# 1 EXECUTIVE SUMMARY

The Avila Beach Community Services District (District), in partnership with the San Miguelito Mutual Water Company (SMMWC), hired Water Systems Consulting, Inc. (WSC) to conduct this Recycled Water Facilities Planning Study (Study) to develop and evaluate alternatives for recycled water production and use in the Avila Valley within the District's Sphere of Influence (SOI).

The recycled water goals for this Study are:

1. Identify, screen and prioritize new drought-resistant recycled water supply alternatives to enhance regional water supply reliability;
2. Evaluate regional recycled water projects based on economic and non-economic factors; and
3. Identify the preferred location for a future regional wastewater treatment plant in order to address aging infrastructure and the long-term sustainability of wastewater treatment in the SOI.

The District and SMMWC each have their own wastewater treatment plants (WWTPs) that treat wastewater from their respective service areas. There have been no prior recycled water initiatives within the Avila Valley. The purpose of this Study is to evaluate feasible recycled water alternatives that would diversify the Avila Valley's water supply portfolio, provide a drought-resistant source of supply, and create opportunities for shared regional facilities and collaboration. This Study was funded in part by a grant from the California State Water Resources Control Board (SWRCB) Water Recycling Funding Program (WRFP).

## 1.1 WATER SUPPLY, WATER DEMAND, AND WASTEWATER FLOWS

The water supply, buildout water demand, and wastewater flows for the District and SMMWC are presented in Table 1-1. At full surface water allocation (i.e. State Water Project (SWP) Table A and Lopez Reservoir), each water purveyor has sufficient supply to meet buildout demands. However, full allocation is rarely achieved, especially during drought conditions. The District has purchased a 100 acre-feet per year (AFY) drought buffer to supplement their Table A SWP allocation, which has historically been delivered at approximately 62% of the maximum Table A allocation but has been as low as 5%.

**Table 1-1: Buildout Water and Wastewater Characteristics for the District and SMMWC**

| | Water Supply[1] (AFY) | Water Demand (AFY) | Wastewater Flow (gpd/AFY)[2] |
|---|---|---|---|
| **District** | 168 | 108 | 81,300/91.1 |
| **SMMWC** | 464 | 302 | 128,280/144 |
| **Total** | 632 | 410 | 209,580/235 |

Notes:
[1] Water supply includes historical groundwater production levels and full allocation of all surface water supplies
[2] gpd = gallons per day

During dry years, the District is expected to face supply deficits at buildout according to WSC's *Water Resources Analysis Technical Memorandum* (1). This deficit can be as high as 37 AFY if buildout demand does not change due to drought conditions (1). SMMWC's worst case scenario water supply was

conservatively estimated as 216.5 AFY by Garing Taylor & Associates in their *Water Resources Analysis*, indicating a potential supply shortfall of 85 AFY at buildout conditions (2). Recycled water production could provide an opportunity to meet this potential supply shortfall.

## 1.2 RECYCLED WATER MARKET AND OPPORTUNITIES

Currently, no recycled water is produced in the Study Area, which is defined as the District's SOI (Figure 1-1), therefore a new market and new recycled water customers were identified as part of this Study. Potential recycled water production was also estimated. Projected recycled water availability at buildout for the District is approximately 91 AFY (based on 2014-2016 average annual wastewater generation data available), for SMMWC is approximately 144 AFY (based on 2009-2015 average annual wastewater generation data available), and combined is approximately 235 AFY.

For the purposes of this Study, the Project Team only evaluated potential recycled water demand from customers within the District's and SMMWC's service areas that had existing irrigation meters or had large demands (i.e. the Avila Beach Golf Course). Since these customers have sufficient demand for the recycled water generated, there was no need to expand the market analysis. Additionally, by focusing on just the District's and SMMWC's service areas, interagency agreements necessary for the implementation of the recycled water alternatives can be streamlined.

Potential customers were categorized into one of four recycled water groups based on their location, in an effort to optimize distribution piping. Groups 1-4 are shown in Figure 1-2. All identified users require disinfected tertiary recycled water at a minimum, as the end uses include residential landscaping, a park, and an unrestricted access golf course. The market for potable reuse via groundwater augmentation includes all potable water customers who receive drinking water from groundwater wells (i.e. SMMWC's service area).

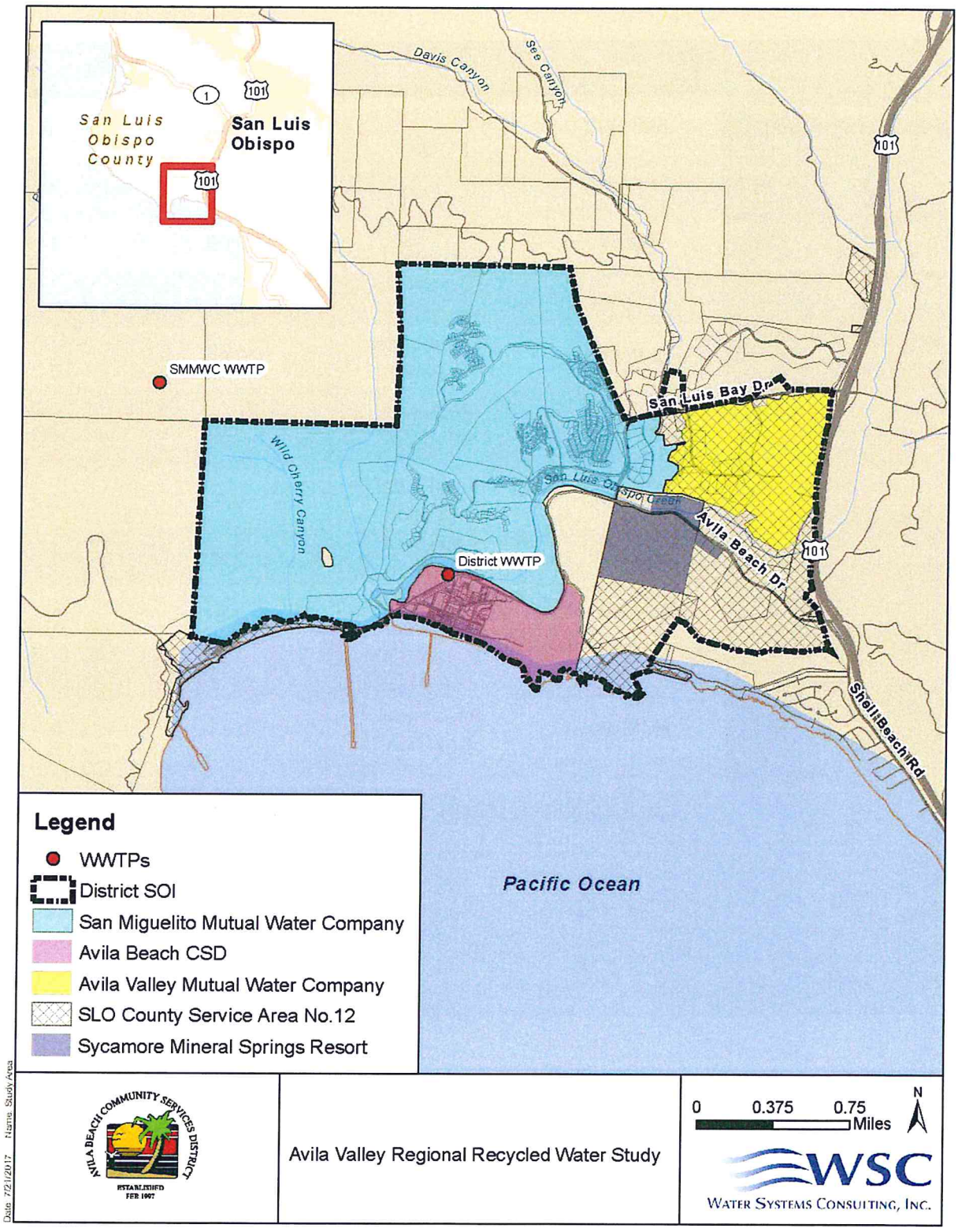


Figure 1-1: Map of the Study Area

Table 1-2. Potential Recycled Water Customers

| Potential Customer | Service Area | Use Type | Potential Demand (AFY)[1] | Recycled Water Group |
|---|---|---|---|---|
| Avila Beach Golf Course | SMMWC | Commercial Irrigation | 207 | 1 |
| San Luis Bay Inn | SMMWC | Commercial Irrigation | 5.9 | 1 |
| Avila Beach Park | District | Commercial Irrigation | 0.06 | 1 |
| Avila Village | SMMWC | Commercial Irrigation | 4.4 | 2 |
| Avila Bay Club | SMMWC | Commercial Irrigation | 0.82 | 2 |
| Pelican Point Home Owners' Association (HOA) | SMMWC | Residential Irrigation | 10.1 | 2 |
| Mallard Green HOA | SMMWC | Residential Irrigation | 3.7 | 2 |
| Indian Hill HOA | SMMWC | Residential Irrigation | 5.8 | 3 |
| Skylark HOA | SMMWC | Residential Irrigation | 2.5 | 3 |
| Kingfisher HOA | SMMWC | Residential Irrigation | 0.33 | 3 |
| Heron Crest HOA | SMMWC | Residential Irrigation | 0.43 | 4 |
| Total | - | - | 240 | - |

**Note:**

1. Potential demand is the anticipated recycled water demand for each customer. It was estimated using average consumption data from 2011-2015 for each customer, as measured by irrigation meters, with the exception of the golf course. Golf course irrigation demand was estimated using evapotranspiration and precipitation data from the California Irrigation Management Information System (CIMIS). Additional information is provided in Section 6.1. Due to the seasonality of wastewater flows and water demands, not all of the potential demand can be met through recycled water.

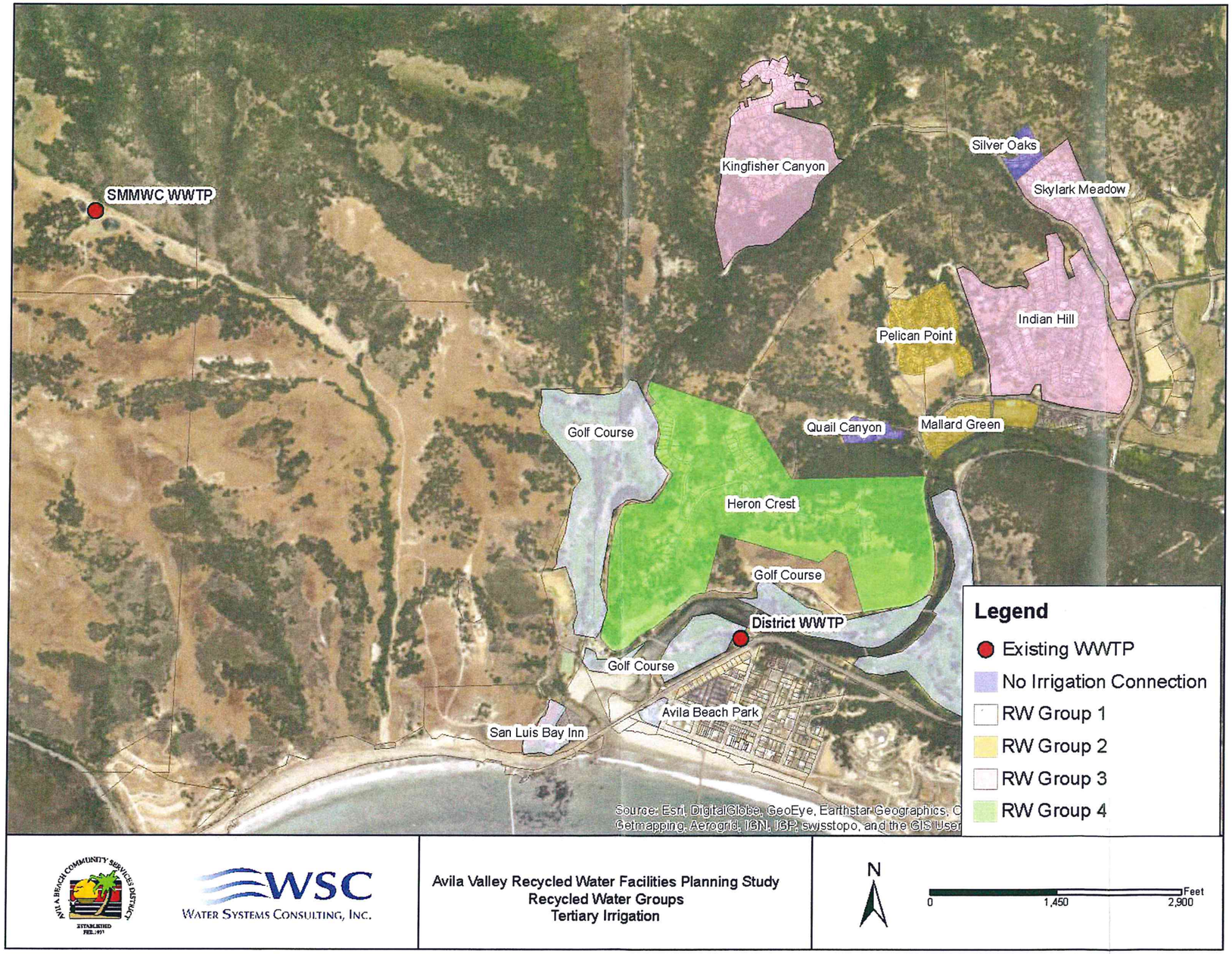


Figure 1-2: Recycled Water Groups

## 1.3 PROJECT ALTERNATIVES ANALYSIS

Based on discussions with the District and SMMWC (collectively the Project Team) at the Alternatives Development Workshop on December 20, 2016, a total of three alternatives were identified to be further developed and evaluated within this Study. During the Alternatives Evaluation Workshop on June 9, 2017, WSC worked with the Project Team to refine Alternatives 2B and 2C into a new alternative that is presented as Alternative 2D. The alternatives are:

1. Alternative 1: Individual Treatment Facilities, with 2 sub-alternatives:
    a. No Recycled Water Alternative: maintain secondary treatment at both the District's and SMMWC's wastewater treatment plants while making recommended infrastructure upgrades.
    b. Individual Tertiary Facilities: upgrade both the District's and SMMWC's wastewater treatment plants to produce tertiary recycled water for unrestricted landscape irrigation.
2. Alternative 2: Regional Treatment Facilities, with 4 sub-alternatives:
    a. Regional Secondary Facility: expand the existing SMMWC site into a regional facility by adding a new primary pond to handle the combined flows from the District and SMMWC.
    b. Regional Tertiary Water Resource Recovery Facility (WRRF) at Wild Cherry Canyon: construct a new regional WRRF along the Wild Cherry Canyon access road that will produce disinfected tertiary recycled water for unrestricted landscape irrigation.
    c. Regional Tertiary WRRF at Cave Landing: construct a new regional WRRF at the Chevron site near Cave Landing Road that will produce disinfected tertiary recycled water for unrestricted landscape irrigation.
    d. Regional Tertiary WRRF at Existing SMMWC Site: construct a new regional WRRF on SMMWC's existing site in Wild Cherry Canyon to produce disinfected tertiary recycled water for unrestricted landscape irrigation.
3. Alternative 3: Regional Advanced Treatment at Wild Cherry Canyon: construct a new regional WRRF along the Wild Cherry Canyon access road that will produce advanced treated recycled water for groundwater augmentation.

It should be noted that none of the alternatives were analyzed in terms of flood risk, which leads to the recommendation for additional analysis in Section 8.

### 1.3.1 Alternative 1

Alternative 1A (No Recycled Water Alternative) assumes the following conditions:

- Maintain secondary treatment levels at both the District's and SMMWC's WWTPs;
- Add redundancy at the District's WWTP based on prior analysis by Kennedy-Jenks; and
- No planned upgrades at SMMWC's WWTP.

Alternative 1A is an important component of this Study because it establishes a baseline against which to compare the other alternatives.

Alternative 1A requires minimal construction, no new conveyance infrastructure, and no additional staff. However, Alternative 1A includes no water resource recovery or water supply diversification, leaving the Avila Valley more susceptible to drought conditions with the potential for water supply shortages (see

Section 3). Under Alternative 1A, no steps are taken to address long-term sustainability of the current wastewater treatment strategy for the Avila Valley. Alternative 1A does not address risks associated with aging infrastructure, flooding, or long term regulatory compliance.

Alternative 1B (Individual Tertiary Facilities) involves upgrading each existing WWTP to meet disinfected tertiary standards. Irrigation demand within the Study Area comes primarily from an unrestricted-access golf course, food crops, and residential landscaping. Recycled water must meet disinfected tertiary standards to irrigate unrestricted-access landscape. Alternative 1B proposes upgrades to the District and SMMWC treatment systems to produce tertiary disinfected recycled water, and installation of the required recycled water conveyance infrastructure to jointly meet the demand in the Study Area. This alternative assumes that both the District and SMMWC implements the project, which allows for a shared recycled water conveyance system.

Disinfected tertiary treatment is also most likely to meet future permit requirements for the region. The siting locations of Alternative 1B are advantageous because the acquisition of land is not required. Alternative 1B increases system reliability and robustness with the addition of treatment processes, increases effluent water quality, and provides a drought-resistant water supply via water resource recovery. However, existing wastewater operations must remain functional during construction at both facilities, which could pose challenging construction sequencing. It would also result in duplicate efforts at the two plants and additional operations and maintenance requirements at both plants.

### 1.3.2 Alternative 2

Alternative 2 investigates a regional solution to treating wastewater within the Study Area. Alternative 2 is divided into 4 sub-alternatives to determine the optimal method for a regional plant. Alternative 2A (Regional Secondary Facility) involves upgrading SMMWC's existing plant to treat the wastewater from both the District and SMMWC to secondary standards. Alternative 2B (Regional Tertiary WRRF at Wild Cherry Canyon), Alternative 2C (Regional Tertiary WRRF at Cave Landing), and Alternative 2D (Regional Tertiary WRRF at SMMWC existing site) each involve the construction of a new regional WRRF that produces disinfected tertiary recycled water. Alternatives 2B through 2D include the same level of treatment and plant design but are sited at different locations to analyze impacts on conveyance and distribution of recycled water.

Alternative 2A provides a regional alternative that requires no land acquisition, and few additional treatment process. Alternative 2A would require that operations remain functional during construction and does not provide any water supply benefits. Additionally, the SMMWC site location selected for Alternative 2A could be susceptible to flooding and a flood study is recommended prior to implementation should the District and SMMWC pursue this option. Implementing this alternative would result in uncertain permit requirements and effluent quality reliability is a concern with the pond system. Maintaining secondary treatment at the facility results in the waste of a potential resource (recycled water) that Alternatives 2B, 2C, and 2D all utilize.

Alternatives 2B, 2C, and 2D increase system reliability and robustness by implementing an MBR treatment system to increase effluent water quality. They also provide a drought-resistant water supply via water resource recovery, and thus reduce regional potable water demand. Disinfected tertiary treatment is also most likely to meet future permit requirements for the region. The siting locations of Alternatives 2A and 2D are advantageous because no additional land would have to be acquired for the

treatment process, and existing infrastructure and knowledge could be leveraged at the sites. All of the sub-alternatives of Alternative 2 have potential for cost-sharing, regional collaboration, and partnering in the Avila Valley. Alternative 2C's site is in the California Coastal Zone, a characteristic which will most likely lead to additional regulatory requirements.

### 1.3.3 Alternative 3

Under Alternative 3, the District and SMMWC would augment their potable water supply through indirect potable reuse (IPR). This type of potable reuse would involve treating the wastewater to tertiary standards, further treating the water via advanced purification, percolating it into a groundwater aquifer, and extracting the water downstream as potable water supply.

Advantages of Alternative 3 include increased system reliability and robustness with the addition of the advanced treatment train. This alternative is also unique in that it maximizes resource recovery and adds a drought-resistant potable water supply to the region's water supply portfolio. This alternative augments the groundwater supply and reduces consumption of imported water. Alternative 3 also presents the opportunity for cost-sharing, regional collaboration, and partnering. However, Alternative 3, has the highest cost of all the alternatives analyzed. It also requires the most advanced treatment plant, more experienced/higher trained staff, and the most involved permitting process.

### 1.3.4 Recycled Water Groups

For the purposes of determining irrigation customers for alternatives that utilize recycled water, a Recycled Water Market Analysis (Section 6) was conducted. The users identified in the Recycled Water Market Analysis (Section 6, Table 6-1) were used since irrigation meters already exist, thus minimizing the initial infrastructure investment. The exception to this was the golf course, which lacks existing irrigation meters but has demand far exceeding all other users. The existing irrigation meters allow the recycled water system to tap directly into the existing irrigation lines saving on the installation of piping and service lines. With these considerations in mind, four groups of irrigation customers (Table 1-3) were created based on the presence of irrigation meters and the proximity of the customers to one another. Estimated irrigation demands are provided by customer based on historical irrigation data and evapotranspiration estimates. The cumulative amount of recycled water delivered to each group is also presented in Table 7-1Table 1-3. It is assumed that all the wastewater will be treated to disinfected tertiary recycled water standards and be available as recycled water supply for alternatives utilizing recycled water irrigation. The amount of recycled water delivered is less than the cumulative irrigation demand due to the seasonality of the recycled water supply (see Section 4.3 for seasonality of wastewater flows). In the summer months, irrigation demand exceeds the recycled water supply while in the wetter winter months there is more recycled water supply than demand. It is assumed that the Project Team will continue to use the District's ocean outfall pipeline during the wet season when the recycled water demand is lower than the recycled water supply.

Table 1-3: Proposed Irrigation Users

| Group | Customer Served | Estimated Irrigation Demand (AFY) | Group Irrigation Demand (AFY) | Cumulative Recycled Water Delivery (AFY) |
|---|---|---|---|---|
| 1 | San Luis Bay Inn<br>Avila Beach Golf Resort | 5.9<br>207 | 213 | 174 |

| | | | | |
|---|---|---|---|---|
| | Avila Beach Park | 0.06 | | |
| 2 | Avila Village | 4.4 | 19 | 181 |
| | Avila Bay Club | 0.82 | | |
| | Pelican Point HOA | 10.1 | | |
| | Mallard Green HOA | 3.7 | | |
| 3 | Indian Hill HOA | 5.8 | 8.6 | 184 |
| | Skylark HOA | 2.5 | | |
| | Kingfisher Canyon HOA | 0.33 | | |
| 4 | Heron Crest HOA | 0.43 | 0.43 | 184 |
| Total | | 241 | 240 | - |

### 1.3.5 Alternative Comparison

Table 1-4 summarizes the alternatives' recycled water yield (when applicable) and estimated project costs. The alternatives analysis (Section 7) showed that it was most economically favorable to only serve Recycled Water Group 1 for the recycled water irrigation alternatives, so only costs for Recycled Water Group 1 are shown in Table 1-4. For more detailed cost tables and assumptions, please refer to Section 7 and Appendix E.

Table 1-4: Alternatives Summary

| Economic Parameter | | Alt 1A: No Recycled Water[1] | Alt 1B: Individual Tertiary Facilities | Alt 2A: Regional Secondary Facility | Alt 2B: Regional WRRF at Wild Cherry Canyon | Alt 2C: Regional WRRF at Cave Landing | Alt 2D: Regional WRRF at SMMWC Existing Site | Alt 3: IPR |
|---|---|---|---|---|---|---|---|---|
| Treatment Cost[2] | District Capital | $2,520,000 | $5,650,000 | $570,000 | $10,830,000 | $11,340,000 | $10,640,000 | $14,890,000 |
| | SMMWC Capital | $0 | $1,680,000 | $890,000 | $17,090,000 | $17,890,000 | $16,780,000 | $23,500,000 |
| | Treatment Capital Total | **$2,520,000** | **$7,330,000** | **$1,460,000** | **$27,920,000** | **$29,230,000** | **$27,420,000** | **$38,390,000** |
| | District Total O&M | $680,000 | $1,050,000 | $220,000 | $560,000 | $560,000 | $560,000 | $880,000 |
| | SMMWC Total O&M | $250,000 | $585,000 | $360,000 | $890,000 | $890,000 | $890,000 | $1,390,000 |
| | Treatment O&M Total | **$930,000** | **$1,635,000** | **$580,000** | **$1,450,000** | **$1,450,000** | **$1,450,000** | **$2,270,000** |
| Recycled Water System Cost[3] | District Capital | - | $2,110,000 | - | $1,960,000 | $1,910,000 | $2,070,000 | $4,610,000 |
| | SMMWC Capital | - | $3,060,000 | - | $3,080,000 | $3,020,000 | $3,270,000 | $7,280,000 |
| | Recycled Water System Capital Total | **$0** | **$5,170,000** | **$0** | **$5,040,000** | **$4,930,000** | **$5,340,000** | **$11,890,000** |
| | District Total O&M | - | $30,000 | - | $27,000 | $27,000 | $12,000 | $66,000 |
| | SMMWC Total O&M | - | $45,000 | - | $43,000 | $43,000 | $18,000 | $104,000 |
| | Recycled Water System O&M Total | **$0** | **$75,000** | **$0** | **$70,000** | **$70,000** | **$30,000** | **$170,000** |
| Recycled Water Group Served | | N/A | 1 | N/A | 1 | 1 | 1 | N/A |
| Annual Recycled Water Yield (AF) | | 0 | 170 | 0 | 170 | 170 | 170 | 176 |
| Recycled Water Cost/AF[4] | | - | **$2,200** | - | **$2,100** | **$2,100** | **$2,000** | **$4,900** |

Notes:

1. The No Recycled Water Alternative is based on the plant's existing conditions and is not adjusted for buildout flow like the other alternatives. For this alternative, existing O&M costs were used and additional O&M cost associated with the plant upgrade were added to the existing O&M costs.
2. Treatment capital cost for Alternatives 1A and 1B are based on the individual capital and O&M costs for retrofitting each facility. It is assumed that the District and SMMWC would pay for the upgrades at each of their respective facilities. For the purposes of this report, Alternatives 2A, 2B, 2C, 2D, and 3, the treatment capital cost is split based upon the expected average buildout influent flow since these facilities are regional solutions. The District's wastewater flow makes up 39% of the overall flow, thus they are bearing 39% of the capital and O&M costs. SMMWC's wastewater flows makes up 61% of the overall flow, thus they are bearing 61% of the capital and O&M costs. It will be up to the District and SMMWC to develop a Water Share agreement to determine who owns the water and how costs will be allocated should they pursue a regional solution.
3. Recycled water system costs include any costs associated with recycled water storage, recycled water mains, recycled water pump stations, and any additional recycled water conveyance infrastructure. For the purposes of these reports, the capital and O&M costs have been divided based on wastewater flow. For Alternative 1B, recycled water system cost is shared among the District and SMMWC as it is assumed that they will have a joint distribution system to meet the region's recycled water needs rather than create two parallel systems to serve users. These costs were allocated based on the total buildout influent flow in the same manner described in Note 2 above. For Alternatives 2A, 2B, 2C, 2D, and 3, capital and O&M costs were allocated based on total buildout influent flow in the same manner as described in Note 2 above.
4. Recycled Water cost per acre foot is based on the capital and O&M costs associated with the recycled water systems. The treatment costs were not included in this calculation. Costs are based on a 30-year period with an interest rate of 4%.

Table 1-4 shows that all of the recycled water alternatives are costly. In this Study, cost is less of a project driver than risk reduction related to aging infrastructure, water supply reliability, and long-term wastewater treatment sustainability.

## 1.4 RECOMMENDED FACILITIES PROJECT

Alternative 2D was chosen as the preferred project alternative by the Project Team during the Alternatives Evaluation Workshop. It includes a regional tertiary recycled water WRRF that would treat wastewater from the District's and SMMWC's service areas for beneficial use. Under this alternative, the plant would be located at the site of SMMWC's current wastewater treatment plant. This siting location is preferable because no land must be acquired for the treatment process, and existing infrastructure and knowledge could be leveraged at the site. Alternative 2D provides the additional benefit of a regional solution with cost-sharing potential. Group 1 was selected as the preferred recycled water user group because the high economic costs outweighed the minor increase in recycled water demand from serving the other potential user groups. WSC recommends, however, that a site-specific hydrologic study be prepared as part of the environmental review process prior to project implementation to assess potential flood risk and options for flood protection. None of the cost estimates provided in Table 1-4 include flood proofing or major grading changes associated with flood protection.

No stakeholder outreach has been completed to-date, but this draft Study will be shared with the following stakeholders: District's Board of Directors, SMMWC's Board of Directors, Avila Beach Golf Course, the County of San Luis Obispo, Port San Luis, and Avila Valley Mutual Water Company.

The new regional WRRF would produce disinfected tertiary recycled water for landscape irrigation. As described in Section 7, the regional alternatives evaluated in this Study include membrane bioreactor (MBR) and chlorine disinfection facilities. It should be noted that though these technologies have been selected as a basis for comparison, there are other tertiary treatment options that may be a better fit for a regional plant in the Avila Valley. These options should be evaluated in detail during project planning and design. Regardless, a tertiary facility is expected to be more reliable than the current treatment plants, and will meet and/or exceed the needs of the users. The design flow criteria for the new regional WRRF are summarized in Table 1-5.

Table 1-5. Preliminary Design Criteria

| Parameter | Units | Value |
|---|---|---|
| Combined Average Annual Flow | Million gallons per day (MGD) | 0.21 |
| Combined Maximum Daily Flow | MGD | 0.67 |
| Combined Max Day Peaking Factor | Multiplier | 3.2 |

If this project moves forward to implementation, it can be expected to begin with user commitments in 2019. Table 1-6 shows the preliminary implementation schedule in general terms because the start date is unclear at this point. It is anticipated that recycled water use commitments will be gathered prior to moving forward with project design. After permitting is completed, recycled water use agreements can be obtained.

Table 1-6. Preliminary Implementation Schedule

**Implementation Schedule**

| Preferred Project Tasks and Milestones | YEAR: Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |
|---|---|---|---|---|---|---|
| Set up governance and obtain recycled water use commitments from recycled water users | | | | | | |
| Design, CEQA, and permitting for new regional treatment facility | | | | | | |
| Construction of new facility and conveyance pipeline | | | | | | |
| Recycled water use agreements | | | | | | |
| Deliver water to regional users | | | | | | ◆ |

Table 1-7 shows the implementation costs for the preferred alternative escalated 4.25 years to the mid-point of construction at 3% inflation, which can be expected to be April 2023 if the project begins in January 2019.

Table 1-7. Implementation Cost Estimate

| | | District | SMMWC | Total |
|---|---|---|---|---|
| Treatment Cost | Capital | $10,640,000 | $16,780,000 | $27,420,000 |
| | Total O&M | $560,000 | $890,000 | $1,450,000 |
| Recycled Water Delivery Cost | Capital | $2,080,000 | $3,270,000 | $5,350,000 |
| | Total O&M | $13,000 | $20,000 | $33,000 |
| Annual Recycled Water Yield (AF) | | | 170 | |
| Recycled Water Cost/AF | | | $2,000 | |