FINAL FEASIBILITY STUDY

San Lucas County Water District Water Supply Project
San Lucas, California

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San Lucas County Water District
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EXECUTIVE SUMMARY

Monterey County (County) retained AMEC Environment and Infrastructure and SRT Consultants (AMEC/SRT) to perform a feasibility analysis, preliminary engineering, environmental review, and provide final design engineering services for the San Lucas Water Supply Project (Project). The Project was developed by the County in order to establish the best alternative for addressing ongoing water quality problems at the existing San Lucas County Water District (SLCWD) water source (which have occurred since 2006), and subsequently design and implement the selected alternative.

Water supply alternatives were developed based on potential water supply sources in the SLCWD region. Five alternatives were developed and ranked as part of this Feasibility Study (FS). This executive summary includes a description of the recommended alternative and an overview of the five alternatives considered. Key background information on the water system and the process for the selection of the recommended alternative is included in the body of this report. Table ES-1 summarizes the five alternatives that were developed and ranked.

Table ES-1 Summary of Alternatives

Alternative	Summary
Alternative 1: Treatment of Existing SLCWD Source	Additional treatment of water from existing well San Lucas #2. (report pages 15 – 19)
Alternative 2: New Groundwater Source (Mission Ranches Well)	Long-term use of the interim well installed May 2014. Treat the water as required. (report pages 19 – 25)
Alternative 3: New groundwater under the influence of surface water (GWUI) Source	Install a new well near the Salinas River and treat the water from the well as groundwater under the influence of surface water. (report pages 25 – 31)
Alternative 4: Water Importation from King City	A new single connection to the King City water system (Cal Water). Cal Water would supply water to SLCWD. SLCWD would buy water from Cal Water and SLCWD remains a separate water district. (report pages 31 – 37)
Alternative 5: Consolidation with King City	SLCWD water system becomes part of King City's' water system (Cal Water). (report pages 37 – 43)

The five alternatives were developed and evaluated as to their physical, administrative, legal, operational, political, and economic feasibility, as well as their long-term sustainability. Additional detail regarding the alternatives and ranking of them is included in Section 4 of this report. Table ES-2 outlines the alternatives and summarizes the benefits and challenges of each.

Table ES-2 Summary of Alternatives (In Order of Ranking)[1]

Alternative	Benefits	Challenges	Estimated Monthly Water Rate	Annual System O&M Cost	Capital Cost	Schedule to Implement
Alternative 2: New Groundwater Source (Mission Ranches Well)	• **Schedule of implementation will be short if stakeholder negotiations are successful.** • Source construction and permitting have been initiated. • Based on initial sampling, no additional treatment facilities will be necessary. • Low estimated capital costs**.** • Low/comparable estimated O&M costs. • Low/comparable estimated water rates.	• Naraghi/Mission Ranches have legally stated that this source is not intended to be a permanent source for SLCWD.[2] • **Eminent domain proceedings are anticipated.** • Possibility of TDS treatment required for MCL compliance and RWQCB wastewater discharge compliance, which would increase capital and O&M costs.	$63 $136 if TDS treatment required	$65,000 $138,000 if TDS treatment required	$1.0 Million $2.55 Million if TDS treatment required	2 years
Alternative 5: Consolidation with King City	• **No anticipated property negotiations or substantial legal proceedings.** • High ranking for long-term sustainability.	• **Discontinues SLCWD autonomy.** • High estimated capital costs. • High estimated water rates. • Longer implementation schedule. • Cal Water does not favor consolidation with SLCWD, mainly due to a lack of interest in maintaining the pipeline and SLCWD distribution system.	$92	Unknown, based on Cal Water budget decisions	$7.2 million	4 to 5 years
Alternative 3: New GWUI Source	• Moderate estimated capital costs: approx**. $3.5M** • Moderate estimated O&M costs: approx. **$81K** • Moderate water rates: approx. **$80/month**	• It is unlikely that SLCWD will be granted access to drill test wells on Naraghi's property. • There is a high risk that an adequate source of good quality water will not be found. • Eminent domain proceedings are anticipated for any potential well site. • Potential water rights negotiations.	$80	$81,000	$3.5 million	3 to 4 years
Alternative 4: Water Importation from King City	• No anticipated property negotiations or substantial legal proceedings. • High ranking for long-term sustainability.	• **Continues SLCWD autonomy.** High estimated capital costs. • High estimated O&M costs. • High estimated water rates. • Longer implementation schedule.	$122	$124,000	$7.2 million	4 to 5 years
Alternative 1: Treatment of Existing Source	• Utilizes existing SLCWD Well #2, which SLCWD currently owns and operates. • Moderate estimated capital costs: approx. **$3.5M**	• Additional land must be acquired for waste discharge evaporation pond, likely requiring eminent domain. • Water quality is very low and could degrade in the future. • High estimated O&M costs. • High estimated water rates.	$163	$167,000	$3.5 million	2 to 3 years

Notes:

1. See text in Section 4 for ranking of alternatives.
2. License Agreement between Naraghi and San Lucas County Water District, 2014.

Recommended Alternative

Based on the comparison and ranking of the alternatives evaluated, *Alternative 2: New Groundwater Source*, has been determined as the most feasible alternative to be implemented for the Project. The recommended alternative consists of transitioning the interim groundwater source (interim well) recently installed by Mission Ranches, to a permanent source for SLCWD. Water from the new interim groundwater well will require treatment, however, to a lesser degree than water from the existing well (SLCWD well #2). The new well has received a conditional County of Monterey Environmental Health Bureau (EHB) approval for use to supply water to the SLCWD system. The conditional approval requires testing of the water at regular intervals for compliance with applicable drinking water standards, specifically including indicators related to groundwater under the influence of surface water (GWUI).

The key reasons this alternative ranked highest include:

- It results in the lowest monthly water bill cost for SLCWD customers,
- It has the lowest capital cost, and
- It is the quickest to implement.

The alternative was ranked and selected based on the information currently available regarding water quality and associated treatment requirements, as this is the only reported data on which to base assumptions. There is a possibility that additional treatment will be required, however, this is based on assumptions that groundwater quality will deteriorate seasonally or over time.

The development and analysis of Alternative 2, considered that multiple stakeholders are currently opposed to transitioning the interim well to a permanent source and this may lead to legal proceedings. However, the political and legal feasibility of the alternative are only two of the seven parameters that were considered in the overall ranking. Although Alternative 2 ranked low in political and legal feasibility categories, it ranked high in all other categories. As the feasibility study is an objective analysis, the outcome represents an unbiased selected alternative.

The interim (new) well is located approximately 1200 feet west of the existing SLCWD supply well, on land owned by Naraghi and rented by Mission Ranches[1]. As shown in Table ES-2, if the total dissolved solids (TDS) content for the water from the well in the future does exceed applicable standards, reverse osmosis (RO) treatment would be required. This would increase capital costs for the alternative from $1 million to approximately $2.55 million, and the estimated monthly water bills would increase from $63 to $136.

Implementation of the recommended alternative would likely require the following activities and facilities:

[1] This well is referred to as a “replacement well” installed under Monterey County Well Permit #14-12351, per a letter report from Martin B. Feeney, Consulting Hydrogeologist, to Mission Ranches, titled: San Lucas Community Water System – New Replacement Well- Water Quality and Pumping Test Results, dated May 21, 2014.

- Conversion of the interim well to a permanent supply well or construction of a new well and pump at selected site (conducted by Mission Ranches);
- Construction of new conveyance pipeline (yard piping) from the wellhead to the treatment facilities (conducted by Mission Ranches);
- Possible installation of reverse osmosis for treatment of TDS (depending on on-going testing of the water from the well and results of additional WWTP effluent analysis); and
- Instrumentation and controls.

The next steps for design and implementation of the recommended alternative involve multiple local stakeholders. Should the County choose to initiate the transition of the interim well into a permanent source for SLCWD, the following next steps are recommended:

1. **Presentation of Feasibility Study:** Present the Feasibility Study and recommended alternative to SLCWD for input from staff and Board of Directors on the outcome of the Study and their preferred option. It will be most beneficial if the Board of Directors is in agreement to pursue the transition of the interim source to a long-term source.
2. **Legal Counsel:** Consult with legal staff regarding the feasibility of transitioning the interim source into the long-term water supply for SLCWD, including review of all documents signed by SLCWD indicating that the well would not be used as a permanent supply. Meet with Naraghi legal counsel as necessary.
3. **Stakeholder Meeting:** Meet with local stakeholders critical to the success of the Project to discuss the recommended alternative.
4. **Conduct Additional Water Quality Sampling:** Conduct additional water quality sampling to better characterize the groundwater and understand the additional treatment facilities that are needed, if any.[2] Conduct a pilot test, if necessary, for design of a reverse osmosis system to treat the water to reduce TDS.
5. **Reach Agreement with Landowner:** Reach an agreement with Naraghi regarding the acquisition of the well and well site, or proceed with eminent domain.
6. **Apply for Permit Amendment:** If not already completed, work with the County of Monterey Environmental Health Branch (EHB) to obtain a permit amendment for the water system.[3]
7. **Inspection of Construction:** Inspect the construction of the yard piping and wellhead to ensure it meets SLCWD standards.
8. **Acquisition of Assets:** Acquire the assets installed by Mission Ranches through formal legal agreement.

[2] Mission Ranches may already have conducted adequate water quality sampling, however, it is not available at this time.
[3] Mission Ranches/SLCWD will likely have completed the permit amendment application process for the interim source.

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1.0 PROJECT BACKGROUND

Monterey County (County) retained AMEC Environment and Infrastructure and their subcontractor SRT Consultants (AMEC/SRT) to perform a feasibility analysis, preliminary engineering, environmental review, and provide final design engineering services for the San Lucas Water Supply Project (Project). The Project was developed by the County in order to establish the best alternative for addressing ongoing water quality problems at the existing San Lucas County Water District (SLCWD) water source, and subsequently design the selected alternative.

In 2006, levels of total dissolved solids (TDS) at the SLCWD water source were reported above the regulatory limit, and have remained elevated since 2006. In 2011, SLCWD water quality testing results indicated elevated levels of nitrates, and the Monterey County Environmental Health Bureau (EHB) issued a “Do Not Drink” order for San Lucas, an order that is still in effect for the community. These water quality issues have precipitated the need to establish a long-term solution for the SLCWD that will restore a high quality potable water source for the community.

This Feasibility Study (FS) serves as a description and analysis of several alternatives, including a discussion of the physical, legal, administrative, operational, political, and economic feasibility of each alternative. Additionally, the Study details the background information collected from SLCWD and Project stakeholders, further defining key design parameters utilized to establish and evaluate the alternatives. Lastly, the Study presents a comparison of the alternatives and recommends an alternative based on this analysis.

1.1 PROJECT NEED AND OBJECTIVE

The Project has an overall objective of developing an affordable and reliable long-term water supply solution for the San Lucas community. The existing system has failed to meet the needs of the community, and the system’s deficiencies have previously been thoroughly investigated and characterized. This FS provides an overview of the SLCWD existing system facilities and water quality deficiencies, introduces alternatives, and evaluates the feasibility of each of these alternatives based on several key parameters.

The purpose and objective of the FS is to detail potential water supply alternatives based on existing information and analysis, and recommend the best alternative for the community of San Lucas.

1.2 STUDY AREA CHARACTERISTICS

San Lucas is a small disadvantaged farming community located in unincorporated Monterey County, immediately east of State Highway 101 approximately 8 miles south of King City and approximately 9.5 miles north of the small community of San Ardo. SLCWD is an independent special district serving approximately 325 people through 85 active water service connections.[4] Figure 1 shows the area around San Lucas.

The village of San Lucas was developed on a river terrace immediately east of the Salinas River. To the east, San Lucas is backed by low foothills along the eastern edge of the Salinas River floodplain. San Lucas lies at an average surface elevation of about 410 feet above mean sea level (MSL), sloping gently towards the Salinas River. The foothills north of San Lucas rise to elevations of over 500 feet, while the floodplain below San Lucas lies at surface elevations of approximately 340 to 360 feet above MSL.[5] The Salinas River is the major surface drainage in the area, flowing southeast to northwest approximately 120 miles from its headwaters to Monterey Bay, through the Salinas Valley. The Salinas Valley is a large coastal basin that lies within the southern Coast Ranges between the San Joaquin Valley and the Pacific Ocean.[6]

Northwest and west of San Lucas, US Highway 101 runs parallel to the Salinas River, along the eastern bank of the river (see Figure 1). Approximately 1.5 miles south of San Lucas, US Highway 101 crosses the Salinas River by a freeway bridge and continues to parallel the river along the western bank of the river.

1.2.1 Climate and Hydrology

The Salinas Valley climate is Mediterranean, with typically mild summers and cool winters. Seasonal precipitation in the area varies over long-term cycles, with periods of less-than-average rainfall to periods of above-average rainfall. Precipitation is almost entirely rain, which normally occurs during the late autumn, winter, and early spring. Historical records indicate that about 85 to 90-percent of the yearly precipitation falls during the period of

[4] Conversation between SRT and Susan Madson of the SLCWD on March 19, 2014 during the water system visit.
[5] USGS, San Lucas California 7.5 Minute Series Topographic Quadrangle,1949.
[6] TRAK Environmental Group Inc., 2002, *Hydrogeologic Investigation and Water Quality Evaluation.* Ventura, CA, 15, July.

November through April. The average annual rainfall ranges from about 11 inches to as much as 60 inches within the watershed of the Salinas Valley, and depends mainly upon altitude. Mean annual rainfall in the town of San Lucas is approximately 11 to 12 inches.[7,8]

A majority of the water utilized in the area for agriculture and potable use is groundwater extracted from source wells nearby the point of use. No water is imported, and recharge to the basin is from precipitation within the watershed.[9] Local groundwater conditions and hydrogeology in the San Lucas area are summarized in Table 1.

Table 1 San Lucas Hydrogeology

Parameter	Description
Aquifer Thickness and Well Depth	Water supply and irrigation wells in the area generally range in depth from approximately 70 to 200 feet deep. The depths of the wells in the area reflect, in part, the thickness of the aquifer materials in the area. Sediments at depths of 200 feet or greater do not appear to be of significant water-bearing capacity.
Well Yield	Aquifer conditions near the Salinas River vary by location and well yields may vary accordingly. Wells in areas near the Salinas River bed south of San Lucas in the vicinity of SLCWD Well #2 have yields of 1,000 gallons per minute (gpm) or greater. At some locations not far from the river, however, sediments are fine-grained and well yields in these areas would be low. An example of such conditions is along Highway 198 where a November 2013 test borehole indicated fine-grained materials.[10] Wells in areas further from the river, including beneath the town of San Lucas, may have yields that are lower, but yields are believed to be generally of 100 gpm or more.
Depth to Groundwater	The depth to groundwater in areas along the river is on the order of 10 to 20 feet below ground surface. In the surrounding areas where ground surface elevations are higher, the depth to groundwater is correspondingly greater.
Aquifer Recharge	Groundwater in the vicinity of the Salinas River is influenced by recharge from the Salinas River. As a result of this recharge and recharge from the surrounding aquifer system, water levels in wells in the area appear to vary only a few feet seasonally and from year to year.

[7] Monterey County Water Resources Agency (MCWRA), 2001, Draft Environmental Impact Statement for the Salinas Valley Water Project;
[8] USGS, Digital Data Series DDS-37, 2002.
[9] TRAK Environmental Group Inc., 2002, Hydrogeologic Investigation and Water Quality Evaluation, Ventura, CA, dated July 15.
[10] Martin B. Feeney, 2013, 2013 Annual Report – Hydrogeologic Work at Mission Ranches – San Lucas Property, letter report to Mission Ranches, dated December 30.

1.2.2 Groundwater Quality

Overall, the groundwater beneath San Lucas proper has been adversely impacted by septic systems and is of poor quality. In the area surrounding San Lucas and distant from the Salinas River, groundwater is generally of poor mineral quality, with high TDS. The aquifer materials in these areas are, in large part, marine sediments of the Pancho Rico formation, which contribute to the high mineral content of the groundwater. TDS concentrations often exceed the California maximum contaminant level (MCL) of 1,000 milligrams per liter (mg/L).

Available groundwater quality data from wells in the area are somewhat limited, as many wells in the area are not in use, are abandoned, or are irrigation wells that are not regularly sampled for water quality analyses. With the exception of the San Lucas Supply Well #2, available water quality data date from 2012 and older.

SLCWD Well #2 is located approximately 2,000 feet from the Salinas River. June 8, 2012 water samples from two wells near SLCWD Well #2 - Well LCW7 (approximately 100 feet from Well #2) and Well LCW8 (approximately 250 feet west of Well #2) -indicated nitrate concentrations of 180 mg/L and 36 mg/L, respectively, and TDS values of 2,300 mg/L and 1,400 mg/L, respectively.

Groundwater near the Salinas River bed is influenced by recharge of Salinas River surface water flows and is generally of better quality, with TDS concentrations generally below 1,000 mg/L. Sampling results from some test holes in the area indicate, however, that even near the river, there are areas of poor groundwater quality. Specifically, sampling performed for Mission Ranches in 2013 at locations along Bunte Road approximately 1,500 feet from the river indicated TDS values ranging from 1,700 to 3,400 mg/L.[11]

As shown on Figure 1, there are several irrigation wells (wells AL-1 through AL-5 located on a dirt road adjacent to the Salinas River) approximately 2,750 to 3,600 feet south-southeast of SLCWD Well #2.[12] Additionally, wells AR-4 and AR-5 and several Las Colinas Ranch Wells (LCW7 through LCW12) are located southwest of SLCWD Well #2, between SLCWD Well #2 and the Salinas River.[13,14] All of these wells range in depth from approximately 75 to

[11] 2013 Annual Report – Hydrogeologic Work at Mission Ranches – San Lucas Property, letter report to Mission Ranches by Martin B. Feeney, dated December 30, 2013.
[12] These wells are in the south half of T21S/R09E- Section 16 and are also referred to in some documents as wells LCW1 through LCW5.
[13] These wells are in the north half of T21S/R09E- Sections 16 and 17 and are also referred to in some documents as LCW wells. Wells AR-4 and AR-5 are most likely duplicate names for two of the wells

100 feet[15] and generally draw from the same aquifer units as SLCWD Well #2. Well LCW12 is located approximately 400 feet from the river and approximately 1,600 feet from SLCWD Well #2. June 8, 2012 water samples from this well indicated non-detect for nitrates and a relatively low TDS of 460 mg/L. These water quality results are consistent with the understanding that groundwater quality improves with proximity to the river.

At various times, test borings and now-abandoned wells were drilled east of and near the Salinas River. In some instances, including in 1981[16] and in 2013[17], the results of the testing indicated poor quality water near the river; contrary to conditions overall, where groundwater quality near the river is better than away from the river. There does not appear to be a direct correlation between well depth and groundwater quality, based on a review of the available well logs and construction information and groundwater quality data (EC and TDS). Overall, wells in the area have perforated intervals less than 100 feet in total length, and the saturated aquifer thickness penetrated by the wells may not be enough to illustrate changes in water quality with depth.

1.2.3 Land Use and Ownership

Land uses in the San Lucas area are primarily agriculture and rangeland, and the major crops being grown in the region are grain and wine grapes.[18] Land is split into large tracts and owned by several different landowners, as depicted in Figure 1.[19]

1.2.4 Wastewater Treatment

Wastewater from the community of San Lucas is discharged to a wastewater treatment plant (WWTP) that is operated in conjunction with the SLCWD water system. The WWTP is located approximately one mile northeast of the town of San Lucas. The wastewater is treated by passing the water through a series of three settling ponds, followed by spray discharge of the effluent to nearby land. The California Regional Water Quality Control

numbered LCW7 through LCW12.

[14] N. Isakson Consultant, 2012, Report to Mission Ranches Re: Las Colinas Ranch, Exhibit C, dated August 15.

[15] TRAK Environmental Group, Inc., 2002, Hydrogeologic Investigation and Water Quality Evaluation in the San Lucas Area, report dated July 15.

[16] TRAK Environmental Group, 2002, Hydrogeologic Investigation and Water Quality Evaluation in the San Lucas Area, page 18, report dated July 15.

[17] Martin B. Feeney, 2013, 2013 Annual Report – Hydrogeologic Work at Mission Ranches – San Lucas Property, letter report to Mission Ranches dated December 30.

[18] TRAK Environmental Group Inc., 2002, Hydrogeologic Investigation and Water Quality Evaluation. Ventura, CA, July 15.

[19] Information on landowners obtained from the County of Monterey Information Technology Public Geographic Information System (GIS) online portal: http://www.co.monterey.ca.us/gis/

Board-Central Coast region (RWQCB) oversees discharges to land, including the San Lucas wastewater effluent. The RWQCB effluent limit for TDS is 1,500 mg/L.[20] If the TDS of the sprayed effluent exceeds this limit, discharge by spraying is not allowed. The TDS of the wastewater effluent is, in part, a result of the TDS of the potable water supplied to the community of San Lucas.

Since at least 2007[21], the TDS of the San Lucas WWTP effluent has exceeded the RWQCB requirement of 1,500 mg/L. TDS data for the existing water supply source and WWTP effluent were collected to quantify the impact the TDS of the water supply source has on the WWTP effluent for the San Lucas community. The TDS concentration of the effluent produced by the WWTP is composed of the following:

(1) TDS concentration of SLCWD Well #1, and

(2) TDS concentration added to the water by residential and commercial uses in San Lucas.

In addition, the TDS increases in the settling ponds, as evaporation of the surface water occurs throughout the 60-90 days that the wastewater is detained.[22]

Based on the limited data available, a possible seasonal trend in TDS effluent concentration is occurring due to the high evaporation rates of the summer months. The data most closely associated with the summer season - a three month period from July to October – indicates that the TDS concentration increases approximately 750 mg/L, on average, from the point of production (SLCWD Well #2) to the WWTP spray discharge. The data most closely associated with the winter season - beginning as early as December and ending as late as April of the following year – indicates that the TDS concentration increases approximately 350 mg/L, on average, from the point of production (SLCWD Well #2) to the WWTP spray discharge. Without accounting for likely seasonal variations, the data indicates that the TDS concentration increases approximately 550 mg/L, on average, from the point of production (SLCWD Well #2) to the WWTP spray discharge.[23] These values are used in the following sections of the Study to estimate the potential impact that each alternative may have on the effluent TDS concentration.

[20] Per RWQCB Waste Discharge Requirements (WDRs) Order No. 89-7.)
[21] Data was not available prior to 2007 for the effluent TDS concentrations.
[22] Detention time estimates were determined through conversation with William Marcum, SLCWD water and wastewater system operator, and San Lucas Wastewater Treatment and Collection Project Plan Set, C-Rem Engineers, 1998.
[23] Data provided by William Marcum, SLCWD water and wastewater system certified operator.

In addition, it is important to note that a potential source of the high effluent TDS concentrations is the residual TDS in the WWTP settling ponds due to multiple years of high TDS concentrations and high evaporation rates. Since there was no WWTP influent data available, the impact of the WWTP evaporation rates could not be quantified, in comparison to the impact of the TDS concentrations added by residential and commercial uses. It is possible that regardless of the TDS concentration of the water supply source, the WWTP will continue to have high levels of TDS until the WWTP is rehabilitated (for example, new ponds are used to store the effluent before it is sprayed).

1.3 WATER FACILITIES BACKGROUND

SLCWD is an independent special district formed in 1965 to provide potable drinking water and wastewater services to residential and commercial users in the community of San Lucas. SLCWD currently serves approximately 325 people through 85 active water service connections.[24] Water is distributed to customers off the main line connecting SLCWD Well #2 to the storage tank, and from the storage tank by gravity through PVC and galvanized steel distribution system pipelines. Figure 2 is a map showing the major components of the SLCWD water system, including the abandoned well, SLCWD Well #1.

Water infrastructure, including a well, pump, manganese filter system, and 78,000-gallon redwood tank, was initially constructed in 1968 to provide potable water for the community. The well constructed in 1968 was located near Lockwood-San Lucas Road, as detailed in the 1968 "Plans for Construction of a Domestic Water System," and likely was decommissioned due to water quality issues. A second well, constructed in 1980 and referred to as SLCWD Well #1 in all literature reviewed, is located near a bend in the Lockwood-San Lucas Road, approximately 100 feet east of State Highway 101 and was not connected to the system due to the poor water quality in that well.[25]

In May 1981, another well was drilled on Las Colinas Ranch in the vicinity of several irrigation wells and adjacent to a small domestic well, at a location that, based on information available at that time, would likely produce higher quality water. The well was further away from the Salinas River than SLCWD Well #1, however. SLCWD exercised eminent domain power to obtain the land on which the well was constructed, and completed the well in 1981. This well is referred to as SLCWD Well #2 in all the literature reviewed, and is currently the only source for the SLCWD water system.

[24] Information obtained through a conversation between SRT and Susan Madson of the SLCWD on March 19, 2014 during a water system visit by AMEC and SRT.
[25] TRAK Environmental Group Inc., 2002, Hydrogeologic Investigation and Water Quality Evaluation. Ventura, CA, July 15.

Water pumped from SLCWD Well #2 passes through treatment facilities at the well site prior to being delivered to the storage tank or customers. At the treatment facilities, water pumped from SLCWD Well #2 is injected with chlorine and then flows through filtration units. There are four anthracite and sand filter vessels at the treatment facility that are utilized for iron and manganese removal prior to delivery of the water to customers. The treatment facility operates approximately 6 to 7 hours per day, according to the Water System Operator.[26]

Currently, SLCWD has one water storage tank: a 300,000-gallon aboveground bolted steel tank constructed in 2006. The tank has a diameter of 40 feet, is 32 feet in height, and has a base elevation of 525 feet. SLCWD does not have a conventional transmission system that connects SLCWD Well #2 to the storage distribution tank. Instead, the pipeline from the well to the storage tank has service connections between the well and the storage tank that provide water to customers.

A 6-inch-diameter PVC pipeline extends from the well to the distribution system, and an 8-inch-diameter PVC pipeline extends from the distribution system to the tank. The 8-inch pipeline connecting the tank to the distribution system acts as a conveyance line to feed both (1) the storage tank from SLCWD Well #2, and (2) the distribution system from the storage tank. Figure 2 shows the locations of major transmission and distribution lines. The distribution system is metered for water use, and customers are billed monthly based on volume consumed, in accordance with the approved rate structure.

1.3.1 Water Supply and Demand

SLCWD has one active water source, SLCWD Well #2, located on Las Colinas Ranch, in the vicinity of several irrigation wells. SLCWD Well #2 was drilled to a depth of 73 feet and cased to a depth of 70 feet with a 10-inch-diameter steel casing. The well is screened from 35- to 70-feet and gravel packed. The well has blank casing to a depth of 35 feet. The well was constructed with a 30-foot sanitary seal, a Monterey County EHB approved variance by from the typical 50-foot requirement.

SLCWD Well #2 has a rated capacity of 175 gallons per minute (gpm) and is currently the primary supply well for SLCWD. Water from the well is chlorinated in the treatment building on site (i.e. near the well head), and manganese and iron are removed through filtration. The well is equipped with a 15-hp submersible pump, which pumps water to a 300,000-gallon storage tank for distribution to customers.

[26] Based on communications with William Marcum, SLCWD operator.

Production data for SLCWD Well #2 were provided by SLCWD staff and analyzed to determine the demand of the community, and therefore the required production of a new source for the community. Since water facilities only produce water in response to customer demands, SLCWD's source production is dependent upon customer consumption, which provides the most accurate gauge of existing demand. Figure 3 illustrates the water total production demand recorded from 2006-2013.

Source water production records from 2006 through 2010 were used to calculate the average demand on the water system. Data was available for 2012 and 2013, however this data was not used in the calculations since the community of San Lucas has not been using SLCWD Well #2 as a potable water source since March 2011. The average annual water demand, average daily demand (ADD) and the per capita daily water demand for 2006-2010 were calculated to be:

- Average Annual Demand = 14,235,000 gallons per year
- ADD = 39,000 gallons per day (gpd), and
- Per Capita Demand = 120 gallons per capita per day (gpcd)

Rate of Production

Based on the production data available and information regarding the operational schedule of the well and treatment facility, the average rate of production was calculated. Assuming an ADD of 39,000 gpd and SLCWD Well #2 operating 6 hours per day[27], the following values were calculated:

- Average Rate of Production = 108 gpm
- Maximum Rate of Production[28] = 173 gpm

Should SLCWD intend to operate the water system similarly in the future, the new source must be able to produce approximately 175 gpm to meet the estimated maximum daily demand (MDD).

However, should the District operate the source for longer over a 24-hour period of time, a lower capacity source would be a viable alternative. Table 2, below, indicates the production, and therefore required demand, over a 24-hour period of time. Additionally, Table 2 indicates the estimated average and maximum demand should the SLCWD population grow in the future. Population growth has been estimated based on information provided by the County

[27] Based on communications with William Marcum, SLCWD operator
[28] Based on a planning ratio of 1:1.6, ADD: Maximum Day Demand

of Monterey regarding a potential housing development of 33 units, housing 4 people per unit (additional population of 132 people).[29]

Table 2 Current and Future Daily Demands[30]

	Current Daily Demand, gpd	Current Daily Demand, gpm[31]	Future Daily Demand , gpd[32]	Future Daily Demand, gpm
ADD	39,000 gpd	27 gpm	54,840 gpd	38 gpm
MDD[33]	62,400 gpd	43 gpm	87,774 gpd	61 gpm

1.3.2 Water Usage

There are 85 metered, active accounts that draw water from the SLCWD water system. Data on the volume of water delivered to metered customers from 2005-2011 was used to calculate annual usage values. Figure 4 shows total water use for 2005 through 2011, and the average annual water usage over the time period evaluated. From this data, average annual, daily, and per capita water use values were calculated to be:

- Average Annual Water Usage = 8,871,200 gallons per year
- Average Daily Usage = 24,305 gpd, and
- Per Capita Usage = 75 gpcd

The per capita usage is very low on the usage spectrum for the State of California,[34] indicating good conservation practices by SLCWD customers or inaccurate customer meter readings.

1.3.3 Unaccounted-for-Water

The difference between the water production and water usage in a water system represents system losses. These system losses, or unaccounted-for-water, represent water used for fire flow testing, water main flushing, repairs, filter backwash operations at the water treatment plant, and transmission and distribution system leaks. Unaccounted-for-water for the SLCWD

[29] The feasibility of additional growth in the SLCWD community is unlikely based on comments from SLCWD staff and census data. The population in San Lucas decreased from 419 people in 2000 (2000 Census data) to 269 people in 2010 (2010 Census data). Current population is estimated at 325 people.
[30] Based on production data from 2006 through 2010
[31] Required production capacity assuming source is operating 24 hours per day.
[32] Future demand estimated by adding the demand of 132 people at 120 gallons per capita per day (gpcd) to existing demand values.
[33] Maximum daily demand (MDD) calculated utilizing a ratio of 1:1.6, ADD:MDD
[34] California Department of Water Resources, per capita water use statistics. California average per capita water use = 196 gpcd (2013).

system was estimated for 2006 through 2011. Table 3 and Figure 5 compare consumption and production volumes for the MWSD system and quantify system losses.[35]

Table 3 Unaccounted-for-Water

Year	Annual Water Production (Million Gallons)	Annual Water Usage (Million Gallons)	Percentage of Water Loss
2006	16.41	8.89	46%
2007	16.30	9.58	41%
2008	14.34	8.61	40%
2009	12.48	8.88	29%
2010	11.66	8.82	24%
2011	10.18	8.94	12%

Historically, water losses in the SLCWD water system are significantly higher than the industry standard of 10%. However, the water losses calculated for 2011 indicate that system improvements have likely led to the decrease in unaccounted-for-water. Unaccounted-for-water is significantly higher in 2006 through 2008 in comparison to the subsequent years, most likely due to the water system improvement projects completed during that time period (main replacement project, new tank installation). Unaccounted-for-water volume decreased significantly after 2008 (11%), and again in 2011 (12%). Water losses in the SLCWD could also be associated with leaks in the transmission and distribution system, inaccurate meter readings on the well production meter, and inaccurate meter readings on customer meters.

1.3.4 Cost of Water

The SLCWD cost of water is based on the water system annual operations and maintenance (O&M) cost. SLCWD budgeted expenditures were presented in the 2011/2012 Annual Expenditures Budget and are summarized in Table 4, below.

[35] The time period utilized for comparison was based on the data provided by SLCWD. Both water production and water usage data were available for years 2006-2011.

Table 4 SLCWD Annual O&M Expenditures

Item	Description	Cost ($)
1	Salaries	$6,700
2	Meter Reader	$2,400
3	Operator	$15,000
4	Workers' Compensation	$261
5	Laboratory Fees	$1,850
6	Permit Fees	$2,273
7	Telephone	$738
8	Electricity	$4,150
9	Internet	$144
10	Rent	$600
11	Insurance	$3,688
12	Legal	$600
13	Auditor	$5,625
14	Office Supplies	$920
15	New Equipment	$3,600
16	Repairs and Maintenance	$2,500
17	Well Site Weed Control	$600
18	Deposit Refund	$250
19	USDA Loan Payment	$4,278
20	IRS	$1,235
21	CA Employment Development Department	$310
22	Miscellaneous/Other	$7,003
23	Total Annual O&M Expenditures	**$64,725**
24	Well Site Expenses (Electricity, Misc., Weed Control)	*$11,753*
25	Baseline O&M Expenditures	**$52,972**

Annual O&M expenditures without the estimated well site expenses are calculated are shown in Table 4, item 25, “Baseline O&M Expenditures”, representing the baseline annual O&M value that will be used in the evaluation of alternatives

SLCWD metered use data and billing records for 2013 were used to establish the average monthly and annual cost of water per connection for 2013. Additionally, average monthly and

annual costs per connection for 2009 through 2012 were previously reported in the SLCWD 2009-2012 financial audits. Table 5 presents the data available for the cost of water to SLCWD customers.

Table 5 SLCWD Monthly and Annual Customer Water Costs

Year	Average Monthly Cost per Connection	Average Annual Cost per Connection
2009	$72.35	$868.20
2010	$71.99	$863.88
2011	$69.15	$829.80
2012	$72.84	$864.08
2013[36]	$68.11	$817.32
Average Cost per Connection	$70.89	$848.66

SLCWD staff has indicated that an increase in the monthly cost of water service would present hardship to the SLCWD customers.[37]

1.3.5 Water Quality

SLCWD Well #2 has had significant water quality issues since 2006, when the TDS in the source water was first reported above the California maximum contaminant level (MCL). AMEC/SRT reviewed the most recent water quality results provided by the County and SLCWD staff for all California Administrative Code (CAC) Title 22 constituents, and evaluated them for compliance with applicable California Department of Public Health (CDPH) drinking water standards.[38] The Technical Memorandum submitted to the County by AMEC/SRT in May 2014 includes a detailed analysis of the water quality deficiencies in addition to a full description of water quality parameters that are in compliance with Title 22 requirements.[39] Table 6 summarizes the major water quality deficiencies that are critical in understanding the development of project alternatives.

[36] Values for 2013 were calculated for a calendar year (January – December), while values for 2009 through 2012 were calculated based on the fiscal year (July - June). All values accurately represent the range of monthly usage, and the consistency of calculated values support the relevance of the data.
[37] Conversation between SRT and Susan Madson of the SLCWD on March 19, 2014 during the water system visit
[38] Although the term CDPH is used in this document, as of July 1, 2014, the CDPH Drinking Water Program transferred to the California State Water Resources Control Board.
[39] AMEC and SRT, 2014, Technical Memorandum: San Lucas Water District Condition Assessment Summary, submitted to the County of Monterey, May.

Table 6 Summary of Water Quality Deficiencies at SLCWD Well #2

Water Quality Parameter	MCL	Details of Deficiency at SLCWD Well #2
Total Dissolved Solids (TDS)	1,000 mg/L	SLCWD Well #2 TDS concentrations have been out of compliance with the MCL since 2006, and have generally remained above the MCL, ranging from 1,053 mg/L to 2,564 mg/L.[40] There is currently no treatment for TDS at SLCWD Well #2.
Nitrates	45 mg/L	SLCWD Well #2 has been out of compliance with the MCL for nitrates since January 2011, when routine sampling indicated a concentration of 47 mg/L. Nitrates have generally remained above the MCL, ranging from 47 mg/L to 145 mg/L. There is currently no treatment for nitrates at SLCWD Well #2.
Manganese	50 µg/L; 500 µg/L[41]	Manganese has been present in SLCWD Well #2 since the well was brought on line in 1981 and since then the raw well water has been consistently above the MCL. Results reported over the last seven years indicate that manganese in the source water was consistently above the notification level of 500 micrograms per liter (µg/L). The water is presently treated at the wellhead to remove manganese.
Iron	300 µg/L	Iron has been present in SLCWD Well #2 since the well was brought on line in 1981 and has only on occasion been reported above the MCL. However, iron has exceeded the MCL at the well source during two (2) recent sampling events. In July 2007, iron was reported at 756 µg/L, and in October 2013, iron was reported at 306 µg/L. The water is presently treated at the wellhead to remove iron.

2.0 FEASIBILITY PARAMETERS

Feasibility parameters were selected to assess the practicality of the proposed alternatives by comparing each option to a set of criteria. For the purposes of this evaluation, feasibility criteria are as follows: physical feasibility, administrative and legal feasibility, operational feasibility, political feasibility, economic feasibility, and long-term sustainability. Additionally,

[40] TDS results were available from 1981 – 2013 from information provided by Monterey County (2007-2013) and Pueblo Water Resources (1981-2009).
[41] Manganese has a notification level of 500 µg/L due to neurological health risks associated with the contaminant at this concentration

the implementation schedule is included for each alternative however it is not a ranked feasibility parameter in the alternative comparison.

2.1 PHYSICAL FEASIBILITY

The physical challenges and obstacles associated with each alternative are evaluated under the physical feasibility parameter. This includes a comparison of the current state of the water system with the physical challenges anticipated in transitioning the water system to the proposed alternative. These physical considerations may include infrastructure improvements and construction, physical barriers to construction activities, and additional investigations and research prior to implementation. Physical feasibility also includes consideration of how the TDS of the potable water supply might affect the ability of the WWTP to meet TDS requirements for its effluent. If the TDS of the potable water supplied to San Lucas is too high, additional facilities may be required to treat the water for TDS so that the WWTP will meet the RWQCB effluent requirements.

2.2 ADMINISTRATIVE AND LEGAL FEASIBILITY

The anticipated legal and regulatory challenges and obstacles associated with each alternative are evaluated under the administrative and legal feasibility parameter. A component of an infrastructure solution is the incurrence of administrative and legal obligations associated with land acquisition, regulatory permitting, and activities on lands not legally owned by the water district. Legal and administrative challenges include environmental compliance, water rights, anticipated eminent domain proceedings, construction and O&M easements, and EHB requirements for each alternative.

2.3 OPERATIONAL FEASIBILITY

The anticipated O&M challenges and obstacles associated with each alternative are evaluated under the operational feasibility parameter. Water quality monitoring requirements, disinfection requirements, energy efficiency, and operator certification requirements are evaluated under operational feasibility.

2.4 POLITICAL FEASIBILITY

The anticipated stakeholder challenges and obstacles associated with each alternative are evaluated under the political feasibility parameter. Political feasibility considers the effects of the chosen alternatives on Project stakeholders. These considerations include the importance of community autonomy, private landowner preferences for County easements and future liabilities, and infrastructure maintenance responsibility. This human impact may also include perceived impacts or affects from a particular alternative.

2.5 ECONOMIC FEASIBILITY

The anticipated capital cost financing challenges and annual O&M costs associated with each alternative are evaluated under the economic feasibility parameter. Economic feasibility includes evaluating the relative capital cost, potential for grant funding, legal and administrative costs, increases in customer rates necessary to cover additional O&M costs, and other considerations of financial consequence.

2.6 LONG-TERM SUSTAINABILITY

Effective planning includes evaluation of the anticipated reliability of the source and its long-term sustainability. This includes risk of water source degradation, political and regulatory challenges that may influence the long-term viability of the alternative, and the accommodation of expected community growth.

2.7 IMPLEMENTATION SCHEDULE

The implementation schedule is the timeframe for which the community could transition from the current system to full reliance on a new long-term potable water supply. Each phase of activity leading to a completed project depends on the feasibility parameters described above in sections 2.1 to 2.5. The implementation schedule may be contingent upon sequential steps involving numerous stakeholders, permitting agencies, community involvement, and re-evaluations during actual implementation. For the purpose of this feasibility study, it also represents the length of time the community must continue utilization of the existing impaired water system.

3.0 PROJECT ALTERNATIVES

Project alternatives have been established based on potential water supply sources in the SLCWD region. Five (5) alternatives were established and evaluated as to their physical, administrative, legal, operational, political, and economic feasibility. The alternatives are listed below, and feasibility of each alternative is detailed in the following section:

- Alternative 1: Treatment of Existing Source
- Alternative 2: New Groundwater Source[42]
- Alternative 3: New Groundwater Under the Influence of Surface Water (GWUI) Source

[42] This would be the new interim well installed in late April 2014 on Mission Ranch's property. (Letter report from Martin B. Feeney, Consulting Hydrogeologist, to Mission Ranches c/o Horan Lloyd Law Offices, re: San Lucas Community Water System – New Replacement Well- Water Quality and Pumping Testing Results, dated May 21, 2014). Other locations were considered for a new groundwater well, however, no locations outside of the Naraghi property were deemed viable for test wells due to known or expected poor groundwater quality or limited groundwater quality data.

- Alternative 4: Water Importation from King City
- Alternative 5: Consolidation with King City

3.1 ALTERNATIVE 1: TREATMENT OF EXISTING SOURCE

Alternative 1 consists of adding wellhead treatment to SLCWD Well #2 to meet the water quality requirements of Monterey County EHB. Nitrates at SLCWD Well #2 were recently measured at a high of 145 mg/L and TDS was recently measured at a high of 2,564 mg/L, and additional wellhead treatment would include facilities for the removal of these water quality concerns. The new water treatment facilities would be installed on the existing SLCWD Well #2 site, while new waste discharge facilities including an evaporation pond would need to be located on a nearby parcel of land, as shown on Figure 6.

Implementation of Alternative 1 would require the construction of the following facilities:

- Concrete pad for installation of new wellhead treatment equipment;
- Pretreatment to reduce the groundwater scaling potential;
- Reverse osmosis (RO) for TDS and nitrate treatment;
- Instrumentation and controls; and
- Evaporation pond facilities for the discharge of treatment facility waste.

3.1.1 Alternative 1: Physical Feasibility

The water quality concerns at SCLWD Well #2 are the most significant contributor to the physical feasibility of Alternative 1. Due to extremely high levels of both nitrates and TDS, treatment facilities would have to be robust and the footprint of the facilities would increase substantially from its current size.

The TDS levels present in the existing source require treatment with reverse osmosis (RO), an energy-intensive membrane technology that produces an RO concentrate, which cannot be treated at the existing SLCWD wastewater treatment facility. RO concentrate could be treated onsite in an evaporation pond. However, an evaporation pond would require a larger footprint, and the facilities will not fit on the site currently owned by SLCWD.

No additional treatment would be required at the source in order to meet the RWQCB TDS requirements for the WWTP effluent discharge, as the source is already being treated for TDS. The treatment facilities will need to be designed to lower TDS to a level that meets the RWQCB effluent discharge requirements.

3.1.2 Alternative 1: Administrative and Legal Feasibility

Alternative 1 presents challenges with meeting the regulatory requirements of Monterey County EHB and CDPH. Although a treatment system could be designed to treat the contaminants present in SLCWD Well #2, regulatory action in the future is possible due to the potential of rising contaminant levels that could not be treated by the existing treatment system.

Additionally, Alternative 1 presents challenges regarding land ownership and potential legal proceedings regarding the installation of waste discharge facilities. Since SLCWD Well #2 is located on Naraghi/Mission Ranches land, and SLCWD will need to acquire land nearby in order install an evaporation pond, negotiations with Naraghi/Mission Ranches will be necessary. Eminent domain proceedings will likely be required to acquire the land for an evaporation pond.

3.1.3 Alternative 1: Operational Feasibility

Additional facilities to treat for high TDS and nitrates would increase the operational responsibilities at the treatment facilities. O&M responsibilities and associated costs will increase due to membrane replacement and energy requirements. If Alternative 1 is further considered, a pilot study is highly recommended to better assess the operational feasibility of Alternative 1, including the future O&M cost.

3.1.4 Alternative 1: Political Feasibility

The probable opinions of local stakeholders were taken into account in evaluating the political feasibility of Alternative 1. Table 7 includes the potential challenges based on conversations and written documentation of stakeholder concerns.

Table 7 Alternative 1, Probable Stakeholder Opinions and Challenges

Stakeholder	Probable Stakeholder Opinions and Challenges
SLCWD	Alternative 1 would be favorable to SLCWD as the district could continue community autonomy and not consolidate with a nearby water district. However, since operational costs, and therefore increased water rates, are major considerations for SLCWD, Alternative 1 would also be unfavorable because of the added O&M costs and the anticipation of substantially increased water rates.
Naraghi/ Mission Ranches	Land on which SLCWD Well #2 and the associated treatment system are operating is owned by SLCWD, while being located within the bounds of Naraghi's property and on the farm operated by Mission Ranches. Naraghi and Mission Ranches have indicated that they are not interested in the permanent SLCWD source continuing to be within the bounds of land owned or operated by the stakeholders. However, though Naraghi/Mission Ranches have indicated no interest to continue having SLCWD's well on their property, it is likely difficult for the landowner to attempt a legal battle over the existing well site due to the existing agreement.
CDPH	CDPH has provided support through grant funding for the San Lucas Water Supply Project in an effort to find a permanent solution for the community. As water quality is the main consideration of CDPH, CDPH staff has expressed concerns regarding the high concentrations of contaminants in source water and potential for the continued degradation of water quality.
Monterey County EHB	Similarly to CDPH, water quality is the main consideration for Monterey County EHB. Monterey County EHB has also expressed concerns regarding the high concentrations of contaminants in source water and potential for the continued degradation of water quality: including the age of the well, lack of information regarding how long the well can be productive, and the high cost and complexity of nitrate treatment.

3.1.5 Alternative 1: Economic Feasibility

The engineer's opinion of probable capital cost for Alternative 1 is presented in the Table 8. O&M costs are included in Table 9. The cost of land acquisition and obtaining property rights (line item 14) can be highly variable, however, it is assumed that Naraghi is unwilling to sell the land to SLCWD and eminent domain proceedings would be necessary. Legal fees associated with eminent domain proceedings are assumed to be substantial based on preliminary conversations and the political climate.

Table 8 Alternative 1, Engineer's Opinion of Probable Capital Cost

Item	Description	Cost ($)
1	Well Rehabilitation	$25,000
2	Reverse Osmosis Pilot Study	$50,000
3	Demolition	$25,000
4	Site Work and Yard Piping	$100,000
5	Packaged Reverse Osmosis Membrane Treatment	$300,000
6	Packaged MF/UF Membrane Pretreatment[43]	$250,000
7	Chemical Treatment	$50,000
8	New Building	$100,000
9	Reverse Osmosis Concentrate Evaporation Pond[44]	$1,000,000
10	Membrane Backwash/Cleaning Facilities	$100,000
11	Electrical Upgrade	$100,000
12	***Subtotal 1: Construction Cost***	$2,100,000
13	**Engineering** (10% of Construction Cost)	$210,000
14	**Legal and Administrative Fees** Land Acquisition, Property Negotiations (Based on anticipated challenges)	$750,000
15	**Contingency** (20% of Construction Cost)	$420,000
16	**Total Cost**	**$3,480,000**

The existing Safe Drinking Water State Revolving Fund (SDWSRF) grant will cover the cost to design new infrastructure (line item 13). Additional funding could cover the full capital costs of new infrastructure. The capital cost of this alternative is dependent upon the degree of treatment required due to the poor water quality. More detailed costs can be determined through communications with reverse osmosis vendors and the reverse osmosis pilot study.

The O&M costs presented below will be included in SLCWD's annual operating budget and need to be covered by the customer rates. Assuming that SLCWD customer base remains constant, monthly bills will increase (from an average of approximately $71) to approximately

[43] MF/UF membrane pretreatment may not be necessary; however, it is assumed that some pre-treatment will be required. The pilot test would determine the type of pre-treatment to be installed.
[44] Preliminary design is based on a net evaporation rate of 40 in/yr and concentrate production of 2.5 MG/yr (~4.8gpm), and cost is based on an estimated pond surface area of 100,000 square feet (approx. 300 x 350 feet) and estimated excavation of 25,000 cubic yards of soil at $40/cubic yard for pond construction.

$163. Based on discussions with SLCWD staff, water at this rate will not be affordable for SLCWD customers.

Table 9 Alternative 1, Engineer's Opinion of Probable O&M Cost and Customer Rates

Yearly Production (x1,000 gallons)	Unit Cost (/1,000 gallons)	Annual O&M Cost ($)
14,235	$8	$113,880
Baseline Annual O&M Expenditures		$52,972
Alternative 1: Estimated O&M Expenditures		**$166,852**
Alternative 1: Estimated Annual Cost per Connection		**$1,963**
Alternative 1: Estimated Monthly Bill per Connection		**$163**

3.1.6 Alternative 1: Long-term Sustainability

There is a low probability that Alternative 1 will be a long-term sustainable solution for SLCWD. SLCWD Well #2 has poor water quality and the trends in contaminant concentrations indicate likely degradation of water quality in the future due to neighboring agricultural practices or existing contaminant plumes.

The O&M costs are substantial and if water quality worsens, the O&M costs and SLCWD water rates will increase. High O&M costs and the potential of consistent increases in water rates is not sustainable for the community of San Lucas.

Additionally, there is a possibility of declining water levels and production capacity due to drought, increased agricultural well production in the vicinity, or other unforeseen conditions.

3.1.7 Alternative 1: Implementation Schedule

The implementation schedule for Alternative 1 includes permitting, land acquisition, improvements to the well, installation of treatment facilities, and construction of the evaporation pond for waste discharge. Since the well is currently permitted and operational, and SLCWD already owns the land on which the source is located, the implementation schedule is more streamlined than other alternatives. However, acquiring additional land for the evaporation pond will require negotiations with Naraghi and the possibility of eminent domain proceedings. It is estimated that land acquisition will take approximately 12 to 18 months.

It is estimated that the implementation schedule for Alternative 1 would be approximately 30 months from the completion and County acceptance of the Feasibility Study findings.

3.2 ALTERNATIVE 2: NEW GROUNDWATER SOURCE

Review of existing water quality data in the vicinity of the Salinas River and previously issued reports indicate that relatively better groundwater quality exists beneath the Naraghi/Mission Ranches property as compared to groundwater in the surrounding area.[45,46,47] This is likely due to historical pumping that has drawn higher quality groundwater from the vicinity of the river to beneath the property. Additional locations on other properties in the area were considered for the proposed new groundwater source, however the water quality and possibly the well production capacity are anticipated to be significantly better and higher, respectively, on the Naraghi/Mission Ranches property.

Mission Ranches installed a well in late April 2014 approximately 1,200 feet west of existing well SLCWD #2.[48] The new well is considered an interim groundwater source for SLCWD, providing potable water to the community until a permanent source is established. Alternative 2 consists of transitioning the interim groundwater source (interim well) established by Mission Ranches to a permanent source for SLCWD. Water from the new groundwater well will require treatment, however, to a lesser degree than the existing SLCWD #2 well.

The interim well is located on land owned by Naraghi and rented by Mission Ranches. The site was surveyed by a licensed surveyor and determined the elevation of the new well to be 345.90 feet, msl NVGD. The site of the replacement well is in the mapped 100-year flood plain and as such, the wellhead will need to be constructed such that its final elevation is 1 foot above the 100-year flood stage. Figure 7 indicates the location of Alternative 2 facilities.

Water quality concerns related to the well include TDS, manganese, and sulfate, and based on initial data collected, the existing treatment facilities will likely be sufficient. However, if TDS results are continuously recorded above 1,000 mg/L, additional treatment for this

[45] Pueblo Water Resources, Inc. 2010, *Hydrologic Characterization and Test Well Feasibility Analysis for San Lucas County Water District*. Ventura, CA, September
[46] Pueblo Water Resources, Inc., 2011, *Technical Memorandum: Nitrate Concentration in Groundwater near San Lucas*. Ventura, CA, dated 6 June.
[47] Martin B. Feeney, 2013, 2013 Annual Report – Hydrogeologic Work at Mission Ranches – San Lucas Property, letter report to Mission Ranches , dated December 30.
[48] Feeney, Martin B. Consulting Hydrogeologist, 2014, San Lucas Community Water System New Replacement Well, Water Quality and Pumping Test Results, letter to Mission Ranches c/o Horan Lloyd Law Offices, May 21.

constituent will be necessary. Implementation of Alternative 2 would likely require the following activities and facilities:

- Construction of a new well and pump at selected site (Mission Ranches);
- Construction of new yard piping from the wellhead to the treatment facilities (Mission Ranches);
- Possible installation of reverse osmosis treatment for treatment of TDS; and
- Installation of instrumentation and controls.

3.2.1 Alternative 2: Physical Feasibility

The physical feasibility of Alternative 2 is reliant upon establishing a well of adequate capacity and water quality. Based on the report provided by Mission Ranches the interim well is highly productive and capable of discharge rates up to 800 gpm, which exceeds the capacity requirements of SLCWD.[49]

The water from the new replacement well meets all primary drinking water standards, and nitrate was not detected. The water from the new well, however, exceeds secondary drinking water standards for several constituents, as shown in Table 10.

Table 10 Interim Well Water Quality Concerns

Constituent	Reported Concentration	Secondary Standard
Manganese	329 µg/L	50 µg/L
Sulfate	527 mg/L	250 mg/L
TDS	1,080 mg/L	1,000 mg/l

These constituents, specifically TDS, are the most substantial water quality challenges for the established source. However, manganese and TDS concentrations are both significantly lower than the concentrations in the existing SLCWD #2 well. Sulfate concentrations are slightly higher compared to the SLCWD #2 well (503 mg/L). Additional research is necessary to determine whether the TDS level reported in the water source would result in an exceedance of the RWQCB TDS requirement for the WWTP effluent. Based on the values established in Section 1.2.4, the projected TDS concentration of the effluent for Alternative 2 is estimated at 1,830 mg/L in the summer season, and 1,430 mg/L in the winter season. Collecting additional data would allow for a more accurate projection of the TDS increase due to wastewater inputs from the community of San Lucas and evaporation in the settling ponds; however, the data available indicates that winter TDS concentrations could remain

[49]Feeney, Martin, 2014, San Lucas Community Water System New Replacement Well, Water Quality and Pumping Test Results, letter to Mission Ranches c/o Horan Lloyd Law Offices, May 21.

below the RWQCB discharge limit, while the summer TDS concentrations could exceed this limit

All organic constituents were reported as non-detect, with the exception of carbon tetrachloride, detected at 0.69 micrograms per liter (µg/L). It was presumed that the presence of carbon tetrachloride is most likely transient and the result of the recent use of PVC primer and solvent cement on the PVC casing. Additionally, the water tested positive for total coliform and negative for fecal coliform. This is not presently considered a major concern, however the well will need to be disinfected after installation of permanent pump and retested.[50]

There would be minimal physical improvements necessary for the implementation of this alternative by SLCWD, as Mission Ranches will complete construction of new infrastructure. Representatives of SLCWD and the County will need to ensure that infrastructure meets water quality and general water system construction requirements (cover, pipe materials, etc.).

3.2.2 Alternative 2: Administrative and Legal Feasibility

Alternative 2 presents challenges regarding land ownership and potential legal proceedings regarding well placement and pipeline easements. Since the new well is located on Naraghi/Mission Ranches land, SLCWD will need to acquire the land in order to transition the well to a permanent source. Naraghi and Mission Ranches have indicated that they are not interested in this well transitioning to a permanent source for SLCWD, and a contractual agreement was signed regarding the interim source, establishing that it would not be considered as a permanent source.[51] Eminent domain proceedings will likely be required to acquire the land on which the well is located.

Additionally, the pipeline connecting the well to the treatment facilities is on Naraghi/Mission Ranches property and a maintenance easement will be required for the pipeline. It is unknown if Naraghi/Mission Ranches will be agreeable to terms and conditions of a maintenance agreement, or if legal proceedings will be required.

Lastly, the new source will need to be approved by Monterey County EHB, the water supply permit amended to include the source, and the appropriate environmental review work completed, if required. Mission Ranches is currently in the process of obtaining the water supply permit amendment and constructing the well to California Department of Water

[50] Feeney, Martin, 2014, San Lucas Community Water System New Replacement Well, Water Quality and Pumping Test Results, May 21.
[51] License Agreement between Naraghi and San Lucas County Water District, 2014.

Resources (DWR) standards. Monterey County EHB has indicated that use of the water from the interim well for potable supply purposes is conditional,[52] and that required water testing to support the continued use would include:

- Initial one-time evaluation of water from the well to verify that the new well is not under the influence of surface water,
- Two additional evaluations during the rainy season,
- Bi-monthly sampling for coliform bacteria,
- Sampling and analyses for carbon tetrachloride and manganese,
- Sampling and analyses for total dissolved solids in July and October 2014 and January 2015,

3.2.3 Alternative 2: Operational Feasibility

Operational requirements for Alternative 2 will be similar to the existing treatment facilities, in the case that TDS treatment is not required. However, there is a possibility that TDS levels above 1,000 mg/L will be reported for water from the well, in which case RO treatment facilities will need to be added to the existing treatment facilities. If additional facilities to treat for high TDS are required, operational costs will substantially increase due to higher energy usage and membrane replacement. Additionally, waste discharge for TDS treatment would be a significant challenge, as discussed in Alternative 1, and will likely require additional land use for construction of an evaporation pond.

3.2.4 Alternative 2: Political Feasibility

The probable opinions of local stakeholders were taken into account in evaluating the political feasibility of Alternative 2. Table 11, includes the potential challenges based on conversations and written documentation of stakeholder concerns.

[52] Monterey County Department of Health letter to Manual Zuniga, President of San Lucas County Water District, RE: San Lucas Water District Permit Amendment, dated July 8, 2014.

Table 11 Alternative 2 Stakeholder Challenges

Stakeholder	Potential Stakeholder Challenges
SLCWD	Alternative 2 would be favorable to SLCWD as the district could continue community autonomy and not consolidate with a nearby water district. However, SLCWD staff has indicated that SLCWD supports the well ***not*** being on land owned by Naraghi. This is especially an issue if Board approval is necessary for eminent domain proceedings.
Naraghi/ Mission Ranches	Naraghi and Mission Ranches have indicated that they - do not want the interim well transitioned to a permanent source for SLCWD. A contractual agreement was signed between the stakeholders and SLCWD regarding the interim source and establishing that it would not be considered as a permanent source.[53] Eminent domain proceedings will likely be required to acquire the land on which the well and associated yard piping are located.
Other Local Landowners	This option would be constructed entirely on land owned by Naraghi; no other local landowners would likely be involved.

3.2.5 Alternative 2: Economic Feasibility

The engineer's opinion of probable capital cost for Alternative 2 is presented in Table 12. All costs to be covered by Mission Ranches in the construction of the well are listed as not applicable (NA).

Initial testing of water from the new well shows that the TDS of the water is slightly higher than the "upper" secondary MCL (1,000 mg/L).[54] For regulatory purposes, the concentration of TDS is determined by annual averaging of quarterly sampling and analyses. Additional quarterly water quality sampling and TDS analyses for the next three quarters (9 months) will be required, per Title 22 California Code of Regulations, section 64449, to determine the "annual average" TDS. The annual average TDS will then be used to determine if treatment of the water may be required.

If the annual average TDS is determined to be greater than the "upper" secondary MCL (1,000 mg/L) but less than the "short term" secondary MCL for TDS (1,500 mg/L), the following options may be considered:

[53] License Agreement between Naraghi and San Lucas County Water District, 2014.
[54] See Table 10 of this report.

- Treatment;
- Waiver of treatment approved by the County of Monterey, which would also include a requirement for consumer acceptance.

If the “annual average” TDS is greater than the “short term” secondary MCL (1,500 mg/L), treatment will be required. There are additional items included as optional should RO treatment be required to treat for high TDS. Since a reliable, average TDS level is unknown, this cost estimate is general and not based on a specific TDS concentration. Additionally, it is assumed that these costs would be incurred by SLCWD in the future (and not by Mission Ranches), as the average annual TDS concentration for water from the new well, and the need for TDS treatment have not yet been determined.

As discussed in Section 1.2.4, the TDS of the effluent from the SLCWD WWTP is determined, in part, by the TDS of the potable water provided by SLCWD and used in San Lucas, and it should be noted that the SLCWD WWTP has not been certified by the California RWQCB due to the high TDS of the effluent. Consequently, there is a possibility that TDS treatment of water from the new groundwater source may also be required in order to meet the RWQCB WWTP effluent requirements.

As an additional consideration, TDS is a secondary “aesthetic” water quality standard. As such, treatment for TDS may not be eligible for California state grant funding.

O&M costs are included in Table 13. The cost of land acquisition and obtaining property rights (line item 6) can be highly variable, however, it is assumed that Naraghi is unwilling to sell and eminent domain proceedings are necessary. Legal fees associated with eminent domain proceedings are assumed to be substantial based on preliminary conversations and the political climate.

Table 12 Alternative 2, Engineer's Opinion of Probable Capital Cost

Item	Description	Cost ($)
1	Well Construction (Mission Ranches)	NA
2	Installation of Conveyance Line	NA
3	Installation of New Treatment Facilities, if necessary	NA
4	***Subtotal: Construction Cost***	***NA***
5	**Engineering**	NA
6	**Legal and Administrative Fees** Land Acquisition, Property Negotiations (Based on anticipated challenges)	$1,000,000[55]
7	**Total Cost (SLCWD, without RO treatment)**	$1,000,000
	Potential Costs Associated with RO treatment for TDS	
8	Packaged Reverse Osmosis Membrane Treatment	$300,000
9	Packaged MF/UF Membrane Pretreatment[56]	$250,000
10	Evaporation Pond for Waste Discharge	$1,000,000
11	**Total Cost (SLCWD, with RO Treatment)**	$2,550,000

Annual O&M expenditures for Alternative 2 are assumed to be the same as the existing treatment facilities in the case that treatment for high TDS is not required. These O&M costs are presented below and would be included in SLCWD's annual operating budget and need to be covered by the customer rates. Assuming that the SLCWD customer base remains constant, monthly bills will remain relatively constant, as well.

Should RO treatment for high TDS be required, the O&M costs would be significantly higher due to increased energy production and membrane replacement. These O&M costs are also presented below.

[55] Legal fees are anticipated to be more for Alternative 2 as opposed to Alternatives 1 or 3 given that SLCWD has signed an agreement with Naraghi regarding the interim well stating that it will not be used as a permanent source.

[56] MF/UF membrane pretreatment may not be necessary; however, it is assumed that some pre-treatment will be required. The pilot test would determine the type of pre-treatment to be installed.

Table 13 Alternative 2, Engineer's Opinion of Probable O&M Cost and Customer Rates, With and Without Reverse Osmosis Treatment

ALTERNATIVE 2: NO REVERSE OSMOSIS	
Description	**Cost ($)**
Alternative 2: Estimated O&M Expenditures	$64,725[57]
Alternative 2: Estimated Annual Cost per Connection	$761
Alternative 2: Estimated Monthly Bill per Connection	$63

ALTERNATIVE 2: INCLUDING REVERSE OSMOSIS TREATMENT		
Yearly Production (x1,000 gallons)	**Unit Cost (/1,000 gallons)**	**Annual O&M Cost ($)**
14,235	$6	$85,410
	Baseline Annual O&M Expenditures	$52,972
Alternative 2: Estimated O&M Expenditures with RO		**$138,382**
Alternative 2: Estimated Annual Cost per Connection with RO		**$1,628**
Alternative 2: Estimated Monthly Bill per Connection		**$136**

3.2.6 Alternative 2: Long-term Sustainability

There is a strong possibility that Alternative 2 could be a sustainable long-term solution for SLCWD. Should a high quality source of adequate capacity be demonstrated during exploratory drilling, and an agreement can be reached between SLCWD and Naraghi/Mission Ranches, a new well owned and operated by SLCWD would provide a sustainable source for the utility.

However, as is the case with wells located in agricultural regions, there is a possibility of water quality degradation in the future due to neighboring agricultural practices or existing contaminant plumes, even if the new source has high quality water when drilled. The TDS levels in water from the interim well drilled in April 2014 were measured slightly above the regulatory limit, and if the TDS concentrations continue to rise, additional treatment facilities will need to be installed.

[57] See Table 4 for this cost amount. These estimated O&M expenditures for Alternative 2 do not include O&M costs for a reverse osmosis unit, and these costs would increase substantially if reverse osmosis is required for TDS treatment in the future.

Additionally, there is a possibility of declining water levels and production capacity due to drought, increased agricultural well production in the vicinity, or other unforeseen conditions.

3.2.7 Alternative 2: Implementation Schedule

The implementation schedule for Alternative 2 includes permitting, construction of the well, obtaining EHB approval, installation of pipeline infrastructure, and legal negotiations. The work to be conducted by Naraghi/Mission Ranches for the new groundwater well source consists of well construction, obtaining EHB approval, and installation of treatment and pipeline infrastructure. Naraghi/Mission Ranches has already initiated well construction and is working with EHB for approval. It is anticipated that the construction schedule for the facilities related to the new well will be approximately 6 months.

The most substantial scheduling challenge will be the necessary legal proceedings to transition the interim well into a permanent source for SLCWD. It is estimated that land acquisition, if possible, will take approximately 12 to 18 months.

The total implementation schedule for Alternative 2 is approximately 24 months.

3.3 ALTERNATIVE 3: NEW GWUI OF SURFACE WATER SOURCE

Alternative 3 consists of drilling a groundwater well at a new location that qualifies as groundwater under the influence of surface water (GWUI) and will therefore need to meet the Monterey County EHB, CDPH, and Environmental Protection Agency (EPA) requirements for a surface water source. Review of historical water quality data has established the most viable location for a new GWUI source. The proposed new GWUI well is located very near the Salinas River approximately 1,800 feet southwest of the existing SLCWD supply well and associated facilities, on land owned by Naraghi and rented by Mission Ranches. The new treatment facilities would be located at the existing SLCWD Well #2 site. Figure 8 indicates the location of Alternative 3 facilities.

Review of existing water quality data in the vicinity of the Salinas River and previously issued reports indicate that relatively better water quality exists on the Naraghi/Mission Ranches property as to compared to groundwater in the surrounding area. [58,59,60] This is likely due to historical pumping that has drawn higher quality groundwater from the vicinity of the river to

[58] Pueblo Water Resources, Inc. 2010, *Hydrologic Characterization and Test Well Feasibility Analysis for San Lucas County Water District*. Ventura, CA, September.
[59] Pueblo Water Resources, Inc., 2011, *Technical Memorandum: Nitrate Concentration in Groundwater near San Lucas*. Ventura, CA, dated 6 June.

beneath the property. Additional sites were considered for the proposed GWUI source, however the water quality and quantity are anticipated to be significantly better and higher, respectively, on the Naraghi/Mission Ranches property. There is a possibility that the well could be located approximately 200 feet closer to the Salinas River on land owned by Anne Marie Rosen (see Figure 1), however there is no water quality information available for this location.

At a minimum, a surface water treatment plant will be necessary for Alternative 3 in order to meet Monterey County EHB and CDPH requirements. Based on historical water quality sampling, the water will likely not have to be treated for additional contaminants and will not require installation of additional treatment facilities. Water quality results for Las Colinas Irrigation Well #12 (LCW12) were used as the basis for this determination, as LCW12 is in the vicinity of the new GWUI well site. Nitrates were reported non-detect for water drawn from LCW12 in June 2011 and 2012, and TDS was reported at 460 mg/L in June 2012.[61] Additional water quality results are not available. The water could be treated for manganese and iron, if necessary, at the existing treatment facilities. The water quality results are not conclusive, and test wells will need to be drilled to confirm water quality and well yield. Implementation of Alternative 3 would likely require the following activities and facilities:

- Drilling of test wells;
- Construction of a new well and installation of a pump at selected site;
- Construction of concrete pad and/or building for installation of treatment equipment;
- Installation of a surface water treatment plant, likely including ultra/micro filtration, commonly referred to as membrane treatment, at the SLCWD Well #2 site[62];
- Installation of a new transmission line to deliver potable water directly to the distribution tank;
- Instrumentation and controls; and
- Storage facilities to hold the liquid waste produced by the treatment facilities.

3.3.1 Alternative 3: Physical Feasibility

The physical feasibility of Alternative 3 is reliant upon installation of a well of adequate capacity and water quality. Although a preliminary site has been assumed (Figure 8), several test well borings may need to be completed in order to establish whether a source of

[60] Martin B. Feeney, 2013, 2013 Annual Report – Hydrogeologic Work at Mission Ranches – San Lucas Property, letter report to Mission Ranches , dated December 30.
[61] Isakson, Nancy, 2012, Memorandum to Mission Ranches Re: Las Colinas Ranch. Marina, CA, dated August 15.
[62] Since SLCWD currently owns the land on which SLCWD Well #2 is located, and treatment facilities exist at the wellhead site, it will likely be most cost-effective for the GWUI treatment facilities to be located at the existing site. Additionally, the existing pressure vessels may be repurposed, if possible.

adequate yield and water quality exists, and to subsequently determine the best source for full construction.

Due to the low O&M requirements of a membrane surface water treatment plant, it would likely be the best option for installation at SLCWD. A membrane treatment facility is a self-contained unit and would meet the requirements of EHB and CDPH.

Yard piping from the new well to the existing water treatment facilities will be necessary, and the treated water will have to be conveyed to the existing transmission and distribution system. Additionally, GWUI will have to meet requirements similar to surface water, which requires longer contact time with chlorine, and increased monitoring for pathogens and disinfectant byproducts (DBPs). To meet these requirements, the new system must include either:

1. A new tank that will be used to meet the CDPH chlorine contact time and pump at the existing treatment facility site, or
2. A new transmission line that brings water directly to the existing tank before being served to customers.

It is assumed for the purposes of this study that Alternative 3 will include a new transmission line to deliver potable water to the existing distribution tank.

No additional treatment would be required at the source in order to meet the RWQCB TDS requirements for the WWTP effluent discharge, as it is estimated that the source has a TDS of 460 mg/L. Based on the values established in Section 1.2.4, the projected TDS concentration of the WWTP effluent for Alternative 3 is estimated at 1,210 mg/L in the summer season, and 810 mg/L in the winter season. Additional research should be conducted to more accurately estimate the TDS of the GWUI source water, and TDS increase due to wastewater inputs from the community of San Lucas and evaporation in the settling ponds; however, the data available indicates that TDS concentrations would remain below the RWQCB discharge limit.

3.3.2 Alternative 3: Administrative and Legal Feasibility

Alternative 3 presents challenges regarding land ownership and potential legal proceedings regarding well placement and pipeline easements. Since the new GWUI source is sited to be located on Naraghi/Mission Ranches land, SLCWD will need to obtain an easement to drill on the land, and acquire the land if an acceptable source is found. Based on the opinion of Naraghi/Mission Ranches regarding the interim well, it is likely that they will not be in favor of a new GWUI well on their land and eminent domain proceedings will be required. There is

also a strong possibility that SLCWD will not be able to negotiate an easement for drilling test wells.

As noted previously, it is possible that the well could be sited approximately 200 feet closer to the Salinas River on land owned by Anne Marie Rosen (see Figure 1), which could be less contentious. However, the opinion of the landowner is unknown, and there is no water quality information available for this site.

The yard piping that connects the well to the treatment facilities will also be on Naraghi/Mission Ranches property, and a maintenance easement and construction agreement will be necessary for the landowner. Based on the opinion of Naraghi/Mission Ranches regarding the interim well, it is likely that they will not be agreeable to any construction activities that involve the connection of a well sited on their property. It is unknown at this stage in project design if the other landowners would be agreeable to terms and conditions of a maintenance easement and construction agreement.

Additionally, since Alternative 3 assumes that the well is a GWUI source, there may be water rights issues should it be determined that the source is capturing appropriated water. Resolution of possible water rights issues could require significant effort. Additionally, the County and SLCWD may find it undesirable to deal with water rights issues. Lastly, should an adequate new source be demonstrated, the well will need to be approved by Monterey County EHB, the water supply permit amended to include the source, and the appropriate environmental review work completed.

3.3.3 Alternative 3: Operational Feasibility

There will be additional water quality requirements for a GWUI source, and these requirements will increase the operational responsibilities at the treatment facilities. O&M responsibilities and associated costs will increase due to more frequent water quality monitoring, additional disinfectant requirements, energy requirements, and the potential for an operator to be onsite more regularly.

However, the recommended treatment technology, ultra/micro-filtration, was selected since it is fully automated and requires less frequent maintenance than direct filtration. Membrane treatment will minimize additional operator responsibilities and media replacement costs in comparison to the alternative technologies available.

3.3.4 Alternative 3: Political Feasibility

The probable opinions of local stakeholders were taken into account in evaluating the political feasibility of Alternative 3. Table 14 includes the potential challenges based on conversations and written documentation of stakeholder concerns.

Table 14 Alternative 3 Stakeholder Challenges

Stakeholder	Potential Stakeholder Challenges
SLCWD	Alternative 3 would be favorable to SLCWD as the district could continue community autonomy and not consolidate with a nearby water district. However, since operational costs, and therefore increased water rates, are major considerations for SLCWD, Alternative 3 would also be unfavorable due to the added O&M costs and the anticipation of increased water rates.
Naraghi/ Mission Ranches	It is anticipated that Naraghi will not grant the County easement to drill on their land to establish a new GWUI source, and will not allow SLCWD to purchase the land should an adequate source be established. Eminent domain proceedings are likely for acquisition of any parcels owned by Naraghi.
Other Local Landowners	There may be necessary negotiations regarding land acquisition and maintenance easements with local landowners for the construction of the new transmission line. Additionally, there may be negotiations necessary regarding local water rights.

3.3.5 Alternative 3: Economic Feasibility

The engineer's opinion of probable capital cost for Alternative 3 is presented in Table 15. O&M cost estimates are included in Table 16. The cost of land acquisition and obtaining property rights (included in line item 12) can be highly variable, however, it is assumed that Naraghi is unwilling to sell and eminent domain proceedings are necessary. Legal fees associated with eminent domain proceedings are assumed to be substantial based on preliminary conversations and the political climate.

The existing SDWSRF grant will cover the cost to design new infrastructure (line item 11). Additional funding could cover the full capital costs of new infrastructure (line item 10). The capital cost of this alternative is dependent upon the degree of treatment required and length of the new transmission main. More detailed costs can be determined after test wells have been drilled and the location of the new transmission line connection is established.

The O&M costs presented in Table 16 will be included as part of SLCWD's annual operating budget and need to be covered by the customer rates. Assuming that SLCWD customer

base remains constant, the monthly bill will increase to $80, approximately 15% more than the current average monthly bill.

Table 15 Alternative 3, Engineer's Opinion of Probable Capital Cost

Item	Description	Cost ($)
1	Drilling 3 Exploratory Wells	$60,000
2	Site work and yard piping	$100,000
3	Packaged MF/UF Membrane Treatment	$250,000[63]
4	Membranes Backwash/Cleaning Facilities	$100,000
5	Chemical Treatment	$50,000
6	New Building	$70,000
7	Electrical	$70,000
8	Transmission Line	$600,000
9	Provision for PG&E service	$100,000
10	***Subtotal: Construction Cost***	***$1,400,000***
11	**Engineering** (20% of Construction Cost)	$280,000
12	**Legal and Administrative Fees** Land Acquisition, Legal Negotiations, Environmental Review (Based on anticipated challenges)	$1,500,000
13	**Contingency** (20% of Construction Cost)	$280,000
14	**Total Cost**	**3,460,000**

Table 16 Alternative 3, Engineer's Opinion of Probable O&M Cost & Customer Rates

Yearly Production (x1,000 gallons)	Unit Cost (/1,000 gallons)	Annual O&M Cost ($)
14,235	$2	$28,470[64]
	Baseline Annual O&M Expenditures	$52,972
	Alternative 3: Estimated O&M Expenditures	**$81,442**
	Alternative 3: Estimated Annual Cost per Connection	**$958**
	Alternative 3: Estimated Monthly Bill per Connection	**$80**

[63] The cost estimate for membrane treatment will vary depending upon waste discharge requirements. It is assumed that the liquid waste produced will be stored on-site in a holding tank and hauled to the San Lucas wastewater treatment facility at regular intervals. Since UF/MF backwash water is not as concentrated as RO waste stream, wastewater treatment plants usually accept the waste stream. If effluent transport is cost-prohibitive, or the wastewater facility will not accept the waste stream, an evaporation pond could be another option, albeit at higher capital and legal costs.

[64] This O&M cost item includes disposal of wastes from the Packaged MF/UF Membrane Treatment unit. Disposal would be by trucking off of wastes to the San Lucas wastewater treatment facility.

3.3.6 Alternative 3: Long-term Sustainability

There is a strong possibility that Alternative 3 could be a sustainable long-term solution for SLCWD. Should a high quality source of adequate capacity be demonstrated by exploratory drilling, and an agreement can be reached between SLCWD and the landowner, a new well owned and operated by SLCWD would provide a sustainable source for the utility.

However, as is the case with wells located in agricultural regions, there is a possibility of water quality degradation in the future due to neighboring agricultural practices or existing contaminant plumes, even if the new source has high quality water when drilled. Additionally, there is also a possibility of declining water levels and production capacity due to drought, increased agricultural well production in the vicinity, or other unforeseen conditions.

3.3.7 Alternative 3: Implementation Schedule

The implementation schedule for Alternative 3 includes drilling test well(s), permitting, environmental review, water rights negotiations, constructing the well, land acquisition, installation of treatment facilities, and installation of pipeline infrastructure.

Acquiring additional land for the new well site will require negotiations with Naraghi and the possibility of eminent domain proceedings. It is estimated that land acquisition, if possible, will take approximately 12 to 18 months. Environmental review and potential water rights negotiations could also take a significant amount of time, and it may not be politically or financially effective for this task to be done in parallel with the acquisition of additional land. It is estimated that environmental review and water rights negotiations will take approximately 12 months. Design and construction of the new well and conveyance lines will take approximately 18 months, however, design of the system can be completed in parallel with environmental review and water rights negotiations.

It is estimated that the implementation schedule for Alternative 3 would be approximately 3 to 4 years from the completion of this Feasibility Study.

3.4 ALTERNATIVE 4: WATER IMPORTATION FROM KING CITY

Alternative 4 consists of constructing a pipeline from the King City Water System (King City), owned and operated by Cal Water, to the SLCWD water system, and executing an importation agreement with Cal Water for the purchase of bulk water. The proposed new pipeline would tie into the Cal Water system on the east side of King City, and deliver water directly to the SLCWD water distribution tank. The pipeline is anticipated to be approximately

7.8 miles long, and run along the eastern side of Highway 101 and the railroad line, as shown on Figure 9.

Cal Water representatives with technical knowledge of the King City Water System provided information regarding the proposed connection to the system, and the following assumptions made regarding the preliminary design of Alternative 4:

- The proposed pipeline would connect to the King City water system on Lonoak Road, near the intersection of 1st Street, east of the railroad tracks on the east side of King City, as shown on Figure 9;[65]
- The pipeline would travel along the eastern side of the railroad line, outside of the designated railroad easement, as shown on Figure 9;[66]
- The pipeline will likely cross multiple private properties and easements for construction and maintenance will be required;
- The total head at the proposed King City tie-in is approximately 460 feet msl;[67]
- The required flow to be delivered to SLCWD was estimated at a maximum of 91.5 gpm, which is based on the MDD of the existing population, the potential of a future 33-unit housing development, and a safety factor of 1.5 for peak demands;
- The proposed pipeline does not cross Highway 101 or the railroad tracks;
- The proposed pipeline does not cross San Lorenzo Creek;
- The pipeline delivering water will be 4 inches in diameter;
- One booster pump station with chlorination injection will be installed along the pipeline, near the point of connection, to maintain pressure and chlorine residual;[68]
- The master meter will be located just downstream of the connection point to the Cal Water King City water system; and
- The water delivered to SLCWD would be under a bulk water service agreement, and the O&M associated with the proposed pipeline would be the responsibility of SLCWD.

Conversations with Cal Water management have indicated that executing a bulk water service agreement is not common practice for the utility, however, management is willing to discuss this with SLCWD should the alternative be deemed feasible.[69]

[65] Location of connection point has been assumed based on communication with Cal Water technical staff. Cal Water has recently extended an 8" main to the east side of 1st Street and the railroad tracks.
[66] The pipeline alignment was established with the intention to minimize the number of railway, roadway, and creek crossings along the length of the alignment, as crossings can be expensive and time intensive. The alignment proposed may present issues in obtaining easements from landowners, however, it is assumed that the proposed alignment will minimize cost and increase the feasibility of this alternative. A second option for pipeline alignment is along Cattleman's Road and includes crossing the railroad lines twice.
[67] Based on communication with Ting He, Manager of Distribution, Engineering at Cal Water.
[68] Location of the pump station to be confirmed during pipeline design.
[69] Communication with Ms. Ting He and Mr. Shawn Heffner, Director of Corporate Development and Real Estate at Cal Water.

3.4.1 Alternative 4: Physical Feasibility

The physical feasibility of Alternative 4 is mostly subject to the physical obstacles present along the pipeline alignment. Although a preliminary alignment has been developed

(Figure 9), it is based on several general design assumptions that may change should more accurate information become available. Currently, the pipeline does not require any major railroad, roadway, or creek crossings. However, the pipeline will be directly along the railroad easement, and potentially cross several private landowners properties. Additional information is required regarding existing easements along the proposed alignment in order to further evaluate the feasibility.

If the construction of a new pipeline requires multiple roadway, railroad, or stream crossings, Alternative 4 will be less physically feasible due to acquisition of permits and construction requirements.

The pipeline will require one in-line booster pump and disinfection station to maintain acceptable pressure, flow, and chlorine levels. The necessity of a pump station will influence the design of the pipeline, however, it is not anticipated to present substantial physical challenges in implementing Alternative 4.

No additional treatment would be required in order to meet the RWQCB TDS requirements for the WWTP effluent discharge, as it is estimated that the potable water source has an average TDS of 347 mg/L, with a TDS range of 320-470 mg/L[70]. Based on the values established in Section 1.2.4 and the highest reported TDS concentration (470 mg/L), the projected TDS concentration of the effluent for Alternative 4 is estimated at 1,220 mg/L in the summer season, and 820 mg/L in the winter season. Additional research should be conducted to more accurately estimate the TDS increase due to wastewater inputs from the community of San Lucas and evaporation in the WWTP settling ponds; however, the data available indicates that the WWTP effluent TDS concentrations would remain below the RWQCB discharge limit.

Additionally, the length of the pipeline, and therefore the residence time of the water in the pipeline, will potentially lead to the formation of disinfection byproducts (DBPs). The location of in-line booster pump and disinfection stations must be designed to minimize the potential for DBP formation. The water source for the King City system has low total organic carbon (TOC), and therefore the distribution system exhibits very low DBP formation. Communication with Cal Water staff indicates that there would be no expected DBP formation in the SLCWD distribution system if the pipeline were constructed. Should the

[70] King City Consumer Confidence Report, Cal Water, 2013

pipeline be constructed, the water would be tested at several points in the SLCWD distribution system for DBPs, and treatment would be added if necessary. Cal Water indicates that this is unlikely.[71]

3.4.2 Alternative 4: Administrative and Legal Feasibility

Alternative 4 presents legal and administrative challenges regarding negotiation of water rates with Cal Water, land ownership, easements, and environmental review. In order to arrange for bulk water delivery from Cal Water, SLCWD will need to negotiate an agreement with Cal Water regarding bulk water rates and delineation of O&M responsibilities. In preliminary discussions, Cal Water indicated that the water rates would be based on their approved residential water rate schedule[72] and the O&M of the pipeline would to be the responsibility of SLCWD in the case of importation.[73]

The new pipeline will likely need to undergo extensive environmental review due to its length and proximity to transportation routes and water bodies. Additionally, if necessary, permits will need to be acquired for railway and road crossings from the appropriate transportation utilities.

3.4.3 Operational Feasibility

Constructing the pipeline for importation of water will require one in-line booster pump and disinfection station. The booster pump and disinfection station will require additional O&M to maintain appropriate pressure in the pipeline and chlorine residual in the SLCWD water system. Cal Water has indicated that the O&M related to the pump station and new pipeline would be SLCWD's responsibility.

O&M responsibilities and associated costs will increase due to more frequent water quality monitoring, additional disinfectant requirements, energy requirements due to pumping, and the potential for an operator to be onsite more regularly than required for the current SLCWD water system.

3.4.4 Political Feasibility

The probable opinions of local stakeholders were taken into account in evaluating the political feasibility of Alternative 4. Table 17 includes the potential challenges based on conversations and written documentation of stakeholder concerns.

[71] Email Communication with Erin McCauley, Cal Water, Water Quality Division
[72] Schedule NO. KC-1-R, King City Tariff Area, Residential Metered Service, effective 8/29/14.
[73] Communication with Ms. Ting He and Shawn Heffner of Cal Water.

Table 17 Alternative 4 Stakeholder Challenges

Stakeholder	Potential Stakeholder Challenges
SLCWD	Alternative 4 could be favorable to SLCWD due to continued community autonomy; however, SLCWD's water rates would be subject to Cal Waters Water service rates and may be higher than what is currently charged to the community. Additionally, the O&M of the pipeline would be SLCWD's responsibility, which would also increase the operational costs and increase the customer water rates. SLCWD staff has indicated that this is not the preferred option for SLCWD.[74]
Cal Water (King City)	Cal Water has indicated that they are willing to explore the possibility of this connection, but has not made a commitment for the O&M for the pipeline. Cal Water staff indicated that importation of water to SLCWD through a bulk water service agreement would be preferred to consolidation by the utility.[75]
Other Local Landowners	There will need to be negotiations with local landowners regarding any necessary land acquisition and maintenance easements along the length of the pipeline.
Transportation Authorities	Although there are currently no major road or railway crossings along the pipeline alignment, the possibility of obtaining railroad and roadway crossing permits needs to be explored with the appropriate jurisdictions to understand the feasibility and cost of this effort if necessary.

3.4.5 Alternative 4: Economic Feasibility

The engineer's opinion of probable capital cost for Alternative 4 is presented in Table 18. O&M costs are included in Table 19. The cost of negotiations for land easements (included as part of line item 7) can be highly variable, however, it is assumed that the landowners along the pipeline's alignment will be agreeable to easements, and negotiations will not be contentious.

[74] Communication with Susan Madson, SLCWD.
[75] Communication with Ting He and Shawn Heffner, Cal Water.

Table 18 Alternative 4, Engineer's Opinion of Probable Capital Cost

Item	Description	Cost ($)
1	Transmission Line (41,200 feet of 4-inch diameter PVC, $120/ft)	$4,944,000
2	Pump Station with Chlorination Unit	$100,000
3	Provision for PG&E electric power service and SCADA	$40,000
4	***Subtotal 1: Construction Cost***	***5,084,000***
5	**Engineering** (10% of Construction Cost)	$508,400
6	**Connection Fee**[76]	$10,000
7	**Legal and Administrative Fees** Land Acquisition, Property Rights, Environmental Review	$600,000
8	**Contingency** (20% of Construction Cost)	$1,016,800
9	**Total Cost**	**$7,219,200**

The existing SDWSRF grant will partially cover the cost to design new infrastructure (line item 5). Additional funding could cover the full capital costs of new infrastructure (line item 4); however, the capital construction cost of this alternative is estimated to be significantly higher than the other alternatives, and it may be difficult for the entire construction to be funded through grants. The capital cost of this alternative is dependent upon the size of the pipeline and any necessary crossings that require permits and specialized pipeline construction techniques. More detailed costs can be determined after additional information is obtained from landowners along the pipeline alignment.

The O&M costs presented in Table 19 will be included as part of SLCWD's annual operating budget and need to be covered by the customer rates. In addition to the operational requirements downstream of the connection to Cal Water, the customers will be responsible for paying the monthly service fees and residential water rates set by Cal Water. Cal Water has indicated that the water rates would be based on their approved residential water rate schedule.[77] Assuming that SLCWD customer base remains constant, monthly bills will increase to approximately $122. Based on discussions with SLCWD staff, water at this rate may not be affordable for SLCWD customers.

[76] Connection fee based on a 4" meter connection, as per conversation with Ting He.
[77] Schedule NO. KC-1-R, King City Tariff Area, Residential Metered Service, effective 8/29/14

Table 19 Alternative 4, Engineer's Opinion of Probable O&M Cost and Customer Rates

	Yearly Production (x1,000 gallons)	Unit Cost (/1,000 gallons)	Annual Cost ($)
O&M	14,235	$0.24	$3,416
Water Rate[78]	14,235	$4.34	$61,804
Annual Fee for Water Service (4-inch meter)[79]			$6,032
Baseline Annual O&M Expenditures			$52,972
Alternative 4: Estimated O&M Expenditures			**$124,224**
Alternative 4: Estimated Annual Cost per Connection			**$1,461**
Alternative 4: Estimated Monthly Bill per Connection			**$122**

3.4.6 Alternative 4: Long-term Sustainability

There is a high possibility that Alternative 4 would be a sustainable long-term water supply solution for SLCWD. Should the pipeline be constructed, and the water delivered meets water quality standards, SLCWD would be connected to a stable, high quality water source. Additionally, communications with Cal Water staff and review of the King City 2010 Urban Water Master Plan indicate that there is enough capacity to serve the San Lucas community now and in the near future.[80]

Conversely, the increased cost of water, could ultimately impact the customers to a degree that they would consider relocating outside of the SLCWD service area. If the community is not able to afford the monthly cost of water presented above ($122/month), which has been indicated by SLCWD staff, Alternative 4 should be considered less sustainable due to customer relocation.

3.4.7 Alternative 4: Implementation Schedule

The implementation schedule for Alternative 4 includes the acquisition of property easements, design of the pipeline, permitting, environmental review, construction of the pipeline, and installation of treatment facilities.

[78] Based on Cal Water King City residential water rates, Schedule NO. KC-1-R, King City Tariff Area, Residential Metered Service, effective 8/29/14. The highest monthly water rate was assumed ($4.2376 per 100 cubic feet).
[79] Based on Cal Water King City monthly service meter fees, Schedule NO. KC-1-R, King City Tariff Area, Residential Metered Service, effective 8/29/14.
[80] King City 2010 Urban Water Master Plan.

Acquiring easements along the pipeline will require negotiations with local landowners for easements along the pipeline alignment, and legal proceedings are possible. It is estimated that property negotiations will take approximately 6 months. Environmental review could also take a significant amount of time, and should be initiated after the appropriate easements have been obtained, as the outcome could impact the alignment of the pipeline. It is estimated that environmental review will take approximately 18 months. Design and construction of the new pipeline and related facilities will take approximately 30 months, however, design of the system can be completed in parallel with environmental review.

It is estimated that the implementation schedule for Alternative 4 would be approximately 4 to 5 years from the completion of this Feasibility Study.

3.5 ALTERNATIVE 5: CONSOLIDATION WITH KING CITY

Alternative 5 consists of constructing a pipeline from Cal Water King City to the SLCWD water system and executing a consolidation and mainline extension agreement with Cal Water. For this alternative, the SLCWD would become part of the Cal Water King City system. The proposed new pipeline would connect to the Cal Water system on the east side of King City, and deliver water directly to the SLCWD water distribution tank. The pipeline is anticipated to be approximately 7.8 miles long, and run along the eastern side of Highway 101 and the railroad line, as shown on Figure 9.

Cal Water representatives with technical knowledge of the King City Water System provided information regarding the proposed connection to the system, and the following assumptions made regarding the preliminary design of Alternative 4:

- The proposed pipeline could connect to the King City water system on Lonoak Road, near the intersection of 1st, east of the railroad tracks on the east side of King City, as shown on Figure 9;[81]
- The pipeline will travel along the eastern side of the railroad line, outside of the designated railroad easement, as shown on Figure 9;[82]
- The pipeline will likely cross multiple private properties and easements for construction and maintenance will be required;

[81] Location of connection point has been assumed based on communication with Cal Water technical staff. Cal Water has recently extended an 8" main to the east side of 1st Street and the railroad tracks.
[82] The pipeline alignment was established with the intention to minimize the number of railway, roadway, and creek crossings along the length of the alignment, as crossings can be expensive and time intensive. The alignment proposed may present issues in obtaining easements from landowners, however, it is assumed that the proposed alignment will minimize cost and increase the feasibility of this alternative. A second option for pipeline alignment is along Cattleman's Road and includes crossing the railroad lines twice.

- The total head at the proposed King City tie-in is approximately 460 feet;[83]
- The required flow to be delivered to SLCWD was estimated at a maximum of 91.5 gpm, which is based on the MDD of the existing population, the potential of a future 33-unit housing development, and a safety factor of 1.5 for peak demands;
- The proposed pipeline does not cross Highway 101 or the railroad tracks;
- The proposed pipeline does not cross the San Lorenzo Creek;
- The pipeline delivering water will be 4 inches in diameter;
- One booster pump station with chlorination injection will be installed along the pipeline, near the point of connection, to maintain pressure and chlorine residual[84];
- Consolidation is dependent upon Cal Water inspecting the SLCWD water system facilities and determining that the facilities meet the utility's standards; and
- SLCWD would no longer be an autonomous water district, and the O&M associated with the proposed pipeline and existing SLCWD water facilities would be the responsibility of Cal Water.

Conversations with Cal Water management have indicated that consolidating with SLCWD is not a preferred option with respect to Cal Water, as this would result in Cal Water operators traveling 8 miles from the King City system to take meter readings and maintenance the distribution system. However, management is willing to discuss this with SLCWD should the alternative be deemed feasible. [85]

3.5.1 Alternative 5: Physical Feasibility

The physical feasibility of Alternative 5 is mostly reliant upon the physical obstacles present along the pipeline alignment. Although a preliminary alignment has been established (Figure 9), it is based on several general design assumptions that may change should more accurate information become available. Currently, the pipeline does not require any major railroad, roadway, or creek crossings. However, the pipeline will be directly along the railroad easement, and potentially cross several private landowners' properties. Additional information is required regarding existing easements along the proposed alignment in order to further evaluate the feasibility.

If the construction of a new pipeline requires multiple roadway, railroad, or stream crossings, Alternative 5 will be less physically feasible due to acquisition of permits and construction requirements.

The pipeline will require one in-line booster pump and disinfection station to maintain acceptable pressure, flow, and chlorine levels. The necessity of a pump station will influence

[83] Based on communication with Ting He, Engineer at Cal Water.
[84] Location of the pump station to be confirmed during pipeline design.
[85] Communication with Ting He and Shawn Heffner, Cal Water.

the design of the pipeline, however, it is not anticipated to present substantial physical challenges in implementing Alternative 5.

No additional treatment would be required in order to meet the RWQCB TDS requirements for the WWTP effluent discharge, as it is estimated that the potable water source has an average TDS of 347 mg/L, with a TDS range of 320-470 mg/L[86]. Based on the values established in Section 1.2.4 and the highest reported TDS concentration (470 mg/L), the projected TDS concentration of the WWTP effluent for Alternative 5 is estimated at 1,220 mg/L in the summer season, and 820 mg/L in the winter season. Additional research should be conducted to more accurately estimate the TDS increase due to wastewater inputs from the community of San Lucas and evaporation in the settling ponds; however, the data available indicates that TDS concentrations for the WWTP effluent would remain below the RWQCB discharge limit.

Additionally, the length of the pipeline, and therefore the residence time of the water in the pipeline, will potentially lead to the formation of disinfection byproducts. The location of in-line booster pump and disinfection stations must be designed to minimize the potential of disinfection byproduct formation. The water source for the King City system has low TOC, and therefore the distribution system exhibits very low DBP formation. Communication with Cal Water staff indicates that there would be no expected DBP formation in the SLCWD distribution system if the pipeline were constructed. Should the pipeline be constructed, the water would be tested at several points in the SLCWD distribution system for DBPs, and treatment would be added if necessary. Cal Water indicates that this is unlikely.[87]

3.5.2 Alternative 5: Administrative and Legal Feasibility

Alternative 5 presents legal and administrative challenges regarding negotiation of consolidation agreement, negotiation of water rates, land ownership, easements, and environmental review. SLCWD/Monterey County will need to negotiate an agreement with Cal Water regarding consolidation and O&M of the pipeline. Cal Water indicated that the O&M of the pipeline would to be the responsibility of SLCWD for the importation of water[88]; however, if SLCWD consolidated with Cal Water, (as presented in this Alternative) the pipeline would become the legal responsibility of Cal Water.

The new pipeline will likely need to undergo extensive environmental review due to its length and proximity to transportation routes and water bodies. Additionally, if necessary, permits

[86] King City Consumer Confidence Report, Cal Water, 2013
[87] Email Communication with Erin McCauley, Cal Water, Water Quality Division
[88] Communication with Ting He and Shawn Heffner, Cal Water.

will need to be acquired for railway and road crossings from the appropriate transportation utilities.

3.5.3 Alternative 5: Operational Feasibility

Constructing the pipeline will require one in-line booster pump and disinfection station. The booster pump and disinfection station will require additional O&M to maintain appropriate pressure in the pipeline and chlorine residual in the SLCWD water system. In the event of consolidation, the operation of the pump station will be the responsibility of Cal Water.

Cal Water will likely evaluate how the increase in operational requirements will impact their annual O&M expenses and the impact may be reflected in the water rates established for the SLCWD customers.

3.5.4 Alternative 5: Political Feasibility

The probable opinions of local stakeholders were taken into account in evaluating the political feasibility of Alternative 5. Table 20 includes the potential challenges based on conversations and written documentation of stakeholder concerns.

Table 20 Alternative 5 Stakeholder Challenges

Stakeholder	Potential Stakeholder Challenges
SLCWD	Alternative 5 would discontinue community autonomy, and SLCWD's water rates would be based on Cal Water's water rate schedule. SLCWD staff has indicated that this is not the preferred option for SLCWD.[89]
Cal Water (King City)	Cal Water has indicated that they are willing to explore the possibility of this connection, but has not made a commitment for the O&M of the pipeline. . It is possible that full consolidation with Cal Water, including Cal Water taking O&M responsibility for the pipeline, is not an option due to a lack of interest from Cal Water. Cal Water staff also indicated that they believe this would not be the most cost-effective alternative for SLCWD.[90]
Other Local Landowners	There will need to be negotiations with local landowners regarding any necessary land acquisition and maintenance easements along the length of the pipeline.
Transportation Authorities	Although there are currently no major road or railway crossings, the possibility of obtaining railroad and roadway crossing permits needs to be explored with the appropriate jurisdictions to understand the feasibility and cost of this effort if necessary.

[89] Communication with Susan Madson, SLCWD.
[90] Communication with Ting He and Shawn Heffner, Cal Water.

3.5.5 Alternative 5: Economic Feasibility

The engineer's opinion of probable capital cost for Alternative 5 is presented in Table 21. O&M costs are included in Table 22. The cost of negotiations for land easements (line item 7) can be highly variable, however, it is assumed that the landowners along the pipeline's alignment will be agreeable to easements, and negotiations will not be contentious.

Table 21 Alternative 5, Engineer's Opinion of Probable Capital Cost

Item	Description	Cost ($)
1	Transmission Line (41,200' of 4" diameter PVC, $120/ft)	$4,944,000
2	Pump Station with Chlorination Unit	$100,000
3	Provision for PG&E Service and SCADA	$40,000
4	***Subtotal 1: Construction Cost***	***5,084,000***
5	**Engineering** (10% of Construction Cost)	$508,400
6	**Mainline Extension Fee**[91]	Unknown
7	**Legal and Administrative Fees** Land Acquisition, Property Rights, Environmental Review	$600,000
8	**Contingency** (20% of Construction Cost)	$1,016,800
9	**Total Cost**	**$7,209,200**

The existing SDWSRF grant will partially cover the cost to design new infrastructure (line item 5). Additional funding could cover the full capital costs of new infrastructure (line item 6). However, the capital construction cost of this alternative is estimated to be significantly higher than the other alternatives, and it may be difficult for the entire construction to be funded through grants. The capital cost of this alternative is dependent upon the size of the pipeline and any necessary crossings that require permits and specialized pipeline construction techniques. More detailed costs can be determined after additional information is obtained from landowners along the pipeline alignment.

[91] A mainline extension fee to be paid to Cal Water is probable, however the cost is currently known.

O&M costs for Alternative 5 would be the responsibility of Cal Water; however, water rates would still increase due to additional O&M requirements, and Cal Water would dictate the water rate increases, as the SLCWD would no longer be autonomous. The cost to SLCWD customers was estimated from the monthly service fees and residential water rates set by Cal Water. Based on the information available from Cal Water regarding residential rates, the monthly bills would increase to $92, approximately 30% more than current average monthly bill. Based on discussions with SLCWD staff, water at this rate may not be affordable for SLCWD customers.

Table 22 Alternative 5, Engineer's Opinion of Probable Customer Rates

	Annual Usage per Connection (x1,000 gallons)	Unit Cost (/1,000 gallons)	Annual Cost ($)
Water Rate[92]	167	$3.36	$561.12
Annual Fee for Water Service (5/8" x3/4" meter)[93]			$241.32
Additional Monthly Cost to SLCWD due to additional O&M for Cal Water			$300[94]
Alternative 5: Estimated Annual Cost per Connection			**$1102**
Alternative 5: Estimated Monthly Bill per Connection			**$92**

3.5.6 Alternative 5: Long-term Sustainability

There is a high possibility that Alternative 5 would be a sustainable long-term water supply solution for SLCWD. Should the pipeline be constructed, and the water delivered meets water quality standards, SLCWD would be connected to a stable, high quality water source. Additionally, communications with Cal Water staff and review of the King City 2010 Urban Water Master Plan indicate that there is enough capacity to serve the San Lucas community now and in the foreseeable future.[95] Additionally, the consolidation would reduce the work of

[92] Based on Cal Water King City residential water rates, Schedule NO. KC-1-R, King City Tariff Area, Residential Metered Service, effective 8/29/14. The lowest monthly water rate was assumed ($2.5169 per 100 cubic feet).
[93] Based on Cal Water King City monthly service meter fees, Schedule NO. KC-1-R, King City Tariff Area, Residential Metered Service, effective 8/29/14
[94] Annual O&M expenses for the pipeline and the transmission/distribution system will be rolled into the SLCWD water rates and determined by Cal Water. The additional cost per customer was determined to be approximately $300.
[95] King City 2010 Urban Water Master Plan.

the EHB in that oversight of the SLCWD as a specific water-supply entity would no longer be required.

Conversely, the increased cost of water could ultimately impact the customers to a degree that they would consider relocating outside of the SLCWD service area. If the community is not able to afford the monthly cost of water presented above ($92/month), which has been indicated by SLCWD staff, Alternative 5 should be considered less sustainable due to customer relocation. Relative to Alternative 4, importation from Cal Water, consolidation with Cal Water is more sustainable due to the lower anticipated monthly bills.

3.5.7 Alternative 5: Implementation Schedule

The implementation schedule for Alternative 5 includes the acquisition of property easements, design of the pipeline, permitting, environmental review, construction of the pipeline, and installation of treatment facilities.

Acquiring easements along the pipeline will require negotiations with local landowners for easements along the pipeline alignment, and legal proceedings are possible. It is estimated that property negotiations will take approximately 6 months. Environmental review could also take a significant amount of time, and should be initiated after the appropriate easements have been obtained, as the outcome could impact the alignment of the pipeline. It is estimated that environmental review will take approximately 18 months. Design and construction of the new pipeline will take approximately 30 months, however, design of the system can be completed in parallel with environmental review and water rights negotiations.

It is estimated that the implementation schedule for Alternative 5 would be approximately 4 to 5 years from the completion of the Feasibility Study.

3.6 SUMMARY OF ALTERNATIVES

The benefits and challenges for the five alternatives are summarized in Table 23. Overall costs are also shown.

Table 23 Summary of Alternatives

Alternative	Benefits	Challenges	Estimated Monthly Water Rate	Annual System O&M Cost	Capital Cost	Schedule to Implement
Alternative 1: Treatment of Existing Source	• Utilizes existing SLCWD Well #2, which SLCWD currently owns and operates. • Moderate estimated capital costs: approx. $3.5M	• Additional land must be acquired for waste discharge evaporation pond, likely requiring eminent domain. • Water quality is very low and could degrade in the future. • High estimated O&M costs. • High estimated water rates.	$163	$167,000	$3.5 million	2 to 3 years
Alternative 2: New Groundwater Source (Mission Ranches Well)	• Schedule of implementation will be short if stakeholder negotiations are successful. • Source construction and permitting have been initiated. • Based on initial sampling, no additional treatment facilities will be necessary. • Low estimated capital costs. • Low/comparable estimated O&M costs. • Low/comparable estimated water rates.	• Naraghi/Mission Ranches have legally stated that this source is not intended to be a permanent replacement source for SLCWD # 2 well. • Eminent domain proceedings are anticipated. • Possibility of TDS treatment required for MCL compliance and RWQCB wastewater discharge compliance, which would increase capital and O&M costs.	$63 $136 if TDS treatment required	$65,000 $138,000 if TDS treatment required	$1.0 Million $2.55 Million if TDS treatment required	2 years
Alternative 3: New GWUI Source	• Moderate estimated capital costs: approx. $3.5M • Moderate estimated O&M costs: approx. $81K • Moderate water rates: approx. $80/month	• It is unlikely that SLCWD will be granted access to drill test wells on Naraghi's property. • There is a high risk that an adequate source of good quality water will not be found. • Eminent domain proceedings are anticipated for any potential well site. • Potential water rights negotiations.	$80	$81,000	$3.5 million	3 to 4 years
Alternative 4: Water Importation from King City	• No anticipated property negotiations or substantial legal proceedings. • High ranking for long-term sustainability.	• Continues SLCWD autonomy. • High estimated capital costs. • High estimated O&M costs. • High estimated water rates. • Longer implementation schedule.	$122	$124,000	$7.2 million	4 to 5 years
Alternative 5: Consolidation with King City	• No anticipated property negotiations or substantial legal proceedings. • High ranking for long-term sustainability.	• Discontinues SLCWD autonomy. • High estimated capital costs. • High estimated water rates. • Longer implementation schedule. • Cal Water does not favor consolidation with SLCWD, mainly due to a lack of interest in maintaining the pipeline and SLCWD distribution system.	$92	Unknown, based on Cal Water budget decisions	$7.2 million	4 to 5 years

4.0 COMPARISON OF ALTERNATIVES

In order to select the preferred alternative for the San Lucas Water Supply Project, the alternatives were evaluated based on the feasibility criteria described in Section 3. The following report sections detail the relative ranking of the feasibility criteria and the overall comparison of the five (5) alternatives.

4.1 WEIGHTED FEASIBILITY CRITERIA

The feasibility criteria have been assigned a weighted ranking based on the importance of the criteria to the overall success of the Project. This method was selected due to the apparent differential in the level of importance between the seven (7) feasibility categories. The feasibility criteria were ranked on a scale of one (1) through five (5) based on the understanding of how each category will influence the overall success of the Project. No categories were ranked below a value of three (3) based on the relative importance of each category. Table 24 includes the weighted ranking values assigned to each of the feasibility criteria and the associated justification for the purposes of this analysis.

Table 24 Feasibility Criteria Weighted Ranking and Descriptions

Feasibility Criteria	Weighted Ranking	Justification
Physical Feasibility	3	The physical construction is **important** to the success of the project; however, the technical aspects of the alternatives will not inhibit the Project from being implemented.
Legal and Administrative Feasibility	4	Land acquisition and other property negotiations are **highly important** to the success of the Project, since the implementation of most alternatives is directly reliant upon constructing on land that is currently owned by other parties.
Operational Feasibility	3	The operational requirements are **important** to the success of the project; however, any changes in operations will not inhibit the Project from being implemented, and are anticipated to be manageable by trained operations staff.
Political Feasibility	4	The opinion of local stakeholders is **highly important** to the success of the project, since the implementation of most alternatives is reliant upon effective stakeholder negotiations.
Economic Feasibility (Capital)	4	The capital costs are **highly important** to the success of the project, since the project will not be completed should the capital costs be too high. However, there are grant funds that could potentially cover capital costs for the project.
Economic Feasibility (O&M)	5	The O&M costs are **critical** to the success of the project since these costs are directly related to the water rates for SLCWD customers. Grant funding will not cover O&M costs.
Long-Term Sustainability	5	Long-term sustainability is **critical** to the success of the project, as it is unlikely that the community will have the resources to improve or replace the water source should the selected alternative fail.

4.2 RANKING OF ALTERNATIVES AND COMPARISON MATRIX

The ranking of alternatives is based on the importance of the feasibility criteria to the success of the Project, as described in Section 4.1, and the relative feasibility of each category for the alternatives. Each feasibility category is evaluated for the five (5) alternatives, as detailed in Section 3, and ranked on a scale of one (1) through five (5) as to its feasibility. The descriptions of each feasibility ranking are included in Table 25.

Table 25 Feasibility Ranking Values

Value	Feasibility
1	Not Feasible
2	Feasible, with a potential implementation will be inhibited
3	Low Feasibility
4	Moderate Feasibility
5	High Feasibility

The five (5) alternatives were ranked based on their overall feasibility, taking into consideration both the impact of the feasibility categories and the specific ranking of the feasibility criteria for each alternative. The alternatives were ranked based on the information currently available for each alternative, as this is the only concrete data on which to base assumptions. Several alternatives have potential additional costs - such as capital and O&M costs for treatment units - however, these items were not included in the alternative ranking since there is no conclusive data that the treatment components will be required. The overall ranking of each alternative was determined by summing the weighted totals for each alternative, as depicted in the comparison matrix presented as Table 26.

Table 26 Alternatives Comparison Matrix*

Feasibility Category	Category Weight	Alternative 1: Treatment of Existing Source		Alternative 2: New Groundwater Source		Alternative 3: New GWUI Source		Alternative 4: Importation from Cal Water		Alternative 5: Consolidation with Cal Water	
		Rating	Score	Rating	Score	Rating	Score	Rating	Score	Rating	Score
Physical Feasibility	**3**	2	**6**	5	**15**	4	**12**	3	**9**	3	**9**
Administrative and Legal Feasibility	**4**	3	**12**	2	**8**	2	**8**	4	**16**	4	**16**
Operational Feasibility	**3**	4	**12**	5	**15**	4	**12**	4	**12**	4	**12**
Political Feasibility	**4**	2	**8**	2	**8**	2	**8**	4	**16**	4	**16**
Economic Feasibility (Capital)	**4**	3	**12**	5	**20**	3	**12**	2	**8**	2	**8**
Economic Feasibility (O&M)	**5**	2	**10**	5	**25**	4	**20**	2	**10**	3	**15**
Long-Term Sustainability	**5**	2	**10**	4	**20**	4	**20**	4	**20**	5	**25**
Total			**70**		**111**		**92**		**91**		**101**
Anticipated Schedule		2 to 3 years		2 years[96]		3 to 4 years		4 to 5 years		4 to 5 years	

Note: * Score = Rating x Category Weight

[96] Anticipated schedule could be as short as 6 months, but is unknown due to anticipated legal proceedings.

5.0 RECOMMENDED ALTERNATIVE

Based on the comparison of alternatives presented in Section 5, Alternative 2; New Groundwater Source, has been determined as the most feasible alternative to be implemented for the San Lucas Water Supply Project. The alternative was ranked and selected based on the information currently available regarding water quality and associated treatment requirements, as this is the only reported data on which to base assumptions. There is a possibility that additional treatment will be required, however this is based on assumptions that groundwater quality will deteriorate seasonally or over time.

Throughout the development and analysis of Alternative 2, it was taken into consideration that multiple stakeholders are currently opposed to transitioning the interim well to a permanent source and this may lead to legal proceedings. However, the political and legal feasibility of the alternative are only two of the seven parameters that were considered in the overall ranking. Although Alternative 2 ranked low in political and legal feasibility categories, it ranked high in all other categories. As the feasibility study is an objective analysis, the outcome represents an unbiased selected alternative.

The sections below include a brief description of the recommended alternative, associated benefits and challenges, and potential next steps.

5.1 DESCRIPTION OF RECOMMENDED ALTERNATIVE

The recommended alternative, Alternative 2, consists of transitioning the interim groundwater source established by Mission Ranches to a permanent source for SLCWD. The new groundwater well will require treatment, however, to a lesser degree than the existing well. Mission Ranches has completed test well drilling and established a viable location for the new well.

The interim well is located approximately 1200 feet west of the existing SLCWD supply well, on land owned by Naraghi and rented by Mission Ranches (Figure 7 indicates the location of Alternative 2). Implementation of Alternative 2 would likely require the following activities and facilities:

- Construction of a new well or upgrading the interim well to meet DWR standards for a potable supply well and installing/upgrading pump and controls, etc. at selected site (Mission Ranches);
- Construction of new conveyance pipeline from the wellhead to the treatment facilities, or, if needed, modifying existing piping from the interim well to meet applicable standards (Mission Ranches);
- Possible installation of reverse osmosis treatment for treatment of TDS; and
- Instrumentation and controls.

5.2 BENEFITS AND CHALLENGES

The anticipated benefits and challenges of the recommended alternative are summarized in Table 27.

Table 27 Recommended Alternative Benefits and Challenges

Benefits	Challenges
• Low capital costs for SLCWD, as the construction will be paid for by Naraghi/Mission Ranches • Low O&M costs for SLCWD. • No increase in water rates for SLCWD customers. • Based on initial sampling, no additional treatment facilities will be necessary Schedule of implementation will be short if stakeholder negotiations and/or legal proceedings are successful.	• Naraghi/Mission Ranches have legally stated that this source is not intended to be a permanent source for SLCWD.[97] • Eminent domain proceedings are anticipated. • Possibility of TDS treatment required in the future, which would increase capital and O&M costs.

5.3 NEXT STEPS FOR DESIGN AND IMPLEMENTATION

The next steps for design and implementation of the recommended alternative involve multiple local stakeholders. Should the County choose to initiate the transition of the interim well into a permanent source for SLCWD, the following next steps are recommended:

1. Presentation of Feasibility Study: Present the FS and recommended alternative to SLCWD for input from staff and Board of Directors for input on the outcome of the FS and their preferred option. It will be most beneficial if the Board of Directors is in agreement to pursue the transition of the interim source.

2. Legal Counsel: Consult with legal staff regarding the feasibility of transitioning the interim source into the long-term water supply for SLCWD, including review of all documents signed by SLCWD indicating that the well would not be used as a permanent supply. Meet with Naraghi legal counsel as necessary.

3. Stakeholder Meeting: Meet with local stakeholders critical to the success of the Project to discuss the recommended alternative.

4. Conduct Additional Water Quality Sampling: Conduct additional water quality sampling to better characterize the groundwater and understand the additional treatment facilities that are needed, if any.[98] Additional water quality sampling is required by Monterey County EHB, for use of the interim well as a source of potable supply (see Section 3.2.2 of this report). Conduct a pilot test, if necessary for reverse osmosis.

[97] License Agreement between Naraghi and San Lucas County Water District, 2014
[98] Mission Ranches may already have conducted adequate water quality sampling, however, results are not available at this time.

5. Reach Agreement with Landowner: Reach an agreement with Naraghi regarding the acquisition of the well and well site, or proceed with eminent domain.

6. Apply for Permit Amendment: If not already completed, work with EHB to obtain a permit amendment for the water system.[99]

7. Inspection of Construction: Inspect the construction of the yard piping and wellhead to ensure it meets SLCWD standards.

8. Acquisition of Assets: Acquire the assets installed by Mission Ranches through formal legal agreement.

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FIGURES

Rava, Jerry J Sr G Tr et al,
PO Box 1600, King City, CA 93930

Rosen, Anne Marie Lang Tr et al,
P.O. Box 11, Carmel Valley, CA 93924

San Bernabe Vineywards LLC,
12001 S Highway 99, Manteca, CA 95336

Giudici, Mary Jane L Tr et al,
512 Metz Rd, King City, CA 93930

Owner of Record
Not Available
(San Bernabe
Vineywards LLC,
12001 S Highway 99,
Manteca, CA 95336)

Mission Ranches, owners:
Naraghi Farms and Las Colinas Ranch

Amaral, George TR,
PO Box 3035. Gonzales, CA 93926

Rosen, Anne Marie Lang Tr et al,
P.O. Box 11, Carmel Valley, CA 93924

Long Valley Partners LP,
c/o Kenneth L Eade,
PO Box 454, San Ardo, CA

Echenique Family Limited Partnership et al,
1168 Old Peachy Canyon Rd, Paso Robles, CA 93466

Scheid Vineyards California Inc,
308 Hilltown Rd, Salinas, CA 93908

Echenique Family Limited Partnership et al,
1168 Old Peachy Canyon Rd, Paso Robles, CA 93466

San Lucas

Salinas River

Main St.

SLCWD Well #1

San Lucas Rd.

Lockwood

Oasis Rd.

Cattlemen Rd.

AR-4

AR-5

SLCWD Well #2

Well AL-5

Well AL-3

Well AL-2

Well AL-1

Well AL-4

Lockwood San Lucas Rd.

101

198

Explanation

- Parcel boundary
- Approximate extent of Salinas Riverbed
- SLCWD Well #2 — Water well (approximate location)
- SLCWD Well #1 — Abandoned water well (approximate location)

SITE LOCATION

N

0 2,000 4,000

Approximate scale in feet

REFERENCE:

Aerial photo from BING Maps, © 2014 Microsoft Corporation, © 2013 Nokia, dated August 2013.

LOCAL LANDOWNERS IN THE SAN LUCAS VICINITY
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/09/14	Project No. IR13164650
amec		Figure 1

Plot Date: 10/09/2014 2:07:50 PM, Plotted by: joanna worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig1_Landowners-Site Vicinity.dwg

Explanation

SLCWD Well #2	Water well
SLCWD Well #1	Abandoned water well
6"W	6" underground pipeline
8"W	8" underground pipeline

REFERENCE:

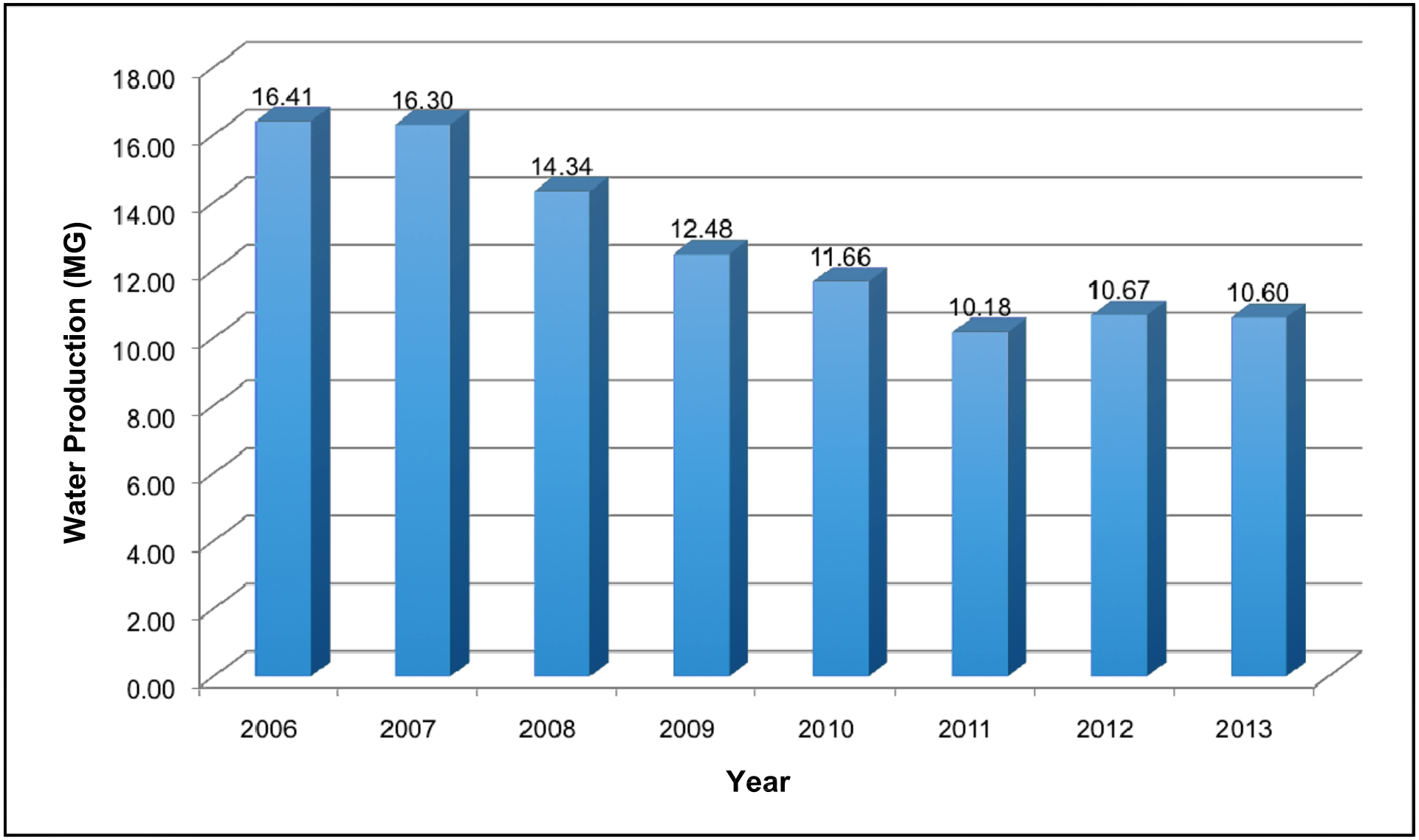
Aerial photo from BING Maps, © 2014 Microsoft Corporation, © 2013 Nokia, dated August 2013.

SITE MAP AND EXISTING WATER SYSTEM FACILITIES
San Lucas County Water District
San Lucas, California

By: YH	Date: 09/11/14	Project No. IR13164650.0002
amec		Figure 2

Plot Date: 10/08/2014 2:29:40 PM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig2_San Lucas Wtr District System Map.dwg

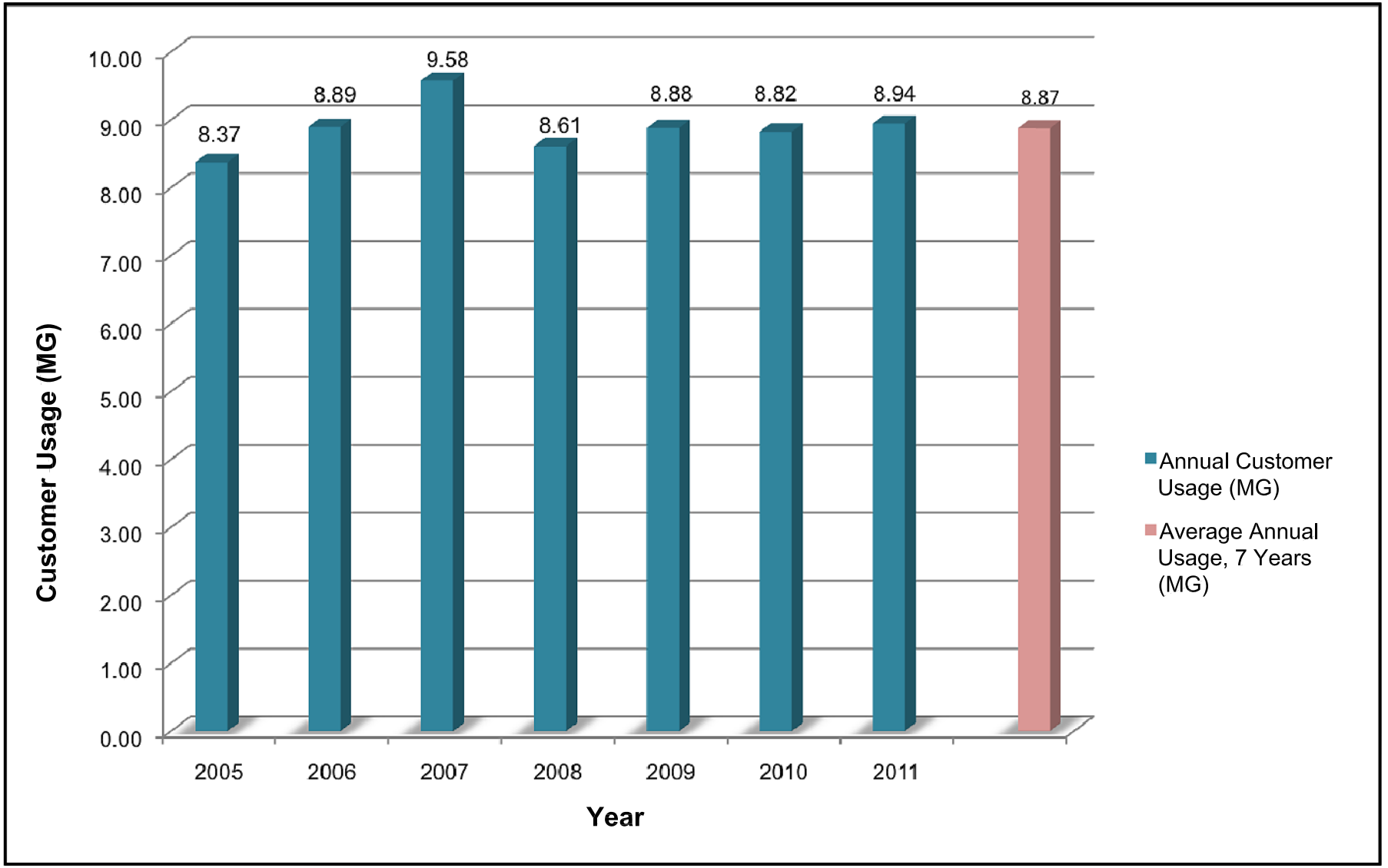
Plot Date: 10/06/2014 3:30:55 PM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig3_Wtr Production.dwg



SLCWD ANNUAL WATER PRODUCTION
(2006 - 2013)
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/03/14	Project No. IR13164650
amec		Figure 3

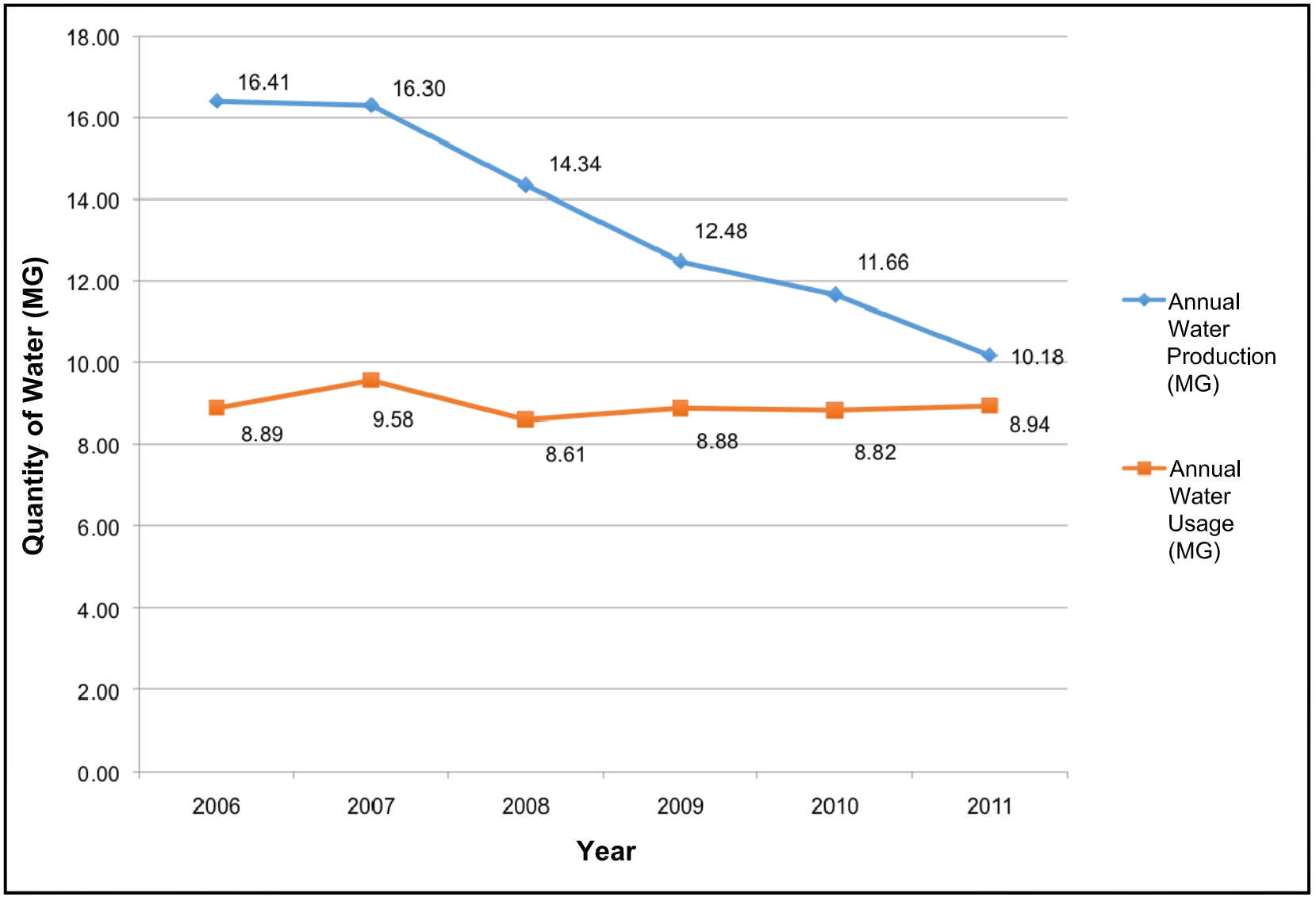
Plot Date: 10/06/2014 3:19:16 PM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig4_Wtr Usage.dwg



SLCWD ANNUAL WATER USAGE
(2005 - 2011)
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/06/14	Project No. IR13164650
amec		Figure 4

Plot Date: 10/06/2014 3:27:11 PM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig5_Production Vs Usage.dwg



SLCWD ANNUAL PRODUCTION VS. ANNUAL USAGE
(2006-2011))
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/06/14	Project No. IR13164650
amec		Figure 5

Explanation

- SLCWD Well #2 — Water well
- SLCWD Well #1 — Abandoned water well
- 6"W — 6"W — Existing 6" underground pipeline
- 8"W — Existing 8" underground pipeline
- Existing site with new reverse osmosis treatment facilities
- New site for the construction of a waste discharge evaporation pond

REFERENCE:

Aerial photo from BING Maps, © 2014 Microsoft Corporation, © 2013 Nokia, dated August 2013.

ALTERNATIVE 1: TREATMENT OF EXISTING SOURCE
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/02/14	Project No. IR13164650.0002
amec		Figure 6

Plot Date: 10/02/2014 9:53:13 AM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig6_Alt-1.dwg

Explanation

- Proposed well location (drilled by Naraghi/Mission Ranches)
- New yard piping (installed by Naraghi/Mission Ranches)
- SLCWD Well #2 — Water well
- SLCWD Well #1 — Abandoned water well
- 6"W — 6"W — Existing 6" underground pipeline
- 8"W — Existing 8" underground pipeline
- Existing treatment facilities site

REFERENCE:

Aerial photo from BING Maps, © 2014 Microsoft Corporation, © 2013 Nokia, dated August 2013.

ALTERNATIVE 2:
NEW GROUNDWATER SOURCE
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/02/14	Project No. IR13164650.0002
amec		Figure 7

Plot Date: 10/02/2014 10:14:29 AM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig7_Alt-2.dwg

Explanation

- Proposed well location
- New yard piping
- 8"W — New 8" transmission main
- SLCWD Well #2 — Water well
- SLCWD Well #1 — Abandoned water well
- 6"W — 6"W — Existing 6" underground pipeline
- 8"W — Existing 8" underground pipeline
- Existing site with new membrane treatment facilities

REFERENCE:

Aerial photo from BING Maps, © 2014 Microsoft Corporation, © 2013 Nokia, dated August 2013.

ALTERNATIVE 3:
NEW GWUI SOURCE
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/02/14	Project No. IR13164650.0002
amec		Figure 8

Plot Date: 10/02/2014 10:12:48 AM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig8_Alt-3.dwg

Explanation

- Proposed 4" transmission line
- Pump Station
- Bulk water meter
- Existing 300,000 gal. water storage tank
- SLCWD Well #1 — Abandoned water well

N

0 2,000 4,000

Approximate scale in feet

REFERENCE:

Aerial photo from BING Maps, © 2014 Microsoft Corporation, © 2013 Nokia, dated August 2013.

ALTERNATIVES 4 & 5:
NEW PIPELINE FROM CAL WATER KING CITY, FOR IMPORTATION OR CONSOLIDATION
San Lucas County Water District
San Lucas, California

By: jrw	Date: 10/06/14	Project No. IR13164650
amec		Figure 9

Plot Date: 10/06/2014 10:42:11 AM, Plotted by: joanna.worker
Drawing Path: W:\Projects\IR13164650 (San Lucas Wtr Dist)\Fig9_Alt4-5.dwg