, 2003).
e. PWWF is based on storm event that is 65% of ADWF such that the PWWF = ADWF x (1.80 + 0.65).

Water Conservation

ID#1 has experienced over 25 percent decrease in water use from 2013 through 2015 (refer to Table 2-3) and any further significant conservation is expected to be achieved through outdoor uses so use 2015 sewer flows for wastewater flow estimates is warranted. Further decreases in the indoor water use would reduce sewer flows whereas increased indoor use would increase sewer flows.

2.3.4 Wastewater Quality

Existing Conditions

Wastewater from SYCSD is commingled with wastewater flow from the City of Solvang at the City's Fjord Road Lift Station, which pumps sewage across the Santa Ynez River to the Solvang WWTP. The influent quality of SYCSD flows is not routinely analyzed so historical water quality data for SYCSD wastewater flows do not exist. The results of grab sampling performed by SYCSD at Manhole 33, upstream of the Solvang WWTP, during the months of May, September and October 2015 are presented in **Table 2-11**. As a comparison, the table also includes historical influent wastewater quality data for the Solvang WWTP.

Table 2-11: Influent Wastewater Quality

Parameter	Units	Average	Peak	No. Samples	Average[(a)]	Peak[(a)]
		SYCSD Manhole #33			Solvang WWTP	
BOD	mg/L	320	429	7	262.5	400
TSS	mg/L	176	288	7	155	290
Oil & Grease	mg/L	20	22	2	- [b]	- [b]
Chloride	mg/L	164	183	3	227.5	320
Sodium	mg/L	148	157	3	184.2	210

Notes:

a. Average and peak values based on monthly reported values for January through December 2014.
b. Influent data for Oil & Grease not reported.

Projected WRRF Influent Wastewater Quality

Based on water quality sampling performed by SYCSD, wastewater currently conveyed from SYCSD to the Solvang WWTP can be characterized as "Medium-Strong" based on average concentrations for Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) (in Table 2-11) (Metcalf & Eddy, 2003). Based on this characterization, and without further sampling and testing, the assumed projected concentrations of various constituents within SYCSD wastewater flows are presented in **Table 2-12**.

Table 2-12: Projected WRRF Influent Wastewater Quality, SYCSD

Parameter	Units	Average	Maximum
BOD [a]	mg/L	320	429
TSS [a]	mg/L	176	288
Ammonia-N	mg/L	37.5	50.0
Organic-N	mg/L	25	35
TKN	mg/L	62.5	85
TDS	mg/L	675	850
Turbidity	NTU	NA	NA
pH	S.U.	7.0	9.0
DO	mg/L	NA	NA
Total Coliform Bacteria	MPN/100 mL	1.00E+08	1.00E+09
Settleable Solids	mL/L	15	20
Oil & Grease [b]	mg/L	125	150
Chloride [a]	mg/L	164	183
Sodium [a]	mg/L	148	157

Notes:

a. Based on results of sampling at Manhole 33 in May, September and October 2015.
b. Oil & Grease concentration increased to be consistent with "Medium-Strong" assumption.

Chapter 3 Regulatory, Permitting, and Legal Requirements

This chapter identifies the regulatory, permitting, and legal requirements for implementing recycled water projects. The chapter is organized into the following sections:

- SWRCB DDW regulations
- SWRCB policies
- RWQCB requirements
- Permitting discharges
- Permitting recycled water projects

The use of recycled water (potable and non-potable) is regulated under the Safe Drinking Water Act, several State laws, regulations, and policies, and the Clean Water Act when applicable (for example, when a project involves discharge to a Water of the U.S.), with different responsibilities assigned to the SWRCB, the SWRCB DDW, and the nine RWQCBs.

The California Water Code (CWC) and Health and Safety Code contain California's statutes that regulate the use of water and the protection of water quality, public health, water recycling, and water rights. The key statutes that are relevant to water recycling include:

- Water rights
- Recycled water definitions for potable and non-potable reuse
- Authority for adopting state policies to protect water quality and develop regulations to protect drinking water
- Authority related to issuance of recycled water permits
- Authority to develop recycled water regulations

A complete compendium of applicable statutes and regulations is available on the DDW website.[4]

3.1 DDW Regulations

Applicable DDW recycled water regulations are presented in the following sections:

- Non-potable reuse regulations
- Groundwater recharge regulations

3.1.1 Non Potable Reuse Regulations

The California SWRCB DDW sets forth water recycling criteria, including water quality standards, treatment process requirements, operational requirements, and treatment reliability requirements as part of the California Code of Regulations Title 22, Division 4, Chapter 3, Article 7 (Title 22). Per Title 22, recycled water used for surface irrigation of food crops, including all edible root crops, where recycled water comes into contact with the edible portion of the crop must be disinfected tertiary recycled water. Recycled water used for irrigation of food crops where the edible portion does not come in contact with the recycled water must be at least disinfected secondary-2.2 recycled water, meaning 2.2 is the most probable number (MPN) of coliform bacteria per 100 milliliters (mL). Recycled water used for pasture for animals producing milk for human consumption must be at least disinfected secondary-23 recycled water, meaning 23 MPN coliform bacteria per 100 mL. Recycled water meeting Title 22 disinfected tertiary treated requirements for unrestricted reuse can be used for the greatest variety of uses. To be conservative, Title 22

[4] www.swrcb.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWregulations_20150716.pdf
www.swrcb.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWstatutes2014-05-01a.pdf

disinfected tertiary recycled water quality standards are discussed herein and are assumed for the project. The requirements for Title 22 disinfected tertiary recycled water are as follows:

- Wastewater must be oxidized (i.e., the equivalent of primary and secondary wastewater treatment)
- Filtration: the treated wastewater must be filtered so that the turbidity of the filtered wastewater does not exceed 0.2 NTU more than 5 percent of the time within a 24-hour period and 0.5 NTU at any time.
- Disinfection: a disinfection process combined with filtration that has been demonstrated to achieve 99.999% removal or inactivation of plaque-forming units of F-specific bacteriophage MS-2, or polio virus in wastewater. If chlorine is used, a residual/contact time value of not less than 450 milligram-minutes per liter with a contact time of at least 90 minutes based on peak dry weather design flow is required.
- Total coliform concentrations must not exceed a 7-day median concentration of 2.2 MPN per 100 milliliters; not more than one sample greater than 23 MPN per 100 milliliters in any 30-day period; and no sample shall exceed 240 MPN per 100 milliliters.

In addition to establishing recycled water quality standards, Title 22 specifies the reliability and redundancy for each recycled water treatment process and use operation. Title 22 (Articles 9 and 10) specifies that the facilities must be designed to provide operational flexibility. Multiple treatment units capable of producing the required quality must be provided if one unit is not in operation. In lieu of multiple units, alternative treatment processes, storage or disposal provisions may be provided for redundancy.

Table 3-1 includes a list of potential recycled water uses allowed by Title 22 for disinfected tertiary recycled water. This Facilities Plan focuses on municipal use, agriculture use, and groundwater recharge (GWR). Refer to Section 3.1.2 for further information pertaining to GWR. In addition to meeting minimum water quality requirements for DDW public health protection, some crops are sensitive to specific constituents that require additional treatment.

Table 3-1: Title 22 Allowed Uses for Disinfected Tertiary Recycled Water [a]

Municipal Uses
Parks and playgrounds
School yards
Residential landscaping
Golf courses
Cemeteries
Freeway landscaping
Industrial & Commercial Uses
Industrial or commercial cooling
Industrial boiler feedwater
Flushing toilets and urinals
Agricultural Uses
Food crops where recycled water contacts the edible portion of the crop, including all root crops
Ornamental nursery stock and sod farms
Fodder and fiber crops and pasture for animals, including pasture for milk animals for human consumption
Indirect Potable Use
Groundwater recharge via surface spreading [b]

Notes:

a. This table does not represent an all-inclusive list of recycled water uses.
b. GWR regulations include multiple requirements for project approval. GWR via well injection requires a higher level of treatment than disinfected tertiary. Refer to Section 3.1.2 for further information.

3.1.2 Groundwater Recharge Regulations

The CWC defines groundwater recharge as the planned use of recycled water for replenishment of a groundwater basin or an aquifer that has been designated as a source of water supply for a public water system. Since 1976, the California Department of Public Health (CDPH) issued numerous draft versions of GWR regulations that served as guidance for the seven permitted GWR projects in California. Final GWR regulations were adopted and went into effect June 18, 2014. The GWR Regulations are organized by type of project:

- Surface application (surface spreading); and
- Subsurface application (injection or vadose zone wells)

The regulations address the following key project requirements:

- Source control
- Emergency response plan
- Pathogen control
- Nitrogen control
- Regulated chemicals control
- Initial recycled water contribution (RWC)
- Increased RWC
- Advanced treatment criteria
- Application of advanced treatment.
- Soil aquifer treatment (SAT) performance (surface application)
- Response retention time (RRT)

For planning purposes, the key GWR requirements applicable to the Santa Ynez setting are:

- Minimum treatment
- RWC
- Underground retention time

Minimum Treatment

The minimum treatment requirements are substantively different depending on the type of application. For surface spreading, the minimum treatment is disinfected tertiary recycled water and nitrogen removal that produces a total nitrogen concentration less than 10 mg/L. For injection, the minimum treatment is reverse osmosis (RO) and advanced oxidation (AO) applied to the full volume of water recharged – a treatment combination referred to as “advanced water treatment (AWT)”.

Recycled Water Contribution

The RWC is defined as the portion recycled water applied at the GWR project after accounting for credited dilution water [Recycled Water / (Recycled Water + Diluent Water)]. The RWC is calculated initially after 30 months of project operations and as a rolling average over 120 months thereafter. It is determined as a function of total organic carbon (TOC) concentration in the recycled water. For surface spreading projects, an initial RWC of 20% (or 4:1) is applied unless an alternative RWC is approved based on additional treatment prior to recharge or through SAT[5]. Application of AWT to all effluent would ultimately eliminate the need for dilution water while application of RO to a portion of the effluent could decrease the dilution requirement by removing TOC. Also, monitoring of TOC removal can be used to demonstrate SAT proficiency and can allow for an increased maximum RWC. RWC scenarios are summarized in **Table 3-2**.

Table 3-2: Recycled Water Contribution / Diluent Water Requirements [a]

GWR Method	Surface Spreading		Well Injection	
Treatment Level	Initial RWC	Ultimate RWC	Initial RWC	Ultimate RWC
Tertiary Only	20% [b]	20% to 50% [b]	N/A	N/A
Partial RO	20% to 50%[b]	50% to 75% [b]	N/A	N/A
AWT	50%	100%	50%	100%

Notes:

a. RWC is the portion that recycled water makes up of total recharge
b. Initial RWC is dependent on TOC concentration in recycled water and ultimate RWC is dependent on TOC concentration after soil aquifer treatment. The process to justify an increase of the RWC over time is outlined in the GWR regulations and would be included in the GWR permit.

Retention Time

The regulations include two requirements that potentially relate to retention time: Pathogen Control and RRT. For pathogen control for surface spreading projects, the recycled water must meet Title 22 disinfected tertiary effluent requirements. The treatment system must achieve a 12-log enteric virus reduction, 10-log Giardia cyst reduction, and 10-log Cryptosporidium oocyst reduction using at least three treatment barriers. For each pathogen, an individual treatment process can only be credited up to a 6-log reduction and at least three processes must each achieve no less than a 1.0-log reduction. Retention time credit for SAT is allowed for virus (only) of 1-log/month of travel time in the soil. Retention time related to travel time in the soil may be necessary to achieve the 12/10/10 pathogen removal in some settings.

RRT represents the time recycled water is retained underground to allow for identification of any treatment failures and to implement corrective actions. RRT provides time for operators to address inadequately treated recycled water such that it does not enter a potable water system, including the time to provide an alternative water supply or treatment. The minimum RRT is two months, and it must be justified by the project sponsor(s).

The longest of the retention times required (i.e., based on Pathogen Control or RRT) is used to establish the zone within which drinking water wells cannot be constructed. This effectively establishes a boundary between potable and non-potable uses of the groundwater basin.

For planning purposes, the regulations allow use of groundwater modeling to estimate residence times for project facility siting. A project sponsor must validate retention time using an added or intrinsic tracer within the first three months of operation.

[5] SAT describes the natural attenuation of contaminants as water travels through the vadose zone and then underground. Removal mechanisms include photolysis (by the sun while in the recharge basin), biodegradation, and adsorption onto soil particles. SAT is effective at removing viruses, bacteria, TOC, nutrients, and constituents of emerging concern to various degrees. Removal is site specific and column studies must be conducted to obtain accurate estimates of potential performance.

3.2 State Water Resources Control Board Policies

Two types of policies have importance with respect to all recycled water projects for protection of water quality and human health:

- Anti-degradation Policies
- Recycled Water Policy

In addition, the California Toxics Rule (CTR) and the SWRCB Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP) may apply to projects that involve a discharge to a water of the U.S. The CTR and SIP would not apply to a project if the receiving surface water is not deemed to be a Water of the U.S. in the applicable RWQCB Water Quality Control Plan (Basin Plan).

3.2.1 Anti-degradation Policies

California's anti-degradation policies are found in Resolution 68-16, Policy with Respect to Maintaining Higher Quality Waters in California and Resolution 88-63, Sources of Drinking Water Policy. These resolutions are binding on all State agencies. They apply to both surface water and groundwater, protect both existing and potential uses, and are incorporated into RWQCB Basin Plans.

3.2.2 Recycled Water Policy

The Recycled Water Policy was adopted by the SWRCB in 2009. It was subsequently amended in January 22, 2013, regarding monitoring constituents of emerging concern (CECs) for groundwater recharge projects based on recommendations of an expert panel. The panel did not recommend CEC monitoring for landscape irrigation projects using recycled water. The Policy was a critical step in creating uniformity in how RWQCBs were individually interpreting and implementing Resolution 68-16 for water recycling projects. The critical provisions in the Policy related to landscape irrigation and GWR projects include:

- Development of Salt and Nutrient Management Plans (SNMPs)
- Requirements for landscape irrigation projects
- RWQCB GWR requirements
- Anti-degradation and assimilative capacity
- CECs

The Recycled Water Policy requires the development of SNMPs for every groundwater basin/sub-basin by May 2014 (May 2016 with a RWQCB-approved extension). The SNMP must identify salt and nutrient sources, identify basin/sub-basin assimilative capacity and loading estimates (including estimates for GWR and landscape irrigation projects that use recycled water), and evaluate the fate and transport of salts and nutrients. The SNMP must include implementation measures to manage salt and nutrient loadings in the basin on a sustainable basis as well as an anti-degradation analysis demonstrating that all recycling projects identified in the plan will collectively satisfy the requirements of Resolution No. 68-16. The SNMP must also include an appropriate cost-effective network of monitoring locations to determine whether salts, nutrients, and other CECs (as identified in the SNMPs) are consistent with applicable water quality objectives.

Landscape Irrigation Project Requirements

The Recycled Water Policy establishes requirements for control of incidental runoff of recycled water from irrigation areas, such as unintended minimal overspray from sprinklers. These requirements include the implementation of an operations and maintenance plan, proper design and aim of sprinklers, discontinuation of irrigation during precipitation events, and management of storage ponds to prevent overflow.

RWQCB Groundwater Requirements

The Recycled Water Policy does not limit the authority of a RWQCB to include more stringent requirements for GWR projects to protect designated beneficial uses of groundwater, if any proposed limitations for the protection of public health may only be imposed following consultation with DDW. In addition, the Recycled Water Policy does not limit the authority of a RWQCB to impose additional requirements for a proposed GWR project that has a substantial adverse effect on the fate and transport of a contaminant plume (for example, those caused by industrial contamination or gas stations), or changes the geochemistry of an aquifer thereby causing the dissolution of naturally occurring constituents, such as arsenic, from the geologic formation into groundwater.

Anti-degradation and Assimilative Capacity

Assimilative capacity is typically defined as the difference between the ambient groundwater concentration and the concomitant groundwater quality objective. In accordance with the Recycled Water Policy, two assimilative capacity thresholds were established for GWR projects considering the type of assimilative capacity that must be conducted. A GWR project that uses less than 10% of the available assimilative capacity in a groundwater basin/sub-basin (or multiple projects utilizing less than 20% of the available assimilative capacity in a groundwater basin/sub-basin) must conduct an anti-degradation analysis verifying the use of the assimilative capacity. If a project or multiple projects utilize more than the designated fractions of assimilative capacity (e.g., 10% or 20%), the project proponent must conduct a RWQCB-deemed acceptable anti-degradation analysis. Some SNMPs use these assimilative capacity values as thresholds for evaluating impacts of salt and nutrient loadings and implementation measures.

A landscape irrigation project that meets the Recycled Water Policy streamlining criteria, and which is also within a groundwater basin with an approved SNMP, may be approved by a RWQCB without further anti-degradation analysis if the project is consistent with the SNMP. A landscape irrigation project that meets the streamlining criteria, which is within a groundwater basin preparing an SNMP, may be approved by a RWQCB by demonstrating using a salt/nutrient mass balance or equivalent analysis that the project uses less than 10% of the available assimilative capacity, or less than 20% of the available assimilative capacity for multiple projects.

CECs

As part of the Recycled Water Policy, a Science Advisory Panel was formed to identify a list of CECs for monitoring in recycled water used for GWR and landscape irrigation. The Panel recommended monitoring selected health-based and treatment performance indicator CECs and surrogates for GWR projects. The Panel concluded that CEC monitoring was unnecessary for landscape irrigation. The GWR monitoring recommendations were directed at surface spreading using tertiary recycled water and injection projects using advanced water treatment.

The Recycled Water Policy was amended in 2013 to include the CEC monitoring program. The Amendment provides the final list of specific CECs and monitoring frequencies for GWR projects and procedures for both evaluating the data and responding to the results. These requirements will be incorporated into the permits for existing GWR projects and will be included as requirements for all future projects. As part of the final GWR Regulations, additional CEC requirements and monitoring locations must be met in addition to the Recycled Water Policy requirements. The next update of CEC monitoring by a SWRCB expert panel will occur in 2016.

3.2.3 California Toxics Rule and SIP

In 2000, the U.S. Environmental Protection Agency (EPA) adopted the CTR that included aquatic life criteria for 23 priority pollutants and human health criteria for 57 priority pollutants. There are two types of human health criteria: (1) criteria based on consumption of water and organisms, and (2) criteria based on consumption of organisms only.

In the same year, the SWRCB adopted implementation procedures for the CTR through the SIP. The SIP was amended in 2005. The CTR criteria and SIP are applicable to discharges of wastewater (and recycled water) to all inland surface waters and enclosed bays and estuaries of California with some exceptions, such as cases where site-specific water quality objectives have been adopted in Basin Plans.

The SIP includes procedures to determine which priority pollutants need effluent limitations; methods to calculate water quality-based effluent limitations; and policies regarding mixing zones, metals translators, monitoring, pollution prevention, reporting levels for determining compliance with effluent limitations, and whole effluent toxicity control. Using the SIP, permit limits are established for those CTR constituents that have the reasonable potential to cause or contribute to an excursion above any applicable criteria including consideration of a mixing zone if authorized by a RWQCB. The SIP also allows the SWRCB to grant an exception to complying with priority pollutant criteria in situations wherein site-specific conditions in individual water bodies or watersheds differ sufficiently from statewide conditions, wherein the exception will not compromise protection of beneficial uses, and wherein the public interest will be served.

3.2.4 Water Rights

Water Code Section 1210 states that the WWTP owner shall hold the exclusive right to the treated wastewater as against anyone who has supplied the water discharged into the waste water collection and treatment system, including a person using water under a water service contract, unless otherwise provided by agreement.

Water Code Section 1211 requires that before making a change in the point of discharge, place of use, or purpose of use of treated wastewater, the WWTP owner must seek approval from the SWRCB Division of Water Rights, which is accomplished by filing a Petition for Change for Owners of Wastewater Treatment Plants (Petition for Change). The SWRCB must be able to find that the proposed change will not injure other legal users of water, will not unreasonably harm in-stream uses, and is not contrary to the public interest.

The project concepts included in this plan would include changing the place of use (for reuse) and the point of discharge (for discharge of treated water not reused). The petition should be filed early in the planning process and in coordination with California Environmental Quality Act (CEQA) document preparation.

3.3 Central Coast RWQCB Requirements

The Central Coast RWQCB is responsible for regulating discharges to groundwater and surface water, which are subject to State water quality regulations and statutes.

3.3.1 Discharge Permit

For a discharge to land, the RWQCB would issue Waste Discharge Requirements (WDRs) that would include provisions to implement applicable State water quality control policies and plans and water quality objectives and implementation policies established in the Basin Plan.

For a surface water discharge, the RWQCB issues a National Pollutant Discharge Elimination System (NPDES) permit that would include provisions to implement the applicable CTR, State water quality control policies and plans, including water quality objectives and implementation policies established in the Basin Plan. NPDES permits must consider wasteload allocations in approved TMDLs developed for surface waters that do meet water quality standards. The Santa Ynez River between Cachuma Lake and the City of Lompoc, which includes the connecting creeks, is listed by the SWRCB as a 303(d) impaired water body for salinity, temperature, and sedimentation. The 303(d) further increases the likelihood of stricter discharge limits.

3.3.2 Basin Plan

The Basin Plan designates beneficial uses for surface water and groundwater and establishes surface water and groundwater quality objectives to project those uses. Identified uses of surface water bodies by hydrologic unit are presented in Table 2-1 of the Central Coast Basin Plan. Groundwater throughout the Central Coast basins is deemed suitable for municipal, agricultural, and industrial use.

Groundwater Requirements

The Central Coast RWQCB provides local implementation of SWRCB policies and regulations and develops and implements the 2011 Water Quality Control Plan for the Central Coastal Basin (Basin Plan) to protect surface water and groundwater quality and beneficial uses. The Basin Plan identifies groundwater objectives for the "Santa Ynez Sub-Basin," which is assumed to refer to the Uplands Basin, that are intended to serve as a water quality baseline for evaluating water quality management in the basin. The median values for groundwater objectives are shown in **Table 3-3**.

Table 3-3: Uplands Basin Median Groundwater Objectives (mg/L)

TDS	Chloride	Sulfate	Boron	Sodium	Nitrogen
600	50	10	0.5	20	1

Source: Water Quality Control Plan for the Central Coast Basin (Central Coast RWQCB, 2011), Table 3-8
Note: Objectives shown are median values based on data averages; objectives are based on preservation of existing quality or water quality enhancement believed attainable following control of point sources.

A GWR project will need to consider the assimilative capacity of the groundwater basin for specific constituents to conform to State Anti-degradation Policy (Resolution 68-16) and SWRCB Recycled Water Policy. In addition, a Salt and Nutrient Management Plan will be required.

Surface Water Requirements

The Basin Plan also designates beneficial uses and water quality objectives for surface waters. Surface water discharges that recharge groundwater are assigned a GWR beneficial use and the Basin Plan groundwater quality objectives also apply. Discharges to surface water must be of sufficient water quality to not impact groundwater quality beneficial use(s).

The Central Coast Basin Plan defines objectives for the Santa Ynez River but not for tributary creeks. NPDES requirements must be met to discharge to the creek.

Table 3-4: Santa Ynez River Surface Water Objectives at Solvang (mg/L)

TDS	Chloride	Sulfate	Boron	Sodium
700	50	250	0.4	60

Source: Water Quality Control Plan for the Central Coast Basin (Central Coast RWQCB, 2011), Table 3-7
Note: Objectives shown are median values based on data averages; objectives are based on preservation of existing quality or water quality enhancement believed attainable following control of point sources.

3.4 Discharge Permitting Options

WRRF effluent discharges would either be covered by a WDR permit for a discharge to land or an NPDES permit for a surface water discharge. An NPDES permit typically has stricter discharge requirements and/or a longer list of constituents for compliance than a WDR permit due to a combination of sensitive receptors and lack additional treatment that land provides. Also, surface water discharges have a higher risk of stricter treatment requirements in the future and a risk of increased monitoring for new constituents, which can be expensive. The advantage of surface water discharge is that percolation ponds, which can require significant acreage depending on percolation rates and whose cost is driven by land values, can be avoided.

Based on available information, surface water discharge option is not recommended due to the following challenges:

- Discouraged by both federal and state water policies;
- Additional, stringent discharge requirements to eliminate aquatic toxicity in accordance with the CTR;
- Ongoing and expensive testing for compliance with the CTR;
- Uncertain, constantly evolving regulatory environment; and
- Difficulty ceasing discharge once established, particularly if the receiving water supports endangered species and the discharge is considered a significant contribution to base flows.

3.5 Recycled Water Project Permitting Options

In addition to discharge regulations, recycled water projects must meet Title 22 requirements.

3.5.1 SWRCB General Permit

The Water Reclamation Requirements for Recycled Water Use (General Order), adopted on June 7, 2016, replaced the existing statewide Waste Discharge Requirements for Recycled Water Use (2014-0090-DWQ) and established standard conditions for recycled water for non-potable uses such as landscape irrigation, crop irrigation, dust control, industrial/commercial cooling, decorative fountains, etc. Potable reuse activities are not authorized under the General Order. The purpose of the General Order is to streamline permitting of recycled water use statewide and further encourage recycled water projects by acknowledging recycled water as a resource through water reclamation requirements.

To obtain coverage under the General Order, an applicant must have an approved Engineering Report and submit a Notice of Intent to the RWQCB within its jurisdiction. Producers, Distributors, or Users of recycled water covered under existing permits may elect to continue or expand coverage under the existing permits or apply for coverage under the General Order.

3.5.2 Individual Non-Potable Reuse Project Permits

The DDW, as part of the SWRCB, has the statutory authority to issue WDRs and Water Recycling Requirements (WRRs). Under the current permitting framework where the RWQCB issues the permit for WDRs or WRRs, project sponsors are required to submit an Engineering Report to DDW and RWQCB, as well as a Report of Waste Discharge to the RWQCB. In issuing the permit, the RWQCB is required to consult with DDW. Any reclamation requirements included in a permit must conform to Title 22. The RWQCBs have the option of issuing a Master Reclamation Permit in lieu of individual WRRs for a project involving multiple uses. The Master Permit can be issued to a recycled water supplier or distributor, or both.

3.5.3 Groundwater Recharge Projects

The process for project approval and permitting of GWR projects is similar to individual non-potable reuse project permits; however, the Engineering Report prepared for DDW has a more prominent role in review and approval of the project. The RWQCB would issue the permit based on requirements consistent with the GWR Regulations, Basin Plans, SNMPs, and State policies. The type of permit (WDR and/or WRR) issued depends on how and where the recycled water is “discharged”.

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Chapter 4 Market Assessment

4.1 Methodology

The goal of the recycled water market assessment is to identify near- and long-term uses of recycled water within the study area. The market assessment included a detailed examination within the service area of potential users and demands, supply availability, and implementation challenges. The methodology used for the market assessment is described below.

- Identify potential users within a reasonable distance of potential treatment plant sites
- Determine potential recycled water demands, including seasonal and daily peaking factors
- Evaluate recycled water quality relative to potential types of use
- Review availability of recycled water supply relative to timing of demands

4.2 Non-Potable Reuse Market

4.2.1 Approach

Potential non-potable reuses in the study area are predominantly for irrigation and were divided into landscape irrigation (e.g., parks and golf courses) and agricultural irrigation. An initial list of irrigation customers was provided by ID#1 and screened to include those within approximately 1 mile of SYCSD's existing sewer main that is located along Mission Drive (Hwy 246) and then near Alamo Pintado Creek. In addition, aerial imagery on Google Earth was reviewed to identify irrigated areas that were excluded from the initial list.

Then, the potential recycled water demand for each customer was calculated based on estimated irrigated acreage, crop or landscape information, and estimated irrigation for each crop or turf type. The irrigated area was estimated by calculating the parcel size using GIS and assuming that 90 percent of the parcel is irrigated, which is typical for agricultural parcels. Crop and landscape information for each parcel was obtained from ID#1 and supplemented or revised with aerial imagery. The irrigation demands were estimated using the DWR landscape coefficient method (DWR, 2000) and applying local evapotranspiration and precipitation data from California Irrigation Management Information System (CIMIS) Station #64 - Santa Ynez. The basis for applied irrigation rates for different types of crops and landscapes are summarized in **Table 4-1**.

Table 4-1: Applied Irrigation Rate Basis

Irrigation Type	End Use Type	Crop Coefficient (K_c)[1]	Irrigation Efficiency (IE)[2]	End Use Demand (AFY/acre)[3]
Agricultural Irrigation	Vineyard	0.5	0.95	1.5
	Food Crops	0.75	0.75	3.0
	Pasture / Rangeland	0.75	0.75	3.0
	Nursery	0.8	0.95	2.5
	Orchard	0.8	0.75	3.25
Landscape Irrigation	Golf	0.8	0.75	3.5
	Roadway / Trans.	0.4	0.75	1.5
	Park / Open Space	0.7	0.75	2.75

Source: Guide to Estimating Irrigation Water Needs of Landscape Plantings in California (DWR, 2000).
Notes:

1. Crop coefficient (K_c) is determined from field research where water loss from a crop is measured over an extended period.
2. Irrigation Efficiency (IE) is the beneficial use of applied water (by plants).
3. End Use Demand = Sum of Monthly: (ETo * Kc / IE) – Effective Precipitation.
    a. ETo = Reference Evapotranspiration; estimated from a Class A evaporation pan or from a specialized weather station.
    b. Effective Precipitation is estimated as half of the total precipitation.

4.2.2 Potential Non-Potable Reuse

The results of the initial non-potable market assessment from applying the methodology above are summarized in **Table 4-2** and are shown in **Figure 4-1**.

Table 4-2: Santa Ynez Study Area Non-Potable Reuse Market

Irrigation Type	End Use Type	Parcel Area (Acres)	Estimated Irrigated Area (Acres)	% of Total
Agricultural Irrigation	Vineyard	394	355	27%
	Food Crops	518	466	35%
	Pasture / Rangeland	362	326	25%
	Nursery	32	29	2%
	Orchard	37	34	2%
Landscape Irrigation	Golf	114	103	8%
	Park / Open Space	8.4	7.6	1%
Total		**1,465**	**1,321**	**100%**

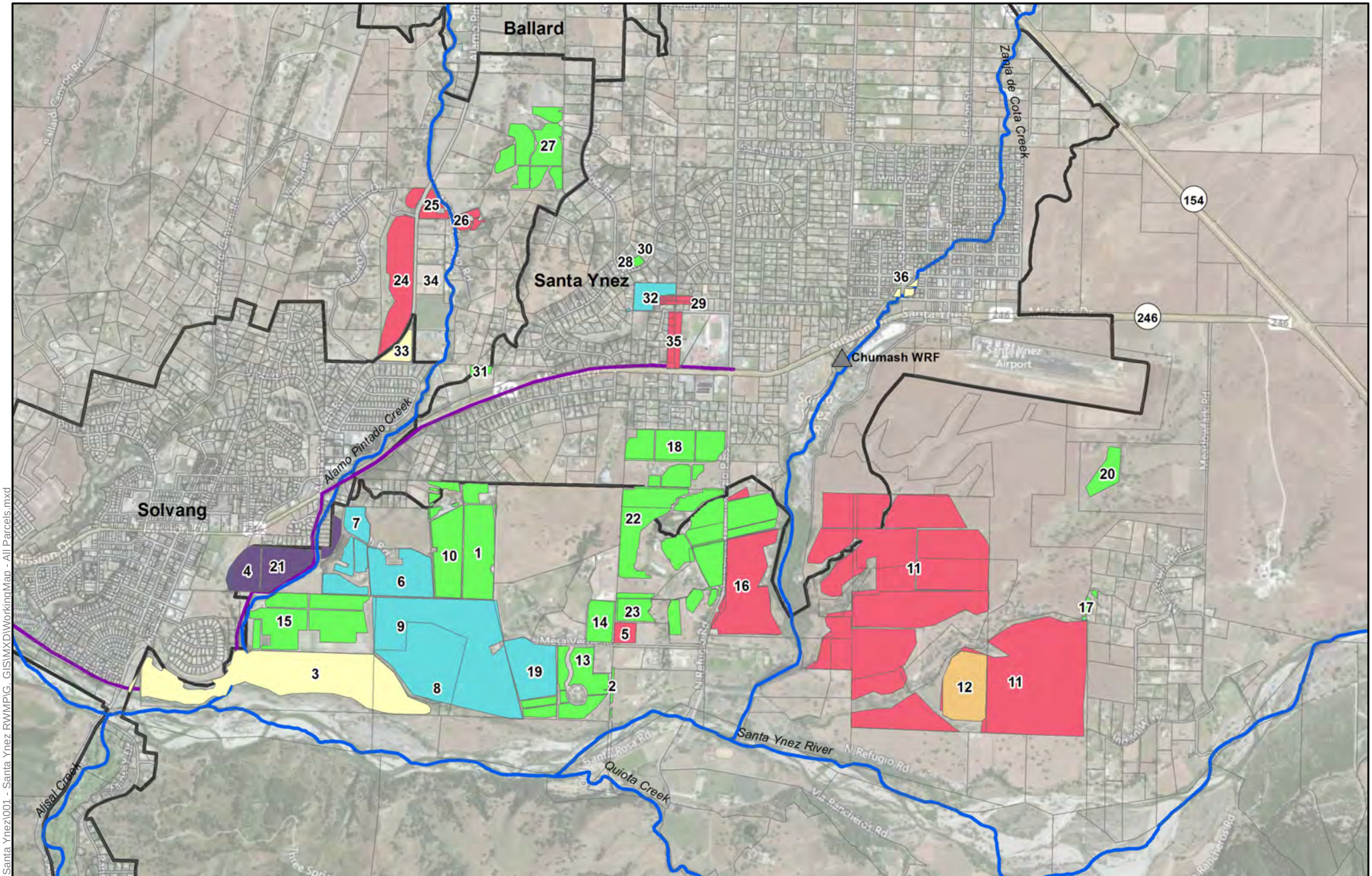
Note: 90 percent of parcel area was assumed to be irrigated for all end use types.

The municipal recycled water demands in the study area are for landscape irrigation at parks and golf courses. Three potential recycled water customers were identified with a combined potable water demand of 381 AFY. These potential customers are listed in **Table 4-3** and are shown in Figure 4-1.

Table 4-3: Landscape Irrigation Demand Estimates

ID	Name	Type of Landscape Irrigation	Irrigated Area (Acres)	Applied Water Irrigation Rate (AFY/acre)	Estimated Demand (AFY)
2	Alisal Guest Ranch Golf Course	Golf Course	103	3.5	360
48	Sunnyfields Park	Park	6	2.75	16
51	Santa Ynez Park	Park	2	2.75	5
	Total		**111**	**-**	**381**

A total of 31 agricultural areas with a total estimated demand of 3,089 AFY were identified. Of these customers, 15 have potential recycled water demands greater than 50 AFY and a combined potential demand of 2,808 AFY, as shown in **Table 4-4**. All potential agricultural customers are shown in **Figure 4-1** and are listed in Appendix A.



Crop Types

Landscape Irrigation

Agriculture:

Food Crops

Nursery

Orchard

Pasture/Rangeland

Vineyard

Other Features

Rivers/Creeks

SYCSD Sewer Main

RMC water and environment

Figure 4-1: Study Area Non-Potable Demands

Table 4-4: Agricultural Irrigation Demand Estimates

ID	Crop Type	Parcel Area (Acres)	Estimated Irrigated Area (Acres)	Applied Water Irrigation Rate (AFY/Acre)	Estimated Demand (AFY)
1	Vineyard	38	34	1.5	52
6	Pasture/Rangeland	31	28	3	84
7	Pasture/Rangeland	25	23	3	68
8	Pasture/Rangeland	47	42	3	127
9	Pasture/Rangeland	190	171	3	514
11	Food Crops	435	391	3	1,173
12	Nursery	32	29	2.5	73
15	Vineyard	58	52	1.5	78
16	Food Crops	54	49	3	146
18	Vineyard	44	39	1.5	59
19	Pasture/Rangeland	30	27	3	80
21	Orchard	23	21	3.25	67
23	Vineyard	96	87	1.5	130
24	Food Crops	38	34	3	103
27	Vineyard	40	36	1.5	54
	Subtotal (> 50 AFY)	**1,181**	**1,063**	**-**	**2,808**
	Remaining Parcels at < 50 AFY (16)	162	146	-	281
	Total	**1,343**	**1,209**		**3,089**

4.2.3 Salinity Sensitivity of Irrigation Demands

Recycled water may meet minimum water quality requirements for DDW public health protection but some crops are sensitive to specific constituents. Three common categories of water quality-related issues are (Ayers and Wescot, 1985):

- Salinity: Salts in soil or water reduce water availability to the crop to such an extent that yield is affected.
- Water Infiltration Rate: Relatively high sodium or low calcium content of soil or water reduces the rate at which irrigation water enters soil to such an extent that sufficient water cannot be infiltrated to supply the crop adequately.
- Specific Ion Toxicity: Certain ions (sodium, chloride, boron) from soil or water accumulate in sensitive crops and cause crop damage and/or reduce yields.

Table 4-5 presents estimated recycled water quality for these constituents and **Table 4-6** characterizes four degrees of restriction (tolerant, moderately tolerant, moderately sensitive, and sensitive) for use of recycled water, which vary depending on crop type. Based on the tables, effluent from a new WRRF is likely not acceptable for "sensitive" crops or turf and may be acceptable for "moderately sensitive" crops or turf. As shown in **Table 4-7** and **Figure 4-2**, roughly 60 percent of the irrigated acreage falls within the moderately sensitive category while most of the balance falls within the moderately tolerant category.

Table 4-5: Estimated Salinity Concentrations in Recycled Water (mg/L)

TDS	Sodium	Chloride
900 mg/L	150 mg/L	200 mg/L

Note: Estimates based on Solvang WWTP influent and effluent quality monitoring. TDS, sodium and chloride concentrations increased in 2014 and 2015 due to strict water conservation mandates. An average of concentrations before and after the mandate (in May 2014) was used.

Table 4-6: Salinity Sensitivity by Crop Type

Salinity Sensitivity	Tolerant	Moderately Tolerant	Moderately Sensitive	Sensitive
TDS Range with 100% Yield (mg/L)	2,560 – 3,840	1,280 - 2,560	320 - 960	0 - 640
Crop Type	--	Oats Olive Pasture Squash Zucchini Landscape: Parks	Alfalfa Cabbage Grape Kale Lettuce Pumpkin	Apple Apricot Blackberry Peach Raspberry Strawberry

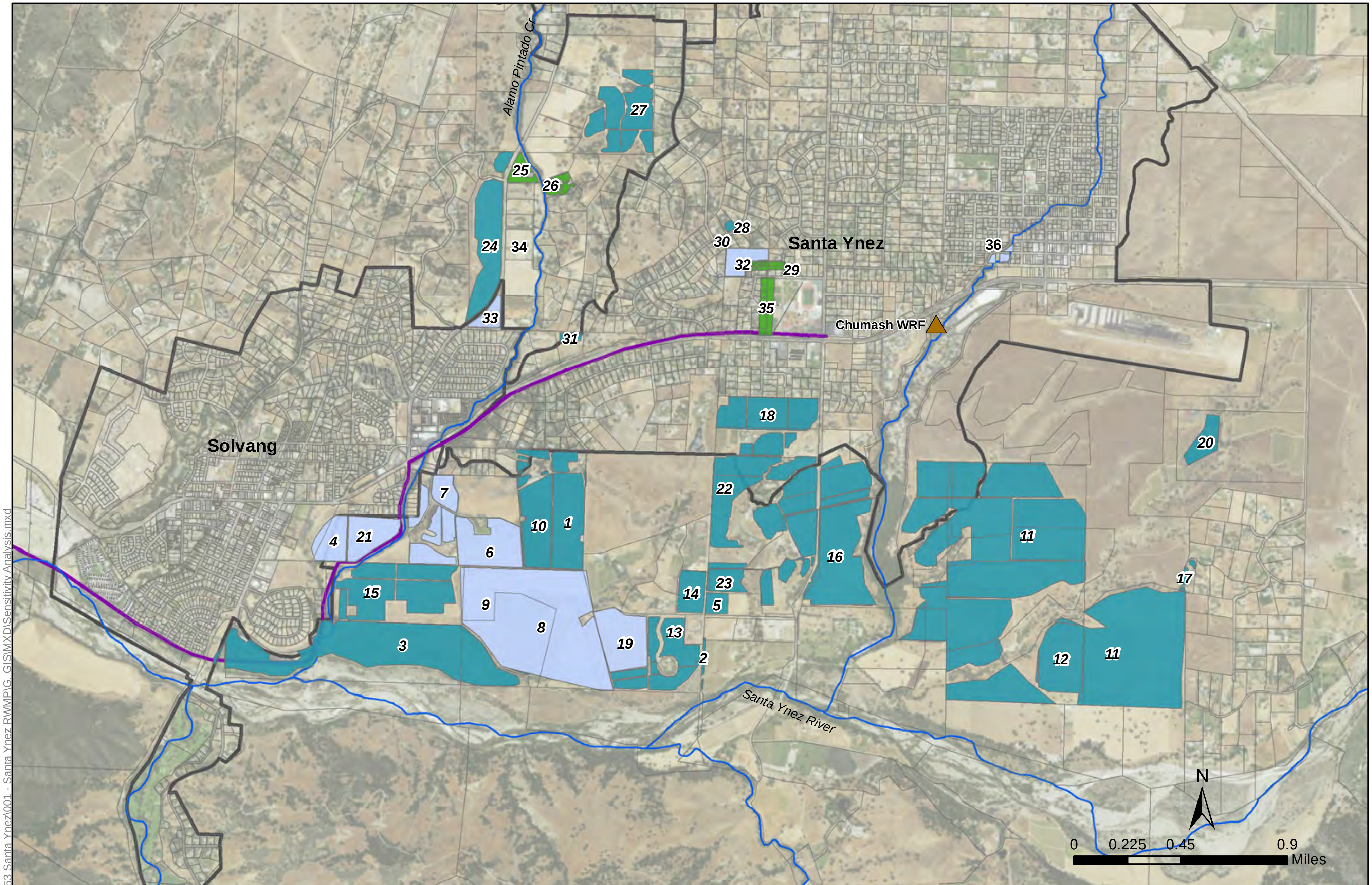
Source: Ayers and Wescot, 1985.

Table 4-7: Non-Potable Reuse Market Summary by Salinity Sensitivity

Salinity Sensitivity	Estimated Irrigated Area (Acres)	Estimated Demand (AFY)
Tolerant	-	-
Moderately Tolerant	393	1,236
Moderately Sensitive	907	2,174
Sensitive	20	61
Total	**1,320**	**3,471**

Based on consideration of salinity sensitivity, irrigation with recycled water should focus first on moderately tolerant crops and then on moderately sensitive crops. Salinity reduction could be achieved through additional treatment, blending with higher quality sources, and/or constituent source management. RO treatment removes approximately 98% of aqueous salts and metal ions. Application of RO to a portion of tertiary effluent would reduce TDS, sodium, and chloride to acceptable concentrations; however, any treatment process that involves RO results in production of a concentrate that must be disposed of and can result in significant costs, especially when there is no access to an ocean outfall.

Salinity (levels in wastewater are primarily influenced by the potable water supply sources, human excretion, types of waste discharges, water conservation practices, and the use of water softeners. An alternative to treatment involves taking proactive steps to reduce salinity inputs to wastewater that can be managed, such as restricting water softener operation (e.g., requiring use of exchangeable canisters that can be discharged at an ocean outfall).



Sensitivity Categories

Moderately Tolerant

Moderately Sensitive

Sensitive

Features

WRF

SYCSD Sewer Main

Parcels

Cities / Communities

Rivers/Creeks

RMC water and environment

Figure 4-2: Salinity Sensitivity by Crop

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4.3 Groundwater Recharge

For the Uplands Basin, percolation of precipitation, seepage from creeks, underflow from consolidated rocks surrounding the basin and irrigation return flow, including return flow from imported water (Cachuma Project, SWP, and Alluvium Basin) enters the shallow groundwater zone. From this zone, groundwater either percolates farther downward to recharge the regional groundwater system or flows laterally by relatively shallow subsurface pathways to discharge as base flow in local streams. Base flow in local creeks is sustained by discharge of groundwater from the basin. The amount of base flow is sensitive to the overall water balance of the groundwater basin and is impacted by only moderate decreases in basin storage (Tetra Tech, 2010).

The Paso Robles Formation is the principal aquifer of the Uplands Basin. Anecdotal evidence suggests that the efficiency of recharge of this formation from the surface is highly variable due to high geologic variability in the unsaturated zone. In addition, GWR with recycled water receiving tertiary treatment requires substantial diluent water volumes ranging from 1:1 to 4:1 ratios of diluent water to recycled water. The primary potential diluent supply is SWP water.

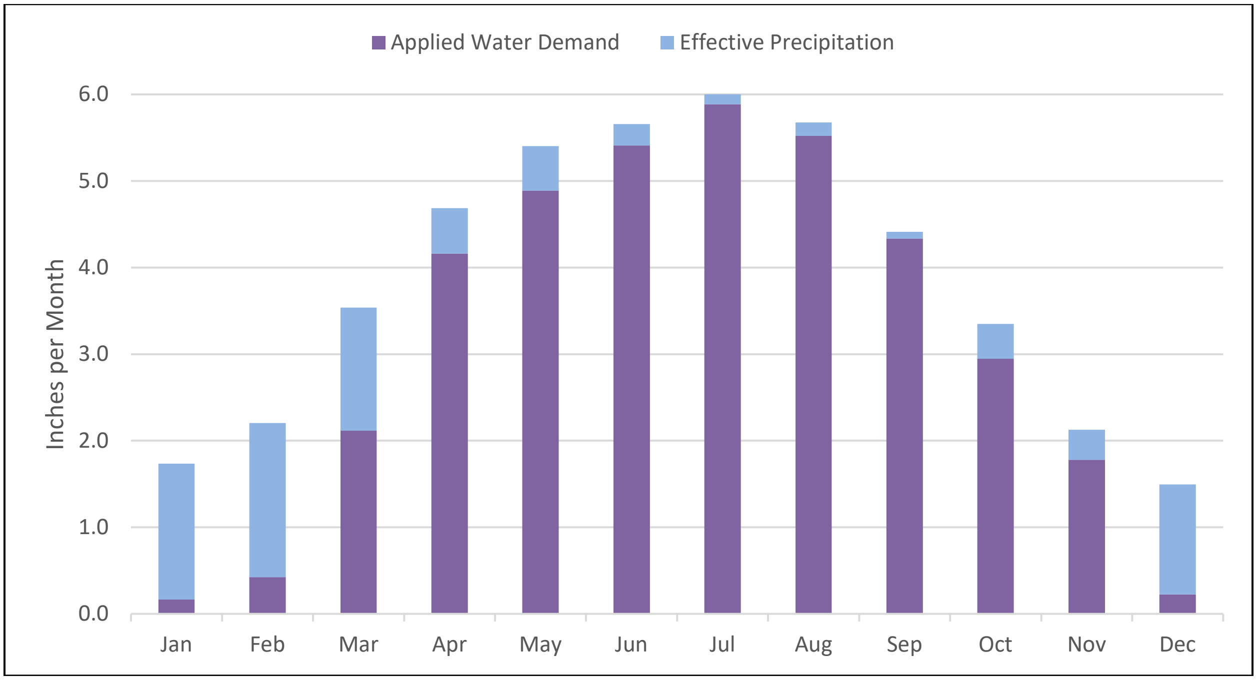
Groundwater recharge with recycled water via surface spreading was not investigated further due to the suspected lack of reliable recharge efficiency combined with a lack of cost effective blend water supply.

A typical alternative to surface spreading is using wells for recharge via direct injection; however, direct injection of recycled water requires RO (refer to Section 3.1.2), which produces a highly saline concentrate as a waste product that is expensive to treat further and/or dispose. As a result, GWR with recycled water via injection wells was not pursued either.

4.4 Recycled Water Supply versus Demand

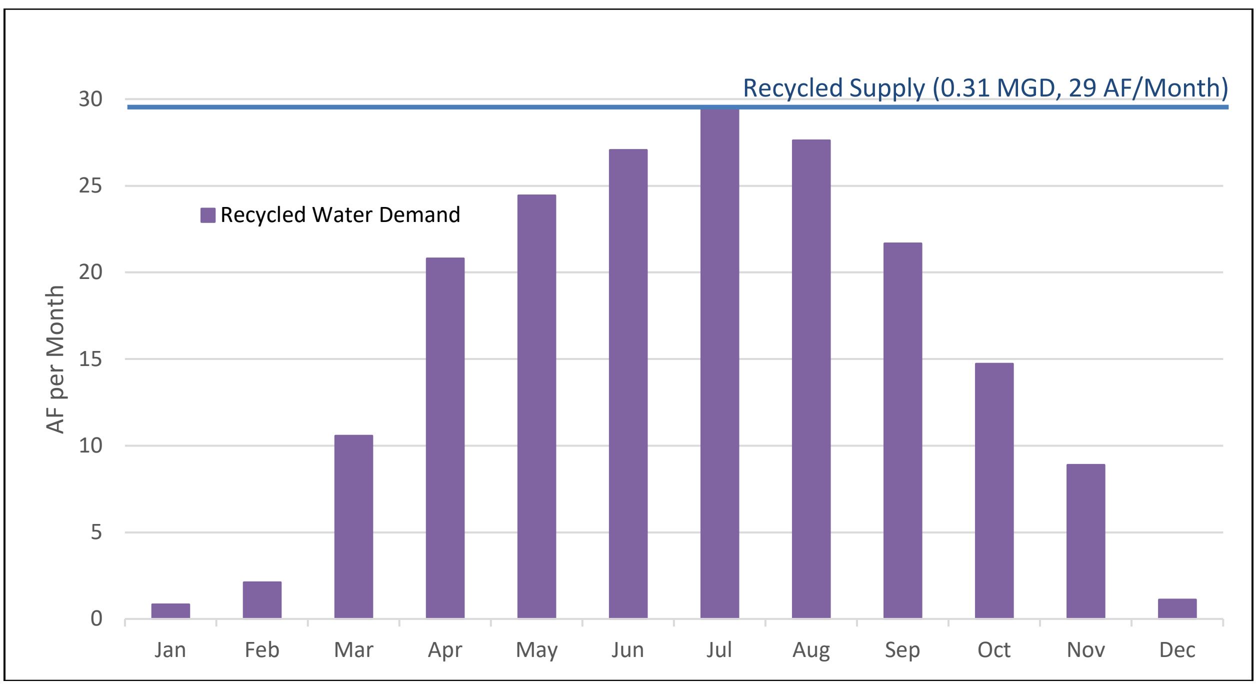
Irrigation water demand is a function of the crop-specific evapotranspiration, irrigation method efficiency, and effective precipitation. An example site with a crop factor of 0.70, irrigation efficiency of 0.75, and effective precipitation of 0.5 results a total water demand of 46 inches per year (3.9 AFY/ac) and an applied irrigation demand of roughly 37 inches per year (3.1 AFY/ac). The example applied water demand and effective precipitation is shown on a monthly basis in **Figure 4-3**. The typical seasonal total water demand is evident with the highest demands in the summer that also correspond to the lowest precipitation which results in a strong seasonal variation in applied water needs.

Figure 4-3: Example Seasonal Irrigation Demand Pattern



The WRRF is projected to treat up to 310,000 gpd (29 AF per month; 350 AFY) of local flows and will produce this volume of recycled water relatively consistently throughout the year. However, recycled water demand for irrigation is seasonal and peaks in July, as demonstrated in the previous figure. Approximately 60 acres of the example crop would consume 29 AF in July based on the demand. Recycled water use on the example 60 acres would results in approximately 190 AF of recycled water use, as shown in **Figure 4-4**, leaving roughly 160 AFY of unused available recycled water.

Figure 4-4: Monthly Irrigation Demand versus Recycled Water Supply



4.5 Market Assessment Summary

The non-potable market assessment identified roughly 3,500 AFY of irrigation demand while only roughly 350 AFY of recycled water supply would be produced by the WRRF. Of this potential demand, roughly 1,200 AFY of irrigation would be for uses with moderate tolerance to salinity. Since supplies exceed identified demands, potential recycled water customers will be refined based on location relative to the recycled water supply. Potential locations are discussed in the alternatives analysis in Chapter 6.

GWR with recycled water was considered but ultimately excluded from further evaluation. Therefore, recycled water for irrigation is carried forward as the focus of this plan.

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Chapter 5 Recycled Water Treatment Alternatives

This chapter identifies recycled water treatment alternatives that provide sufficient water quality for the market segments identified in Chapter 4. The chapter is organized into the following sections:

- WRRF Design Basis
- Treatment Technologies
- Discharge Analysis
- Chumash WRF Modification Alternative

5.1 WRRF Design Basis

5.1.1 Design Influent Loadings

Design influent loadings were developed from projected wastewater flows and quality data included in Section 2.3 and are presented in **Table 5-1**. Note that the "local" flows scenario of 0.31 MGD is the basis for all alternatives since the "regional" flow scenario (0.49 MGD) has significant institutional barriers to implementation. Also, the difference between the near-term flow (0.25 MGD) and ultimate flow (0.31 MGD) was minor such that generally it is more cost effective to install facilities for the ultimate scenario now than try to expand later to accommodate the minor increase in flow.

Table 5-1: Design Mass Loadings (lbs/day)

Constituent	Average Concentration	Peak Concentration
BOD	827	1,109
TSS	455	745
Ammonia-N	97	129
Organic-N	65	90
TKN	162	220
TDS	1,745	2,198
Oil & Grease	323	388
Chloride	424	473
Sodium	383	406

5.1.2 Assumed Effluent Limits

Assumed effluent limits for the proposed WRRF are a combination of the existing Solvang WWTP discharge requirements and the most recent discharge permit in the area (Chumash WRF). The Solvang WWTP (WDR Order No. R3-2007-0069, October 2007) discharges to evaporation / percolation ponds and the Chumash WRF discharges to Zanja de Cota Creek (NPDES Permit No. CA0050008, June 2014). Assumed WRRF effluent limits are based on the more stringent limit between the two permits for a given constituent and are presented in **Table 5-2**.

Table 5-2: Anticipated Effluent Limits

Parameter	Units	Average Monthly	Peak Daily	Average Monthly	Peak Daily
		Chumash WRF		Solvang WWTP	
BOD	mg/L	10	15	30	45
TSS	mg/L	10	15	20	40
Ammonia-N	mg/L	-	25		
Organic-N	mg/L	5	7.5		
TKN	mg/L	5	7.5		
TDS	mg/L	1,100 mg/L Average Annual		1,000	1,400
Turbidity	NTU	2	5		
pH	S.U.	7.0 - 8.3	7.0 - 8.3		
DO	mg/L	5	5		
Total Coliform Bacteria	MPN/100 mL	-	2.2		
Settleable Solids	mL/L	1	2	0.1	0.3
Oil & Grease	mg/L	10	15		
Chloride	mg/L	-	-	150	250
Sodium	mg/L	-	-	150	250

Note: Assumed WRRF effluent limits are based on the more stringent limit between the two permits for a given constituent.

5.2 WRRF Treatment Technologies

There are several technologies available that can be used to meet the anticipated effluent limits based on the design loadings. In this study, only those technologies with proven records for treating wastewater at similarly-sized developments and for the anticipated effluent limits will be evaluated. Three treatment alternatives were identified for evaluation in this study and include:

1. Conventional Activated Sludge (CAS), Extended Aeration
2. Sequence Batch Reactor (SBR)
3. Membrane Bioreactor (MBR)

These alternatives are identified by the secondary treatment system employed to meet BOD and total nitrogen effluent requirements. Each of the above alternatives has advantages and disadvantages, ranging from cost and space requirements to ease of operation and expandability of the technology.

In general, each of the treatment alternatives identified above includes coarse screening, grit removal, a secondary treatment system, tertiary filtration, disinfection, and solids handling processes. All treatment processes will be housed in an enclosed, ventilated building to ensure the WRRF can blend into the surrounding area and minimize any adverse impacts to adjacent activities. In subsequent cost analyses, a pre-engineered steel building, such as that depicted in **Figure 5-1**, is assumed. Detailed descriptions of each alternative, including process flow schematics, facility summaries, and both capital and operating costs, are included in the sections that follow.

Figure 5-1: Example of a Pre-Engineered Steel Building for WRRF Enclosure

Source: Protective Weather Structures, Inc. (http://pwssteelbuildings.com/)

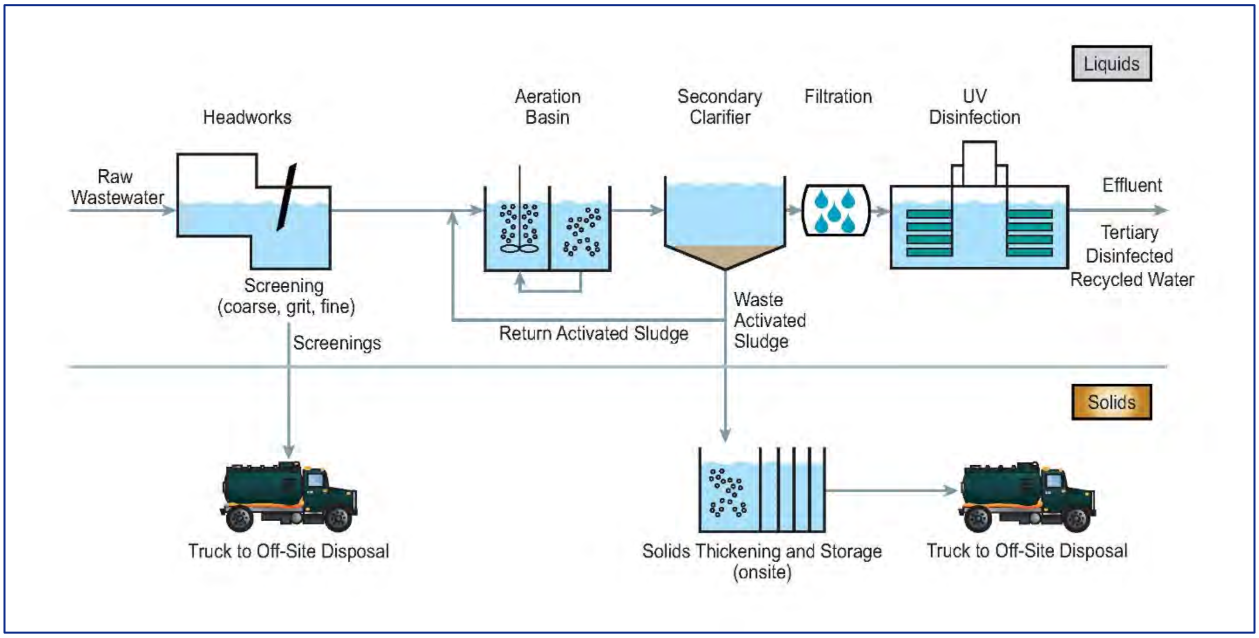
5.2.1 Conventional Activated Sludge (CAS), Extended Aeration

For the proposed CAS, Extended Aeration alternative, the following process components are required:

- Coarse Screening
- Grit Removal
- Secondary Treatment (CAS, Extended Aeration)
- Tertiary Filtration
- Disinfection
- Solids Handling

A process schematic showing the proposed CAS, Extended Aeration alternative is shown in **Figure 5-2** and descriptions of each process with the basis for equipment selection are included below.

Figure 5-2: Process Schematic for CAS, Extended Aeration Alternative



Coarse Screening

Coarse screening removes large debris and solids from the influent wastewater and typically consists of screenings equipment with openings of 6 millimeters (mm) (0.25 inch) or larger. Material caught by coarse screening equipment includes toilet paper, trash, and other large debris. Coarse screening is intended to remove some of the larger-diameter solids prior to reaching downstream equipment, which can get overloaded and rendered inoperable by excessive screenings loadings. The load caught by coarse screens depends largely on the character of the collection system upstream of the WRRF.

Equipment options and configurations considered for coarse screening include:

- Channel-mounted spiral screens with integrated compaction and washing
- Rake/auger/traveling band screens
- Bar screens

For the proposed application, channel-mounted spiral screens are most appropriate because they are automatic, self-cleaning and housed inside a steel tank that can be mounted on a skid at the appropriate hydraulic grade. For low flows, spiral screens are more economical than the other options and require the least amount of operator attention to maintain continuous operation.

The WRRF is assumed to be equipped with a bypass channel mounted with a manual bar screen. Coarse screening can be temporarily taken out of service without long-term impacts to downstream equipment, so only one unit will be installed.

Grit Removal

Removal of grit from the wastewater flow helps to minimize grit accumulation in downstream process tanks, which, over time, can reduce the effective volume of these tanks, and increase equipment wear. The grit load to the WRRF is expected to be low relative to a similarly-sized plant having an older collection system. However, grit is expected and is recommended to be included as protection for mechanical equipment and to ensure that grit does not accumulate in the biological process basins.

Equipment options and configurations considered for grit removal include:

- Mechanical vortex grit removal
- Aerated grit removal
- Stacked tray grit separation

Due to the low capital and operations and maintenance (O&M) cost and proven reliable performance, a mechanical vortex grit removal system is assumed. The vortex grit removal system provides the best combination of small footprint, good removal efficiency, low power consumption and low odor generation. To accommodate the full range of anticipated influent flows, it is recommended that one automated grit removal system be installed. The grit removal system will have a bypass pipe to allow for continued plant operation during maintenance.

Due to the design capacity of the WRRF and the expected grit load, additional grit washing and classification equipment is considered to have minimal value and is not included. The cost of dedicated grit washers/classifiers outweighs the reduced hauling costs due to potential volume reduction.

Secondary Treatment

In a CAS process, wastewater is aerated in an aeration basin in which micro-organisms metabolize the suspended and soluble organic matter to achieve effluent BOD target concentrations. A portion of the organic matter is synthesized into new cells and the remaining matter is oxidized to carbon dioxide and water to derive energy. The new cells formed in the reaction are removed from the liquid stream in the form of a flocculent sludge ("floc") via settling in secondary clarifiers. A portion of this settled biomass, described as activated sludge, is returned to the aeration tank (Return Activated Sludge or RAS) and the remaining forms waste or excess sludge (Waste Activated Sludge or WAS).

For the WRRF, the CAS process would be modified in two ways:

- Extended Aeration: By increasing aerobic detention times, the primary sedimentation process that would typically precede the CAS process can be eliminated. As a result, the wastewater influent starts with a higher concentration of inert solids than a typical CAS process would experience.
- Modified Ludzack-Ettinger (MLE) Configuration: To achieve effluent total nitrogen target concentrations, the CAS process can be modified to allow nitrification and denitrification processes to occur. This is most easily accomplished by using the MLE configuration. This configuration adds an anoxic zone (where little to no air is injected) upstream of the aerobic zone. In the aerobic zone, ammonia and organic nitrogen are converted to nitrate. Nitrified effluent is then recycled back to the anoxic zone where nitrate is converted to nitrogen gas via denitrification and then released to the atmosphere.

Tertiary Filtration

To produce disinfected tertiary recycled water, this alternative will need to meet Title 22 filtration requirements for unrestricted non-potable use. To meet these requirements, tertiary filtration following the secondary treatment system is required.

Equipment options and configurations considered for tertiary filtration include:

- Deep bed sand filters
- Cloth media disk filters

To minimize the space required for tertiary filtration, cloth media disk filters are assumed. Cloth media disk filters have a smaller footprint and do not require the energy-intensive, air scouring blowers or large volume of concrete relative to flow required by deep bed sand filters.

Disinfection

To produce disinfected tertiary recycled water, this alternative will need to meet Title 22 disinfection requirements for unrestricted non-potable use. The two most common Title 22 disinfection methods are:

- Chlorine
- Ultraviolet (UV) light

To minimize the space and large volume of concrete relative to flow required for disinfection facilities, as well as minimize chemical transportation and delivery, UV disinfection is assumed. An alternative to UV disinfection is chlorine disinfection, which would require a much larger footprint and would require more chemical use and delivery. There are several state-certified manufacturers of UV disinfection equipment, each of which has specific design criteria and sizing parameters. In general, the equipment will be closed vessel type.

Solids Handling

Solids handling is assumed to include the following components:

- Solids storage tank
- Mechanical thickening/dewatering

The solids storage tank is envisioned as an aerated tank sized to allow for holiday weekend (3-day) storage of waste activated sludge. In general, the waste solids are not expected to settle in the solids storage tank. Instead, the tank is intended to support daily wasting and to support filling of tanker trucks for off-site disposal or thickening/dewatering processes.

Mechanical thickening/dewatering would further reduce the volume of solids needed to be trucked off-site. Thickening and/or dewatering is a mechanical process to remove additional water and to reduce the total weight of the sludge prior to disposal. Thickening and dewatering of solids typically requires chemical addition (i.e., polymer).

Three technologies to consider for thickening are:

- Gravity belt thickener
- Rotary drum thickener
- Membrane thickener

Thickening would increase solid concentration to about 3% to 4% depending on technology and solids characteristics. Gravity belt and rotary drum thickeners require polymer addition while membrane thickening does not.

Two technologies to consider for mechanical dewatering are:

- Belt filter press
- Screw press

Belt presses require operator attention during start-up and shut down to ensure proper operation while a screw press may increase the amount of time available for dewatering as it can operate for longer periods of time without operator intervention. Both technologies would require polymer systems. Both technologies can produce cake with a solids concentration between 12% and 18% while capturing 95% or more of the influent solids.

To minimize the space for solids handling facilities while providing the means for further solids reduction, solids storage with a membrane thickening system is assumed. Further evaluation is recommended to determine whether a thickening system is required at all. A dewatering system is not considered necessary at this time.

Non-Process Components

In addition to the treatment components described above, the following non-process components will be required:

- Influent or Intermediate Pump Station
- Effluent Pump Station
- Odor Control Facilities
- Electrical Switchgear and Standby Generator
- Operations Control Room
- Laboratory
- Stormwater Management Facilities

Facility Summary

Process equipment selection and sizing used to establish the cost basis for the CAS, Extended Aeration alternative are summarized in **Table 5-3**.

Table 5-3: Facility Summary for CAS, Extended Aeration Alternative

Facility	Scenario 1B	Scenario 2B
Pretreatment		
Coarse Screening		
Type	Channel-Mounted Spiral Screen	Channel-Mounted Spiral Screen
Number of Units	1	1
Grit Removal		
Type	Mechanical Vortex	Mechanical Vortex
Number of Units	1	1
Secondary Treatment		
CAS Basins		
Total Design Capacity (gpd)	310,000	490,000
Number of Treatment Basins	1 (2 trains)	1 (3 trains)
Pre-Anoxic Volume (cf)	3,500	5,500
Pre-Anoxic HRT (hours)	2.0	2.0
Aerobic Volume (cf)	48,000	75,250
Aerobic HRT (hours)	28	28
Minimum Basin Volume (gal)	385,200	604,000
Length (ft)	125	175
Width (ft)	32	32
Depth (ft)	18	18
SRT, Aerobic (days)	12.6	12.6
MLSS (mg/L)	3,500	3,500
F:M (lb BOD/lb MLSS x day)	0.14	0.14
Clarifiers		
Number of Units	1 (see note)	2

Facility	Scenario 1B	Scenario 2B
Overflow Rate at PDWF (gpd/sf)	750	750
Length (ft)	25	25
Width (ft)	35	35
Tertiary Filtration		
Type	Cloth Media Disk	Cloth Media Disk
Number of Units	1	1
Number of Filters per Unit	3	3
Surface Area per Disk (sf)	58.3	58.3
Total Surface Area (sf)	174.9	174.9
Loading Rate at ADWF (gpm/sf)	1.23	1.95
Loading Rate at PDWF (gpm/sf)	2.22	3.49
Disinfection		
Type	Ultraviolet, Closed Vessel	Ultraviolet, Closed Vessel
Number of Units	1	1
Transmittance (%)	65	65
Dose (mJ/cm^2)	100	100
Solids Handling		
WAS Loading		
Hydraulic (gpd)	15,000	22,000
Solids (ppd)	1,250	1,850
Minimum Storage Required (days)	3	3
Volume Required (gal)	45,000	66,000
Number of Basins	1	2
Volume per Basin (gal)	45,000	66,000

Note: Redundant clarifier was not included in Scenario 1B to minimize costs.

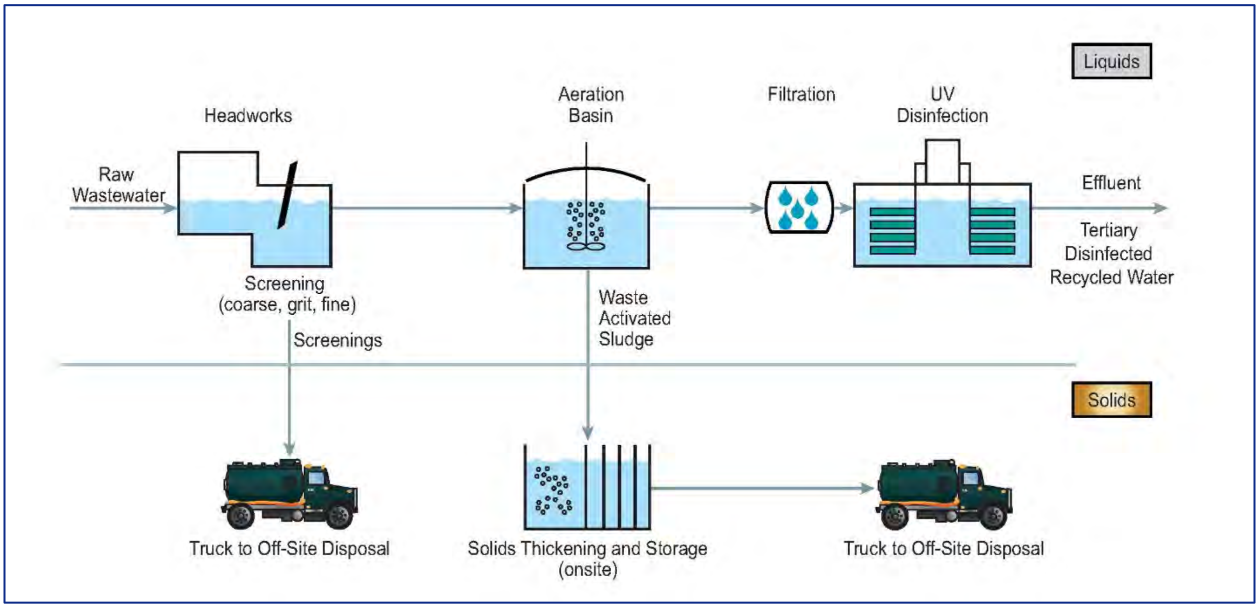
5.2.2 Sequence Batch Reactor (SBR)

For the proposed SBR alternative, the following process components are required:

- Coarse Screening
- Grit Removal
- Secondary Treatment (SBR)
- Tertiary Filtration
- Disinfection
- Solids Handling

In comparison to the CAS, Extended Aeration alternative, the SBR alternative does not require secondary clarification tanks. A process schematic showing the proposed SBR alternative is shown in **Figure 5-3** with descriptions of each process and the basis for equipment selection.

Figure 5-3: Process Schematic for SBR Alternative



Coarse Screening

The basis for selecting coarse screening equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Coarse Screening.

Grit Removal

The basis for selecting grit removal equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Grit Removal.

Secondary Treatment

The SBR is a true “batch” system where equalization, treatment and clarification are all achieved within the confines of a single reactor. The typical treatment cycle of an SBR includes separate fill, react, settle and decant treatment phases. Since these processes occur in a single basin, footprint requirements are reduced and mixed liquor recycle (MLR) pumping needed to achieve nitrification is eliminated.

Two basins would be constructed. One basin would serve as the SBR reactor while the other reactor would serve as an equalization basin to attenuate diurnal peak flows and store influent wastewater. Once the SBR cycle is complete and the effluent has been decanted, the influent in the equalization basin would be pumped into the SBR reactor and the cycle repeated.

Tertiary Filtration

The basis for selecting tertiary filtration equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Tertiary Filtration.

Disinfection

The basis for selecting disinfection equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Disinfection.

Solids Handling

The basis for selecting solids handling equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Solids Handling.

Non-Process Components

In addition to the treatment components described above, the non-process components identified for the CAS, Extended Aeration alternative in Section 5.2.1, Non-Process Components will be required.

Facility Summary

Process equipment selection and sizing used to establish the cost basis for the SBR alternative is summarized in **Table 5-4**.

Table 5-4: Facility Summary for SBR Alternative

Facility	Scenario 1B	Scenario 2B
Pretreatment		
Coarse Screening		
Type	Channel-Mounted Spiral Screen	Channel-Mounted Spiral Screen
Number of Units	1	1
Grit Removal		
Type	Mechanical Vortex	Mechanical Vortex
Number of Units	1	1
Secondary Treatment		
Total Design Capacity (gpd)	310,000	490,000
Number of Treatment Basins	2	3
Minimum Volume per Basin (gal)	145,000	217,500
Length (ft)	50	50
Width (ft)	25	25
Depth (ft)	18	18
Full Tank Liquid Depth (ft)	15	15
HRT (hours)	45	37
SRT (days)	25	19
MLSS (mg/L)	3,500	3,500
F:M (lb BOD/lb MLSS x day)	0.09	0.10
Tertiary Filtration		
Type	Cloth Media Disk	Cloth Media Disk
Number of Units	1	1
Number of Filters per Unit	3	3
Surface Area per Disk (sf)	58.3	58.3
Total Surface Area (sf)	174.9	174.9
Loading Rate at ADWF (gpm/sf^2)	1.23	1.95
Loading Rate at PDWF (gpm/sf^2)	2.22	3.49
Disinfection		
Type	Ultraviolet, Closed Vessel	Ultraviolet, Closed Vessel
Number of Units	1	1
Transmittance (%)	65	65
Dose (mJ/cm^2)	100	100

Facility	Scenario 1B	Scenario 2B
Solids Handling		
WAS Loading		
Hydraulic (gpd)	12,300	20,600
Solids (ppd)	1,025	1,716
Minimum Storage Required (days)	3	3
Volume Required (gal)	36,900	61,800
Number of Basins	1	2
Volume per Basin (gal)	37,000	62,000

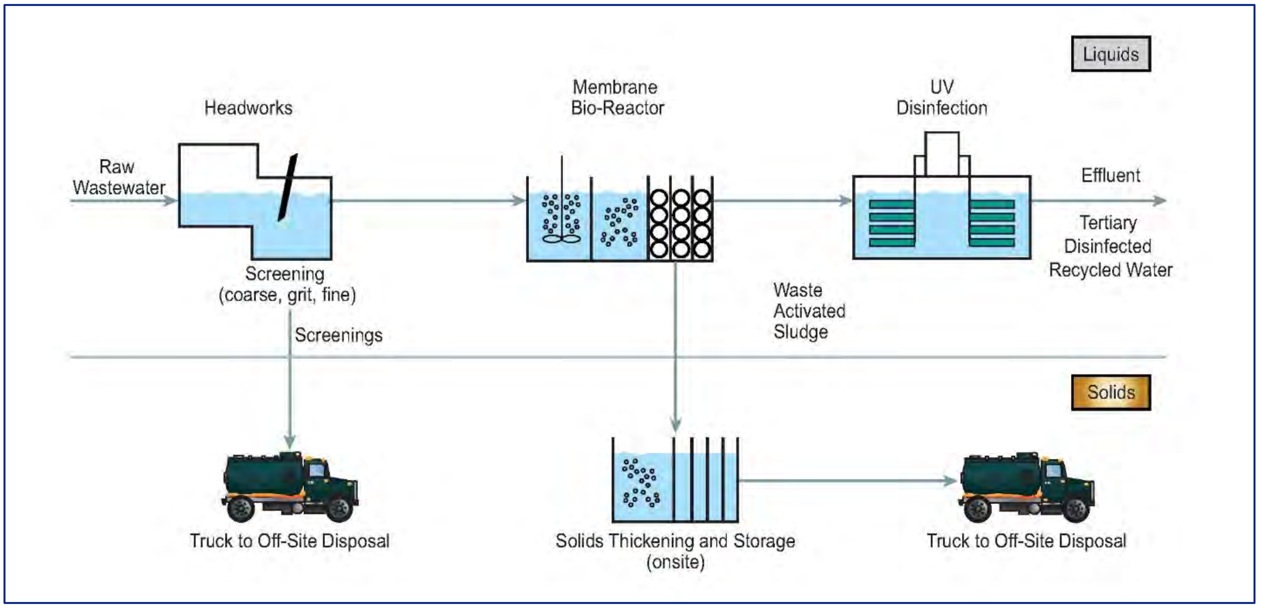
5.2.3 Membrane Bioreactor (MBR)

For the proposed MBR alternative, the following process components are required:

- Coarse Screening
- Grit Removal
- Fine Screening
- Secondary Treatment and Tertiary Filtration (MBR)
- Disinfection
- Solids Handling

In comparison to the CAS and SBR alternatives, the MBR alternative requires Fine Screening to protect downstream membranes but does not require secondary clarification tanks (for the CAS alternative) or tertiary filtration (for both the CAS and SBR alternatives). A process schematic showing the proposed MBR alternative is shown in **Figure 5-4** and descriptions of each process, and the basis for equipment selection, is included below.

Figure 5-4: Process Schematic for MBR Alternative



Coarse Screening

The basis for selecting coarse screening equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Coarse Screening.

Grit Removal

The basis for selecting grit removal equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Grit Removal.

Fine Screening

Fine screening is essential to protect the membranes of the MBR system. As such, fine screen units will be installed with redundancy and will be capable of passing the maximum hydraulic flow (peak hour flow). The fine screens will be sized with the capability of removing all screenings greater than 2-mm without blinding the equipment and assuming no upfront coarse screening. Each fine screen will have an associated washer/compactor to ensure screenings are continually removed from the screenings discharge chute and conveyed to the dumpster for off-site removal.

Equipment options and configurations considered for fine screening include:

- Internally-fed rotary drum screens
- In-channel rotating drum screens with integrating screw conveyor
- Traveling band screens

For the proposed application, internally-fed rotary drum screens are the assumed method of fine screening. The primary reason is that internally-fed rotary drum screens have the least chance of passing through screenings to the downstream processes. In-channel rotating drum screens have a seal between the drum and the channel that can wear and fail over time. Traveling band screens can carry over screened materials if the spray system and brushes that clean the band are not sufficient to wash off material, resulting in material sticking to the band until it is carried to the downstream side.

Secondary Treatment and Tertiary Filtration

The MBR process consists of a reactor, with multiple treatment stages and various levels of mixing and aeration, followed by membrane filtration for solids separation. A biomass is cultured in the reactor in concentrations much higher than in the conventional processes, typically in the range of 8,000 to 10,000 mg/L as compared to 3,000 to 4,000 mg/L in conventional processes. This higher concentration of biomass allows for smaller aeration tanks than in a conventional process. In addition, the use of membrane filtration eliminates the need for secondary clarification and tertiary filtration facilities.

The biological process for an MBR is controlled similarly to a CAS process, whereby solids retention time (SRT) is adjusted to achieve the desired removal efficiencies. The reactor can also be configured for nitrification and denitrification to meet total nitrogen effluent limits by adding anoxic stages and mixed liquor return pumping.

The membranes used downstream of the biological process in an MBR utilize polymeric filtration media with extremely small pore sizes ranging from 0.04 microns (hollow fiber) to 0.2 microns (flat sheet) to separate solids from the treated effluent. These membranes are certified to meet the Title 22 filtration requirements.

For the proposed application, a “submerged” membrane system will be utilized. In this system, the membranes are submerged and subjected to a vacuum to draw effluent through the membranes. The membranes are then routinely agitated by coarse bubble aeration and/or backwashed to minimize suspended solids accumulation on the membrane surface. In addition, all membrane systems require periodic chemical cleaning to address organic and inorganic fouling.

Disinfection

The basis for selecting disinfection equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Disinfection.

Solids Handling

The basis for selecting solids handling equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Solids Handling.

Non-Process Components

In addition to the treatment components described above, the non-process components identified for the CAS, Extended Aeration alternative in Section 5.2.1, Non-Process Components will be required.

Facility Summary

Process equipment selection and sizing used to establish the cost basis for the MBR alternative is summarized in **Table 5-5**.

Table 5-5: Facility Summary for MBR Alternative

Facility	Scenario 1B	Scenario 2B
Pretreatment		
Coarse Screening		
Type	Channel-Mounted Spiral Screen	Channel-Mounted Spiral Screen
Number of Units	1	1
Grit Removal		
Type	Mechanical Vortex	Mechanical Vortex
Number of Units	1	1
Fine Screening		
Type	Internally-fed Rotary Drum Screen	Internally-fed Rotary Drum Screen
Number of Units	2	2
Secondary Treatment, MBR		
Total Design Capacity (gpd)	310,000	490,000
Number of Treatment Units	2	3
Anoxic Zone		
Volume Per Unit (gal)	20,000	20,000
Total Volume, Anoxic (gal)	40,000	60,000
Aerobic Zone		
Volume Per Unit (gal)	40,000	40,000
Total Volume, Oxic (gal)	80,000	120,000
Total Volume, Treatment (gal)	120,000	180,000
MLSS (mg/L)	8,500	8,500
Recycle Rate	4Q	4Q
Number of Membrane Units	4	6
Cassettes per Unit	3	3

Facility	Scenario 1B	Scenario 2B
Total Cassettes	12	18
Cartridges per Cassette	24	24
Total Cartridges	288	432
Total Membrane Area (sf)	65,100	97,650
Flux at ADWF (gfd)	4.45	4.81
Flux at PDWF (gfd)	8.0	8.7
Flux at PHF (gfd)	17.8	19.3
Disinfection		
Type	Ultraviolet, Closed Vessel	Ultraviolet, Closed Vessel
Number of Units	1	1
Transmittance (%)	65	65
Dose (mJ/cm^2)	100	100
Solids Handling		
WAS Loading		
Hydraulic (gpd)	6,900	10,600
Solids (ppd)	575	885
Minimum Storage Required (days)	3	3
Volume Required (gal)	20,700	31,800
Number of Basins	1	2
Volume per Basin (gal)	21,000	32,000

5.2.4 Recycled Water Treatment Alternatives Cost Estimates

A comparative summary of the construction, implementation and O&M costs for the three treatment alternatives are presented in **Table 5-6** (Local WRRF Scenarios) and **Table 5-7** (Regional WRRF Scenarios). The purpose of the information presented in these tables is solely to provide a comparison between the treatment alternatives and should not be considered a complete capital cost estimate. For example, costs associated with real property acquisition and development, collection and effluent management systems, and sludge hauling and disposal are not included. The costs included in the following tables are conceptual level estimates. A breakdown of the costs for each alternative is included in Appendix D.

Table 5-6: Recycled Water Treatment Alternatives, Cost Estimates for Local WRRF ($M)

Items	CAS	SBR	MBR
Capital Costs			
Raw Construction Cost	$7.7	$6.7	$8.3
Construction Contingency (30%)	$2.3	$2.0	$2.5
Base Construction Cost	$10.0	$8.7	$10.8
Implementation Costs (35%)	$3.5	$3.0	$3.8
Total Capital Costs	**$13.5**	**$11.7**	**$14.6**
Annual Costs			
Annual O&M Costs	$0.2	$0.2	$0.3
Present Worth (20 yrs @ 3%)	$3.6	$3.2	$4.0
Total Present Worth Costs	**$17.1**	**$14.9**	**$18.6**

Table 5-7: Recycled Water Treatment Alternatives, Cost Estimates for Regional WRRF ($M)

Items	CAS	SBR	MBR
Capital Costs			
Raw Construction Cost	$9.4	$8.0	$9.9
Construction Contingency (30%)	$2.8	$2.4	$3.0
Base Construction Cost	$12.2	$10.4	$12.9
Implementation Costs (35%)	$4.3	$3.6	$4.5
Total Capital Costs	**$16.5**	**$14.0**	**$17.4**
Annual Costs			
Annual O&M Costs	$0.3	$0.2	$0.3
Present Worth (20 yrs @ 3%)	$3.8	$3.4	$4.4
Total Present Worth Costs	**$20.3**	**$17.4**	**$21.8**

5.2.5 Comparison of Alternatives

In addition to both capital and O&M costs, the following additional criteria are typically considered when selecting a treatment technology for a new WRRF:

- Effluent Quality: Each treatment technology evaluated will achieve compliance with Title 22 recycled water quality requirements. When compared, treatment technologies that produce effluent with consistently higher quality will be rated higher.

- Sludge Production: Waste sludge generated by the treatment technologies evaluated will ultimately be hauled off-site for disposal, which has a direct impact on O&M costs. When compared, treatment technologies that generate lower volumes of sludge will be rated higher.
- Ease of Operation, Automated: The operational complexity for each treatment technology varies and due to existing limited staffing resources, it is anticipated that automated operation of the treatment process will be critical. When compared, treatment technologies that are simpler to operate from an automated perspective will be rated higher.
- Footprint: The footprint required by each treatment technology evaluated has a direct impact on both capital and O&M costs (i.e., due to ventilation requirements). When compared, treatment technologies with a smaller footprint will be rated higher.
- Odors / Odor Control: Odors are considered a public nuisance and require odor control facilities to mitigate. These odor control facilities have a direct impact on both capital and O&M costs. When compared, treatment technologies that generate less odor will be rated higher.
- Expandability: To accommodate potential future flows from neighboring cities (e.g., Ballard, Los Olivos, etc.), the treatment technologies evaluated need to be expandable. When compared, treatment technologies that are more easily expanded and include modular features will be rated higher.

A summary comparison of the relative advantages and disadvantages of each treatment technology for each of the above criteria is presented in **Table 5-8**.

Table 5-8: Summary Comparison of Treatment Technologies

Criteria	CAS, Extended Aeration	SBR	MBR
Cost, Capital	0	+	-
Cost, O&M	+	+	-
Effluent Quality	0	0	+
Sludge Production	-	0	+
Ease of Operation, Automated	+	-	0
Footprint	-	0	+
Odors / Odor Control	-	0	+
Expandability	-	0	+

Key
(+) Advantage
- Neutral
(-) Disadvantage

In general, the following statements can be made regarding the three treatment alternatives:

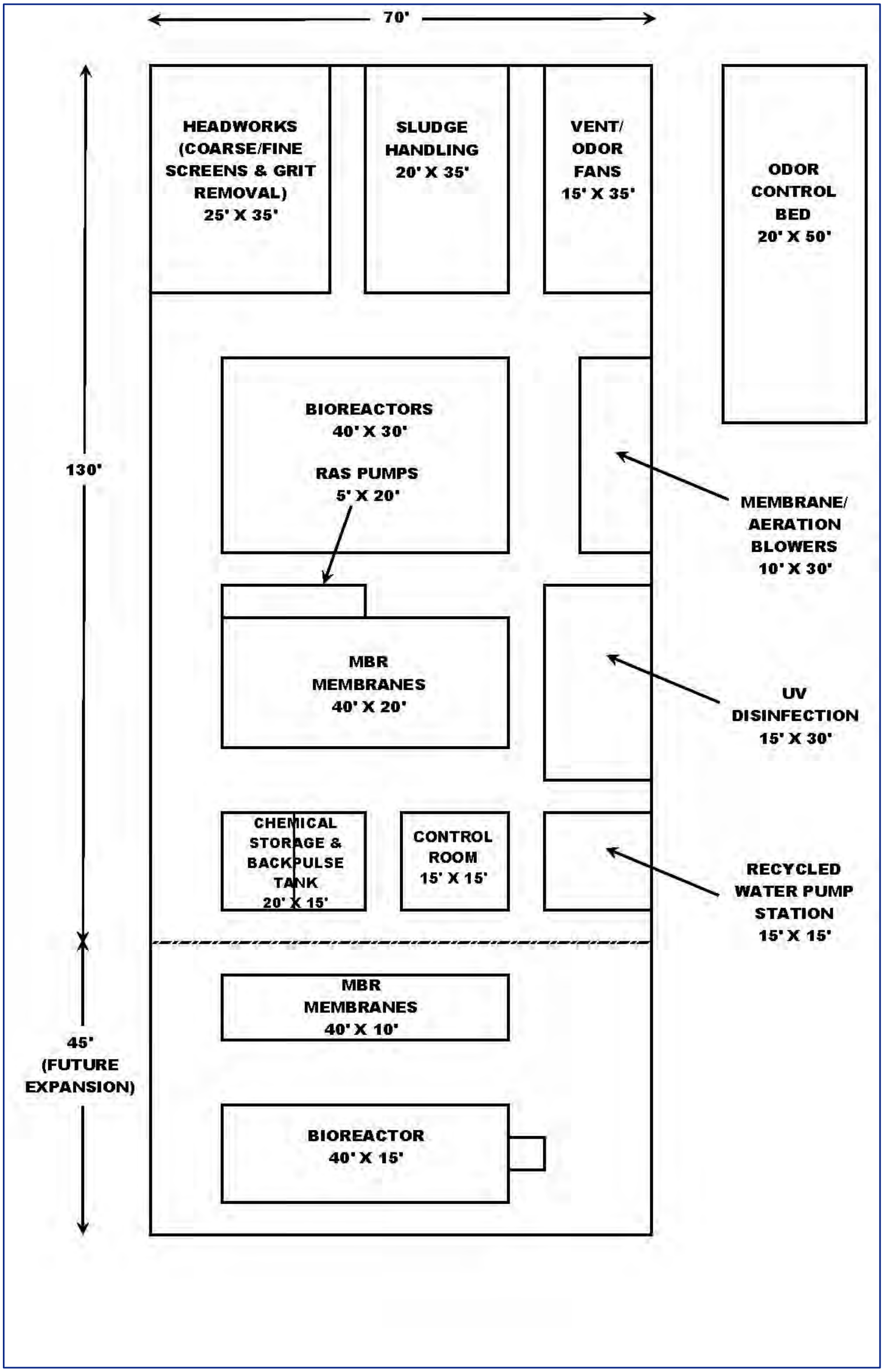
- The SBR alternative has the lowest capital construction cost and the MBR alternative has the highest capital construction cost.
- The MBR alternative has the highest operating costs, resulting from power costs due to membrane air scouring requirements, chemical costs due to membrane cleaning requirements, and periodic membrane replacement.
- The MBR alternative provides the greatest removal efficiencies and highest quality effluent of the three alternatives.

- The MBR alternative produces the least amount of sludge of the three alternatives. This is an important factor since sludge will be hauled off-site for disposal.
- The “batch” nature of the SBR alternative requires the most interfacing with an operator. While it is a relatively straightforward process to operate, adding automation to reduce on-site personnel time requires more sophisticated controls than the other treatment technologies.
- Due to the smaller footprint of its bioreactor and longer solids retention times (SRT), the MBR alternative produces the least odor of the three alternatives.
- The modular nature of the MBR alternative makes it the easiest to expand to accommodate future changes in flow.

Based on an evaluation of the above criteria, with equal weight given to each element, the MBR alternative is the highest ranked alternative, followed by the SBR alternative and then the CAS, Extended Aeration alternative.

An example layout for the MBR alternative is included in **Figure 5-5**. It is initially sized for local flows (0.31 MGD) with an expansion option for regional flows (0.49 MGD). The enclosed portion of the facility is approximately 12,250 SF and would be reduced to 9,100 SF if only local flows are included.

Figure 5-5: MBR Alternative Layout



5.3 Discharge Analysis

A new WRRF must have discharge capacity for all effluent. This is true even if the effluent is beneficially reused for irrigation since irrigation demands are seasonal and cannot be relied upon as a sole discharge method. There are two primary methods for effluent disposal in an inland setting: 1) Percolation ponds (e.g., the Solvang WWTP); and 2) Surface water discharge (e.g., the Chumash WRF).

As discussed in Section 3.4, surface water discharges generally have stricter discharge limits to accommodate surface water beneficial uses, additional compliance requirements (such as California Toxics Rule and TMDLs), and lack of a soil buffer between the discharge point and the water of concern. As a result, the focus of this discharge analysis is on percolation ponds. However, a surface water discharge may be reconsidered in the future if the cost of percolation ponds is deemed too high due to the required area and land purchase cost.

Percolation ponds are basins where effluent is held for both percolation into the ground and evaporation. Sizing requirements are primarily dependent on the sustained percolation rate. The maximum percolation rate is limited by soil type and the sustained rate depends on fluctuating groundwater levels and proper basin maintenance. Technical pond siting requirements consider distance to the nearest well, depth to groundwater, and groundwater quality. In addition, land availability and suitability for the surroundings are considerations.

Soils in the study area are mostly clay loam and some locations have sandy loam (UC Davis Soilweb[6]). Clay loam has a permeability of 0.20 to 0.63 inches per hour and sandy loam has a permeability of 2.0 to 6.3 inches per hour. Typically, sustained percolation rates are estimated at between 4 and 10 percent of the saturated vertical permeability (EPA, 2006). Ten percent of the average permeability results in a percolation rates of 1.0 inches per day (in/day) for clay loam soil and 10.0 in/day for sandy loam soil.

Minimum percolation pond recharge areas were estimated based on a monthly water balance that considered inputs (effluent and precipitation) and outputs (evaporation and percolation). Also, a 25 percent factor was added to the minimum recharge area to account for pond berms and vehicle access. Several scenarios were defined to understand sensitivity to the percolation rate and discharge flow:

- Clay Loam Soil: Discharge via percolation pond at 1.0 in/day
- Clay Loam Soil: Discharge via percolation pond at 1.0 in/day and reuse via irrigation
- Sandy Loam Soil: Discharge via percolation pond at 10.0 in/day
- Sandy Loam Soil: Discharge via percolation pond at 10.0 in/day and reuse via irrigation

The four scenarios were evaluated for local buildout flows (Scenario 1B, 310,000 gpd) and, as shown in **Table 5-9**, a 10-fold increase in the assumed percolation rate reduced percolation area requirements by roughly 9 times; while the addition of reuse via irrigation reduced the percolation area by half. The analysis demonstrates the benefits of siting a percolation basin in an area with higher sustained percolation rates. Also, the range in potential percolation rates and the associated impact on the area required for disposal supports the benefits of site-specific field percolation testing as a next step.

[6] http://casoilresource.lawr.ucdavis.edu/gmap/

Table 5-9: Summary of Percolation Pond Area Requirements

Soil Type	Disposal Method	Percolation Pond Area Footprint	Irrigation Reuse Demand & Area
Clay Loam	Percolation Ponds Only	14 acres[1]	--
	Percolation Ponds & Agricultural Irrigation	7 acres[1]	190 AFY[2] 59 acres
Sandy Loam	Percolation Ponds Only	2 acres[1]	--
	Percolation Ponds & Agricultural Irrigation	1 acre[1]	190 AFY[2] 59 acres

Notes:
1. Percolation area is based on monthly water balance (Appendix C) plus 25 percent area to account for berms, access, etc.
2. Based on example crop demand from Section 4.4 with an annual demand of 3.1 AFY per acre.

5.4 Chumash WRF Modification Alternative

As an alternative to constructing a new WRRF, modifying the Chumash WRF to accommodate anticipated flows was explored. The Chumash WRF is owned by the Santa Ynez Band of Chumash Indians (Chumash) and operated by the District under contract to the Chumash. The facility treats wastewater flows from the Chumash Casino Resort (Resort) and is located on tribal land to the southeast of the Resort.

The existing WRF includes an influent lift station, fine screening equipment, MBR process, UV disinfection, and centrifuge for solids dewatering. The existing secondary treatment includes anoxic, aerobic, and post anoxic zones for biological nutrient removal and membrane filtration for tertiary treatment. The plant is designed to produce effluent quality consistent with the State of California's Title 22 requirements for unrestricted reuse. **Table 5-10** summarizes the plant design influent parameters.

Table 5-10: Chumash WRF Design Influent Parameters

Item	Unit	Parameter
Average Day Dry Weather Flow (ADWF)	MGD	0.17
Peak Day Dry Weather Flow (PDWF)	MGD	0.32
BOD	mg/L	640
TSS	mg/L	480
TKN	mg/L	85

Source: Chumash Casino Resort WRF Process Improvements, Process Design Criteria (Sheet M1.0), Job No. A626, Dec 2015.

The following two options were evaluated to determine the feasibility of expanding the Chumash WRF to accommodate SYCSD Ultimate (Scenario 1B) flows:

1. MBR Expansion
2. Flow Equalization

In both options, it was assumed that the Chumash WRF would not require any further enhancements or expansion to address the ongoing expansion of the Resort. Due to the challenge in routing flows from the Cities of Ballard and Los Olivos to the existing Chumash WRF, Regional Ultimate (Scenario 2B) flows were not considered as part of this analysis; but they could be considered in a future analysis if merited.

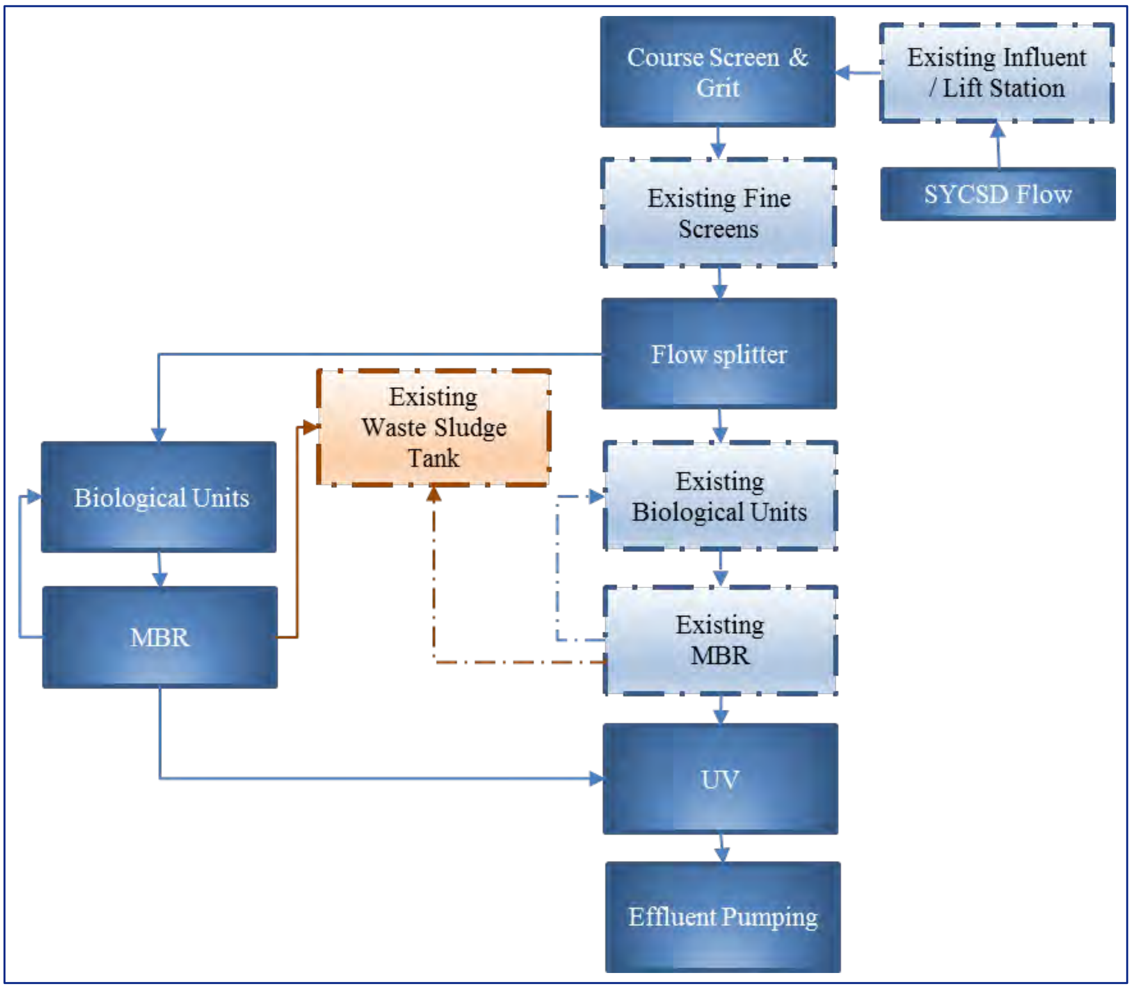
5.4.1 MBR Expansion Alternative

In the MBR Expansion alternative, the following facilities would be constructed to address the additional anticipated flows from the District:

- New Headworks (Coarse Screening, Grit Removal)
- New MBR Train (Reactor, Membranes, Process Air Compressors)
- New UV Disinfection
- Effluent Pump Station

A flow schematic showing the proposed MBR Expansion alternative is shown in **Figure 5-6** and descriptions of each process with the basis for equipment selection are included below.

Figure 5-6: Chumash WRF MBR Expansion Alternative



Under this alternative it is assumed that the existing Chumash WRF design capacity will remain unchanged and a new treatment train for SYCSD flow will be required. **Table 5-11** summarizes the design influent parameters for this alternative.

Table 5-11: MBR Expansion Design Influent Parameters

Condition	ADWF (MGD)	BOD (mg/L)	TSS (mg/L)	TKN (mg/L)
SYCSD Design (Scenario 1B)	0.31	429	288	85
Existing Chumash WRF Design	0.17	640	480	85
New Chumash WRF Design	0.48	504	356	85

Influent Pump Station

Flow from SYCSD will be diverted to the existing influent lift station. The station will be modified to pump the flow to the proposed coarse screening and grit removal facility.

Coarse Screening & Grit Removal

New coarse screening and grit removal equipment is proposed upstream of existing fine screens. The basis for selecting coarse screening and grit removal equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Coarse Screening and Section 5.2.1, Grit Removal, respectively.

Fine Screening

The existing Clean TEK Roto-Sieve fine screens and washer compactor will continue to be used.

Flow Splitter

Piping from the existing fine screens will be modified to split the flow between the existing secondary and the proposed secondary treatment facilities.

Secondary Treatment and Tertiary Filtration

The existing secondary treatment and MBR system will remain and an additional secondary treatment and MBR system will be constructed to accommodate the additional anticipated flows. The basis for process design be will the same as presented in Section 5.2.3 for the MBR alternative.

Disinfection

The existing UV system is rated for 0.4 MGD and does not have the capacity for the additional flow. It was also installed more than ten years ago. It is assumed that the existing UV disinfection equipment will be replaced as part of this alternative. The basis for selecting disinfection equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Disinfection.

Effluent Pump Station

The existing station consists of two (2) effluent pumps rated at 220 gpm at 60 ft total dynamic head (TDH). An additional 220 gpm pump, and associated piping and accessories, will be needed to expand the pump station capacity.

Solids Handling

Based on available information, the existing solids handling facilities have sufficient capacity and no additional improvements will be required.

Facility Summary

Process equipment selection and sizing used to establish the cost basis for the MBR Expansion alternative is summarized in **Table 5-12**.

Table 5-12: Facility Summary for MBR Expansion Alternative

Facility	MBR Expansion [a]	
Pretreatment		
Coarse Screening, Type (Number of Units)	Channel-Mounted / Spiral Screen (1)	
Grit Removal, Type (Number of Units)	Mechanical Vortex (1)	
Fine Screening, Type (Number of Units)	Internally-fed / Rotary Drum Screen (2)	
Secondary Treatment, MBR	**Existing Treatment**	New Treatment Train
Total Design Capacity (gpd)	320,000	
Number of Treatment Units	2	2
Anoxic Zone, Total Volume (gal)	62,000	45,000
Aerobic Zone, Volume Per Unit (gal)	218,000	120,000
Post Anoxic, Total Volume (gal)	57,450	45,000
Total Volume (gal)	**337,450**	210,000
HRT (hour)	26	16
Total HRT (hour)	21	
MLSS (mg/L)	8,500	8,500
Number of Membrane Units	2	2
Cassettes per Unit	3	3
Total Cassettes	6	6
Cartridges per Cassette	24	24
Total Cartridges	144	144
Total Membrane Area (sf)	32,550	32,550
Disinfection		
Type, Number of Units	Ultraviolet, Closed Vessel (1)	
Transmittance (%)	65	
Dose (mJ/cm^2)	100	
Effluent Pump Station	220 gpm pumps (2)	220 gpm pump (1)
Solids Handling	Existing	

Note: Items in black font indicate proposed equipment, while items in gray font indicate existing equipment.

5.4.2 Flow Equalization Alternative

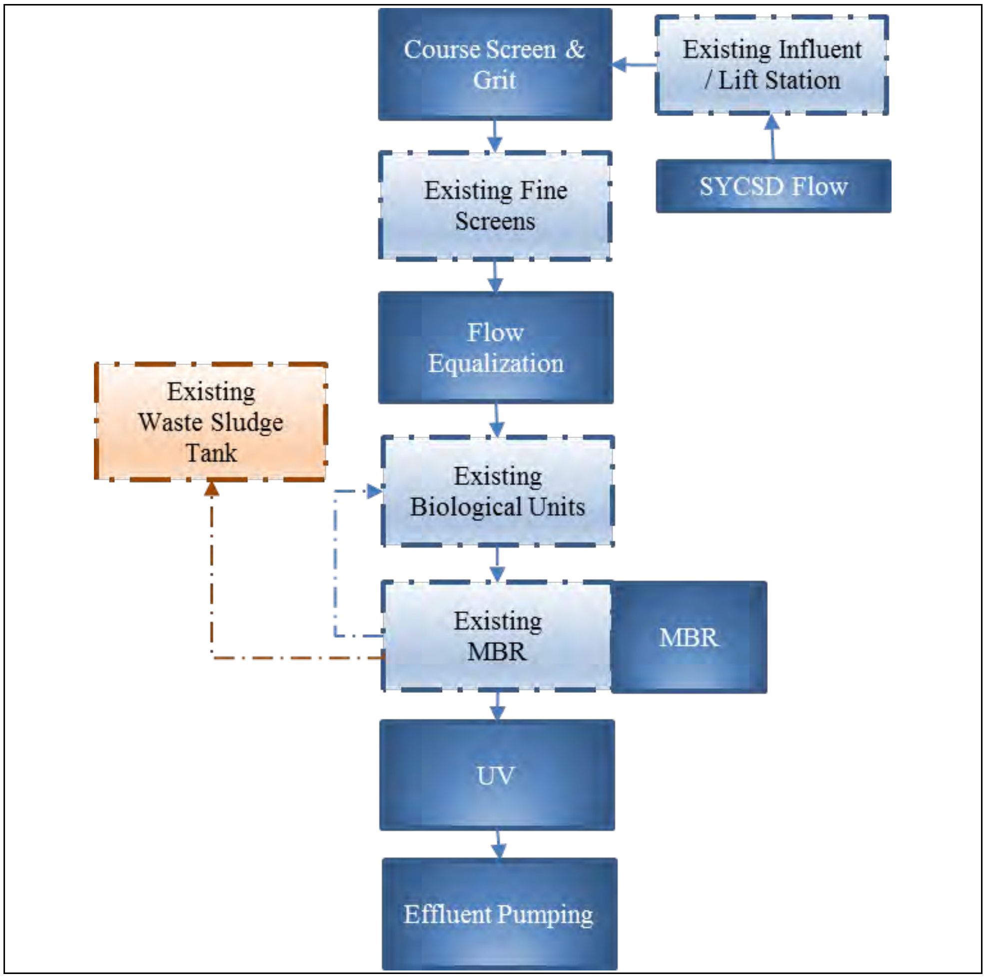
In the Flow Equalization alternative, the following facilities would be constructed or modified to address the additional anticipated flows from the District:

- New Headworks (Coarse Screening, Grit Removal)
- Flow Equalization (Flow Equalization Tank, Lift Station, Odor Control)
- Installation of Additional MBR System

- New UV Disinfection
- Effluent Pump Station

A flow schematic showing the proposed Flow Equalization alternative is shown in **Figure 5-7** and descriptions of each process with the basis for equipment selection are included below.

Figure 5-7: Chumash WRF Flow Equalization Alternative



This alternative proposes to use the underutilized capacity of the Chumash WRF. Based on historical data, the WRF treats less than 0.1 MGD of flow on average and has approximately 26 hours of hydraulic retention time. Therefore, plant capacity is not fully utilized and can be expanded at a marginal cost to provide treatment for additional flow from SYCSD. However, it is assumed that the existing wastewater flow and load to the plant will not increase such that the expansion of the plant will be based on current flow to the Chumash WRF plus the additional flow from SYCSD. **Table 5-13** summarizes the design influent parameters for this alternative.

Table 5-13: Flow Equalization Alternative, Design Influent Parameters

Condition	Flow (MGD)	BOD (mg/L)	TSS (mg/L)	TKN (mg/L)
SYCSD Design	0.31	429	288	85
Existing Chumash WRF, Actual [a]	0.09	923	660	NA [b]
New Chumash WRF with Equalization [c]	0.40	536	369	85

Notes:

a. Based on monitoring data between 1/31/2013 and 2/29/16.
b. Data not available.
c. Flow is rounded up to nearest 100,000 gpd.

Influent Pump Station

Flow from SYCSD will be diverted to the existing influent lift station. The station will be modified to pump the flow to the proposed coarse screening and grit removal facility.

Coarse Screening & Grit Removal

New coarse screening and grit removal equipment is proposed upstream of existing fine screens. The basis for selecting coarse screening and grit removal equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Coarse Screening and Section 5.2.1, Grit Removal, respectively.

Fine Screening

The existing Clean TEK Roto-Sieve fine screens and washer compactor will continue to be used. All flow will then be conveyed to the proposed flow equalization basin.

Flow Equalization

A 60,000-gallon equalization basin and associated aeration and diffuser equipment will be provided to better manage variability of the diurnal and potential wet weather flows. This basin is sized to provide about one hour of equalization volume at the existing peak flows and potential peak from SYCSD. It is unlikely that the peak flows would occur at the same time, but for planning purposes and to be conservative it is assumed that they occur at the same time. If this alternative is selected, the diurnal and wet weather flows to each facility will be used to optimize the size of the basin. **Table 5-14** summarizes the equalization basin sizing.

Table 5-14: Summary for Flow Equalization Basin Sizing

Condition	Flow / Volume	Unit
Peak SYCSD	1.24	MGD
Peak Chumash	0.6	MGD
Max Peak	1.84	MGD
Plant Capacity	0.4	MGD
Δ (Max Peak – Plant Capacity)	1.44	MGD
Volume per hour	60,000	gallons
Basin Volume	60,000	gallons

The equalization basin will include a pumping station to pump the flow to the existing anoxic tanks. The pumping system will include variable speed redundant pumps with firm pumping capacity of 0.6 MGD.

Secondary Treatment and Tertiary Filtration

The existing secondary treatment and MBR will remain and an additional MBR system sized for 0.1 MGD will be installed. As an alternative to constructing an additional MBR system, the capacity of the existing MBR system could have been expanded to 0.41 MGD by installing a fourth rack of membrane cassettes. However, the equipment manufacturer was concerned about the long-term effects and potential impacts on the membrane warranty provided to the Chumash. The equipment manufacturer proposes to use one 40-foot container to house all required equipment. The new tank will be connected to the existing MBR tankage via piping.

Disinfection

The existing UV system is rated for 0.4 MGD. With flow equalization, the existing UV disinfection equipment may be sufficient. However, since the equipment was installed more than ten years ago, it is assumed that the existing UV disinfection equipment will be replaced as part of this alternative. The basis for selecting disinfection equipment is the same as that for the CAS, Extended Aeration alternative. For more details, see Section 5.2.1, Disinfection.

Effluent Pump Station

The existing station consists of two (2) effluent pumps rated at 220 gpm at 60 ft TDH. With flow equalization, it is not necessary to expand pump station capacity.

Solids Handling

Based on available information, the existing solids handling facilities have sufficient capacity and no additional improvements will be required.

Facility Summary

Process equipment selection and sizing used to establish the cost basis for the Flow Equalization alternative is summarized in **Table 5-15**.

Table 5-15: Facility Summary for Flow Equalization Alternative

Facility	Flow Equalization [a]	
Pretreatment		
Coarse Screening, Type (Number of Units)	Channel-Mounted / Spiral Screen (1)	
Grit Removal, Type (Number of Units)	Mechanical Vortex (1)	
Fine Screening, Type (Number of Units)	Internally-fed / Rotary Drum Screen (2)	
Equalization		
Total Volume (gal)	60,000	
Transfer Pumps	420 gpm (2)	
Secondary Treatment		
Bioreactor	Existing Treatment	
Total Design Capacity (gpd)	400,000	
Number of Bioreactor Units	2	
Anoxic Zone, Total Volume (gal)	62,000	
Aerobic Zone, Volume Per Unit (gal)	218,000	
Post Anoxic, Total Volume (gal)	57,450	
Total Volume (gal)	337,450	
HRT (hour)	20	
MLSS (mg/L)	8,500	
MBR	Existing MBR	New MBR
Number of Membrane Units	2	2
Cassettes per Unit	3	1
Total Cassettes	6	2
Cartridges per Cassette	24	24
Total Cartridges	144	48
Total Membrane Area (sf)	32,550	10,850
Disinfection		
Type (Number of Units)	Ultraviolet, Closed Vessel (1)	
Transmittance (%)	65	
Dose (mJ/cm^2)	100	
Effluent Pump Station	220 gpm pumps (2)	
Solids Handling	Existing	

Notes: Items in black font indicate proposed equipment, while items in gray font indicate existing equipment.

5.4.3 Chumash WRF Expansion Alternatives Comparison

Based on a preliminary investigation, both alternatives are feasible but with the following limitations:

- Significantly restricts expansion of the Chumash WRF to support future potential expansion of the Resort and SYCSD (beyond projected 0.31 MGD).
- Rerouting of District flows to a private facility will have legal, institutional, political, and regulatory implications considering that the Chumash exist as an independent Native Sovereign Nation. For example, treatment and discharge of municipal effluent is typically regulated by the local RWQCB, whereas the Chumash WRF is under EPA jurisdiction for discharge permitting.

In addition, the increase in effluent flows for the MBR Expansion alternative would require modification of the existing NPDES permit.

Expansion of the Chumash WRF with the Flow Equalization alternative is preferred over the MBR Expansion alterative primarily due to the lower cost, as shown in **Table 5-16**. Layouts of each alternative are presented in **Figure 5-8** and **Figure 5-9**.

Table 5-16: Cost Estimates for Chumash WRF Modification Alternatives ($M)

Items	MBR Expansion	MBR Expansion w/Flow Equalization
Capital Costs		
Raw Construction Cost	$6.0	$3.9
Construction Contingency (30%)	$1.8	$1.2
Base Construction Cost	$7.8	$5.1
Implementation Costs (35%)	$2.7	$1.8
Total Capital Costs	**$10.5**	**$6.9**
Annual Costs		
Annual O&M Costs	$0.2	$0.1
Present Worth (20 yrs @ 3%)	$2.7	$2.1
Total Present Worth Costs	**$13.2**	**$9.0**

Figure 5-8: Chumash WRF MBR Expansion Alternative Layout

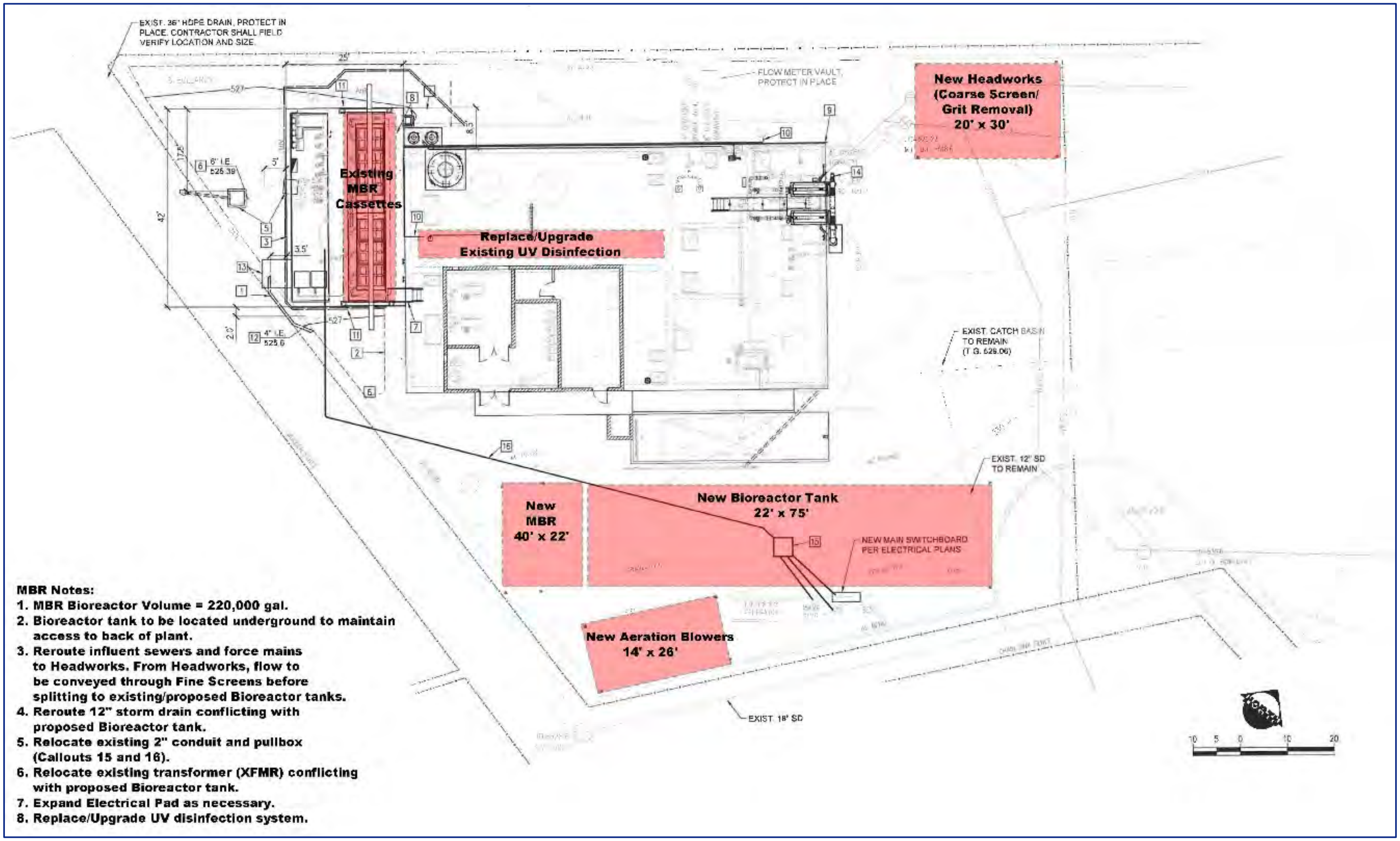
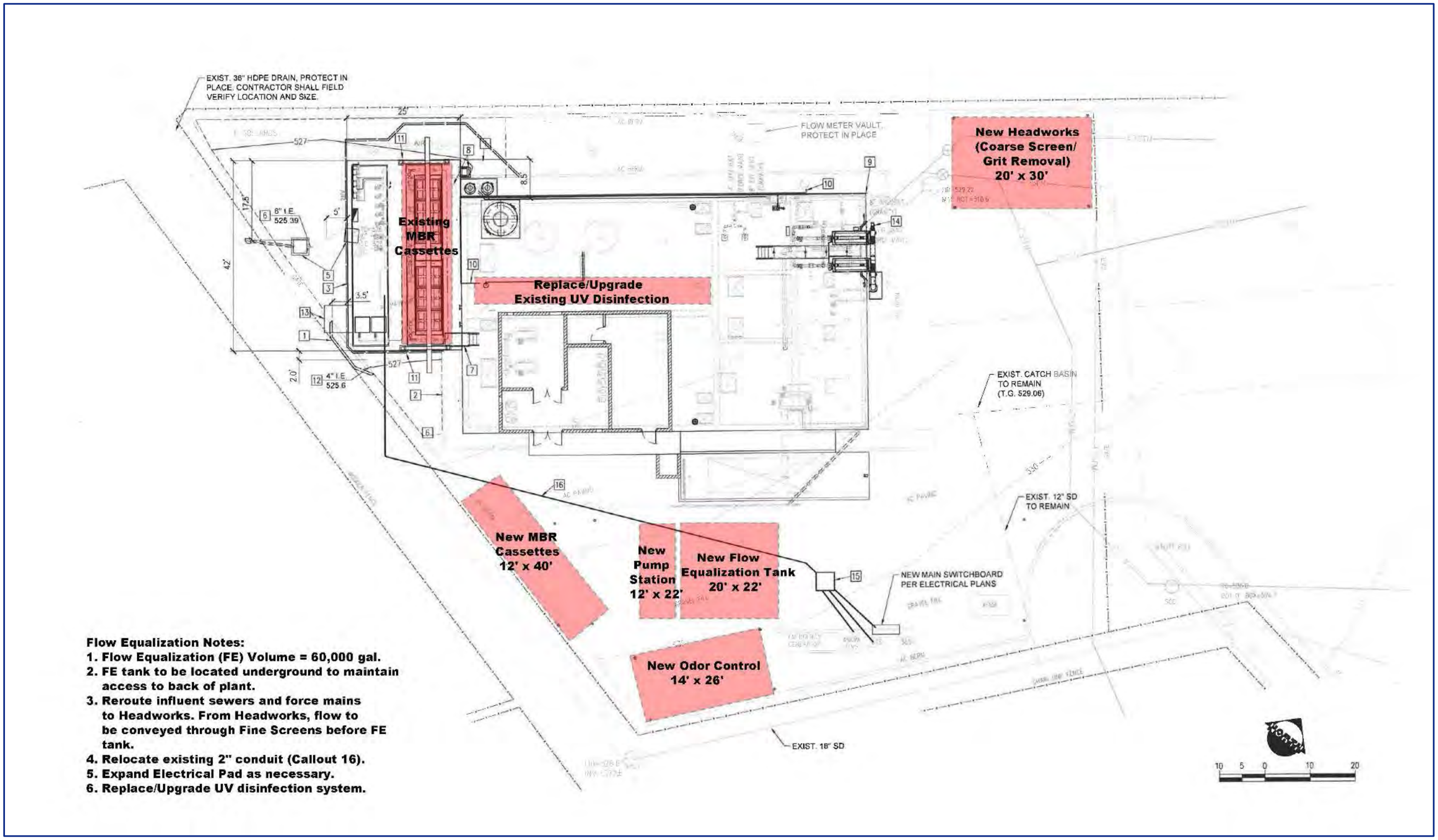


Figure 5-9: Chumash WRF Flow Equalization Alternative Layout



Chapter 6 Project Alternatives Analysis

This chapter presents the development and analysis of recycled water alternatives built upon the recycled water market assessment from Chapter 4 and the treatment alternatives analysis in Chapter 5.

The non-potable market assessment in Chapter 4 identified roughly 3,500 AFY of irrigation demand while only roughly 350 AFY of recycled water supply would be produced by the WRRF. Of this potential demand, roughly 1,200 AFY of irrigation would be for uses that are moderately tolerant to salinity (100 percent yield with TDS from 1,300 mg/L to 2,500 mg/L; recycled water TDS estimate is 900 mg/L; refer to Section 4.2.3). Since supplies exceed identified demands, potential recycled water customers will be refined and optimized based on WRRF location relative to the recycled water supply.

The WRRF treatment technology analysis in Chapter 5 recommended the use of MBR for the new WRRF and the use of percolation ponds for disposal in combination with recycled water customers. In addition, the Chumash WRF Expansion with Flow Equalization was recommended as the preferred modification alternative. Note that the "local" flows scenario of 0.31 MGD is the basis for all alternatives since the "regional" flow scenario (0.49 MGD) has significant institutional barriers to implementation. Also, the difference between the near-term flow (0.25 MGD) and ultimate flow (0.31 MGD) was minor; generally, it is more cost effective to install facilities with capacity for the ultimate scenario now rather than try to expand later to accommodate the minor increase in flow.

Based on these analyses, four core project alternatives are explored in this chapter:

- WRRF without Reuse
- WRRF with Reuse
- Chumash WRF Modification
- No Project

This chapter develops and evaluates these alternatives, including a WRRF siting analysis.

6.1 Alternatives Development

The following approach was adopted to define project alternatives:

1. Develop conceptual alternatives
2. Develop conceptual level cost estimates for each alternative
3. Obtain input from District staff to refine alternatives and develop evaluation criteria?
4. Evaluate the advantages and disadvantages of each conceptual alternative
5. Recommend an alternative based on evaluation criteria scoring

6.1.1 Facility Development Assumptions

Design criteria for alternative facilities are summarized in **Table 6-1**.

Table 6-1: Hydraulic Criteria

Item	Criteria
Min Delivery Pressure	60 psi 20 psi - with on-site storage (assumed to have booster pumps)
Pipe Material[1]	Up to 12" diameter: PVC, C900 Class 150
Max System Pressure	140 psi for PVC pipe
Design Velocity	5 feet per second
Allowable Velocity Range	2 to 8 feet per second
System Storage	Not Included
Customer Time of Delivery	
Agriculture[2]	12 Hours: 7 am to 7 pm
Municipal	8 Hours: 10 pm to 6 am
With On-Site Storage	24 Hours

Note:
1. Pipeline materials will be evaluated as part of preliminary design.
2. To be refined once specific customers are identified.

6.1.2 Cost Estimates Basis

This section presents the cost basis costs for each alternative.

Cost Estimate Classification

The Association for Advancement of Cost Estimating International's (AACE) cost estimate classification system includes five classes of project cost estimates. Cost estimates in the Facilities Plan fall within Class 4 estimates, which have an expected accuracy of +50% to -30%. Per AACE (2011): "Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Typically, engineering is from 1% to 15% complete and would comprise at a minimum the following: plant capacity, block schematics, indicated layout, process flow diagrams for main process systems, and preliminary engineered process and utility equipment lists."

Total Capital Cost Factors

Construction contingency and implementation factors are added to the raw construction costs derived from the unit costs in the previous section.

Construction contingencies are defined as unknown or unforeseen costs. In general, higher contingencies should be applied to projects of high risk or with significant unknown or uncertain conditions. Unknowns and risk conditions for construction cost estimates could include project scope, level of project definition, occurrence of groundwater and associated dewatering uncertainties, unknown soil conditions, unknown utility conflicts, etc. A 25% contingency will be applied to construction cost estimates based on the methodology for Class 4 estimates.

Implementation factors are included to try to capture the capital costs associated with the implementation of the project in addition to construction costs. While these costs can vary greatly from project to project and from component to component, it is most common to assume a standard factor applied to the estimated construction costs across all projects and project types when conducting a relative analysis of alternatives and project options. Implementation factors are used to account for the following activities:

- Planning, environmental documentation, and permits
- Engineering services (pre-construction)
- Engineering services during construction
- Construction management and inspection
- Legal and administrative services

For this study, 25% of the estimated project construction costs are used to account for these additional services based on the methodology for Class 4 estimates.

Present Worth

The various alternatives will be compared using the present worth method, which adds the total capital cost to the present value of annual O&M costs such that both the initial capital and ongoing annual costs are considered. The economic factors used to analyze the estimated costs for each of the alternatives are:

- **Cost Basis:** Engineering News Record's (ENR) Construction Cost Index (CCI) for California is used as the common cost basis. The costs in this report reflect the ENR 20 Cities Average CCI for May 2016 of 10,230. The CCI for reference unit costs was used to escalate those estimates to the CCI applied for this report.
- **Project Financing:** Interest Rate & Payback Period: 3% over 20 years. Based on State Revolving Fund (SRF) loans which have a lower rate than loans available from the open financial market.

Unit Costs

Table 6-2 presents the construction and O&M costs for various facilities.

Table 6-2: Unit Costs

Facilities	Construction Cost(1)	Notes	O&M Cost
Electricity	--		$0.13/kWh
Treatment Facilities			
WRRF (MBR) - 0.31 MGD	$14.6 M	Refer to Section 5.2.4	$0.27 M / Yr
WRRF (MBR) - 0.49 MGD	$17.4 M	Refer to Section 5.2.4	$0.30 M / Yr
Chumash WRF Modification (0.31 MGD)	$6.9 M	Refer to Section 5.4.3	$0.14 M / Yr
Wastewater Facilities			
Influent Lift Station(2)	= HP x 17437 x HP^ (-0.46) x (CCI/4500)	HP = Horsepower	5% of capital cost
Percolation Basins	$50,000/ac	XX	$5,000/ac
Land Purchase(3)	$100,000/ac	For agricultural land	--
Recycled Water Facilities			
Recycled Water Pump Station(2)	= 3.12 x 10^(0.7853*log(Q)) + (3.1951 x (CCI/4500))	Q = Peak Flow	5% of capital cost
Pipelines, Paved Trench	6" - $150/LF 8" - $160/LF	Includes appurtenances	1% of capital cost

Pipelines, Unpaved Trench	6" - $100/LF 8" - $110/LF	Includes appurtenances	1% of capital cost
Customer Facilities			
Municipal Customer Retrofit	$15,000/ea	XX	--
Agricultural Customer Retrofit	$30,000/ea		--

Note:

1. Contingencies and factors presented in the previous section are added to the unit construction costs except for the treatment facilities.
2. Pump station size based on peak flow and 75% pump / motor efficiency.
3. The land purchase cost can vary widely depending on the acreage available, location, zoning, etc. This value is a rough average of listed properties at the time the report was prepared. The actual land purchase cost will ultimately be site specific.

6.2 Preliminary WRRF Siting Analysis

A preliminary WRRF site analysis was completed to identify potential areas where the new facility could be constructed, to understand potential tradeoffs to be made when ultimately selecting a site, and to highlight key cost considerations. The analysis considered a variety of factors and identified a shortened list of potential areas, but a specific location was not recommended. Note that parcel owner willingness to sell or lease the property may be important, but it was not considered at this time since the intent of the analysis was to identify general areas. A recommended next step for implementation of a new WRRF is to identify parcels for site-specific evaluation.

6.2.1 Methodology

The general methodology for the preliminary WRRF siting analysis entailed:

1. Select parcels for analysis that meet minimum qualifying criteria.
2. Combine adjacent parcels into groups for further comparison.
3. Characterize each group to evaluate compatibility with a new WRRF, disposal constraints, and potential for reuse on and adjacent to the site.
4. Compare the combined sites using cost and other criteria to select a grouping or groupings to be carried forward to next steps in WRRF implementation.

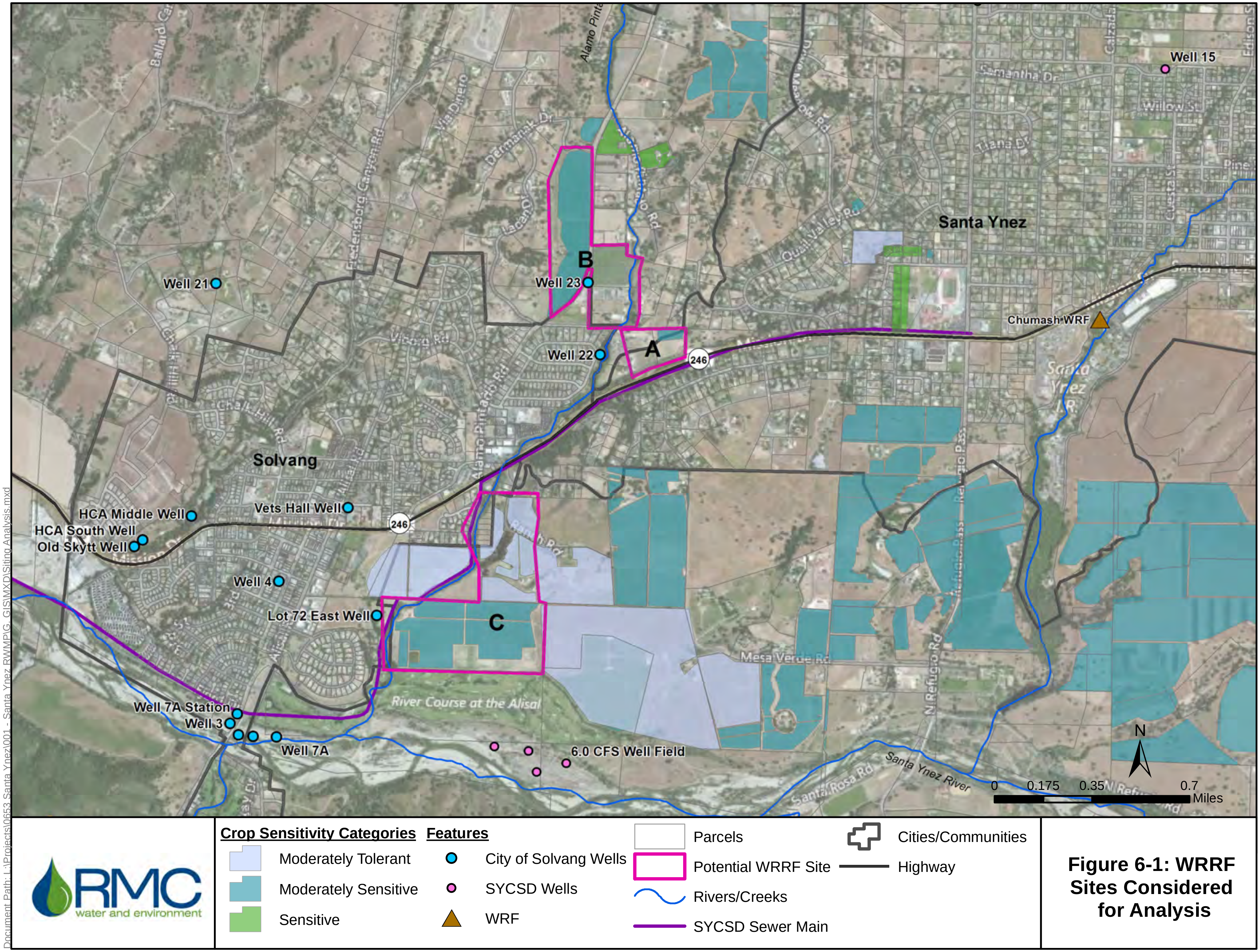
6.2.2 Minimum Qualifying Criteria

The following criteria were used to initially screen parcels for analysis:

- No residence on the property.
- No large permanent structures, such as commercial stores.
- West of Refugio Road, which is the collection point for almost all SYCSD sewer tributary areas.
- Within 1 mile (5,280 feet) of the SYCSD sewer main to avoid excessive conveyance costs.
- Minimum total area of 1 acre (43,560 sf) of open space without permanent crops to account for vehicle access and small buffer between facilities and adjacent activities.
- Outside of 100-year flood zone.

Based on these criteria, eight parcels were identified to form three groups, as shown on **Figure 6-1**. The three groups of parcels for analysis are:

- **Group A:** Along Hwy 246, East of Alamo Pintado Rd
- **Group B:** Along Alamo Pintado Rd, North of Hwy 246
- **Group C:** Along Hwy 246, Near Alisal Golf Course



RMC water and environment

Figure 6-1: WRRF Sites Considered for Analysis

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Inner-Rural Area Designation

It should be noted that the Santa Barbara County General Plan Land Use Element defines an inner-rural area as an area where development is limited to rural uses such as agriculture, recreation and ranchette development and has a minimum parcel size of five acres. This designation is to be used adjacent to urban areas and may help to buffer urban and rural land uses. All potential sites considered are designated inner-rural.

Rural and inner-rural areas are exempt from the minimum acreage and can be divided into smaller parcels when such parcel(s) are for a public use, consistent with the "Public Facilities" Policies. Public Facilities are buildings, structures, and uses by government agencies that provide public services. Appropriate public facilities in the rural and inner-rural areas include wastewater disposal, therefore the minimum five-acre parcel size requirement is assumed not to apply.

6.2.3 Potential Site Characterization

The groups of parcels were characterized to support the analysis. The characterization addressed available area; location relative to sewer, potable wells, and residences; soil type for percolation; and proximate potential reuse opportunities. The full list of categories includes:

- Total Area (acres): To consider potential buffer between the WRRF site and adjacent land uses
- Undeveloped Area (acres): Area within the parcel that does not have development or permanent crops to estimate potential area for WRRF and percolation ponds. Up to 15 acres could be needed for both WRRF (1 acre) and percolation ponds (14 acres) (per Table 5-9)
- Irrigated Area (acres): Area within parcel for potential reuse of WRRF effluent. Up to 60 acres could be irrigated (per Table 5-9)
- Salinity Sensitivity (category): Category of salinity sensitivity for irrigation end use(s) of previous item to gauge likelihood of reuse. Higher tolerance increases the likelihood
- FEMA Floodplain Status: Must be located outside of the 100-year floodplain
- Distance to Sewer (linear feet (LF)): To estimate capital cost of a new force main to the WRRF
- Distance to Closest Potable Well (LF): To determine compliance with DDW setback requirements and potential for discharge siting
- Proximity to Residences: To capture potential opposition to the placement of the WRRF in proximity to existing residents

Characteristics that could influence site selection but were not evaluated include:

- Shallow groundwater
- Ability of adjacent roadway to handle increased traffic
- Proximity of electrical source(s) with sufficient capacity

Table 6-3 presents a characterization of the three groups and **Table 6-4** presents a brief list of pros and cons for each group.

Table 6-3: WRRF Siting Grouping Characterization

ID	Total Area (Acres)	Open Area (Acres)	Irrigated Area (Acres) (Salinity Sensitivity)	Distance to Sewer (LF)(1)	Proximity to Potable Well (LF)(2)	Proximity to Residences(3)
A	13	9	2 (Mod. Sensitive)	300	Well 22: 500 LF from boundary	Development along northern edge
B	70	40	90 (Mod. Tolerant)	5,000	Well 23: Adjacent to boundary	Residence adjacent to area; Residences overlooking area
C	140	15	50 (Mod. Sensitive) 220 (Mod. Tolerant)	1,500	Lot 72 Well: 500 LF from boundary	Development along western edge; Residences along northern edge

Note:
1. Distance to the centroid of the area.
2. Discharge location would be located with sufficient distance to avoid impacting the closest potable well.
3. WRRF and disposal facilities would be located within the area to minimize impacts to proximate residences.

Table 6-4: Preliminary WRRF Siting Analysis Summary

ID	Pro	Con
A	Adjacent to sewer	Small area limits disposal ability Limited reuse potential in the vicinity Adjacent to residential area with limited agricultural buffer Proximity to Solvang well
B	Adjacent to over 40 acres of irrigation with adequate salinity tolerance Low adjacent residential impact	Portion of area is within Moderate Flood Risk Area (500-year flood) Proximity to Solvang well Force main cost increase due to distance from sewer Overlooking residences
C	Soils with higher percolation rate reduces percolation basin size Adjacent to over 200 acres of irrigation with salinity tolerance Surrounded by agricultural land and golf course Farthest distance from residences	Proximity to ID#1 river well field

As shown in **Table 6-5**, there are notable capital cost differences between the three groups.

- Group C is the least expensive. This is due to the lowest volume required for percolation basins due to higher percolation rates in the sandier soils in the area compared with the clay soils of the other sites.
- Group B is the most expensive due to its distance from the SYCSD sewer main.
- Group A is in between the other two groups.

Table 6-5: Local WRRF Siting Capital Cost Comparison, No Reuse ($M)

Item	Group A	Group B	Group C
Influent Lift Station	$0.17	$0.31	$0.24
Force Main	$0.05	$0.50	$0.31
Percolation Basins	$0.70	$0.70	$0.09
Effluent Pump Station	$0.17	--	--
Effluent Pipeline	$0.50	--	--
Raw Construction Subtotal	**$1.59**	**$1.50**	**$0.65**
Contingency Costs (25%)	$0.40	$0.38	$0.16
Construction Total	**$1.99**	**$1.88**	**$0.81**
Implementation Costs (25%)	$0.50	$0.47	$0.21
Treatment (MBR)	$14.61	$14.61	$14.61
Land Purchase	$1.50	$1.50	$0.30
Total Capital Cost	**$18.6**	**$18.5**	**$15.9**

Note: Refer to Appendix D for detailed cost estimates. Cost estimates assume 100% disposal via percolation ponds.

The capital cost comparison changes slightly when reuse is included, as shown in **Table 6-6.** The percolation pond costs are reduced for Group B while recycled water conveyance costs increase for Group A. It should be noted that the costs with reuse do not capture the benefits of reuse, which are discussed in Section 6.4

Table 6-6: Local WRRF Siting Capital Cost Comparison, With Reuse ($M)

Item	Group A	Group B	Group C
Influent Lift Station	$0.17	$0.31	$0.24
Force Main	$0.05	$0.50	$0.31
Percolation Basins	$0.35	$0.35	$0.04
Effluent Pump Station	$1.30	$1.30	$1.30
Effluent Pipeline	$1.60	$0.32	$0.53
Municipal Customer Connection	$0.03	$0.02	--
Agricultural Customer Connection	$0.18	$0.09	$0.18
Raw Construction Subtotal	**$3.68**	**$2.88**	**$2.61**
Contingency Costs (25%)	$0.92	$0.72	$0.65
Construction Total	**$4.60**	**$3.60**	**$3.26**
Implementation Costs (25%)	$1.15	$0.90	$0.82
Treatment (MBR)	$14.61	$14.61	$14.61
Land Purchase	$0.80	$0.80	$0.20
Total Capital Cost	**$21.2**	**$19.9**	**$18.9**

Note: Refer to Appendix D for detailed cost estimates.

The facilities for each group are shown in **Figure 6-2**. In addition to the lowest capital cost, **Group C** has the largest total area, the largest open area, the largest irrigated area with salinity tolerance, and the longest distance to residences. The primary issue to further investigate is proximity to ID#1 potable wells.

Group B has a moderate amount of total area, open area, and irrigated area with salinity tolerance. Proximity to a Solvang well, the existence of residences overlooking the site, and floodplain issues should be further investigated. Even though Group B's metrics are less desirable than Group C, the area appears to be suitable for a new WRRF. The two Group B cost components that are higher than Group C are the influent force main and land purchase for percolation ponds. Percolation rates should be confirmed to assess the percolation assumptions and associated cost impacts.

Group A ranks the poorest compared with the other two groups, primarily due to the limited area, which would require percolation ponds and/or reuse areas to be located at another site. The group is included pending confirmation of percolation and reuse assumptions.

All three areas will be carried forward for consideration to implement a new WRRF.

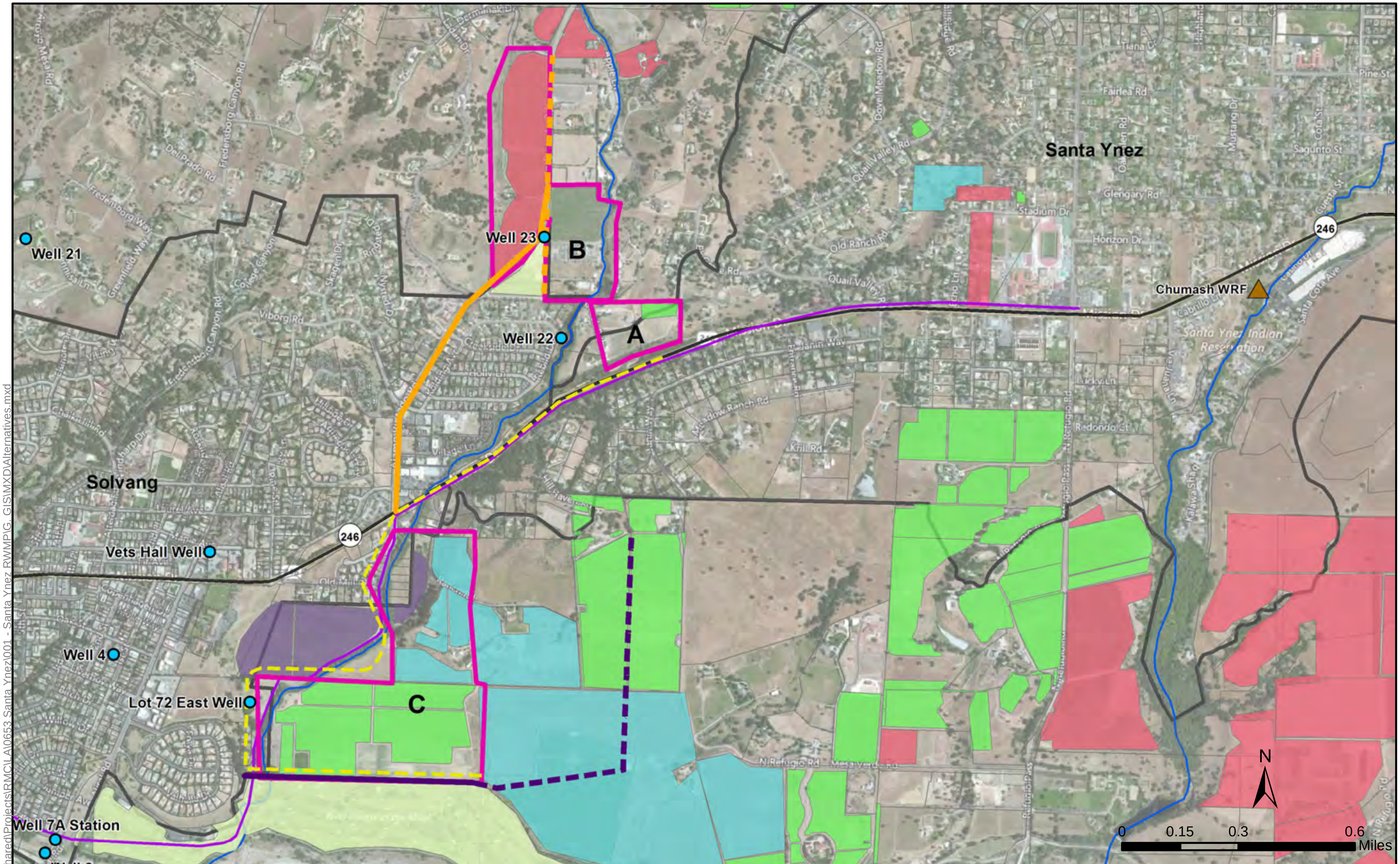
6.3 Alternatives Descriptions

Alternatives were developed for the four core project alternatives (WRRF without Reuse; WRRF with Reuse; Chumash WRF Modification; and No Project) using the three WRRF site groups for the WRRF alternatives, as shown in **Table 6-7**. The "local" flows scenario of 0.31 MGD is the basis for all alternatives.

Table 6-7: Summary of Alternatives

#	Name	Treatment	Site	Discharge
1A	WRRF without Reuse	MBR	Group A	Percolation Ponds
1B			Group B	
1C			Group C	
2A	WRRF with Reuse	MBR	Group A	Percolation Ponds & Reuse
2B			Group B	
2C			Group C	
3	Chumash Modification	MBR	Chumash	Creek & Reuse
0	No Project	Solvang WWTP (SBR)	Solvang WWTP	Existing

Note: "Local" flows scenario of 0.31 MGD is the basis for all alternatives.



Alternatives

- Alt A Effluent Pipe
- Alt B RW Pipe
- Alt B Force Main
- Alt C Force Main
- Alts A or C RW Pipe

Crop Types

- Landscape Irrigation

Agriculture:

- Food Crops
- Orchard
- Pasture/Rangeland
- Vineyard

Features

- City of Solvang Wells
- SYCSD Wells
- SYCSD Sewer Main
- Potential WRRF Site
- Cities/Communities

RMC water and environment

Figure 6-2: Alternative Facilities

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6.3.1 Alternative 1 Series (New WRRF; No Reuse)

The Alternative 1 series is the WRRF without reuse (e.g., all effluent disposed via percolation ponds) applying MBR treatment technology at each of the three grouped sites (A, B, C). Each Alt 1 sub alternative includes:

- Influent lift station from existing SYCSD sewer main
- Force main from the lift station to the WRRF
- New WRRF
    - Coarse screening
    - Grit removal
    - Fine screening
    - Secondary treatment and tertiary filtration (MBR)
    - Disinfection
    - Effluent pump station
    - Solids handling
- Percolation ponds for disposal
- Group A requires a pipeline from the WRRF site to off-site percolation ponds due to the limited available area at the site.

Table 6-8: Summary of Alternative 1 Series (New WRRF; No Reuse)

Item	1A	1B	1C
Influent Lift Station (hp)	15	44	29
8-in Influent Force Main (LF)	500	5,000	3,100
WRRF (MGD)	0.31	0.31	0.31
8-in Effluent Pipeline (LF)	5,000	--	--
Percolation Basins (Acres) [a]	14	14	7
Land Purchase Total (Acres) [b]	15	15	8

Notes:

a. The range in percolation basin area varies due to the percolation rate assumed for the soils in the general area of each site. On-site percolation testing is recommended due to the significant impacts the percolation rate assumption has on land purchase requirements.

b. Includes 1 acre for the WRRF.

Table 6-9: Local WRRF Siting Capital Cost Comparison, No Reuse ($M)

	1A	1B	1C
Total Capital Cost	$18.6	$18.5	$15.9

Note: Refer to **Table 6-5** for line items and Appendix D for detailed cost estimates.

6.3.2 Alternative 2 Series (New WRRF with Reuse)

The Alternative 2 series consist of the WRRF applying MBR treatment technology with reuse and percolation basins at each of the three grouped sites (A, B, C). The Alt 2 sub alternative includes the same components as the Alt 1 sub alternatives (lift station, force main, WRRF, percolation basins) plus:

- Recycled water pump station
- Recycled water distribution pipeline

- Recycled water customer conversions

Table 6-10: Summary of Alternative 2 Series (New WRRF with Reuse)

Item	2A	2B	2C
Influent Lift Station (hp)	15	44	29
8-in Influent Force Main (LF)	500	5,000	3,100
WRRF (MGD)	0.31	0.31	0.31
Percolation Basins (Ac) [a]	7	7	1
Land Purchase Total (Ac) [b]	8	8	2
Recycled Water			
Pump Station (hp)	29	29	29
6-in Distribution Pipeline (LF)	16,000	3,200	5,300
Municipal Customers	2	1	--
Agricultural Customers	6	3	6
Irrigation Area (Ac)	59	59	59
Irrigation Demand (AFY)	190	190	190

Note:

a. The range in percolation basin areas varies significantly due to the percolation rate assumed for the soils in the general area of each site. On-site percolation testing is recommended due to the significant impacts the percolation rate assumption has on land purchase requirements.

b. Includes 1 acre for the WRRF.

Table 6-11: Local WRRF Siting Capital Cost Comparison, With Reuse ($M)

	Site A	Site B	Site C
Total Capital Cost	$21.2	$19.9	$18.9

Note: Refer to **Table 6-6** for line items and Appendix D for detailed cost estimates.

6.3.3 Alternative 3 Series (Chumash WRF Modification)

Alternative 3 entails modification of the existing Chumash WRF by adding MBR capacity and flow equalization to increase the diurnal treatment yield. This alternative includes the following facilities that would be constructed or modified to address the additional anticipated flows from the District:

- New Headworks (Coarse Screening, Grit Removal)
- Flow Equalization (Flow Equalization Tank, Lift Station, Odor Control)
- Installation of Additional MBR System
- New UV Disinfection
- Effluent Pump Station

The capital cost for this alternative is $6.8 million. Refer to **Table 5-16** and Appendix D for additional cost estimate information.

6.3.4 No Project Alternative

The Facilities Plan assumes that existing septic systems in areas that are causing surface water and groundwater contamination will be connected to a centralized system. However, the City of Solvang has stated that SYCSD does not have sufficient capacity in the Solvang WWTP for increased flows (Cannon, 2016) and a request by SYCSD to purchase more capacity was denied by the City (Santa Ynez Valley News, September 27, 2016). Therefore, the no project alternative could be defined as

- Continued conveyance of District flows to the Solvang WWTP with no further septic tank conversions
- Continued surface water and groundwater contamination from existing septic systems in certain areas.

Another alternative entails an upgrade of the Solvang WWTP to meet nitrogen limits when the existing WDR permit is renewed in 2017 (Santa Ynez Valley News, September 27, 2016) while increasing SYCSD's share of available capacity. This no project alternative entails:

- Continued conveyance of District sewer flows to the Solvang WWTP and the District's associated annual capital and O&M costs
- Upgrade of the Fjord Road Lift Station, which conveys all flows to the WWTP across the Santa Ynez River, due to existing capacity constraints
- Upgrade of Solvang WWTP to address future nitrogen limits
- Increase SYCSD share of available capacity

From the regional flow scenario perspective, the no project alternative would also include the construction of a new WWTP to serve converted septic systems in both Los Olivos and Ballard. However, a regional comparison was not conducted as part of this plan since each area is evaluating options independently.

6.3.5 Alternative Water Supply

There are no obvious new water supplies for the Santa Ynez valley since no surplus local groundwater supplies exist, the Cachuma Project yield is projected to decrease, and the State Water Project has experienced decreasing yield and reliability.

A comparable supply is the Santa Barbara Desalination Plant, which is planned to start operations in March 2017. The plant will produce 3,125 AFY of potable water. **Table 6-12** presents estimated costs for the initial plant size. Conceptually, participation by ID#1 would entail an exchange of Cachuma Project or SWP water for expanding the desalination plant, rather than direct delivery of the desalinated water. ID#1 could theoretically fund an expansion of the plant beyond the initial planned size of 3,125 AFY in exchange for additional Cachuma Project or SWP water. This could be a relatively straightforward exchange since both entities are Cachuma Project and SWP members. It should be made clear that ID#1 is not pursuing this alternative, but the option provides a reasonable cost comparison with production of recycled water locally.

Table 6-12: Summary of Alternatives Cost Estimates

Item	Santa Barbara Desalination
Yield	3,125 AFY
Capital Cost	$61,000,000
Capital Financing	1.6% over 20 Years (SRF Loan Terms)
Capital Payment	$3,500,000
Annual O&M Cost	$4,100,000
Total Annual Cost	$7,600,000
Rounded Unit Cost	**$2,400 / AF**

Source: www.santabarbaraca.gov/gov/depts/pw/resources/system/sources/desalination.asp

6.4 Alternatives Evaluation

Four core project alternatives were described in the previous section

- WRRF without Reuse (Alternatives 1A, 1B, 1C)
- WRRF with Reuse (Alternatives 2A, 2B, 2C)
- Chumash WRF Modification (Alternative 3)

The cost estimates for each alternative are summarized in **Table 6-13**.

Table 6-13: Summary of Alternatives ($M)

Item	1A	1B	1C	2A	2B	2C	3
Capital Costs							
Construction	$2.0	$1.9	$0.8	$4.6	$3.6	$3.3	--
Implementation	$0.5	$0.5	$0.2	$1.2	$0.9	$0.8	--
Treatment Plant	$14.6	$14.6	$14.6	$14.6	$14.6	$14.6	$6.9
Land Purchase	$1.5	$1.5	$0.3	$0.8	$0.8	$0.2	--
Total Capital Cost	**$18.6**	**$18.5**	**$15.9**	**$21.2**	**$19.9**	**$18.9**	**$6.9**
Annual Costs							
Annual O&M	$0.37	$0.37	$0.30	$0.41	$0.41	$0.37	$0.10
Annualized Capital Cost	$1.25	$1.24	$1.07	$1.42	$1.34	$1.27	$0.46
Total Annual Cost	**$1.62**	**$1.61**	**$1.38**	**$1.83**	**$1.75**	**$1.64**	**$0.56**

A comparison between the three sites was presented in Section 6.2. When comparing the Alt 1 series and Alt 2 series, there is a slight increase in costs; however, the costs do not capture the benefits of reuse. For example, 190 AFY of reuse at a cost of $2,400/AF (Santa Barbara desalination) is equivalent to $0.46 million per year. This exceeds the additional costs to build and operate reuse facilities at all three sites.

6.4.1 Chumash WRF Modification (Alternative 3) Comparison with New WRRF Alternatives

The following conclusions can be made when comparing the preferred new WRRF treatment alternative (MBR) (see Section 5.2) with the preferred Chumash WRF expansion alternative (Flow Equalization):

- Chumash WRF Expansion would be less expensive than the new WRRF alternative from a capital cost and lifecycle cost perspective; however, the expansion cost does not include any "buy-in" costs or capital facility charges for use of existing treatment capacity.
- Chumash WRF Expansion would increase the relative cost of future WRF expansions within the existing WRF parcel, which could dissuade Chumash from participating.
- Implementation of the expansion option has more legal, institutional, political, and regulatory issues due to Chumash's status as an independent Native Sovereign Nation.

The new WRRF treatment alternative will be carried forward as the preferred alternative considering the significant Chumash WRF Expansion alternative implementation considerations to be addressed; however, discussions with relevant parties for implementation of the Chumash WRF expansion are also recommended to assess the feasibility of this option.

6.4.2 Other Considerations

Environmental Impacts

All public projects in California must comply with the CEQA unless a project is determined to be exempt. The recommended project would comply with CEQA by completing an environmental impact analysis and defining mitigation measures to address any significant impacts, as described in Chapter 7.

When comparing alternatives, there are few differences in potential environmental impacts since most if not all facilities included in each of the alternatives will be constructed in disturbed or impervious areas based on the existing alternative concepts. Also, sensitive areas will be avoided to the greatest extent possible. For example,

- Pipelines will be in public right of way to the greatest extent possible and likely within paved roads except for alignments within agricultural land, which is considered disturbed land.
- Percolations basins would be in available agricultural land due to the lack of open space. The basin footprint could include undisturbed land but this is not preferred.

Therefore, overall, potential environmental impacts do not significantly differentiate the alternatives.

Climate Change

A topic of growing concern for water planners and managers is climate change and the potential impacts it could have on California's future water supplies. Climate change models have predicted that potential effects from climatic changes include: increased temperature, reduction in Sierra Nevada snowpack depth, early snow melt and a rise in sea level.

All the recycled water options improve the area's climate change resilience by increasing reliance on local supplies with a lower embedded energy than State Water Project supplies and desalination and a supply that is not impacted by changes to temperature, precipitation, and snowpack.

State Planning Priorities

California Government Code Section 65041.1 define the State's "planning priorities, which are intended to promote equity, strengthen the economy, protect the environment, and promote public health and safety in the state, including in urban, suburban, and rural communities" and are:

(a) To promote infill development and equity

(b) To protect environmental and agricultural resources

(c) To encourage efficient development patterns

All the alternatives protect the environment by reducing the use of imported water. In addition, agricultural reuse helps to protect agricultural resources by providing a long-term, locally-controlled, and drought resistant water supply.

6.5 Recommended Project

The alternatives evaluation found that:

- Of the three treatment technologies evaluated, MBR was selected for a new WRRF.
- Of the three sites evaluated for a new WRRF, Site C has the lowest capital and O&M cost (primarily due to assumed soils with higher percolation rates), the largest total area, the largest open area, the largest irrigated area with salinity tolerance, and the longest distance to residences. The primary issue to further investigate is proximity to ID#1 potable wells.

- Expansion of the Chumash WRF has significantly lower (roughly one third) capital and O&M costs than the new WRRF alternatives. However, the alternative presents significant institutional issues and has not been approved by the Chumash.
- The cost of the no project alternative - upgrading the Solvang WWTP to meet new nitrogen limits and increasing the SYCSD share of available capacity. The City of Solvang is currently investigating options to address future nitrogen limits and is estimating their associated costs.

Therefore, the recommended approach is to pursue multiple options in parallel paths:

1. Pursue a new 0.31 MGD WRRF by investigating potential sites in more detail to refine cost estimates with better information on land available for purchase, land purchase costs, and percolation rates (which translates to area required for disposal).
2. Pursue 0.31 MGD expansion of the Chumash WRF by engaging with the Santa Ynez Band of Chumash Indians to determine the viability of the proposal and whether any additional costs are needed to address their concerns.
3. Incorporate new information, when available, on the Solvang WWTP upgrade / expansion options and costs for comparison with a new WRRF or Chumash WRF expansion.

6.5.1 Regional WRRF Option

A regional WRRF option (0.49 MGD), which would include flows from Los Olivos and Ballard, is included as an alternative to local, centralized treatment in Los Olivos and Ballard. SYCSD is not pursuing a regional WRRF since the decision to participate will be made by the impacted communities; the information is presented for informational purposes only. **Table 6-14** summarizes the capital cost estimates for a new regional WRRF at the three areas evaluated, with and without reuse.

Table 6-14: Regional WRRF Capital Cost Comparison ($M)

	1A	1B	1C	2A	2B	2C
	Without Reuse			With Reuse		
Area	Group A	Group B	Group C	Group A	Group B	Group C
Total Capital Cost						
Regional WRRF	$22.7	$22.6	$19.0	$25.4	$24.2	$22.8
Local WRRF	$18.6	$18.5	$15.9	$21.2	$19.9	$18.9
Increased Cost for Regional WRRF	$4.1	$4.1	$3.0	$4.2	$4.3	$3.9

Note: Refer to Appendix D for detailed cost estimates.

In addition, a sewer main from Los Olivos and Ballard to the new WRRF is required. The distance from Los Olivos to site Group B is roughly 4 miles (to 21,100 LF). The Los Olivos Wastewater Management Plan (Santa Barbara County, 2010 identified a 15-inch diameter sewer to convey flows from Los Olivos. Assuming $16 per inch-diameter per LF results in roughly $5.1 M of raw construction costs and a total capital cost of $8.6 M once the construction contingency (30%) and implementation factor (30%) are included.

As shown in **Table 6-14**, a regional WRRF adds roughly $3M to $4M in capital costs to expand the local WRRF. The inclusion of the sewer main increases the marginal cost of a regional WRRF to between $11.6 M and $12.9 M. In comparison, costs to plan and construct the community wastewater system serving all of Los Olivos totals roughly $21M (AECOM, 2016). Therefore, a regional WRRF appears to provide the potential for cost savings over a separate wastewater plant and it is recommended that SYCSD reach out to Los Olivos representatives to introduce the concept of a new regional WRRF.

A regional concept was rejected in the Los Olivos Wastewater Management Plan (Santa Barbara County, 2010) partially due to Santa Ynez Valley Community Plan Policy WW-SYV-3: *Annexation of inner-rural and rural area(s) to a sanitary district or extensions of sewer lines into inner-rural and rural area(s) as defined on the land use plan maps shall not be permitted unless required to prevent adverse impacts on an environmentally sensitive habitat or to protect public health.* As a result, implementation of a regional WRRF would require an amendment to the SYVCP or a Board of Supervisors' finding that the existing septic system conditions constitute a threat to public health. This issue must be addressed to implement a regional WRRF.

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Chapter 7 Recommended Project

As discussed in the previous chapters, there are several outstanding information needs that depend on completion of ongoing work (by others). Therefore, to move forward with a preferred project, the recommended approach is to pursue multiple options in parallel paths:

4. Pursue a new 0.31 MGD WRRF by investigating potential sites in more detail to refine cost estimates with better information on land available for purchase, land purchase costs, and percolation rates (which translates to area required for disposal).
5. Pursue a 0.31 MGD expansion of the Chumash WRF by engaging with the Santa Ynez Band of Chumash Indians to determine the viability of the proposal and whether any additional costs are needed to address their concerns.
6. Incorporate new information, when available, on the Solvang WWTP upgrade / expansion options and costs for comparison with a new WRRF or Chumash WRF expansion.

Key inputs in the selection of the preferred project include:

- The cost of the no project alternative - upgrading the Solvang WWTP to meet new nitrogen limits and increasing the SYCSD share of available capacity. The City of Solvang is currently investigating options to address future nitrogen limits and is estimating their associated costs.
- The ability to address institutional and incremental cost issues of the Chumash WRF expansion alternative.
- Refinement of sites evaluated for a new WRRF and their associated availability, cost, and percolation rates.

This chapter describes the Recommended Project as a new WRRF since this is the most feasible option at time; it includes descriptions of project facilities, cost estimates, and an implementation plan (including construction financing plan).

7.1 Project Description

The New WRRF project, as shown in **Figure 7-1**, entails construction of a new wastewater treatment plant located in the SYCSD service area using MBR treatment technology that will produce effluent with high enough quality for unrestricted non-potable reuse. **Table 7-1** summarizes the recommended facilities and associated planning-level design criteria. **Table 7-2** summarizes the estimated capital cost and O&M cost, for the Recommended Project. **Table 7-3** summarizes energy consumption. See Appendix D for detailed cost information.

Three sites were evaluated for a new WRRF. Site C has the lowest capital and O&M cost (primarily due to soils with higher assumed percolation rates), the largest total area, the largest open area, the largest irrigated area with salinity tolerance, and the longest distance to residences.

Site C will require further investigation to refine cost estimates with better information on land available for purchase, land purchase costs, percolation rates (which translates to area required for disposal), and its proximity to ID#1 potable water wells.

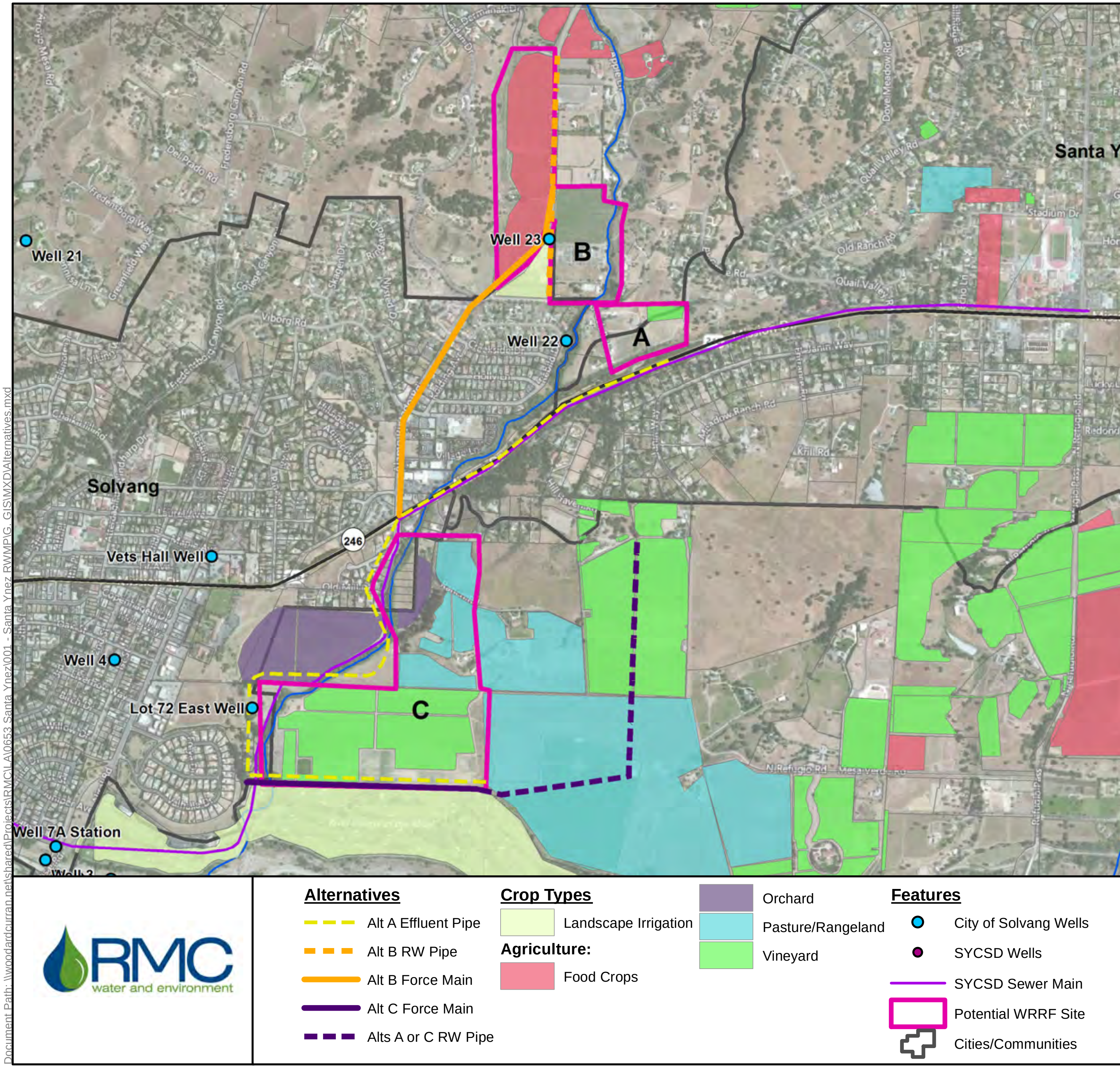


Figure 7-1: Recommended Project

Figure 7-2: New WRRF Layout

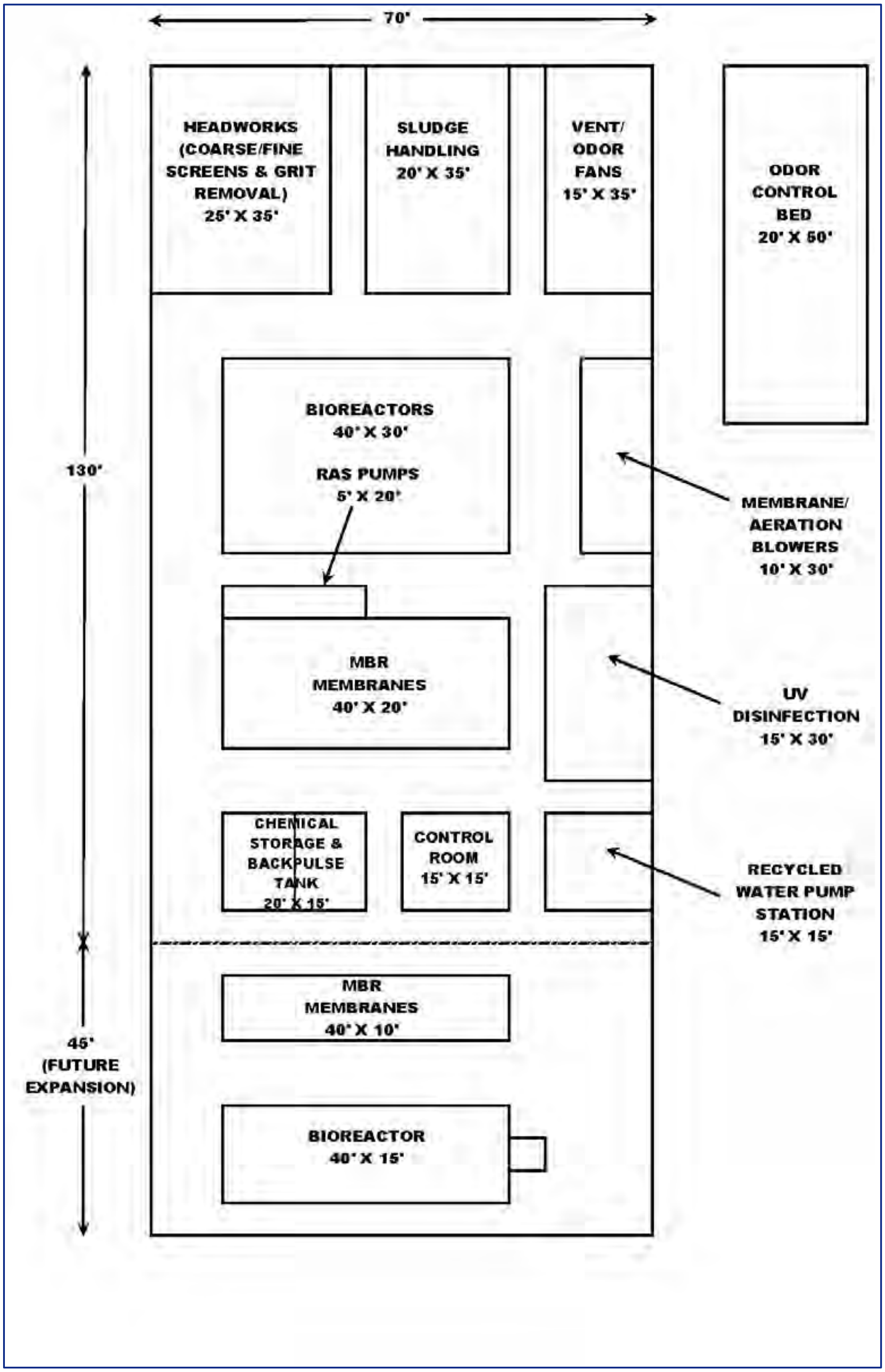


Table 7-1: Recommended Project Facilities

Item	Site A	Site B	Site C
Influent Lift Station (hp)	15	44	29
8-in Influent Force Main (LF)	500	5,000	3,100
WRRF (MGD)	0.31	0.31	0.31
Percolation Basins (Ac) [a]	7	7	1
Land Purchase Total (Ac) [b]	8	8	2
Recycled Water			
Pump Station (hp)	29	29	29
6-in Distribution Pipeline (LF)	16,000	3,200	5,300
Municipal Customers	2	1	--
Agricultural Customers	6	3	6
Irrigation Area (Ac)	59	59	59
Irrigation Demand (AFY)	190	190	190

Notes:

a. The range in percolation basin area varies due to the percolation rate assumed for the soils in the general area of each site. On-site percolation testing is recommended due to the significant impacts the percolation rate assumption has on land purchase requirements.

b. Includes 1 acre for the WRRF.

Table 7-2: Recommended Project Costs

Item	Group A	Group B	Group C
Influent Lift Station	$0.17	$0.31	$0.24
Force Main	$0.05	$0.50	$0.31
Percolation Basins	$0.35	$0.35	$0.04
Effluent Pump Station	$1.30	$1.30	$1.30
Effluent Pipeline	$1.60	$0.32	$0.53
Municipal Customer Connection	$0.03	$0.02	--
Agricultural Customer Connection	$0.18	$0.09	$0.18
Raw Construction Subtotal	**$3.68**	**$2.88**	**$2.61**
Contingency Costs (25%)	$0.92	$0.72	$0.65
Construction Total	**$4.60**	**$3.60**	**$3.26**
Implementation Costs (25%)	$1.15	$0.90	$0.82
Treatment (MBR)	$14.61	$14.61	$14.61
Land Purchase	$0.80	$0.80	$0.20
Total Capital Cost	**$21.2**	**$19.9**	**$18.9**
Annual Costs			
Annual O&M	$0.41	$0.41	$0.37
Annualized Capital Cost	$1.42	$1.34	$1.27
Total Annual Cost	**$1.83**	**$1.75**	**$1.64**

Table 7-3: Energy Consumption Estimates (kW-hr/yr)

Item	Group A	Group B	Group C
Influent Pumping	23,700	71,100	47,400
WRRF	37,400	37,400	37,400
Effluent Pumping	47,400	47,400	47,400
Total	**108,500**	**155,900**	**132,200**

7.2 Summary of Alternatives to Recommended Project

Alternatives were developed for the four core project alternatives (WRRF without Reuse; WRRF with Reuse; Chumash WRF Modification; and No Project) using the three WRRF site groups for the WRRF alternatives. The "local" flows scenario of 0.31 MGD is the basis for these alternatives.

7.2.1 Chumash WRF Expansion Alternatives Comparison

Expansion of the Chumash WRF with the Flow Equalization alternative is preferred over the MBR Expansion alterative primarily due to the lower cost. Based on a preliminary investigation, both alternatives are feasible but with the following limitations:

- Significantly restricts expansion of the Chumash WRF to support future potential expansion of the Resort and SYCSD (beyond projected 0.31 MGD).
- Rerouting of District flows to a private facility will have legal, institutional, political, and regulatory implications considering that the Chumash exist as an independent Native Sovereign Nation. For example, treatment and discharge of municipal effluent is typically regulated by the local RWQCB, whereas the Chumash WRF is under EPA jurisdiction for discharge permitting.

In addition, the increase in effluent flows for the MBR Expansion alternative would require modification of the existing NPDES permit.

The following conclusions can be made when comparing the preferred new WRRF treatment alternative (MBR) (see Section 5.2) with the preferred Chumash WRF expansion alternative (Flow Equalization):

- Chumash WRF Expansion would be less expensive than the new WRRF alternative from a capital cost and lifecycle cost perspective; however, the expansion cost does not include any "buy-in" costs or capital facility charges for use of existing treatment capacity so the cost could increase.
- Chumash WRF Expansion would increase the relative cost of future WRF expansions within the existing WRF parcel, which could dissuade Chumash from participating.
- Implementation of the expansion option has more legal, institutional, political, and regulatory issues due to Chumash's status as an independent Native Sovereign Nation.

The new WRRF treatment alternative will be carried forward as the preferred alternative considering the significant Chumash WRF Expansion alternative implementation considerations to be addressed; however, discussions with relevant parties for implementation of the Chumash WRF expansion are also recommended to continue to assess the feasibility of this option.

7.2.2 Regional WRRF Option

A regional (0.49 MGD) WRRF option, which would include flows from Los Olivos and Ballard, was included in this Facilities Plan as an alternative to local, centralized treatment proposed in Los Olivos and Ballard. SYCSD is not pursuing a regional WRRF since the decision to participate will be made by the impacted communities; the information is presented for informational purposes only.

As shown in **Table 7-4**, the regional WRRF option adds roughly $3 M to $4 M in capital costs compared to constructing a local (0.31 MGD) WRRF. The inclusion of the sewer main increases the marginal cost of a regional WRRF to between $11.6 M and $12.9 M. In comparison, costs to plan and construct the community wastewater system serving all of Los Olivos totals roughly $21M (AECOM, 2016). Therefore, a regional WRRF appears to provide the potential for cost savings over a separate wastewater plant and it is recommended that SYCSD reach out to Los Olivos representatives to introduce the concept of a new regional WRRF.

Table 7-4: Regional WRRF Capital Cost Comparison ($M)

	1A	1B	1C	2A	2B	2C
	Without Reuse			With Reuse		
Area	Group A	Group B	Group C	Group A	Group B	Group C
Total Capital Cost						
Regional WRRF	$22.7	$22.6	$19.0	$25.4	$24.2	$22.8
Local WRRF	$18.6	$18.5	$15.9	$21.2	$19.9	$18.9
Increased Cost for Regional WRRF	$4.1	$4.1	$3.0	$4.2	$4.3	$3.9

Note: Refer to Appendix D for detailed cost estimates.

7.3 Project Implementation Plan

Implementing the Recommended Project entails public support, regulatory approvals, environmental review, institutional partnerships, additional technical investigations, and facility design, construction, and operations. The purpose of the implementation plan is to describe these tasks and provide an approximate schedule for their completion. This section identifies major tasks and then discusses each major task, the recommended approach, and status. This section addresses the following Project items:

- Schedule
- Regulatory Items
- Environmental Documentation
- Institutional Activities
- Engineering, Design, and Construction Activities
- Operation and Maintenance Activities

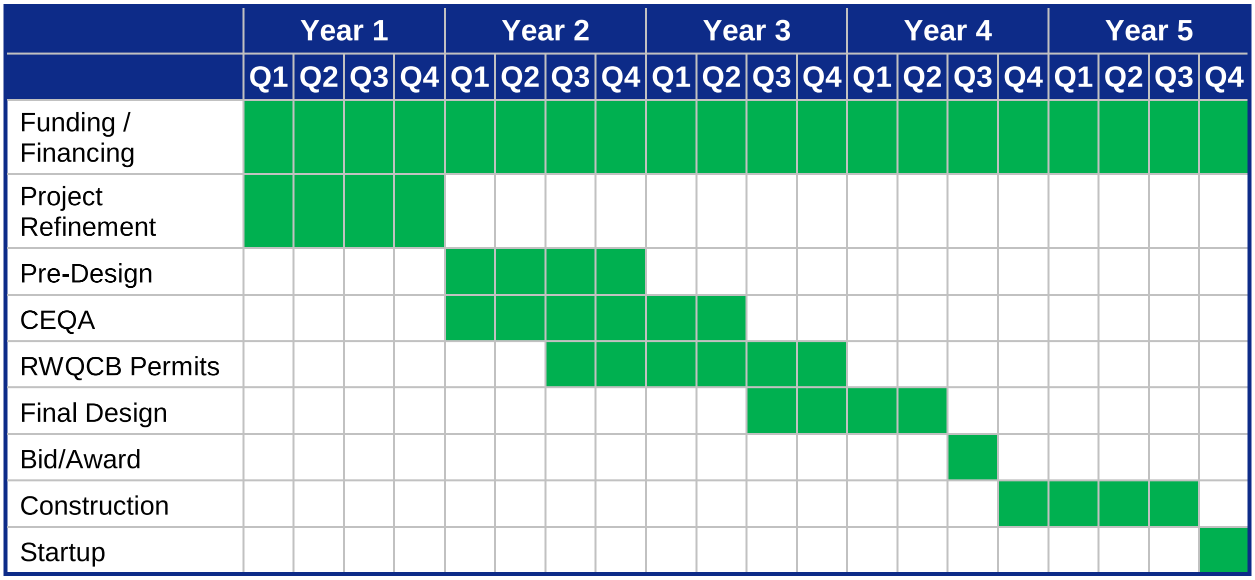
7.3.1 Schedule

The overall implementation plan for the Recommended Project is shown on **Figure 7-3**. Full implementation of the project would take approximately 5 years. Additional efforts are required to further refine the project prior to starting preliminary design, including:

- Define “No Project” alternative (Solvang WWTP upgrades / expansion)
- Address Chumash WRF alternative institutional and incremental cost issues
- Select WRRF site

Once the No Project and Chumash alternatives are better defined, the District can decide whether to move forward with a new WRRF.

Figure 7-3: Implementation Schedule for Project



7.3.2 Environmental Documentation

All public projects in California must comply with CEQA. If a project is not exempt, CEQA provides for the preparation of an Initial Study (IS) to analyze whether the project would have a significant impact upon the environment. A Negative Declaration/Mitigated Negative Declaration could be issued if the analysis in the IS determines that the project or action, as proposed or as proposed with specific mitigation measures, would not have a significant impact upon the environment. If the analysis in the IS determines that the project or action has the potential to result in a significant impact(s) to the environment, then an Environmental Impact Report (EIR) would need to be prepared to further address such impacts. It is anticipated that the District will need to complete an EIR for the project. In addition to CEQA, a project is subject to the National Environmental Policy Act (NEPA) if it is jointly carried out by a federal agency, requires a federal permit, entitlement, or authorization, requires federal funding, and/or occurs on federal land. The SWRCB SRF loan program (see Section 7.4 for further discussion) is partially funded by the U.S. Environmental Protection Agency and, as a result, requires additional environmental documentation beyond CEQA – but not as extensive as NEPA – that is referred to as "CEQA-Plus."

7.3.3 Discharge and Reuse Permits

The District will need to obtain permits from the Central Coast RWQCB for discharge of treated wastewater and a permit to reuse treated wastewater. Discharge will be permitted with Waste Discharge Requirements (WDR). Reuse can be permitted with Water Reclamation Requirements (WRR) in combination with the WDR or using the Water Reclamation Requirements for Recycled Water Use (General Order). The General Order is assumed for this project based on initial feedback from the RWQCB.

Approval of both permit applications requires an approved CEQA document.

Discharge Permit (Waste Discharge Requirements)

WRRF effluent discharges would either be covered by a WDR permit for a discharge to land or an NPDES permit for a surface water discharge issued by the Central Coast RWQCB. Land discharge was assumed for the WRRF (refer to Section 3.4). To apply for a WDR, the District would complete a Report of Waste Discharge (ROWD) pursuant to CWC Section 13260, which states that persons discharging or proposing to discharge waste that could affect the quality of the waters of the State, other than into a community sewer system, shall file a ROWD containing information which may be required by the appropriate RWQCB.

The steps to obtain Waste Discharge Requirements are as follows:

- File the ROWD form with the necessary supplemental information with the RWQCB at least 120 days before beginning to discharge waste.
- RWQCB staff review the application for completeness and may request additional information.
- Once the application is complete, RWQCB staff determines whether the RWQCB should adopt WDRs, prohibit the discharge, or waive the WDRs.
- If WDRs should be issued, RWQCB staff prepares proposed WDRs and distributes them to persons and public agencies with known interest in the project for a minimum of a 30-day comment period. RWQCB staff may modify the proposed WDRs based upon comments received from the discharger and interested parties.
- The RWQCB holds a public hearing after at least a 30-day public notification and may adopt the proposed WDRs or modify and adopt them at the public hearing by majority vote.

The entire process for developing and adopting the requirements normally takes about three months.

Reuse Permit (General Order)

The District can obtain the Water Reclamation Requirements for Recycled Water Use (General Order) permit, which establishes standard conditions for recycled water use. To obtain coverage under the General Order, the District should submit a Notice of Intent (NOI) to the RWQCB and submit a Title 22 Engineering Report to the SWRCB DDW. The NOI includes a Recycled Water Program Technical Report containing information on the wastewater treatment plant, recycled water use(s), recycled water program, and program administration.

The NOI is not considered complete until DDW issues a Title 22 Engineering Report approval letter. The Title 22 Engineering Report must be prepared in accordance with CCR Title 22 and Guidelines for the Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water (2001). The report content typically includes recycled water production facilities, transmission and distribution facilities and use areas.

Approximately 90 days is needed for RWQCB processing once the NOI is complete. The Regional Water Board will issue a Notice of Applicability NOA to the District to authorize the recycled water use and distribution program.

7.3.4 Institutional Activities – ID#1

This section addresses the essential institutional relationship between Santa Ynez CSD and ID #1. A strong working relationship between the water and wastewater agencies is an essential component of a successful recycled water project.

Institutional aspects include, but are not limited to:

- Designation of the program manager
- Rights to approve, reject or charge for changes or additions to the recycled water system
- Basis for decisions on changes or additions to the recycled water system
- Water rights
- Connection rights
- Extension rights
- Capacity rights
- Regulatory responsibility
- Ownership of pipeline reaches

Financial aspects include, but are not limited to:

- Monetary contributions from each partner, including timing, amount and intended use
- Means of compensation between agencies for project expenses
- Price of recycled water to retailer
- Price of recycled water to customers

Operational aspects include, but are not limited to:

- Recycled water quality
- Service pressure at specific locations
- Operations and maintenance requirements and jurisdictions
- Delivery quantities
- Training and enforcement of the proper use of recycled water
- Future expansion
- Service reliability
- Future supply and demand conditions
- Time frame of commitment
- Specified type of usage
- Timeframe of availability of recycled water
- Customers

7.3.5 Institutional Activities - Customers

Two items should be obtained to support recycled water service to customers:

- User Manual: A Recycled Water User Handbook should be developed that includes: State and local standards, regulations and guidelines for the use of recycled water; information on the duties and responsibilities of water purveyors and recycled water users; information on operational requirements at reuse sites; and information on notification and reporting.
- Recycled Water User Commitment / Coordination: It is a requirement of the SWRCB (and good practice) that user commitments be obtained for a project to be eligible for state funding through the SWRCB Water Recycling Funding Program.

7.3.6 Engineering, Design, and Construction Activities

The new facilities for the project are presented in Table 7-1. This section discusses the effort needed to develop and implement the capital improvement projects identified for the project, including the WRRF, conveyance pump stations, pipelines, and percolation basins.

Preliminary Design

As part of the preliminary design, detailed plans would be prepared for all the new facilities identified for the project, including layouts for the WRRF, conveyance pump stations, pipeline alignment, and spreading basins. The plans would also include revised capital and O&M cost estimates based on vendor quotes and proposals. During pre-design, the conceptual design developed in this report would be further refined, and assumptions would be updated, validated and documented. The conveyance pipeline alignments would be included in the pre-design report.

Final Design

Following preliminary design, design packages would be prepared for the WRRF, pump stations, and conveyance pipelines. The WRRF design could proceed independently of the other facilities. A bid package could likely be prepared in two months (after permitting is completed).

Bidding/Contract Award, Construction, and Startup

Bidding and contract award would commence once the bid packages are complete. These tasks are assumed to take three months. The bidding and contract award period is defined as starting from when the bid packages are sent for advertisement to the day the notice to proceed is issued to the contractor. Construction of the WRRF, conveyance pipelines, and pump stations is anticipated to take approximately one year. The startup period and final approvals of the WRRF and overall project are anticipated to take three months.

7.3.7 Operation and Maintenance Activities

Ongoing project activities include maintenance of distribution system facilities, billing and customer service, and inspection/backflow prevention testing. The District will operate the non-potable system and provide staff and equipment for system operations. Based on experience with other water agencies and recycled water programs, the Project will likely need at least one recycled water coordinator and one certified operator. Existing trained staff could be utilized in the interim. Staff could be added as-needed, most likely in association with each major system expansion.

- **Recycled Water Coordinator:** Responsible for coordinating most of the activities identified in Section 5.3.4. The coordinator's responsibilities would also include billing and customer service. The coordinator would not need any specific certification, but prior experience with water and non-potable systems would be desired.
- **Certified Operator:** The operator would be responsible for field work, including system O&M, meter reading, onsite supervisor training, and site inspection. The operator should have a California/Nevada AWWA distribution operator certificate, and a California/Nevada AWWA treatment operator certificate would be desired. Also, prior experience with non-potable systems and backflow prevention would be desired.

Both operator and coordinator should be familiar with the Recycled Water User Manual and should attend a training program on recycled water. Such programs are currently offered either through recycled water consultants or local professional societies, such as local chapters of the WateReuse association.

Large equipment items that should be made available to recycled water program staff include a dump truck, a backhoe, a pick-up/utility vehicle, and spare mechanical parts for critical facilities such as the pump station.

7.4 Project Funding / Financing

7.4.1 Grant / Loan Sources

A variety of funding opportunities are potentially available for this project, including the following:

- SWRCB Recycled Water Funding Program
- SWRCB Clean Water State Revolving Fund Loans
- DWR Integrated Regional Water Management Program
- US Bureau of Reclamation (USBR) Title XVI Program

Each of these funding opportunities is described in further detail in the following sections.

SWRCB Recycled Water Funding Program

The SWRCB administers three types of recycled water funding: recycled water facilities planning grants, construction implementation grants and loans, and Clean Water State Revolving Fund (CWSRF) loans. Construction grants and loans specific to recycled water programs fall under the Water Recycling Funding Program (WRFP) and follow the CWSRF policy. Once the Facilities Plan is in place, the District can focus on obtaining grants or low interest loans to cover the construction implementation costs.

The SWRCB currently administers a grants program to cover construction of recycled water facilities. The Water Recycling Funding Program Guidelines, adopted in 2015, provide for a construction grant that will cover 35% of actual eligible construction costs up to $15 million. Eligible costs include construction allowances which may include engineering during construction, construction management, and contingencies limited to 15% of the construction grant value. To be eligible to receive grant funds, a minimum 50% local cost share match must be provided. More information about the program can be found here:
http://www.waterboards.ca.gov/water_issues/programs/grants_loans/water_recycling/

Clean Water State Revolving Fund Loans

The SWRCB administers the CWSRF Loan Program. This Program offers low-interest loans to eligible applicants for construction of publicly-owned facilities including wastewater treatment, local sewers, sewer interceptors, water reclamation facilities, and stormwater treatment. Funding under this Program is also available for expanded use projects, including implementation of nonpoint source projects or programs, and development and implementation of estuary comprehensive conservation and management plans.

The process for securing funds includes submitting a CWSRF application in addition to WRFP-specific application items. CWSRF loans typically have a lower interest rate than bonds, at half of the General Obligation bond (typically 2.5% to 3%, currently 1.8%) at the time of the Preliminary Funding Commitment. Loans are paid back over 20 or 30 years. Annually, the CWSRF program disburses $200 million to $300 million to agencies in California. There is no award maximum, but a maximum allocation of $50 million per year per agency exists. Repayment begins one year after construction is complete. SWRCB funds projects on a readiness-to-proceed basis. The application process can take up to 6 months; SWRCB recommends collecting required information and applying once the draft CEQA Plus documents, required resolutions, and financial package are completed.

Projects may receive a combination of grant and low interest loan construction financing. The application process for construction grants and loans is the same and involves completion of an application package consisting of four separate sections to document general project information, financial security, technical project information, and environmental documentation and placement on the competitive funding list. More information about the SWRCB CWSRF Program can be found here:
http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/srf_forms.shtml

DWR Integrated Regional Water Management Program

The DWR Integrated Regional Water Management (IRWM) Program provides planning and implementation grants to prepare and update IRWM Plans and to implement integrated regional water resources related projects. IRWM program funding is awarded through a competitive grants program, in which approved IRWM Regions submit application packages for funding multiple projects within their regions as a package.

DWR will be soliciting proposals for implementation grants under Proposition 1 in early 2018. Proposition 1 allocated $43 million to six IRWM regions within California's Central Coast and the Santa Barbara County region was allocated $6.3 million for the upcoming round. Additional information about the IRWM grant program can be accessed here:
http://www.water.ca.gov/irwm/grants/index.cfm

USBR Title XVI Program

The USBR Title XVI grant program is focused on identifying and investigating opportunities for water reclamation and reuse. Funding is made available for the planning, design, and construction of water recycling treatment and conveyance facilities and is structured to cover up to 25% of the total project costs (up to $20 million), with project proponents contributing 75% or more of total project costs. Proposal requirements include technical and budgetary components, as well as a completed Title XVI Feasibility Study, which must be submitted to USBR for review and approval. While compliance with NEPA is not required during the proposal phase, it is required prior to the receipt and expenditure of Federal funds. Also, previous grant cycles required a project to be congressionally authorized to be eligible to receive Title XVI funding.

In December 2016, the Water Resources Development Act (WRDA), now called the Water Infrastructure Improvements for the Nation Act (WIIN), was passed. The act includes reformation of Title XVI into a competitive grant program (previously, Congress added all eligible projects to the Title XVI list) and includes authorization of $50 million for Title XVI. Grant implementation details and timing are not known at this time but are expected by the end of 2017. More information is available from USBR's website, located here:
https://www.usbr.gov/watersmart/title/index.html

7.4.2 Construction Financing

Table 7-5 summarizes project funding and financing assumptions. The District intends to fund pre-construction planning tasks with available funds, and construction costs with a combination of available grant funds and the balance of capital costs with a low-interest SRF loan. Potential grant funds and loans are discussed in the previous section. As shown in the table, the District must generate at least $1.8 million dollars per year in revenue to ensure SRF loan payback and sufficient O&M funding.

Table 7-5: Recommended Project Finance Plan

Item	Group A	Group B	Group C
Total Capital Cost	**$21.2**	**$19.9**	**$18.9**
Annual Costs			
Annual O&M	$0.41	$0.41	$0.37
Annualized Capital Cost	$1.42	$1.34	$1.27
Total Annual Cost	**$1.83**	**$1.75**	**$1.64**

The WRRF is anticipated to be funded primarily with capacity charges for new customers connecting to the District's wastewater collection system and ongoing customer rates. An analysis of the basis for capacity charges and impacts to customer rates will require an updated cost of service study prepared in accordance with Proposition 218.

In addition, the sale of recycled water could provide revenue to offset costs to the District and its customers. ID#1 is the local water supplier and a recycled water rate could be established that considers potential lost revenue. At this time, the District intends to move forward the project without guaranteed revenue from recycled water sales.

7.5 Conclusions

The District identified the need to evaluate sustainable wastewater treatment services for its ratepayers and investigated the feasibility of a new WRRF. A new WRRF would provide cost control and stability for wastewater treatment services that are currently provided by the City of Solvang. A new local water supply could relieve the stressed Santa Ynez Uplands Groundwater Basin and/or reduce the need for reliance of surface water supplies from the Cachuma Project and SWP. In addition, the WRRF could serve "Special Problem Areas" – designated by Santa Barbara County due to constraints and/or historic problems with the use of onsite wastewater disposal systems – that include the communities of Los Olivos, Ballard, Janin Acres, and west of Santa Ynez.

Developing a new, local WRRF that includes reuse of effluent would:

- Provide wastewater sustainability
- Improve centralized wastewater treatment effluent quality
- Reduce surface and groundwater discharges from septic systems
- Reduce dependence on surface water supplies
- Improve water supply reliability
- Preserve potable water supplies for potable uses

The recommended approach is to pursue multiple options in parallel paths: 1) New 0.31 MGD WRRF; 2) 0.31 MGD expansion of the Chumash WRF; 3) Solvang WWTP upgrade / expansion. Key inputs in the selection of the preferred project include:

- The cost of upgrading the Solvang WWTP to meet new nitrogen limits and increase the SYCSD share of available capacity.
- The ability to address institutional and incremental cost issues of the Chumash WRF expansion alternative.
- Refinement of sites evaluated for a new WRRF and their associated availability, cost, and percolation rates.

The District intends to continue to evaluate its sustainable wastewater options and make a final decision once these inputs are determined.

Chapter 8 References

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Appendix A - List of Potential Reuse Sites

Merged ID	Crop Type	Classification	Sub-class	Size (acres)	Irrigated Area (acres)	Applied Water Irrigation Rate (AFY/acre)	Demand (AFY)
1	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	38	34	1.5	52
2	GRAPE, WINE	Agricultural	Vineyard	1	1.0	1.5	1.5
3	LANDSCAPE MAIN, VERTEBRATE CTRL, WATER AREA	andscape Irrigatio	Golf	114	103	3.5	360
4	VERTEBRATE CTRL, VERTEBRATE/PARK, OLIVE	Agricultural	Orchard	15	13	3.25	42
5	PUMPKIN	Agricultural	Food Crops	7	6	3	19
6	LANDSCAPE MAIN, RIGHTS OF WAY, UNCULTIVATED AG	Agricultural	Pasture/ Rangeland	31	28	3	84
7	VERTEBRATE CTRL, FORAGE HAY/SLGE, PASTURELAND, OAT	Agricultural	Pasture/ Rangeland	25	23	3	68
8	VERTEBRATE CTRL, ALFALFA, PASTURELAND	Agricultural	Pasture/ Rangeland	47	42	3	127
9	OAT FOR/FOD	Agricultural	Pasture/ Rangeland	190	171	3	514
10	VERTEBRATE CTRL, GRAPE, WINE	Agricultural	Vineyard	34	30	1.5	45
11	SQUASH, SUMMER, SQUASH, WINTER, PEPPER FRUITNG, CABBAGE, KALE, LETTUCE LEAF, LETTUCE ROMAINE, FENNEL	Agricultural	Food Crops	435	391	3	1,173
12	N-OUTDR FLOWERS, UNCULTIVATED AG	Agricultural	Nursery	32	29	2.5	73
13	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	34	30	1.5	46
14	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	13	11	1.5	17
15	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	58	52	1.5	78
16	VERTEBRATE CTRL, ALFALFA	Agricultural	Food Crops	54	49	3	146
17	VERTEBRATE CTRL, GRAPE, WINE	Agricultural	Vineyard	2	1.4	1.5	2.1
18	VERTEBRATE CTRL, GRAPE, WINE	Agricultural	Vineyard	44	39	1.5	59
19	OAT FOR/FOD	Agricultural	Pasture/ Rangeland	30	27	3	80
20	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	11	10	1.5	14
21	OLIVE	Agricultural	Orchard	23	21	3.25	67
22	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	21	19	1.5	28
23	VERTEBRATE CTRL, RANGELAND, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	96	87	1.5	130
24	VERTEBRATE CTRL, OAT FOR/FOD, ALFALFA, UNCULTIVATED AG	Agricultural	Food Crops	38	34	3	103
25	VERTEBRATE CTRL, APPLE, UNCULTIVATED AG	Agricultural	Food Crops	6	5	3	15
26	VERTEBRATE CTRL, N-OUTDR FLOWERS, OF-ROSE, BLACKBERRY, RASPBERRY, BLUEBERRY, STRAWBERRY, APPLE, APRICOT, NECTARINE, PEACH, PLUM, SQUASH, RHUBARB, UNCULTIVATED AG, UNDECLARED COMM	Agricultural	Food Crops	5	4	3	13
27	GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	40	36	1.5	54
28	GRAPE, WINE	Agricultural	Vineyard	1	0.9	1.5	1.3
29	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	0	0	1.5	0.5

Merged ID	Crop Type	Classification	Sub-class	Size (acres)	Irrigated Area (acres)	Applied Water Irrigation Rate (AFY/acre)	Demand (AFY)
30	GRAPE, WINE	Agricultural	Vineyard	1	1	1.5	1.3
31	VERTEBRATE CTRL, GRAPE, WINE, UNCULTIVATED AG	Agricultural	Vineyard	2	1.9	1.5	2.9
32	VERTEBRATE CTRL, PASTURELAND	Agricultural	Pasture/ Rangeland	-	-	-	-
33	LANDSCAPE/PARK, VERTEBRATE CTRL	andscape Irrigatio	Park/ openspace	6	6	2.75	15.7
34	VERTEBRATE CTRL, UNDECLARED COMM	Agricultural	Food Crops	-	-	-	-
35	VERTEBRATE CTRL, STRAWBERRY, APPLE, GRAPE, WINE	Agricultural	Food Crops	12	11	3	33
36	-	andscape Irrigatio	Park/ openspace	2	2	2.75	5
			Total Irrigated Area	**1,467**	**1,320**		**3,471**

Appendix B - Treatment Plant Cost Estimates

Santa Ynez Recycled Water Facilities Plan

Treatment Plant Options

Estimate Type: Conceptual Design

		Local WRRF Alternatives (0.31 MGD)					Regional WRRF Alternatives (0.49 MGD)		
		CAS, Extended Aeration	SBR	MBR	Chumash WRF - MBR Expansion	Chumash WRF - Flow Equalization	CAS, Extended Aeration	SBR	MBR
Capital Costs									
Raw Construction Cost	-	$7,652,000	$6,661,000	$8,326,000	$5,998,000	$3,894,000	$9,380,000	$7,997,000	$9,889,000
Construction Contingency	30%	$2,296,000	$1,998,000	$2,498,000	$1,799,000	$1,168,000	$2,814,000	$2,399,000	$2,967,000
Base Construction Cost	**-**	**$9,948,000**	**$8,659,000**	**$10,824,000**	**$7,797,000**	**$5,062,000**	**$12,194,000**	**$10,396,000**	**$12,856,000**
Implementation Costs	35%	$3,481,800	$3,030,650	$3,788,400	$2,728,950	$1,771,700	$4,267,900	$3,638,600	$4,499,600
Total Estimated Capital Cost		**$13,429,800**	**$11,689,650**	**$14,612,400**	**$10,525,950**	**$6,833,700**	**$16,461,900**	**$14,034,600**	**$17,355,600**
Annual Costs									
Annual Cost of Consumables	2%	$ 75,938	$ 68,156	$ 112,500	$ 95,414	$ 58,688	$ 80,625	$ 71,906	$ 131,250
Annual Cost of Power	-	$ 116,300	$ 85,537	$ 96,925	$ 55,781	$ 48,252	$ 123,417	$ 92,655	$ 106,890
Annual Cost of Chemicals	-	$ -	$ -	$ 5,610	$ 7,065	$ 7,065	$ -	$ -	$ 7,065
Annual Labor Costs	-	$ 52,000	$ 62,400	$ 52,000	$ 26,000	$ 26,000	$ 52,000	$ 62,400	$ 52,000
Total Annual O&M		**$ 244,237**	**$ 216,093**	**$ 267,035**	**$ 184,260**	**$ 140,005**	**$ 256,042**	**$ 226,961**	**$ 297,205**
Present Value O&M (20 years @ 20%)		**$ 3,634,251**	**$ 3,215,469**	**$ 3,973,482**	**$ 2,741,783**	**$ 2,083,268**	**$ 3,809,909**	**$ 3,377,177**	**$ 4,422,404**
Project Costs									
Total Present Worth		**$ 17,064,051**	**$ 14,905,119**	**$ 18,585,882**	**$ 13,267,733**	**$ 8,916,968**	**$ 20,271,809**	**$ 17,411,777**	**$ 21,778,004**

Santa Ynez Recycled Water Facilities Plan

CAS, Extended Aeration (0.31 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 817,704	
3 - Concrete	$ 2,952,211	
5 - Metals	$ 35,000	
11 - Equipment	$ 2,531,250	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 759,375	
17- I&C	$ 506,250	

RAW CONSTRUCTION COST		**$ 7,652,000**
Construction Contingency	30%	$ 2,296,000
BASE CONSTRUCTION COST		**$ 9,948,000**
Implementation Costs	35%	$ 3,481,800
TOTAL PROJECT COST		**$ 13,429,800**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 817,704**	
	Mobilization/Demobilization					5%	$ 367,704.31	
Treatment Plant								
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for Building Foundation			2,500	CY	$ 50	$ 125,000	75 ft x 180 ft
	Excavation for Below Grade Tanks			3,000	CY	$ 50	$ 150,000	Bioreactors (125 ft x 32 ft x 18 ft deep)
	Excavation for Odor Control Bed			260	CY	$ 50	$ 13,000	20 ft x 70 ft
	Excavation for Effluent PS			40	CY	$ 50	$ 2,000	Wet Well (15 ft x 15 ft x 15 ft deep)
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 50,000	$ 50,000	
	Misc Site Work Allowance			1	LS	$ 75,000	$ 75,000	
3 - Concrete							**$ 2,952,211**	
Treatment Plant								
	Treatment Building			13,500	SF	$ 125	$ 1,687,500	75 ft x 180 ft, preengineered building
	Foundation			750	CY	$ 600	$ 450,000	75 ft x 180 ft
Below Grade Tanks							$ -	
	Slab			220	CY	$ 600	$ 132,000	Bioreactors (125 ft x 32 ft x 18 ft deep)
	Walls			400	CY	$ 1,200	$ 480,000	Bioreactors (125 ft x 32 ft x 18 ft deep)
	Slab			10	CY	$ 1,200	$ 12,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
Odor Control Bed								
	Slab			52	CY	$ 600	$ 31,111	20 ft x 70 ft
	Walls			33	CY	$ 1,200	$ 39,600	20 ft x 70 ft x 5 ft deep
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 70,000**	
	Finishes Allowance			1	LS	$ 70,000	$ 70,000	
11 - Equipment							**$ 2,531,250**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 375,000	$ 375,000	Includes 25% allowance for installation
	Aeration System (Incl. Blowers and Diffusers)			1	LS	$ 625,000	$ 625,000	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	RAS Pumps			1	LS	$ 125,000	$ 125,000	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 18,750	$ 56,250	Includes 25% allowance for installation
	Tertiary Filters			1	EA	$ 125,000	$ 125,000	Includes 25% allowance for installation
	Odor Control			1	LS	$ 343,750	$ 343,750	Includes 25% allowance for installation
	Sludge Handling			1	LS	$ 312,500	$ 312,500	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			2	EA	$ 50,000	$ 100,000	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 759,375**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 759,375.00	
17 - I&C							**$ 506,250**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 506,250	

ANNUAL O&M COSTS	Item	Size	Units	Amount	Unit	Value	Cost	Notes
Consumables						**Total Consumables**	**$ 75,938**	
	Equipment Consumables			$ 2,531,250		2%	$ 50,625	2% of Equipment
	Electrical Consumables			$ 759,375		2%	$ 15,188	2% of Electrical
	Instrumentation Consumables			$ 506,250		2%	$ 10,125	2% of Instrumentation
Power Costs						**Total Power**	**$ 116,300**	
	Screens and Washer Compactor	4 hp	3 kW	6570 hrs	17147 kWh	$0.13 per kWh	$ 2,229	
	Process Aeration	-	600 kWh/day	365 days	219000 kWh	$0.13 per kWh	$ 28,470	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	RAS Pumps	20 hp	15 kW	6570 hrs	97985 kWh	$0.13 per kWh	$ 12,738	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Odor Control		1200 kWh/day	365 days	438000 kWh	$0.13 per kWh	$ 56,940	
	Effluent Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
Chemicals						**Total Chemicals**	**$ -**	
	Hypochlorite				gal	$15	$ -	
	Citric Acid				lbs	$14	$ -	
Labor Costs						**Total Labor**	**$ 52,000**	
			Total # Operators	1	number			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	520	hrs/yr			
			Total Operators per year	520	Total hrs	$ 100	$ 52,000	
						TOTAL ANNUAL O&M COSTS	**$ 244,237**	

Santa Ynez Recycled Water Facilities Plan

SBR (0.31 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 688,055	
3 - Concrete	$ 2,480,292	
5 - Metals	$ 35,000	
11 - Equipment	$ 2,271,875	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 681,563	
17- I&C	$ 454,375	

RAW CONSTRUCTION COST		**$ 6,661,000**
Construction Contingency	30%	$ 1,998,000
BASE CONSTRUCTION COST		**$ 8,659,000**
Implementation Costs	35%	$ 3,030,650
TOTAL PROJECT COST		**$ 11,689,650**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 688,055**	
	Mobilization/Demobilization					5%	$ 320,055	
Treatment Plant								
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for Building Foundation			1,900	CY	$ 50	$ 95,000	75 ft x 135 ft
	Excavation for Below Grade Tanks			2,000	CY	$ 50	$ 100,000	Bioreactors (100 ft x 25 ft x 18 ft deep)
	Excavation for Odor Control Bed			220	CY	$ 50	$ 11,000	20 ft x 60 ft
	Excavation for Effluent PS			40	CY	$ 50	$ 2,000	Wet Well (15 ft x 15 ft x 15 ft deep)
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 50,000	$ 50,000	
	Misc Site Work Allowance			1	LS	$ 75,000	$ 75,000	
3 - Concrete							**$ 2,480,292**	
Treatment Plant								
	Treatment Building			10,125	SF	$ 125	$ 1,265,625	75 ft x 135 ft, preengineered building
	Foundation			560	CY	$ 600	$ 336,000	75 ft x 135 ft
Below Grade Tanks							$ -	
	Slab			140	CY	$ 600	$ 84,000	Bioreactors (100 ft x 25 ft x 18 ft deep)
	Walls			500	CY	$ 1,200	$ 600,000	Bioreactors (100 ft x 25 ft x 18 ft deep)
	Slab			10	CY	$ 1,200	$ 12,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
Odor Control Bed								
	Slab			44	CY	$ 600	$ 26,667	20 ft x 60 ft
	Walls			30	CY	$ 1,200	$ 36,000	20 ft x 60 ft x 5 ft deep
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 60,000**	
	Finishes Allowance			1	LS	$ 60,000	$ 60,000	
11 - Equipment							**$ 2,271,875**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 375,000	$ 375,000	Includes 25% allowance for installation
	Aeration System (Incl. Blowers and Diffusers)			1	LS	$ 625,000	$ 625,000	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 15,625	$ 46,875	Includes 25% allowance for installation
	Tertiary Filters			1	EA	$ 125,000	$ 125,000	Includes 25% allowance for installation
	Odor Control			1	LS	$ 281,250	$ 281,250	Includes 25% allowance for installation
	Sludge Handling			1	LS	$ 250,000	$ 250,000	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			2	EA	$ 50,000	$ 100,000	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 681,563**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 681,562.50	
17 - I&C							**$ 454,375**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 454,375	

ANNUAL O&M COSTS				**Amount**	**Unit**	**Value**	**Cost**	
Consumables						**Total Consumables**	**$ 68,156**	
	Equipment Consumables			$ 2,271,875		2%	$ 45,438	2% of Equipment
	Electrical Consumables			$ 681,563		2%	$ 13,631	2% of Electrical
	Instrumentation Consumables			$ 454,375		2%	$ 9,088	2% of Instrumentation
Power Costs						**Total Power**	**$ 85,537**	
	Screens and Washer Compactor	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	SBR	-	400 kWh/day	365 days	146000 kWh	$0.13 per kWh	$ 18,980	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Odor Control		1000 kWh/day	365 days	365000 kWh	$0.13 per kWh	$ 47,450	
	Effluent Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
Chemicals						**Total Chemicals**	**$ -**	
	Hypochlorite				gal	$15	$ -	
	Citric Acid				lbs	$14	$ -	
Labor Costs						**Total Labor**	**$ 62,400**	
			Total # Operators	1	number			Assume 16 hrs/wk, 6 mo of the year & 8 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	624	hrs/yr			
			Total Operators per year	624	Total hrs	$ 100	$ 62,400	
				TOTAL ANNUAL O&M COSTS			**$ 216,093**	

Santa Ynez Recycled Water Facilities Plan

MBR (0.31 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 705,371	
3 - Concrete	$ 1,910,922	
5 - Metals	$ 35,000	
11 - Equipment	$ 3,750,000	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 1,125,000	
17- I&C	$ 750,000	

RAW CONSTRUCTION COST		**$ 8,326,000**
Construction Contingency	30%	$ 2,498,000
BASE CONSTRUCTION COST		**$ 10,824,000**
Implementation Costs	35%	$ 3,788,400
TOTAL PROJECT COST		**$ 14,612,400**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 705,371**	
	Mobilization/Demobilization					5%	$ 398,871	
Treatment Plant								
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for Building Foundation			1,700	CY	$ 50	$ 85,000	70 ft x 130 ft
	Excavation for Below Grade Tanks			1,000	CY	$ 50	$ 50,000	Bioreactors (40 ft x 30 ft x 18 ft deep)
	Excavation for Odor Control Bed			190	CY	$ 50	$ 9,500	20 ft x 50 ft
	Excavation for Effluent PS			40	CY	$ 50	$ 2,000	Wet Well (15 ft x 15 ft x 15 ft deep)
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 50,000	$ 50,000	
	Misc Site Work Allowance			1	LS	$ 75,000	$ 75,000	
3 - Concrete							**$ 1,910,922**	
Treatment Plant								
	Treatment Building			9,100	SF	$ 125	$ 1,137,500	70 ft x 130 ft, preengineered building
	Foundation			510	CY	$ 600	$ 306,000	70 ft x 130 ft
Below Grade Tanks							$ -	
	Slab			70	CY	$ 600	$ 42,000	Bioreactors (40 ft x 30 ft x 18 ft deep)
	Walls			200	CY	$ 1,200	$ 240,000	Bioreactors (40 ft x 30 ft x 18 ft deep)
	Slab			10	CY	$ 1,200	$ 12,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
Odor Control Bed								
	Slab			37	CY	$ 600	$ 22,222	20 ft x 50 ft
	Walls			26	CY	$ 1,200	$ 31,200	20 ft x 50 ft x 5 ft deep
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 50,000**	
	Finishes Allowance			1	LS	$ 50,000	$ 50,000	
11 - Equipment							**$ 3,750,000**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 531,250	$ 531,250	Includes 25% allowance for installation
	MBR System (Incl. Pumps and Blowers)			1	LS	$ 2,103,125	$ 2,103,125	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 15,625	$ 46,875	Includes 25% allowance for installation
	Odor Control			1	LS	$ 250,000	$ 250,000	Includes 25% allowance for installation
	Sludge Handling			1	LS	$ 250,000	$ 250,000	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			2	EA	$ 50,000	$ 100,000	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 1,125,000**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 1,125,000.00	
17 - I&C							**$ 750,000**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 750,000	

ANNUAL O&M COSTS				Amount	Unit	Value	Cost	
Consumables						**Total Consumables**	**$ 112,500**	
	Equipment Consumables			$ 3,750,000		2%	$ 75,000	2% of Equipment
	Electrical Consumables			$ 1,125,000		2%	$ 22,500	2% of Electrical
	Instrumentation Consumables			$ 750,000		2%	$ 15,000	2% of Instrumentation
Power Costs						**Total Power**	**$ 96,925**	
	Screens and Washer Compactor	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	MBR	-	840 kWh/day	365 days	306600 kWh	$0.13 per kWh	$ 39,858	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Odor Control		800 kWh/day	365 days	292000 kWh	$0.13 per kWh	$ 37,960	
	Effluent Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
Chemicals						**Total Chemicals**	**$ 5,610**	
	Hypochlorite			220	gal	$15	$ 3,300	
	Citric Acid			165	lbs	$14	$ 2,310	
Labor Costs						**Total Labor**	**$ 52,000**	
			Total # Operators	1	number			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	520	hrs/yr			
			Total Operators per year	520	Total hrs	$ 100	$ 52,000	
				TOTAL ANNUAL O&M COSTS			**$ 267,035**	

Santa Ynez Recycled Water Facilities Plan

CAS, Extended Aeration (0.49 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 1,010,467	
3 - Concrete	$ 4,253,086	
5 - Metals	$ 35,000	
11 - Equipment	$ 2,687,500	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 806,250	
17- I&C	$ 537,500	

RAW CONSTRUCTION COST		**$ 9,380,000**
Construction Contingency	30%	$ 2,814,000
BASE CONSTRUCTION COST		**$ 12,194,000**
Implementation Costs	35%	$ 4,267,900
TOTAL PROJECT COST		**$ 16,461,900**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 1,010,467**	
	Mobilization/Demobilization					5%	$ 450,467	
Treatment Plant								
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for Building Foundation			3,700	CY	$ 50	$ 185,000	75 ft x 265 ft
	Excavation for Below Grade Tanks			4,000	CY	$ 50	$ 200,000	Bioreactors (175 ft x 32 ft x 18 ft deep)
	Excavation for Odor Control Bed			260	CY	$ 50	$ 13,000	20 ft x 70 ft
	Excavation for Effluent PS			40	CY	$ 50	$ 2,000	Wet Well (15 ft x 15 ft x 15 ft deep)
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 50,000	$ 50,000	
	Misc Site Work Allowance			1	LS	$ 75,000	$ 75,000	
3 - Concrete							**$ 4,253,086**	
Treatment Plant								
	Treatment Building			19,875	SF	$ 125	$ 2,484,375	75 ft x 265 ft, preengineered building
	Foundation			1,100	CY	$ 600	$ 660,000	75 ft x 265 ft
Below Grade Tanks							$ -	
	Slab			310	CY	$ 600	$ 186,000	Bioreactors (175 ft x 32 ft x 18 ft deep)
	Walls			600	CY	$ 1,200	$ 720,000	Bioreactors (175 ft x 32 ft x 18 ft deep)
	Slab			10	CY	$ 1,200	$ 12,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
Odor Control Bed								
	Slab			52	CY	$ 600	$ 31,111	20 ft x 70 ft
	Walls			33	CY	$ 1,200	$ 39,600	20 ft x 70 ft x 5 ft deep
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 80,000**	
	Finishes Allowance			1	LS	$ 80,000	$ 80,000	
11 - Equipment							**$ 2,687,500**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 375,000	$ 375,000	Includes 25% allowance for installation
	Aeration System (Incl. Blowers and Diffusers)			1	LS	$ 750,000	$ 750,000	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	RAS Pumps			1	LS	$ 156,250	$ 156,250	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 18,750	$ 56,250	Includes 25% allowance for installation
	Tertiary Filters			1	EA	$ 125,000	$ 125,000	Includes 25% allowance for installation
	Odor Control			1	LS	$ 343,750	$ 343,750	Includes 25% allowance for installation
	Sludge Handling			1	LS	$ 312,500	$ 312,500	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			2	EA	$ 50,000	$ 100,000	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 806,250**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 806,250.00	
17 - I&C							**$ 537,500**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 537,500	

ANNUAL O&M COSTS				Amount	Unit	Value	Cost	
Consumables						**Total Consumables**	**$ 80,625**	
	Equipment Consumables			$ 2,687,500		2%	$ 53,750	2% of Equipment
	Electrical Consumables			$ 806,250		2%	$ 16,125	2% of Electrical
	Instrumentation Consumables			$ 537,500		2%	$ 10,750	2% of Instrumentation
Power Costs						**Total Power**	**$ 123,417**	
	Screens and Washer Compactor	4 hp	3 kW	6570 hrs	17147 kWh	$0.13 per kWh	$ 2,229	
	Process Aeration	-	750 kWh/day	365 days	273750 kWh	$0.13 per kWh	$ 35,588	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	RAS Pumps	20 hp	15 kW	6570 hrs	97985 kWh	$0.13 per kWh	$ 12,738	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Odor Control		1200 kWh/day	365 days	438000 kWh	$0.13 per kWh	$ 56,940	
	Effluent Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
Chemicals						**Total Chemicals**	**$ -**	
	Hypochlorite				gal	$15	$ -	
	Citric Acid				lbs	$14	$ -	
Labor Costs						**Total Labor**	**$ 52,000**	
			Total # Operators	1	number			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	520	hrs/yr			
			Total Operators per year	520	Total hrs	$ 100	$ 52,000	
						TOTAL ANNUAL O&M COSTS	**$ 256,042**	

Santa Ynez Recycled Water Facilities Plan

SBR (0.49 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 842,155	
3 - Concrete	$ 3,474,792	
5 - Metals	$ 35,000	
11 - Equipment	$ 2,396,875	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 719,063	
17- I&C	$ 479,375	

RAW CONSTRUCTION COST		**$ 7,997,000**
Construction Contingency	30%	$ 2,399,000
BASE CONSTRUCTION COST		**$ 10,396,000**
Implementation Costs	35%	$ 3,638,600
TOTAL PROJECT COST		**$ 14,034,600**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 842,155**	
	Mobilization/Demobilization					5%	$ 384,155	
Treatment Plant								
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for Building Foundation			2,700	CY	$ 50	$ 135,000	75 ft x 195 ft
	Excavation for Below Grade Tanks			3,000	CY	$ 50	$ 150,000	Bioreactors (150 ft x 25 ft x 18 ft deep)
	Excavation for Odor Control Bed			220	CY	$ 50	$ 11,000	20 ft x 60 ft
	Excavation for Effluent PS			40	CY	$ 50	$ 2,000	Wet Well (15 ft x 15 ft x 15 ft deep)
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 50,000	$ 50,000	
	Misc Site Work Allowance			1	LS	$ 75,000	$ 75,000	
3 - Concrete							**$ 3,474,792**	
Treatment Plant								
	Treatment Building			14,625	SF	$ 125	$ 1,828,125	75 ft x 195 ft, preengineered building
	Foundation			810	CY	$ 600	$ 486,000	75 ft x 195 ft
Below Grade Tanks							$ -	
	Slab			210	CY	$ 600	$ 126,000	Bioreactors (150 ft x 25 ft x 18 ft deep)
	Walls			700	CY	$ 1,200	$ 840,000	Bioreactors (150 ft x 25 ft x 18 ft deep)
	Slab			10	CY	$ 1,200	$ 12,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
Odor Control Bed								
	Slab			44	CY	$ 600	$ 26,667	20 ft x 60 ft
	Walls			30	CY	$ 1,200	$ 36,000	20 ft x 60 ft x 5 ft deep
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 70,000**	
	Finishes Allowance			1	LS	$ 70,000	$ 70,000	
11 - Equipment							**$ 2,396,875**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 375,000	$ 375,000	Includes 25% allowance for installation
	Aeration System (Incl. Blowers and Diffusers)			1	LS	$ 750,000	$ 750,000	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 15,625	$ 46,875	Includes 25% allowance for installation
	Tertiary Filters			1	EA	$ 125,000	$ 125,000	Includes 25% allowance for installation
	Odor Control			1	LS	$ 281,250	$ 281,250	Includes 25% allowance for installation
	Sludge Handling			1	LS	$ 250,000	$ 250,000	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			2	EA	$ 50,000	$ 100,000	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 719,063**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 719,062.50	
17 - I&C							**$ 479,375**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 479,375	

ANNUAL O&M COSTS				Amount	Unit	Value	Cost	Notes
Consumables						**Total Consumables**	**$ 71,906**	
	Equipment Consumables			$ 2,396,875		2%	$ 47,938	2% of Equipment
	Electrical Consumables			$ 719,063		2%	$ 14,381	2% of Electrical
	Instrumentation Consumables			$ 479,375		2%	$ 9,588	2% of Instrumentation
Power Costs						**Total Power**	**$ 92,655**	
	Screens and Washer Compactor	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	SBR	-	550 kWh/day	365 days	200750 kWh	$0.13 per kWh	$ 26,098	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Odor Control		1000 kWh/day	365 days	365000 kWh	$0.13 per kWh	$ 47,450	
	Effluent Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
Chemicals						**Total Chemicals**	**$ -**	
	Hypochlorite				gal	$15	$ -	
	Citric Acid				lbs	$14	$ -	
Labor Costs						**Total Labor**	**$ 62,400**	
			Total # Operators	1	number			Assume 16 hrs/wk, 6 mo of the year & 8 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	624	hrs/yr			
			Total Operators per year	624	Total hrs	$ 100	$ 62,400	
				TOTAL ANNUAL O&M COSTS			**$ 226,961**	

Santa Ynez Recycled Water Facilities Plan

MBR (0.49 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 835,284	
3 - Concrete	$ 2,406,672	
5 - Metals	$ 35,000	
11 - Equipment	$ 4,375,000	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 1,312,500	
17- I&C	$ 875,000	

RAW CONSTRUCTION COST		**$ 9,889,000**
Construction Contingency	30%	$ 2,967,000
BASE CONSTRUCTION COST		**$ 12,856,000**
Implementation Costs	35%	$ 4,499,600
TOTAL PROJECT COST		**$ 17,355,600**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 835,284**	
	Mobilization/Demobilization					5%	$ 473,784	
Treatment Plant								
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for Building Foundation			2,300	CY	$ 50	$ 115,000	70 ft x 175 ft
	Excavation for Below Grade Tanks			1,500	CY	$ 50	$ 75,000	Bioreactors (40 ft x 45 ft x 18 ft deep)
	Excavation for Odor Control Bed			190	CY	$ 50	$ 9,500	20 ft x 50 ft
	Excavation for Effluent PS			40	CY	$ 50	$ 2,000	Wet Well (15 ft x 15 ft x 15 ft deep)
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 50,000	$ 50,000	
	Misc Site Work Allowance			1	LS	$ 75,000	$ 75,000	
3 - Concrete							**$ 2,406,672**	
Treatment Plant								
	Treatment Building			12,250	SF	$ 125	$ 1,531,250	70 ft x 175 ft, preengineered building
	Foundation			680	CY	$ 600	$ 408,000	70 ft x 175 ft
Below Grade Tanks							$ -	
	Slab			70	CY	$ 600	$ 42,000	Bioreactors (40 ft x 45 ft x 18 ft deep)
	Walls			200	CY	$ 1,200	$ 240,000	Bioreactors (40 ft x 45 ft x 18 ft deep)
	Slab			10	CY	$ 1,200	$ 12,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	PS Wet Well (15 ft x 15 ft x 15 ft deep)
Odor Control Bed								
	Slab			37	CY	$ 600	$ 22,222	20 ft x 50 ft
	Walls			26	CY	$ 1,200	$ 31,200	20 ft x 50 ft x 5 ft deep
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 60,000**	
	Finishes Allowance			1	LS	$ 60,000	$ 60,000	
11 - Equipment							**$ 4,375,000**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 531,250	$ 531,250	Includes 25% allowance for installation
	MBR System (Incl. Pumps and Blowers)			1	LS	$ 2,628,906	$ 2,628,906	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 19,531	$ 58,594	Includes 25% allowance for installation
	Odor Control			1	LS	$ 250,000	$ 250,000	Includes 25% allowance for installation
	Sludge Handling			1	LS	$ 312,500	$ 312,500	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			2	EA	$ 62,500	$ 125,000	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 1,312,500**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 1,312,500.00	
17 - I&C							**$ 875,000**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 875,000	

ANNUAL O&M COSTS				Amount	Unit	Value	Cost	
Consumables						**Total Consumables**	**$ 131,250**	
	Equipment Consumables			$ 4,375,000		2%	$ 87,500	2% of Equipment
	Electrical Consumables			$ 1,312,500		2%	$ 26,250	2% of Electrical
	Instrumentation Consumables			$ 875,000		2%	$ 17,500	2% of Instrumentation
Power Costs						**Total Power**	**$ 106,890**	
	Screens and Washer Compactor	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	MBR	-	1050 kWh/day	365 days	383250 kWh	$0.13 per kWh	$ 49,823	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Odor Control		800 kWh/day	365 days	292000 kWh	$0.13 per kWh	$ 37,960	
	Effluent Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
Chemicals						**Total Chemicals**	**$ 7,065**	
	Hypochlorite			275	gal	$15	$ 4,125	
	Citric Acid			210	lbs	$14	$ 2,940	
Labor Costs						**Total Labor**	**$ 52,000**	
			Total # Operators	1	number			Assume 16 hrs/wk, 6 mo of the year & 4 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	520	hrs/yr			
			Total Operators per year	520	Total hrs	$ 100	$ 52,000	
				TOTAL ANNUAL O&M COSTS			**$ 297,205**	

Santa Ynez Recycled Water Facilities Plan

Chumash WRF - MBR Expansion (0.31 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division	Subtotal	Notes
2 - Sitework	$ 584,490	
3 - Concrete	$ 557,600	
5 - Metals	$ 35,000	
11 - Equipment	$ 3,180,469	
15 - Mechanical	$ 50,000	
16 - Electrical	$ 954,141	
17- I&C	$ 636,094	

RAW CONSTRUCTION COST		**$ 5,998,000**
Construction Contingency	30%	$ 1,799,000
BASE CONSTRUCTION COST		**$ 7,797,000**
Implementation Costs	35%	$ 2,728,950
TOTAL PROJECT COST		**$ 10,525,950**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost	Total Cost	Notes
2 - Sitework							**$ 584,490**	
	Mobilization/Demobilization					5%	$ 287,990	
	Site Clearing			3	Days	$ 5,000	$ 15,000	
	Excavation for New Headworks			200	CY	$ 50	$ 10,000	20 ft x 30 ft x 10 ft deep
	Excavation for New Bioreactor Tanks			1,400	CY	$ 50	$ 70,000	22 ft x 75 ft x 18 ft deep
	Excavation for New MBR			160	CY	$ 50	$ 8,000	22 ft x 40 ft
	Excavation for New Aeration Blowers			70	CY	$ 50	$ 3,500	14 ft x 26 ft
	Dewatering Allowance			1	LS	$ 20,000	$ 20,000	
	Landscaping Allowance			1	LS	$ 20,000	$ 20,000	
	Misc Site Work Allowance			1	LS	$ 150,000	$ 150,000	
3 - Concrete							**$ 557,600**	
Below Grade Tanks							$ -	
	Slab/Deck			60	CY	$ 600	$ 36,000	Headworks (20 ft x 30 ft x 10 ft deep)
	Walls			100	CY	$ 1,200	$ 120,000	Headworks (20 ft x 30 ft x 10 ft deep)
	Slab/Deck			180	CY	$ 600	$ 108,000	Bioreactors (22 ft x 75 ft x 18 ft deep)
	Walls			200	CY	$ 1,200	$ 240,000	Bioreactors (22 ft x 75 ft x 18 ft deep)
At Grade Facilities								
	Slab			49	CY	$ 600	$ 29,333	MBR Tanks (40 ft x 22 ft)
	Slab			20	CY	$ 1,200	$ 24,267	Aeration Blowers (14 ft x 26 ft)
5 - Metals							**$ 35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$ 35,000	
5 - Finishes							**$ 50,000**	
	Finishes Allowance			1	LS	$ 50,000	$ 50,000	
11 - Equipment							**$ 3,180,469**	
Treatment Plant								
	Screens and Washer Compactor			1	LS	$ 531,250	$ 531,250	Includes 25% allowance for installation
	MBR System (Incl. Pumps and Blowers)			1	LS	$ 2,103,125	$ 2,103,125	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$ 468,750	Includes 25% allowance for installation
	WAS Pumps			3	EA	$ 19,531	$ 58,594	Includes 25% allowance for installation
Effluent PS								
	Effluent Pumps			1	EA	$ 18,750	$ 18,750	Includes 25% allowance for installation
15 - Mechanical							**$ 50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$ 50,000	
16 - Electrical							**$ 954,141**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$ 954,140.63	
17 - I&C							**$ 636,094**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$ 636,094	

ANNUAL O&M COSTS				Amount	Unit	Value	Cost	
Consumables						**Total Consumables**	**$ 95,414**	
	Equipment Consumables			$ 3,180,469		2%	$ 63,609	2% of Equipment
	Electrical Consumables			$ 954,141		2%	$ 19,083	2% of Electrical
	Instrumentation Consumables			$ 636,094		2%	$ 12,722	2% of Instrumentation
Power Costs						**Total Power**	**$ 55,781**	
	Screens and Washer Compactor	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	MBR	-	840 kWh/day	365 days	306600 kWh	$0.13 per kWh	$ 39,858	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$ 6,369	
	WAS Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
	Effluent Pumps	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$ 3,185	
Chemicals						**Total Chemicals**	**$ 7,065**	
	Hypochlorite			275	gal	$15	$ 4,125	
	Citric Acid			210	lbs	$14	$ 2,940	
Labor Costs						**Total Labor**	**$ 26,000**	
			Total # Operators	1	number			Assume 8 hrs/wk, 6 mo of the year & 2 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	260	hrs/yr			
			Total Operators per year	260	Total hrs	$ 100	$ 26,000	
				TOTAL ANNUAL O&M COSTS			**$ 184,260**	

Santa Ynez Recycled Water Facilities Plan

Chumash WRF - Flow Equalization (0.4 MGD)

Estimate Type: Conceptual Design

Process Cost Summary by Division

Spec. Division		Subtotal	Notes
2 - Sitework	$	390,832	
3 - Concrete	$	484,267	
5 - Metals	$	35,000	
11 - Equipment	$	1,956,250	
15 - Mechanical	$	50,000	
16 - Electrical	$	586,875	
17- I&C	$	391,250	

RAW CONSTRUCTION COST		**$**	**3,894,000**
Construction Contingency	30%	$	1,168,000
BASE CONSTRUCTION COST		**$**	**5,062,000**
Implementation Costs	35%	$	1,771,700
TOTAL PROJECT COST		**$**	**6,833,700**

Spec. Division	Item	Size	Units	Quantity	Unit	Unit Cost		Total Cost	Notes
2 - Sitework							**$**	**390,832**	
	Mobilization/Demobilization					5%	$	187,832	
	Site Clearing			3	Days	$ 5,000	$	15,000	
	Excavation for New Headworks			200	CY	$ 50	$	10,000	20 ft x 30 ft x 10 ft deep
	Excavation for New Flow Equalization Tank & PS			600	CY	$ 50	$	30,000	22 ft x 32 ft x 18 ft deep
	Excavation for New MBR			90	CY	$ 50	$	4,500	12 ft x 40 ft
	Excavation for New Odor Control Facility			70	CY	$ 50	$	3,500	14 ft x 26 ft
	Dewatering Allowance			1	LS	$ 20,000	$	20,000	
	Landscaping Allowance			1	LS	$ 20,000	$	20,000	
	Misc Site Work Allowance			1	LS	$ 100,000	$	100,000	
3 - Concrete							**$**	**484,267**	
Below Grade Tanks							$	-	
	Slab/Deck			60	CY	$ 600	$	36,000	Headworks (20 ft x 30 ft x 10 ft deep)
	Walls			100	CY	$ 1,200	$	120,000	Headworks (20 ft x 30 ft x 10 ft deep)
	Slab/Deck			80	CY	$ 600	$	48,000	FE/PS Tanks (22 ft x 32 ft x 18 ft deep)
	Walls			200	CY	$ 1,200	$	240,000	FE/PS Tanks (22 ft x 32 ft x 18 ft deep)
At Grade Facilities									
	Slab			27	CY	$ 600	$	16,000	MBR Tanks (40 ft x 12 ft)
	Slab			20	CY	$ 1,200	$	24,267	Odor Control Facility (14 ft x 26 ft)
5 - Metals							**$**	**35,000**	
	Misc Metals Allowance			1	LS	$ 35,000	$	35,000	
5 - Finishes							**$**	**50,000**	
	Finishes Allowance			1	LS	$ 50,000	$	50,000	
11 - Equipment							**$**	**1,956,250**	
Treatment Plant									
	Screens and Washer Compactor			1	LS	$ 531,250	$	531,250	Includes 25% allowance for installation
	MBR System (Incl. Pumps and Blowers)			1	LS	$ 656,250	$	656,250	Includes 25% allowance for installation
	UV Disinfection			1	LS	$ 468,750	$	468,750	Includes 25% allowance for installation
	FE Tank Blowers & Diffusers			1	LS	$ 125,000	$	125,000	Includes 25% allowance for installation
	FE Pumps			1	LS	$ 50,000	$	50,000	Includes 25% allowance for installation
	Odor Control			1	LS	$ 125,000	$	125,000	Includes 25% allowance for installation
15 - Mechanical							**$**	**50,000**	
	Misc. Mechanical			1	LS	$ 50,000	$	50,000	
16 - Electrical							**$**	**586,875**	
Electrical Allowance	30% of Division 11 (Equipment)					30%	$	586,875.00	
17 - I&C							**$**	**391,250**	
I&C Allowance	20% of Division 11 (Equipment)					20%	$	391,250	

ANNUAL O&M COSTS				Amount	Unit	Value		Cost	
Consumables						**Total Consumables**	**$**	**58,688**	
	Equipment Consumables			$ 1,956,250		2%	$	39,125	2% of Equipment
	Electrical Consumables			$ 586,875		2%	$	11,738	2% of Electrical
	Instrumentation Consumables			$ 391,250		2%	$	7,825	2% of Instrumentation
Power Costs						**Total Power**	**$**	**48,252**	
	Screens and Washer Compactor	5 hp	4 kW	6570 hrs	24496 kWh	$0.13 per kWh	$	3,185	
	MBR	-	280 kWh/day	365 days	102200 kWh	$0.13 per kWh	$	13,286	
	UV Disinfection	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$	6,369	
	FE Tank Blowers & Diffusers	15 hp	11 kW	6570 hrs	73489 kWh	$0.13 per kWh	$	9,554	
	FE Pumps	10 hp	7 kW	6570 hrs	48992 kWh	$0.13 per kWh	$	6,369	
	Odor Control	-	200 kWh/day	365 days	73000 kWh	$0.13 per kWh	$	9,490	
Chemicals						**Total Chemicals**	**$**	**7,065**	
	Hypochlorite			275	gal	$15	$	4,125	
	Citric Acid			210	lbs	$14	$	2,940	
Labor Costs						**Total Labor**	**$**	**26,000**	
			Total # Operators	1	number				Assume 8 hrs/wk, 6 mo of the year & 2 hrs/wk, 6 mo of the year
			Average Annual Hours per operator	260	hrs/yr				
			Total Operators per year	260	Total hrs	$ 100	$	26,000	
				TOTAL ANNUAL O&M COSTS			**$**	**140,005**	

Appendix C - Effluent Disposal / Reuse Water Balance

Water Balance Calculations

	Flow GPD	Perc Pond Acres	Irrigation Acres	Flow AF/Mo	Irrigation AF/mo	Net Flow AF/mo	1.0 in/d Perc Rate AF/mo	Evaporation AF/mo	Precipitation AF/mo	Monthly AF/mo	Cumulative AF
Nov	310,000	10.4		28.9			26.4	2.3	0.6	0.9	0.9
Dec	310,000	10.4		28.9			26.4	1.8	2.2	2.9	3.8
Jan	310,000	10.4		28.9			26.4	1.6	2.7	3.7	7.5
Feb	310,000	10.4		28.9			26.4	2.3	3.1	3.3	10.8
Mar	310,000	10.4		28.9			26.4	2.9	2.5	2.1	13.0
Apr	310,000	10.4		28.9			26.4	3.9	0.9	-0.5	12.5
May	310,000	10.4		28.9			26.4	4.9	0.9	-1.5	11.0
Jun	310,000	10.4		28.9			26.4	5.6	0.4	-2.6	8.4
Jul	310,000	10.4		28.9			26.4	6.2	0.3	-3.4	5.1
Aug	310,000	10.4		28.9			26.4	5.8	0.3	-3.0	2.1
Sep	310,000	10.4		28.9			26.4	4.6	0.1	-1.9	0.2
Oct	310,000	10.4		28.9			26.4	3.5	0.7	-0.3	**-0.1**
		13.0		**347.19**			**316.7**	**45.3**	**14.7**	**-0.1**	
Nov	310,000	4.8	59.0	28.9	8.7	20.2	12.2	1.1	0.3	7.2	7.2
Dec	310,000	4.8	59.0	28.9	1.1	27.8	12.2	0.8	1.0	15.8	22.9
Jan	310,000	4.8	59.0	28.9	0.8	28.1	12.2	0.7	1.3	16.4	39.3
Feb	310,000	4.8	59.0	28.9	2.1	26.9	12.2	1.1	1.4	15.0	54.3
Mar	310,000	4.8	59.0	28.9	10.4	18.5	12.2	1.3	1.1	6.1	60.4
Apr	310,000	4.8	59.0	28.9	20.5	8.5	12.2	1.8	0.4	-5.2	55.2
May	310,000	4.8	59.0	28.9	24.0	4.9	12.2	2.3	0.4	-9.2	46.0
Jun	310,000	4.8	59.0	28.9	26.6	2.3	12.2	2.6	0.2	-12.3	33.7
Jul	310,000	4.8	59.0	28.9	28.9	0.0	12.2	2.9	0.1	-15.0	18.7
Aug	310,000	4.8	59.0	28.9	27.2	1.8	12.2	2.7	0.1	-13.1	5.7
Sep	310,000	4.8	59.0	28.9	21.3	7.6	12.2	2.1	0.1	-6.7	-1.0
Oct	310,000	4.8	59.0	28.9	14.5	14.4	12.2	1.6	0.3	0.9	**-0.1**
		6.0		**347.2**	**186.1**	**161.1**	**147.0**	**21.0**	**6.8**	**-0.1**	

	Flow GPD	Perc Pond Acres	Irrigation Acres	Flow AF/Mo	Irrigation AF/mo	Net Flow AF/mo	10.0 in/d Perc Rate AF/mo	Evaporation AF/mo	Precipitation AF/mo	Monthly AF/mo	Cumulative AF
Nov	310,000	1.1		28.9			28.7	0.2	0.1	0.1	0.1
Dec	310,000	1.1		28.9			28.7	0.2	0.2	0.3	0.4
Jan	310,000	1.1		28.9			28.7	0.2	0.3	0.4	0.8
Feb	310,000	1.1		28.9			28.7	0.2	0.3	0.4	1.1
Mar	310,000	1.1		28.9			28.7	0.3	0.3	0.2	1.4
Apr	310,000	1.1		28.9			28.7	0.4	0.1	-0.1	1.3
May	310,000	1.1		28.9			28.7	0.5	0.1	-0.2	1.1
Jun	310,000	1.1		28.9			28.7	0.6	0.0	-0.3	0.9
Jul	310,000	1.1		28.9			28.7	0.7	0.0	-0.4	0.5
Aug	310,000	1.1		28.9			28.7	0.6	0.0	-0.3	0.1
Sep	310,000	1.1		28.9			28.7	0.5	0.0	-0.2	-0.1
Oct	310,000	1.1		28.9			28.7	0.4	0.1	0.0	**-0.1**
		1.4		**347.19**			**344.0**	**4.9**	**1.6**	**-0.1**	
Nov	310,000	0.5	59.0	28.9	8.7	20.2	13.3	0.1	0.0	6.8	6.8
Dec	310,000	0.5	59.0	28.9	1.1	27.8	13.3	0.1	0.1	14.6	21.4
Jan	310,000	0.5	59.0	28.9	0.8	28.1	13.3	0.1	0.1	14.9	36.2
Feb	310,000	0.5	59.0	28.9	2.1	26.9	13.3	0.1	0.2	13.6	49.8
Mar	310,000	0.5	59.0	28.9	10.4	18.5	13.3	0.1	0.1	5.2	55.0
Apr	310,000	0.5	59.0	28.9	20.5	8.5	13.3	0.2	0.0	-5.0	50.1
May	310,000	0.5	59.0	28.9	24.0	4.9	13.3	0.2	0.0	-8.6	41.4
Jun	310,000	0.5	59.0	28.9	26.6	2.3	13.3	0.3	0.0	-11.2	30.2
Jul	310,000	0.5	59.0	28.9	28.9	0.0	13.3	0.3	0.0	-13.6	16.6
Aug	310,000	0.5	59.0	28.9	27.2	1.8	13.3	0.3	0.0	-11.8	4.8
Sep	310,000	0.5	59.0	28.9	21.3	7.6	13.3	0.2	0.0	-5.9	-1.1
Oct	310,000	0.5	59.0	28.9	14.5	14.4	13.3	0.2	0.0	1.0	**-0.1**
		0.7		**347.2**	**186.1**	**161.1**	**159.6**	**2.3**	**0.7**	**-0.1**	

Appendix D - Alternatives Cost Estimates

RMC water and environment

Santa Ynez Recycled Water Facilities Plan

Alternatives Cost Summary

Estimate Type: Conceptual Design

		1A Alt A, No Reuse	1B Alt B, No Reuse	1C Alt C, No Reuse	2A Alt A, With Reuse	2B Alt B, With Reuse	2C Alt C, With Reuse
Capital Costs							
Raw Construction Cost	-	$1,592,000	$1,506,000	$654,000	$3,682,000	$2,882,000	$2,615,000
Construction Contingency	25%	$398,000	$377,000	$164,000	$921,000	$721,000	$654,000
Base Construction Cost	**-**	**$1,990,000**	**$1,883,000**	**$818,000**	**$4,603,000**	**$3,603,000**	**$3,269,000**
Implementation Costs	25%	$498,000	$471,000	$205,000	$1,151,000	$901,000	$817,000
Treatment Plant		$14,612,000	$14,612,000	$14,612,000	$14,612,000	$14,612,000	$14,612,000
Land Purchase		$1,500,000	$1,500,000	$300,000	$800,000	$800,000	$200,000
Total Estimated Capital Cost		**$18,600,000**	**$18,466,000**	**$15,935,000**	**$21,166,000**	**$19,916,000**	**$18,898,000**
Annual Costs							
Total Annual O&M		$ 370,000	$ 373,000	$ 304,000	$ 407,000	$ 411,000	$ 374,000
Annualized Capital Cost		$ 1,250,000	$ 1,241,000	$ 1,071,000	$ 1,423,000	$ 1,339,000	$ 1,270,000
Total Annual Cost		**$ 1,620,000**	**$ 1,614,000**	**$ 1,375,000**	**$ 1,830,000**	**$ 1,750,000**	**$ 1,644,000**

Santa Ynez Recycled Water Facilities Plan

Alternative A, No Reuse

Item		Qty	Units	Unit Cost[1]		Cost	
Capital Costs							
Treatment							
Influent Lift Station		15	HP	$	171,090	$	171,000
Force Main		500	LF	$	100	$	50,000
Percolation Basin		14	acres	$	50,000	$	700,000
				Treatment Subtotal		**$**	**921,000**
Disposal							
Effluent Pump Station		15	HP	$	171,090	$	171,000
Effluent Pipeline		5,000	LF	$	100	$	500,000
Municipal Customer Connection		0	EA	$	15,000	$	-
Agriculture Customer Connection		0	EA	$	30,000	$	-
				Reuse Subtotal		**$**	**671,000**
		Raw Construction Subtotal				**$**	**1,592,000**
		Construction Contingency		25%		$	398,000
		Construction Total				**$**	**1,990,000**
		Implementation Costs		25%		$	498,000
Treatment Plant		1	LS	$	14,612,400	$	14,612,000
Land Purchase							
WRRF		1	Acres	$	100,000	$	100,000
Percolation Basin		14	Acres	$	100,000	$	1,400,000
		Total Capital Costs				**$**	**18,600,000**
O&M Costs							
Treatment							
Force Main		1%	% of Capital	$	50,000	$	1,000
Treatment Plant		1	LS	$	267,035	$	267,000
Percolation Basin		14	Acres	$	5,000	$	70,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)				
Influent Lift Station	23,684	$0.13	5%	$	171,000	$	12,000
				Treatment Subtotal		**$**	**350,000**
Disposal							
Effluent Pipeline		1%	% of Capital	$	500,000	$	5,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)				
Effluent Pump Station	47,368	$0.13	5%	$	171,000	$	15,000
				Reuse Subtotal		**$**	**20,000**
		Total O&M Costs ($/yr)				**$**	**370,000**
Annual Costs ($ / Year)							
		Annualized Capital Costs				$	1,250,000
		Annual O&M Costs				$	370,000
		Total Annualized Cost				**$**	**1,620,000**

Santa Ynez Recycled Water Facilities Plan
Alternative A, With Reuse

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		15	HP	$ 171,090	$ 171,000
Force Main		500	LF	$ 100	$ 50,000
Percolation Basin		7	acres	$ 50,000	$ 350,000
				Treatment Subtotal	**$ 571,000**
Reuse					
RW Pump Station		431	GPM	$ 1,301,430	$ 1,301,000
RW Pipeline		16,000	LF	$ 100	$ 1,600,000
Municipal Customer Connection		2	EA	$ 15,000	$ 30,000
Agriculture Customer Connection		6	EA	$ 30,000	$ 180,000
				Reuse Subtotal	**$ 3,111,000**
		Raw Construction Subtotal			**$ 3,682,000**
		Construction Contingency		25%	$ 921,000
		Construction Total			**$ 4,603,000**
		Implementation Costs		25%	$ 1,151,000
Treatment Plant		1	LS	$ 14,612,400	$ 14,612,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		7.0	Acres	$ 100,000	$ 700,000
		Total Capital Costs			**$ 21,166,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 50,000	$ 1,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		7	Acres	$ 5,000	$ 40,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	23,684	$0.13	5%	$ 171,000	$ 12,000
				Treatment Subtotal	**$ 320,000**
Reuse					
RW Pipeline		1%	% of Capital	$ 1,600,000	$ 16,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	47,368	$0.13	5%	$ 1,301,000	$ 71,000
				Reuse Subtotal	**$ 87,000**
		Total O&M Costs ($/yr)			**$ 407,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,423,000
		Annual O&M Costs			$ 407,000
		Total Annualized Cost			**$ 1,830,000**

RMC water and environment

Santa Ynez Recycled Water Facilities Plan
Alternative B, No Reuse

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		44	HP	$ 305,914	$ 306,000
Force Main		5,000	LF	$ 100	$ 500,000
Percolation Basin		14.0	acres	$ 50,000	$ 700,000
				Treatment Subtotal	**$ 1,506,000**
Reuse					
RW Pump Station		0	GPM	$ 0	$ -
RW Pipeline		0	LF	$ 100	$ -
Municipal Customer Connection		0	EA	$ 15,000	$ -
Agriculture Customer Connection		0	EA	$ 30,000	$ -
				Reuse Subtotal	**$ -**
		Raw Construction Subtotal			**$ 1,506,000**
		Construction Contingency		25%	$ 377,000
		Construction Total			**$ 1,883,000**
		Implementation Costs		25%	$ 471,000
Treatment Plant		1	LS	$ 14,612,400	$ 14,612,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		14.0	Acres	$ 100,000	$ 1,400,000
		Total Capital Costs			**$ 18,466,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 500,000	$ 5,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		14	Acres	$ 5,000	$ 70,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	71,052	$0.13	5%	$ 306,000	$ 25,000
				Treatment Subtotal	**$ 367,000**
Reuse					
RW Pipeline		1%	% of Capital	$ -	$ -
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	47,368	$0.13	5%	$ -	$ 6,000
				Reuse Subtotal	**$ 6,000**
		Total O&M Costs ($/yr)			**$ 373,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,241,000
		Annual O&M Costs			$ 373,000
		Total Annualized Cost			**$ 1,614,000**

RMC water and environment

Santa Ynez Recycled Water Facilities Plan
Alternative B, With Reuse

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		44	HP	$ 305,914	$ 306,000
Force Main		5,000	LF	$ 100	$ 500,000
Percolation Basin		7	acres	$ 50,000	$ 350,000
				Treatment Subtotal	**$ 1,156,000**
Reuse					
RW Pump Station		431	GPM	$ 1,301,430	$ 1,301,000
RW Pipeline		3,200	LF	$ 100	$ 320,000
Municipal Customer Connection		1	EA	$ 15,000	$ 15,000
Agriculture Customer Connection		3	EA	$ 30,000	$ 90,000
				Reuse Subtotal	**$ 1,726,000**
		Raw Construction Subtotal			**$ 2,882,000**
		Construction Contingency		25%	$ 721,000
		Construction Total			**$ 3,603,000**
		Implementation Costs		25%	$ 901,000
Treatment Plant		1	LS	$ 14,612,400	$ 14,612,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		7	Acres	$ 100,000	$ 700,000
		Total Capital Costs			**$ 19,916,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 500,000	$ 5,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		7	Acres	$ 5,000	$ 40,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	71,052	$0.13	5%	$ 306,000	$ 25,000
				Treatment Subtotal	**$ 337,000**
Reuse					
RW Pipeline		1%	% of Capital	$ 320,000	$ 3,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	47,368	$0.13	5%	$ 1,301,000	$ 71,000
				Reuse Subtotal	**$ 74,000**
		Total O&M Costs ($/yr)			**$ 411,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,339,000
		Annual O&M Costs			$ 411,000
		Total Annualized Cost			**$ 1,750,000**

RMC water and environment

Santa Ynez Recycled Water Facilities Plan

Alternative C, No Reuse

Item	Qty	Units	Unit Cost[1]	Cost
Capital Costs				
Treatment				
Influent Lift Station	29	HP	$ 244,247	$ 244,000
Force Main	3,100	LF	$ 100	$ 310,000
Percolation Basin	2	acres	$ 50,000	$ 100,000
			Treatment Subtotal	**$ 654,000**
Reuse				
RW Pump Station	0	GPM	$ 0	$ -
RW Pipeline	0	LF	$ 100	$ -
Municipal Customer Connection	0	EA	$ 15,000	$ -
Agriculture Customer Connection	0	EA	$ 30,000	$ -
			Reuse Subtotal	**$ -**
	Raw Construction Subtotal			**$ 654,000**
	Construction Contingency		25%	$ 164,000
	Construction Total			**$ 818,000**
	Implementation Costs		25%	$ 205,000
Treatment Plant	1	LS	$ 14,612,400	$ 14,612,000
Land Purchase				
WRRF	1	Acres	$ 100,000	$ 100,000
Percolation Basin	2.0	Acres	$ 100,000	$ 200,000
	Total Capital Costs			**$ 15,935,000**

Item		Qty	Units	Unit Cost	Cost
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 310,000	$ 3,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		2	Acres	$ 5,000	$ 10,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	47,368	$0.13	5%	$ 244,000	$ 18,000
				Treatment Subtotal	**$ 298,000**
Reuse					
RW Pipeline		1%	% of Capital	$ -	$ -
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	47,368	$0.13	5%	$ -	$ 6,000
				Reuse Subtotal	**$ 6,000**
		Total O&M Costs ($/yr)			**$ 304,000**

Annual Costs ($ / Year)		
	Annualized Capital Costs	$ 1,071,000
	Annual O&M Costs	$ 304,000
	Total Annualized Cost	**$ 1,375,000**

Santa Ynez Recycled Water Facilities Plan
Alternative C, With Reuse

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		29	HP	$ 244,247	$ 244,000
Force Main		3,100	LF	$ 100	$ 310,000
Percolation Basin		1.0	acres	$ 50,000	$ 50,000
				Treatment Subtotal	**$ 604,000**
Reuse					
RW Pump Station		431	GPM	$ 1,301,430	$ 1,301,000
RW Pipeline		5,300	LF	$ 100	$ 530,000
Municipal Customer Connection		0	EA	$ 15,000	$ -
Agriculture Customer Connection		6	EA	$ 30,000	$ 180,000
				Reuse Subtotal	**$ 2,011,000**
		Raw Construction Subtotal			**$ 2,615,000**
		Construction Contingency		25%	$ 654,000
		Construction Total			**$ 3,269,000**
		Implementation Costs		25%	$ 817,000
Treatment Plant		1	LS	$ 14,612,400	$ 14,612,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		1.0	Acres	$ 100,000	$ 100,000
		Total Capital Costs			**$ 18,898,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 310,000	$ 3,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		1	Acres	$ 5,000	$ 10,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	47,368	$0.13	5%	$ 244,000	$ 18,000
				Treatment Subtotal	**$ 298,000**
Reuse					
RW Pipeline		1%	% of Capital	$ 530,000	$ 5,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	47,368	$0.13	5%	$ 1,301,000	$ 71,000
				Reuse Subtotal	**$ 76,000**
		Total O&M Costs ($/yr)			**$ 374,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,270,000
		Annual O&M Costs			$ 374,000
		Total Annualized Cost			**$ 1,644,000**

Santa Ynez Recycled Water Facilities Plan

Alternatives Cost Summary for Regional WRRF

Estimate Type: Conceptual Design

		1A	1B	1C	2A	2B	2C
		Alt A, No Reuse	Alt B, No Reuse	Alt C, No Reuse	Alt A, With Reuse	Alt B, With Reuse	Alt C, With Reuse
Capital Costs							
Raw Construction Cost	-	$2,032,000	$1,940,000	$773,000	$4,441,000	$3,680,000	$3,298,000
Construction Contingency	25%	$508,000	$485,000	$193,000	$1,110,000	$920,000	$825,000
Base Construction Cost	**-**	**$2,540,000**	**$2,425,000**	**$966,000**	**$5,551,000**	**$4,600,000**	**$4,123,000**
Implementation Costs	25%	$635,000	$606,000	$242,000	$1,388,000	$1,150,000	$1,031,000
Treatment Plant		$17,355,000	$17,355,000	$17,355,000	$17,355,000	$17,355,000	$17,355,000
Land Purchase		$2,200,000	$2,200,000	$400,000	$1,100,000	$1,100,000	$300,000
Total Estimated Capital Cost		**$22,730,000**	**$22,586,000**	**$18,963,000**	**$25,394,000**	**$24,205,000**	**$22,809,000**
Annual Costs							
Total Annual O&M		$ 420,000	$ 426,000	$ 325,000	$ 453,000	$ 462,000	$ 413,000
Annualized Capital Cost		$ 1,528,000	$ 1,518,000	$ 1,275,000	$ 1,707,000	$ 1,627,000	$ 1,533,000
Total Annual Cost		**$ 1,948,000**	**$ 1,944,000**	**$ 1,600,000**	**$ 2,160,000**	**$ 2,089,000**	**$ 1,946,000**

Santa Ynez Recycled Water Facilities Plan

Alternative A, No Reuse for Regional WRRF

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		23	HP	$ 215,510	$ 216,000
Force Main		500	LF	$ 100	$ 50,000
Percolation Basin		21	acres	$ 50,000	$ 1,050,000
				Treatment Subtotal	**$ 1,316,000**
Disposal					
Effluent Pump Station		23	HP	$ 215,510	$ 216,000
Effluent Pipeline		5,000	LF	$ 100	$ 500,000
Municipal Customer Connection		0	EA	$ 15,000	$ -
Agriculture Customer Connection		0	EA	$ 30,000	$ -
				Reuse Subtotal	**$ 716,000**
		Raw Construction Subtotal			**$ 2,032,000**
		Construction Contingency		25%	$ 508,000
		Construction Total			**$ 2,540,000**
		Implementation Costs		25%	$ 635,000
Treatment Plant		1	LS	$ 17,355,300	$ 17,355,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		21	Acres	$ 100,000	$ 2,100,000
		Total Capital Costs			**$ 22,730,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 50,000	$ 1,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		21	Acres	$ 5,000	$ 110,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	37,436	$0.13	5%	$ 216,000	$ 16,000
				Treatment Subtotal	**$ 394,000**
Disposal					
Effluent Pipeline		1%	% of Capital	$ 500,000	$ 5,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Effluent Pump Station	74,872	$0.13	5%	$ 216,000	$ 21,000
				Reuse Subtotal	**$ 26,000**
		Total O&M Costs ($/yr)			**$ 420,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,528,000
		Annual O&M Costs			$ 420,000
		Total Annualized Cost			**$ 1,948,000**

RMC water and environment

Santa Ynez Recycled Water Facilities Plan

Alternative A, With Reuse for Regional WRRF

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		23	HP	$ 215,510	$ 216,000
Force Main		500	LF	$ 100	$ 50,000
Percolation Basin		10	acres	$ 50,000	$ 500,000
				Treatment Subtotal	**$ 766,000**
Reuse					
RW Pump Station		681	GPM	$ 1,864,513	$ 1,865,000
RW Pipeline		16,000	LF	$ 100	$ 1,600,000
Municipal Customer Connection		2	EA	$ 15,000	$ 30,000
Agriculture Customer Connection		6	EA	$ 30,000	$ 180,000
				Reuse Subtotal	**$ 3,675,000**
		Raw Construction Subtotal			**$ 4,441,000**
		Construction Contingency		25%	$ 1,110,000
		Construction Total			**$ 5,551,000**
		Implementation Costs		25%	$ 1,388,000
Treatment Plant		1	LS	$ 17,355,300	$ 17,355,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		10.0	Acres	$ 100,000	$ 1,000,000
		Total Capital Costs			**$ 25,394,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 50,000	$ 1,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		10	Acres	$ 5,000	$ 50,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	37,436	$0.13	5%	$ 216,000	$ 16,000
				Treatment Subtotal	**$ 334,000**
Reuse					
RW Pipeline		1%	% of Capital	$ 1,600,000	$ 16,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	74,872	$0.13	5%	$ 1,865,000	$ 103,000
				Reuse Subtotal	**$ 119,000**
		Total O&M Costs ($/yr)			**$ 453,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,707,000
		Annual O&M Costs			$ 453,000
		Total Annualized Cost			**$ 2,160,000**

RMC water and environment

Santa Ynez Recycled Water Facilities Plan

Alternative B, No Reuse for Regional WRRF

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		69	HP	$ 390,044	$ 390,000
Force Main		5,000	LF	$ 100	$ 500,000
Percolation Basin		21.0	acres	$ 50,000	$ 1,050,000
				Treatment Subtotal	**$ 1,940,000**
Reuse					
RW Pump Station		0	GPM	$ 0	$ -
RW Pipeline		0	LF	$ 100	$ -
Municipal Customer Connection		0	EA	$ 15,000	$ -
Agriculture Customer Connection		0	EA	$ 30,000	$ -
				Reuse Subtotal	**$ -**
		Raw Construction Subtotal			**$ 1,940,000**
		Construction Contingency		25%	$ 485,000
		Construction Total			**$ 2,425,000**
		Implementation Costs		25%	$ 606,000
Treatment Plant		1	LS	$ 17,355,300	$ 17,355,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		21.0	Acres	$ 100,000	$ 2,100,000
		Total Capital Costs			**$ 22,586,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 500,000	$ 5,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		21	Acres	$ 5,000	$ 110,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	112,308	$0.13	5%	$ 390,000	$ 34,000
				Treatment Subtotal	**$ 416,000**
Reuse					
RW Pipeline		1%	% of Capital	$ -	$ -
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	74,872	$0.13	5%	$ -	$ 10,000
				Reuse Subtotal	**$ 10,000**
		Total O&M Costs ($/yr)			**$ 426,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,518,000
		Annual O&M Costs			$ 426,000
		Total Annualized Cost			**$ 1,944,000**

Santa Ynez Recycled Water Facilities Plan

Alternative B, With Reuse for Regional WRRF

Item		Qty	Units	Unit Cost[1]		Cost	
Capital Costs							
Treatment							
Influent Lift Station		69	HP	$	390,044	$	390,000
Force Main		5,000	LF	$	100	$	500,000
Percolation Basin		10	acres	$	50,000	$	500,000
				Treatment Subtotal		**$**	**1,390,000**
Reuse							
RW Pump Station		681	GPM	$	1,864,513	$	1,865,000
RW Pipeline		3,200	LF	$	100	$	320,000
Municipal Customer Connection		1	EA	$	15,000	$	15,000
Agriculture Customer Connection		3	EA	$	30,000	$	90,000
				Reuse Subtotal		**$**	**2,290,000**
		Raw Construction Subtotal				**$**	**3,680,000**
		Construction Contingency		25%		$	920,000
		Construction Total				**$**	**4,600,000**
		Implementation Costs		25%		$	1,150,000
Treatment Plant		1	LS	$	17,355,300	$	17,355,000
Land Purchase							
WRRF		1	Acres	$	100,000	$	100,000
Percolation Basin		10	Acres	$	100,000	$	1,000,000
		Total Capital Costs				**$**	**24,205,000**
O&M Costs							
Treatment							
Force Main		1%	% of Capital	$	500,000	$	5,000
Treatment Plant		1	LS	$	267,035	$	267,000
Percolation Basin		10	Acres	$	5,000	$	50,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)				
Influent Lift Station	112,308	$0.13	5%	$	390,000	$	34,000
				Treatment Subtotal		**$**	**356,000**
Reuse							
RW Pipeline		1%	% of Capital	$	320,000	$	3,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)				
RW Pump Station	74,872	$0.13	5%	$	1,865,000	$	103,000
				Reuse Subtotal		**$**	**106,000**
		Total O&M Costs ($/yr)				**$**	**462,000**
Annual Costs ($ / Year)							
		Annualized Capital Costs				$	1,627,000
		Annual O&M Costs				$	462,000
		Total Annualized Cost				**$**	**2,089,000**

RMC water and environment

Santa Ynez Recycled Water Facilities Plan

Alternative C, No Reuse for Regional WRRF

Item		Qty	Units	Unit Cost[1]	Cost
Capital Costs					
Treatment					
Influent Lift Station		46	HP	$ 313,346	$ 313,000
Force Main		3,100	LF	$ 100	$ 310,000
Percolation Basin		3	acres	$ 50,000	$ 150,000
				Treatment Subtotal	**$ 773,000**
Reuse					
RW Pump Station		0	GPM	$ 0	$ -
RW Pipeline		0	LF	$ 100	$ -
Municipal Customer Connection		0	EA	$ 15,000	$ -
Agriculture Customer Connection		0	EA	$ 30,000	$ -
				Reuse Subtotal	**$ -**
		Raw Construction Subtotal			**$ 773,000**
		Construction Contingency		25%	$ 193,000
		Construction Total			**$ 966,000**
		Implementation Costs		25%	$ 242,000
Treatment Plant		1	LS	$ 17,355,300	$ 17,355,000
Land Purchase					
WRRF		1	Acres	$ 100,000	$ 100,000
Percolation Basin		3.0	Acres	$ 100,000	$ 300,000
		Total Capital Costs			**$ 18,963,000**
O&M Costs					
Treatment					
Force Main		1%	% of Capital	$ 310,000	$ 3,000
Treatment Plant		1	LS	$ 267,035	$ 267,000
Percolation Basin		3	Acres	$ 5,000	$ 20,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
Influent Lift Station	74,872	$0.13	5%	$ 313,000	$ 25,000
				Treatment Subtotal	**$ 315,000**
Reuse					
RW Pipeline		1%	% of Capital	$ -	$ -
	kWh/yr	$/kWh	Maint. (% of cap. costs)		
RW Pump Station	74,872	$0.13	5%	$ -	$ 10,000
				Reuse Subtotal	**$ 10,000**
		Total O&M Costs ($/yr)			**$ 325,000**
Annual Costs ($ / Year)					
		Annualized Capital Costs			$ 1,275,000
		Annual O&M Costs			$ 325,000
		Total Annualized Cost			**$ 1,600,000**

Santa Ynez Recycled Water Facilities Plan

Alternative C, With Reuse for Regional WRRF

Item		Qty	Units	Unit Cost[1]		Cost	
Capital Costs							
Treatment							
Influent Lift Station		46	HP	$	313,346	$	313,000
Force Main		3,100	LF	$	100	$	310,000
Percolation Basin		2.0	acres	$	50,000	$	100,000
				Treatment Subtotal		**$**	**723,000**
Reuse							
RW Pump Station		681	GPM	$	1,864,513	$	1,865,000
RW Pipeline		5,300	LF	$	100	$	530,000
Municipal Customer Connection		0	EA	$	15,000	$	-
Agriculture Customer Connection		6	EA	$	30,000	$	180,000
				Reuse Subtotal		**$**	**2,575,000**
		Raw Construction Subtotal				**$**	**3,298,000**
		Construction Contingency		25%		$	825,000
		Construction Total				**$**	**4,123,000**
		Implementation Costs		25%		$	1,031,000
Treatment Plant		1	LS	$	17,355,300	$	17,355,000
Land Purchase							
WRRF		1	Acres	$	100,000	$	100,000
Percolation Basin		2.0	Acres	$	100,000	$	200,000
		Total Capital Costs				**$**	**22,809,000**
O&M Costs							
Treatment							
Force Main		1%	% of Capital	$	310,000	$	3,000
Treatment Plant		1	LS	$	267,035	$	267,000
Percolation Basin		2	Acres	$	5,000	$	10,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)				
Influent Lift Station	74,872	$0.13	5%	$	313,000	$	25,000
				Treatment Subtotal		**$**	**305,000**
Reuse							
RW Pipeline		1%	% of Capital	$	530,000	$	5,000
	kWh/yr	$/kWh	Maint. (% of cap. costs)				
RW Pump Station	74,872	$0.13	5%	$	1,865,000	$	103,000
				Reuse Subtotal		**$**	**108,000**
		Total O&M Costs ($/yr)				**$**	**413,000**
Annual Costs ($ / Year)							
		Annualized Capital Costs				$	1,533,000
		Annual O&M Costs				$	413,000
		Total Annualized Cost				**$**	**1,946,000**

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