



Submitted to
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Title XVI Recycled Water Feasibility Study

Rancho Murieta Community Services District



Table of Contents

Executive Summary..... 1

1 Introduction 1-1

1.1 Study Purpose and Goals..... 1-1

1.2 District Service Area and Study Area Boundaries 1-1

1.3 Project Sponsors..... 1-1

1.4 Report Organization 1-2

2 Problems and Needs 2-1

2.1 Key Water Management Problems..... 2-1

 2.1.1 Local Benefits..... 2-1

 2.1.2 Regional Surface and Ground Water Benefits..... 2-1

 2.1.3 Statewide Benefits 2-1

2.2 Water Supplies..... 2-2

 2.2.1 Surface Water Diversions..... 2-2

 2.2.2 Recycled Water 2-3

2.3 Current and Projected Water Demands..... 2-3

2.4 Potable Water Treatment Improvements 2-6

2.5 Wastewater Treatment and Disposal Improvements 2-6

3 Recycled Water Opportunities 3-1

3.1 Potential Recycled Water Uses 3-1

 3.1.1 Wastewater Facilities Expansion and Financing Plan 3-1

 3.1.2 Integrated Water Master Plan and Integrated Water Master Plan Update..... 3-1

 3.1.3 Recycled Water Feasibility Study 3-2

 3.1.4 Direct and Indirect Potable Reuse 3-2

 3.1.5 Comparison of Alternatives and Recommended Course of Action..... 3-3

3.2 Implementation Considerations and District's Recycled Water Policy 3-4

3.3 Water, Wastewater, and Recycled Water Jurisdiction 3-5

3.4 Source of Water To Be Recycled 3-5

3.5 Recycled Water Uses and Associated Water Quality and Treatment Requirements..... 3-7

 3.5.1 Existing Wastewater Treatment and Recycled Water Systems 3-7

4 Description of Alternatives..... 4-1

4.1 Upgrading Existing Pastureland Irrigation System (Alternative 1) 4-1

4.2 Expanding Recycled Water Program to Serve Future Residential Irrigation (Alternative 2) 4-2

4.3 Treatment and Disposal Water Quality Requirements..... 4-4

4.4 Alternative Measures or Technologies..... 4-5

5 Economic Analyses..... 5-1

5.1 Comparison of Capital Costs to Serve Individual Developments..... 5-1

5.2 Comparison of Alternatives 1 and 2..... 5-4

6 Recommended Improvements and Implementation Plan 6-1

6.1 Phasing of Recommended Facilities and Implementation Schedule 6-1

- 6.1.1 Phase 1 Improvements 6-1
- 6.1.2 Phase 2 Improvements 6-5
- 6.2 Facility Planning 6-5
- 6.3 Environmental Compliance and Permitting 6-5
- 6.4 Coordination with Ongoing Projects and Programs 6-6
- 6.5 Financing 6-6
- 6.6 Stakeholder Outreach 6-6
- 6.7 Implementation Schedule 6-7
- 7 Environmental Considerations and Potential Side Effects..... 7-1**
- 7.1 Potential Environmental Effects 7-1
 - 7.1.1 Project Construction..... 7-1
 - 7.1.2 Project Operation..... 7-1
- 7.2 Environmental Review Status and Requirements 7-1
- 7.3 Public Health and Safety 7-2
- 7.4 Regional Water Supply and Water Quality..... 7-2
- 7.5 Public Involvement 7-2
- 7.6 Historical Properties 7-3
- 8 Legal and Institutional Requirements 8-1**
- 8.1 Water Rights 8-1
- 8.2 Regulatory Requirements 8-1
 - 8.2.1 Title 22 California Code of Regulations 8-2
 - 8.2.2 California Water Code..... 8-2
 - 8.2.3 Permits and Administrative Provisions 8-2
- 8.3 Interagency Agreements..... 8-3
- 9 Financial Capability of Sponsor 9-1**
- 9.1 Project Implementation Schedule..... 9-1
- 9.2 District's Willingness to Pay 9-1
- 9.3 Project Funding Plan 9-1
- 10 Research Needs 10-1**

List of Tables

- Table ES-1. Summary of Required Facility for Recommended Alternative ES-2
- Table ES-2. Project Implementation Schedule ES-3
- Table 2-1. Existing and Projected Number of Connections at Buildout 2-5
- Table 2-2. Current and Projected Water Demands..... 2-5
- Table 4-1. Estimate of Probable Construction and Project Costs for Alternative 1 4-2
- Table 4-2. Estimate of Probable Construction and Project Costs for Alternative 2 4-4
- Table 5-1. Projected Recycled Water Demands..... 5-3
- Table 5-2. Economic Comparison of Alternatives 1 and 2..... 5-4
- Table 6-1. Summary of Required Facilities for Recommended Plan..... 6-1
- Table 6-2. Project Implementation Schedule provided in pdf version..... 6-3

List of Figures

Figure 1-1. District Service Area and Study Area Boundary	1-3
Figure 2-1. Future Phase 1 and 2 Developments	2-4
Figure 3-1. Existing Recycled Water Conveyance System and Use Areas	3-6
Figure 4-1. Proposed Recycled Water System Expansion (Alternative 2).....	4-3
Figure 6-1. Recommended Improvements	6-2

Appendices

- Appendix A. District Recycled Water Policy
- Appendix B. Cost Estimates and Economic Analyses
- Appendix C. General Manager Letter Regarding District Commitment

List of Acronyms

AF	Acre-ft
AFY	Acre-ft per year
Basin Plan	San Joaquin River Basins, Fourth Edition
Board	Rancho Murieta Community Services District Board of Directors
BMP	Best Management Plan
CCR	California Code of Regulations
CDPH	California Department of Public Health
Central Basin	Central Sacramento County Groundwater Basin
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
Delta	Sanramento-San Joaquin Delta
District	Rancho Murieta Community Services District
DPR	Direct potable reuse
EIR	Environmental Impact Report
fps	Feet per second
IPR	Indirect potable reuse
MGD	Million gallons per day
MRP	Master Reclamation Permit
NEPA	Nation Environemntal Policy Act
O&M	Operations and maintenance
Project	Recycled Water System Expansion Project
RWQCB	Regional Water Quality Control Board
Study	Title XVI Recycled Water Feasibility Study
Title 22	California Code of Regulations, Title 22, Chapter 3, Water Recycling Criteria
WDR	Waste Discharge Requirements or Waste Discharge Requirements Order No. 5-01-124
WRR	Water Reclamation Requirements
WWRP	Wastewater Relamation Plant

Executive Summary

This Executive Summary provides an overview of the Title XVI Recycled Water Feasibility Study (Study) and highlights the key findings and recommendations that are further detailed in this report. The purposes of the Study are to (1) determine which particular future residential developments are the most cost-effective for recycled water service, (2) determine whether expansion of the existing recycled water program is cost-effective when compared to the “No Project” alternative, and (3) develop a feasibility study that satisfies the provisions of Public Law 102-575 sections 1603(b) and 1604(c) so that additional Title XVI grant funding can be requested from the Bureau of Reclamation.

Potential Alternatives and Comparison Results

The following alternatives considered in this Study were:

- **Alternative 1 - Upgrading Existing Pastureland Irrigation System (Alternative 1):** This alternative represents the “No Project” alternative and reflects the reasonable and foreseeable actions to meet projected potable water and treated effluent disposal needs of the District’s service area. This alternative assumes the existing recycled water program is not expanded beyond satisfying the irrigation demands of the two existing golf courses, the pastureland treated effluent disposal system is upgraded and expanded, and an additional 1.2 MGD of potable water treatment capacity is provided to serve future residential irrigation demand that, for Alternative 2, is satisfied with recycled water. The total estimated project and net present worth costs for this alternative are \$24.0 and \$24.4 million, respectively.
- **Alternative 2 – Expanding Recycled Water Program (Alternative 2):** This alternative assumes the expansion of the existing recycled water program to serve select future residential developments¹ and existing parks and commercial landscaping. The selected developments were identified by ranking the developments against one another with respect to estimated service costs and selecting those deemed to be cost-effective. Service to these residential developments would be provided by expanding the existing North Golf Course Conveyance System through the addition of recycled water transmission mains and service pipelines, storage tanks, and booster pumping stations. The total estimated project and net present worth costs for this alternative are \$22.8 and \$20.3 million, respectively.

An economic analysis comparing net present worth costs of Alternatives 1 and 2 was developed. This analysis assumed a 20-year life cycle and a 6 percent discount rate and considered the timeline in which individual potable water, wastewater, and recycled water/treated effluent improvements are required to be in service to accommodate two development phases. Results indicate that expanding the District’s recycled water program (Alternative 2) has a 26 percent lower net present worth cost and is therefore deemed to be more cost-effective than Alternative 1. In addition to lower cost, Alternative 2 would provide the following significant benefits:

- Reduce future Cosumnes River diversions, offset potable water demands by 370 acre-ft per year, and conserve surface water supplies,
- Help the District meet its 20x2020 Water Conservation Goals,
- Provide opportunities to serve other potential customers along the recycled water transmission pipeline alignment,
- Support regional water planning efforts,
- Providing a sustainable and long-term means for treated effluent disposal that is directly linked to strengthening the local economy,

¹ The recommended developments for recycled water service are Murieta Gardens, Retreats, Residences of Murieta Hills, Industrial / Commercial / Residential, Apartments, Esquela, Terrace, Highlands, and River Canyon.

- Increase water supply reliability,
- Reduce drought deficits and greenhouse gas emissions as well as the District's overall carbon footprint by minimizing potable water treatment requirements,
- Contribute to the statewide recycled water goals and demonstrate the District's willingness to manage its available resources in a responsible and progressive manner, and
- Contribute to the recovery of the Central Sacramento County Groundwater Basin and Sacramento-San Joaquin Delta and Cosumnes River ecosystems.

Alternative 2 was selected as the recommended alternative based on these significant benefits and the cost comparison results.

Recommended Improvements and Implementation Schedule

Improvements required for the recommended alternative are time-phased to correspond to development. Two phases have been established for the addition of facilities and implementation planning based on the occupancy timelines described by local developers. Individual improvements required for the recommended alternative are illustrated in Figure 6-1 and described in Chapter 6. A summary of the required facilities by phase is presented in Table ES-1. The recommended implementation schedule is presented in Table ES-2 and describes the timelines required for all activities associated with implementation.

The technical work completed for this Study provides the rationale and framework for the recommended alternative and improvements. Preliminary locations of all new facilities are shown in Figure 6-1. Facility planning is required to develop a hydraulic model, optimize and finalize facility locations and alignments, refine design criteria and sizing, identify land requirements, and optimize, attempt to reduce, and update cost estimates. Following completion of facility planning, environmental and regulatory permitting efforts can commence as shown in Table ES-2.

Table ES-1. Summary of Required Facilities for Recommended Alternative

Facility / Improvement Description	Estimated Quantity	Estimate of Probable Project Costs (\$) ^{a, b}
Phase 1, 2013 – 2015		
Disinfection Facilities Upgrade	195,000 gallons	1,300,000
North Golf Course Pump Station	2,110 gpm	1,700,000
Northwest Transmission Main	11,640 LF	3,530,000
Lookout Hill Tanks and Pump Station	400,000 gallons & 700 gpm	2,080,000
Retreats Service Main	1,725 LF	490,000
	Subtotal	9,100,000
Phase 2, 2016 – 2019		
Seasonal Storage Expansion	240 AF	9,750,000
Industrial, Commercial, Residential	190 LF	220,000
Apartments Service Main	110 LF	210,000
Esquela Service Main	260 LF	80,000
North Conveyance System Extension	2,460 LF	520,000
Bass Lake Tanks and Pump Station	500,000 gallons & 1,040 gpm	2,900,000
	Subtotal	13,680,000
	Grand Total	22,780,000

^a Estimated project costs based upon ENR 20 City Average Construction Cost Index of 9437 (January 2013).

^b Project costs include estimated construction costs and allowances for contingency, engineering, administration, and permitting.

Table ES-2. Project Implementation Schedule

Step	Lead Agency and Primary Participants	2012			2013			2014			2015			2016-2025			Desired Outcome										
		M	J	A	S	O	N	D	J	F	M	A	M	J	J	A		S	O	N	D	16	20	25			
1	Title XVI Feasibility Study	RMCS D																									Determine (1) which developments are the most cost-effective to serve recycled water with respect to one another and (2) which alternative is most cost-effective (No Project or Expanded Recycled Water Program). Identify phased approach and infrastructure improvements to cost effectively serve existing commercial, park, and open space as well as future residential (dual plumbed) and commercial customers.
2	System Design Standards	RMCS D																									Develop recycled water standards to serve future commercial and residential customers. Standards will serve as the basis for (1) preparing construction cost estimates and (2) communicating minimum recycled water system requirements to serve future developments and existing commercial areas.
3	Detailed Project Description / Facility Planning	RMCS D																									Incorporate commercial irrigation areas, prepare hydraulic model, refine key aspects, and implement methods to reduce project costs for the proposed recycled water system. Project description to serve as the starting point for the CEQA and NEPA compliance effort as well as the Title 22 Engineering Report and Updated WDR.
4	Agency Coordination	RMCS D and RMCC																									Identify roles and responsibilities for program participants as described by Title 22 (e.g., Producers, Distributors, and Users) and coordinate use of common infrastructure (e.g., recycled water conveyance systems, North Golf Course Pumping Station, etc.). Identify scheduling/ timing constraints and key metrics (e.g., what constitutes success) for each participant. Conduct coordination meetings with Regional Board and CDPH to keep them informed and obtain feedback.
5 Regulatory Permitting																											
5a	Intended Use of Van Vleck Spray Field	RMCS D and Van Vleck Ranch																									Submit a letter to the Regional Board describing the District's intended long-term use of the Van Vleck spray field to satisfy Article F, 12 of WDR R5-2009-0124. COMPLETED
5b	CEQA and NEPA Compliance	RMCS D																									Analyze potential environmental impacts associated with the implementation of the expanded recycled water program; satisfy CEQA and NEPA (if federal funding obtained) review requirements. Estimated cost is based on preparing initial study/mitigated negative declaration (CEQA) and environmental assessment/FCNSI (NEPA).
5c	Title 22 Engineering Report Preparation	RMCS D and RMCC																									Prepare Title 22 Engineering Report. Recycled water use areas to include existing golf courses, commercial, parks, open space, Van Vleck spray fields, and future residential (dual plumbed) and commercial customers.
5d	MRP and Updated WDR Application	RMCS D and RMCC																									Complete Form 200 and prepare Report of Waste Discharge requesting the Regional Board's preparation of a Master Reclamation Permit (MRP) and Updated Waste Discharge Requirements (WDRs).
5e	Salt and Nutrient Management Plan	RMCS D and RMCC																									Prepare salt and nutrient management plan and antidegradation analysis specific to the expanded recycled water program.
5f	Title 22 Engineering Report Review and Approval	RMCS D and RMCC																									Submit Title 22 Engineering Report (completed in Step 5c) to CDPH and Regional Board for review and approval.
5g	Updated WDR Review, MRP Negotiations and Adoption	RMCS D and RMCC																									Submit Form 200 and Report of Waste Discharge (completed in Step 5d) to the Regional Board. Negotiate updated Waste Discharge Requirements (WDRs), Master Reclamation Permit (MRP), and monitoring requirements with Regional Board and CDPH staff.
6 Improvements to Existing Infrastructure																											
6a	Chlorine Contact Basin	RMCS D																									Existing WWRP chlorine contact disinfection facilities has a rated capacity of 2.3 MGD, which is less than the 3.0 MGD capacity provided by the tertiary treatment facilities and required by the future recycled water system. Efforts associated with this task are based on planning, design, and construction a 195,000 gallon contact basin within the existing equalization basin.
6b	Seasonal Storage Expansion	RMCS D																									Install 240 acre-ft (AF) of additional seasonal storage capacity within the WWRP site. Efforts associated with this task are based on planning, design, and construction of new 240 AF storage, conveyance pipeline, and pumping facilities.
7	Detailed Design (Phase 1 RW Program)	RMCS D																									Prepare preliminary design report and final hydraulic model, 60, 90, and bid documents (design drawings and specifications) of the proposed recycled water system infrastructure.
8	Bid and Award (Phase 1 RW Program)	RMCS D																									Respond to questions from potential bidders, conduct pre-bid meeting, prepare addenda, evaluate bids, and recommend award.
9	Construction (Phase 1 RW Program)	RMCS D																									Construct recycled water system expansion and administer contract for the installation of system infrastructure, provide construction management oversight / inspection, respond to contractor requests for information, prepare necessary change orders, review contractor submittals, and participate in construction meetings. Improvements to be limited to those needed to serve Phase 1 development (e.g. 670 Group).
10	Startup (Phase 1 RW Program)	RMCS D and RMCC																									Verify that recycled water system operates and performs as designed; modify system to further enhance and optimize system operation and performance.
11 RMCS D Management and Administration																											
11a	Appoint Recycled Water Program Manager	RMCS D																									Hire recycled water program manager. Specific duties to include pre-qualifying landscape designers and construction contractors, regulatory compliance, stakeholder interaction, and recycled water accounting.
11b	Operations and Maintenance Plan	RMCS D																									Develop operation and irrigation management plans pertaining to the expanded recycled water system.
11c	Landscape Designers and Contractors	RMCS D																									Compile a list of companies authorized to design and work on residential recycled water systems. Authorized companies shall have attended training (Step 11d) and shall be familiar with system design standards (Step 2) and other pertinent recycled water regulatory requirements.
11d	Training (Orientation and Education) Program	RMCS D																									Develop and conduct workshops. Target audience is future homeowners and landscape designers and contractors. Workshop content to include description of recycled water standards (Step 2), need to hire authorized companies (Step 11c), and the preparation of recycled water plans.
11e	Inspection and Testing Program	RMCS D																									Develop program to verify compliance with recycled water standards and regulatory requirements.
12	Public Outreach	RMCS D																									Manage information and promote understanding and communication with key stakeholder groups, demonstrate organizational commitment, promote communication and public dialog, ensure fair and sound decision making, and build and maintain trust.
13	Expand RW System to Serve Phase 2 Development	RMCS D																									Plan, permit, design, and construction recycled water system to serve expanded recycled water service area associated with Phase 2 developments.

- Development of Deliverables
- Ongoing Efforts Not Associated with Specific Deadlines or Milestones
- ★ Draft Deliverables
- ★ Final Deliverables

Footnotes
 * Dates shown in this table are considered preliminary estimates and are based on Phase 1 and 2 development occupancy timeframes of 2016 and 2020, respectively. Actual timeframes will depend on actual residential and commercial development timeframes.

1 Introduction

This chapter describes the purpose of the Rancho Murieta Community Services District's (District's) Title XVI Feasibility Study (Study), general characteristics of the Study Area, Project sponsors, and report organization.

1.1 Study Purpose and Goals

The purpose of the Study is to evaluate and compare potential alternatives for expanding the District's existing recycled water program and determine whether the expansion is cost effective compared to the "No Project" alternative. In addition, this Study describes the physical features and associated construction and project costs associated with the expanded recycled water program and "No Project" alternatives as well as environmental considerations and legal and institutional requirements associated with the recommended project. Specific goals associated with the Study are to:

- Identify a phased approach to expand the existing recycled water system to serve future residential developments and irrigation of existing parks, roadway medians, and commercial landscaping,
- Identify the specific improvements required for the expansion of the existing recycled water system,
- Develop an implementable and regulatory compliant solution for long-term disposal of the District's treated effluent,
- Use recycled water as a means to offset future potable water demands and indirectly contribute to tributary stream flows and restoring groundwater levels, and
- Maximize the beneficial uses of the District's water resources.

1.2 District Service Area and Study Area Boundaries

The District was formed in 1982 to provide water supply collection, treatment, and distribution; wastewater collection, treatment, and reuse; as well as storm drainage collection, disposal and flood control services for the community of Rancho Murieta. This community is located 20 miles east of Sacramento on State Highway 16. The area served by the District, which is also defined as the Study Area, is illustrated in Figure 1-1 and encompasses approximately 3,500 acres. Land uses within this service area include approximately 2,000 acres for single family residences, townhouses, apartments, duplexes and mobile homes. The District currently serves 2,604 connections comprised of 2,502 residential, 97 commercial, and 5 park connections. According to Sacramento County's approved Planned Unit Development Plan, the development of the District's service area represents a potential for roughly 5,189 residential units at buildout.

The District's potable water supply consists of seasonal diversions from the Cosumnes River to three off-stream storage reservoirs (Calero, Chesbro, and Clementia). The Cosumnes River flows into southern Sacramento County, joining the Mokelumne River in San Joaquin County and emptying into the Sacramento-San Joaquin Delta. In addition to providing surface water supply, the Cosumnes River helps to recharge the Central Sacramento County Groundwater Basin (Central Basin).

The District's Wastewater Reclamation Plant (WWRP) and the majority of the recycled water alternatives considered in this Study are located within the District's service area, except for the "No Project" alternative which is located immediately south of the Study Area and is comprised of irrigation of pasturelands and other unimproved areas.

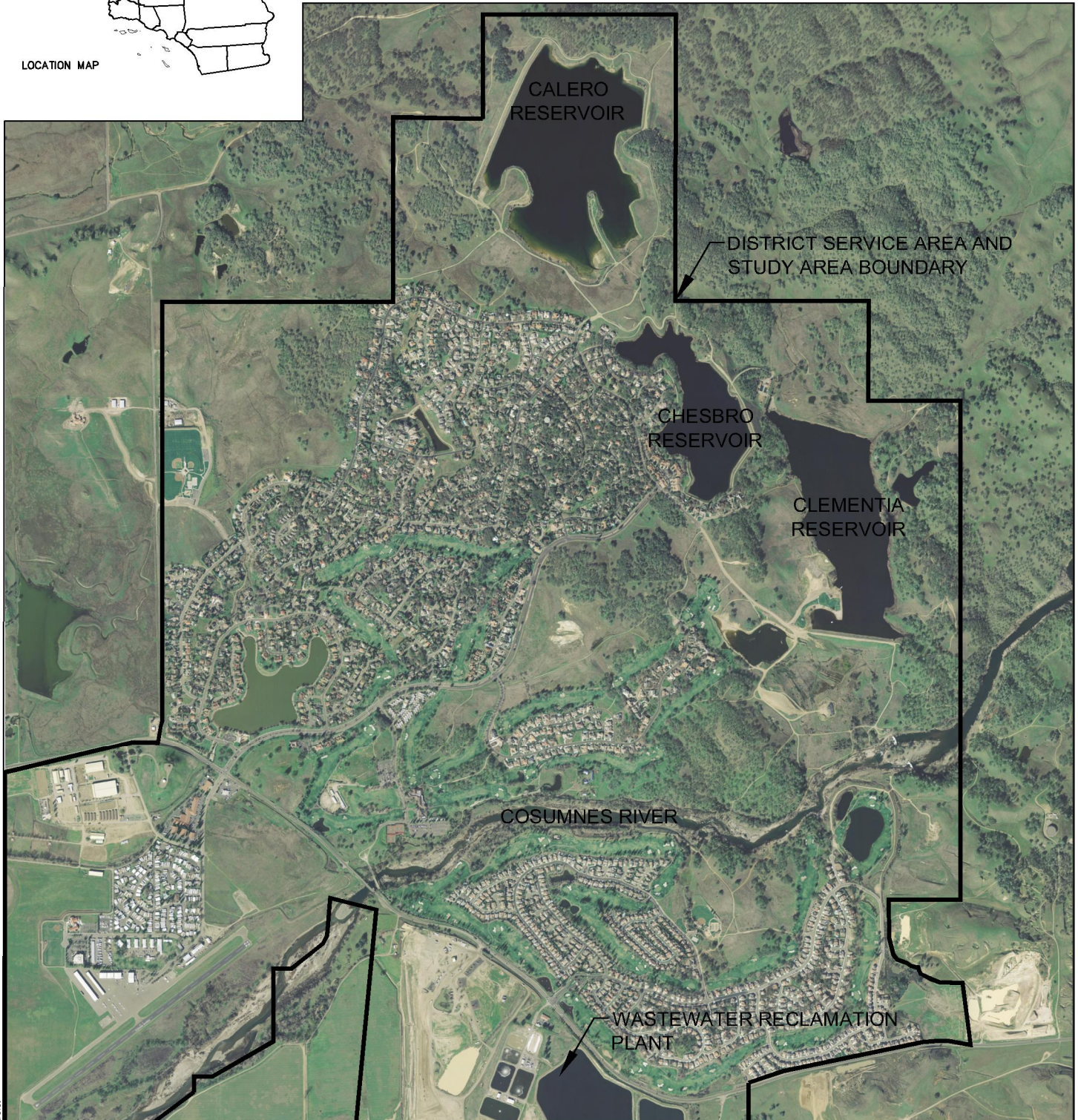
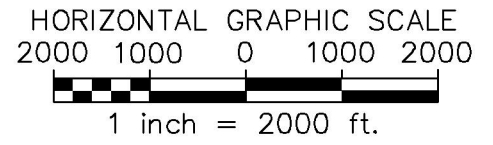
1.3 Project Sponsors

The non-federal sponsor is defined as being the entity, or entities, that construct, own, operate, and maintain all or a portion of the recommended project to be funded in part by a Title XVI grant. The non-federal sponsor of the proposed Recycled Water System Expansion Project (Project)² is the District.

² See Chapter 4 for a description of the proposed Recycled Water System Expansion Project.

1.4 Report Organization

In general, this report is organized in accordance with the feasibility report outline described in the *Guidelines for Preparing, Reviewing, and Processing Water Reclamation and Reuse Project Proposals Under Title XVI of Public Law 102-575*.



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Figure 1-1. District Service Area and Study Area Boundary
 Title XVI Recycled Water Feasibility Study

2 Problems and Needs

This chapter describes key water management problems, the benefits associated with the expansion of the District's recycled water program, along with Study Area near- and long-term water demands and supplies and treated effluent disposal options.

2.1 Key Water Management Problems

According to the *2009 Water Plan Update*, California is facing one of the most significant water crises in its history. To overcome this crisis, there is a need to follow the principles of integrated water management to provide local, regional, and statewide benefits and to use water more efficiently, improve water quality and reliability, and integrate environmental stewardship into the various aspects of how we collectively manage our water resources. As described below, the Project proposed by the District addresses these needs and will illustrate to others how the expanded use of recycled water can contribute to resolving California's water crisis.

2.1.1 Local Benefits

The District initiated an integrated water master plan in 2005 to address potential drought deficits, improve storage reservoir aesthetics, and identify methods to encourage reductions in residential potable water demands. The plan was subsequently updated in 2010 to address changes in state legislation regarding water use targets and greenhouse gas emissions, federal and state guidance regarding recycled water use, and water supply reliability risks associated with climate change. The primary outcome of these studies was the recognition of the benefits (e.g., reduced costs and drought deficits,³ environmental benefits, and improved storage reservoir aesthetics) recycled water could provide when used to offset potable water demands within the community as opposed to irrigation of agricultural lands located outside of the District's service area.

2.1.2 Regional Surface and Ground Water Benefits

The Cosumnes River watershed is located within the Sacramento-San Joaquin Basin. This particular watershed has been a major focus of conservation efforts and has been identified as a priority for ecosystem protection and restoration by the California Bay-Delta Authority (formerly CALFED), the USFWS Anadromous Fish Recovery Program, and the Sacramento County (as part of the Sacramento County General Plan). The Cosumnes River channel and its associated floodplain are major sources of recharge for the Central Basin. The Central Basin has experienced declining groundwater levels which have adversely affected the river's fishery, (e.g., salmon), wildlife, recreational, and aesthetic values.

Although the Cosumnes River can be considered relatively small with respect to its length (approximately 80 miles) and watershed area (approximately 1,265 square miles), it is far more important than its size would indicate given that:

- This particular river is the only remaining unregulated river (e.g., no major dams) on the western slope of the Sierra Nevada Mountain Range which allows frequent and regular winter and spring over bank flooding which fosters the growth of native riparian vegetation and helps to sustain wildlife dependent on these riparian habitats.
- This particular river flows through and supports one of the biologically richest regions in California's Central Valley before merging with the Mokelumne River, and
- This particular river recharges the Central Basin and contributes a significant amount of water to the Sacramento-San Joaquin Delta (Delta).

It is estimated that the proposed Project will reduce annual Cosumnes River diversions by approximately 450 acre-foot per year (AFY) under both normal and drought conditions.

2.1.3 Statewide Benefits

The Delta faces multiple challenges related to ecosystem health, water quality, climate change, and water supply reliability. In late 2008, the Governor of California proposed a comprehensive water plan to address long-term water supply needs. The

³ See Section 2.3 for drought deficit estimations.

Project is directly and consistently aligned with the actions needed to (1) deal with California's dwindling water supply, (2) aggressively promote water programs that stretch California's available potable water supplies, and (3) contribute to the long-term recovery of the Central Basin and Delta and Cosumnes River ecosystems.

The Water Control Plan for the Sacramento River and the San Joaquin River Basins, Fourth Edition (Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting waters of the basin and incorporates plans and policies adopted by the State Water Resources Control Board. The Basin Plan encourages water recycling as a means to conserve and reduce demands on ground and surface water supplies; postpone, or eliminate costly investments for the development of new sources of water supply; enhance water supply reliability during drought; and reduce or eliminate treated effluent surface water discharges.

The District's proposed recycled water system expansion would:

- Reduce future Cosumnes River diversions by 450 AFY,
- Offset potable water demands by approximately 370 AFY and conserve surface water supplies,
- Help the District meet the 20x2020 Water Conservation Goals,
- Provide opportunities to serve other potential users along the recycled water transmission pipeline alignment,
- Support regional water planning efforts,
- Provide a sustainable and long-term means for treated effluent disposal that is directly linked to strengthening the local economy,
- Increase water supply reliability and reduce drought deficits,
- Reduce greenhouse gas emissions as well as the District's overall carbon footprint due to reduced potable water diversions and treatment requirements,
- Contribute to the statewide recycled water goals and demonstrate the District's willingness to manage its available resources in a responsible and progressive manner, and
- Contribute to the recovery of the Central Basin and Delta and Cosumnes River ecosystems.

2.2 Water Supplies

The District's water supplies consist of surface water diverted from the Cosumnes River and recycled water as described below.

2.2.1 Surface Water Diversions

The District's potable water supply consists of seasonal diversions from the Cosumnes River that are normally diverted to and stored in three surface storage reservoirs (Calero, Chesbro, and Clementia – see Figure 1-1). These three reservoirs have an estimated total combined storage volume of 5,132 acre-foot (AF) with flashboards, of which 4,732 AF is considered to be usable for domestic and commercial potable water purposes. The District's water rights permit, 16762, includes the following stipulations:

- a. Surface water can be diverted from the Cosumnes River into the District's storage reservoirs between November 1 and May 31. This diversion season coincides with the critical fall period as well as the period in which over bank flooding is most likely to occur.
- b. Diversions are limited as follows:
 - i. No water may be diverted when river flows are less than 70 cubic feet per second (cfs).
 - ii. For river flows between 70 and 175 cfs, a maximum diversion rate of 6 cfs is allowed provided this diversion does not reduce downstream flow below 70 cfs,
 - iii. When river flows exceed 175 cfs, diversion of up to 46 cfs is allowed for direct use plus an additional 3,900 acre-ft (AF) for storage as follows:
 - 1) 1,250 AF to Chesbro Reservoir.
 - 2) 2,610 AF to Calero Reservoir.

- 3) 850 AF to Clementia Reservoir.
- 4) 40 AF to South Golf Course Lake 10.
- iv. The combined amount of items 2, 3, and 4 cannot exceed 2,650 AFY.
- v. The total amount of water taken from the Cosumnes River cannot exceed 6,368 AFY from October 1 to September 30.

Water right permit 16762 was issued in 1969 and amended in 1980. In 2001, the permit was renewed and extended with no new permit requirements through 2020 in consideration that the community was not at full buildout. Given California's current economic circumstances, it now appears likely that in 2020 the community will not have reached buildout and the permit will need to be extended again.

In 1976 and 1977, California experienced the driest single year drought span on record. This drought also represented the driest three year sequence drought event (1976, 1977, and 1978). The California Water Code in Section 10632 (a) mandates planning for water suppliers with more than 3,000 connections, or 3,000 acre-ft, served to use the single worst year in historical record and the driest three year sequence. Given that the District has nearly reached 3,000 connections,⁴ the District has decided to follow the above described state mandate planning criteria (e.g., single worst year and driest three year sequence for drought planning purposes).

2.2.2 Recycled Water

The District owns and operates the Rancho Murieta Wastewater Reclamation Plant (WWRP) which provides wastewater treatment and disposal/recycled water services for the entire Study Area. Raw wastewater sources are residential homes and commercial facilities such as stores and restaurants which serve the community. There are no industrial dischargers in the Study Area.

The WWRP consists of a secondary wastewater treatment facility and a tertiary treatment plant. Wastewater undergoing secondary treatment is stored in two storage reservoirs before undergoing tertiary treatment during the dry season. The tertiary treatment facilities consist of two dissolved air flotation units, two rapid sand filters, a chlorine contact chamber and pipeline, and concrete lined equalization basin. The tertiary treatment plant produces treated effluent meeting Title 22 requirements for *Disinfected Tertiary Recycled Water*.

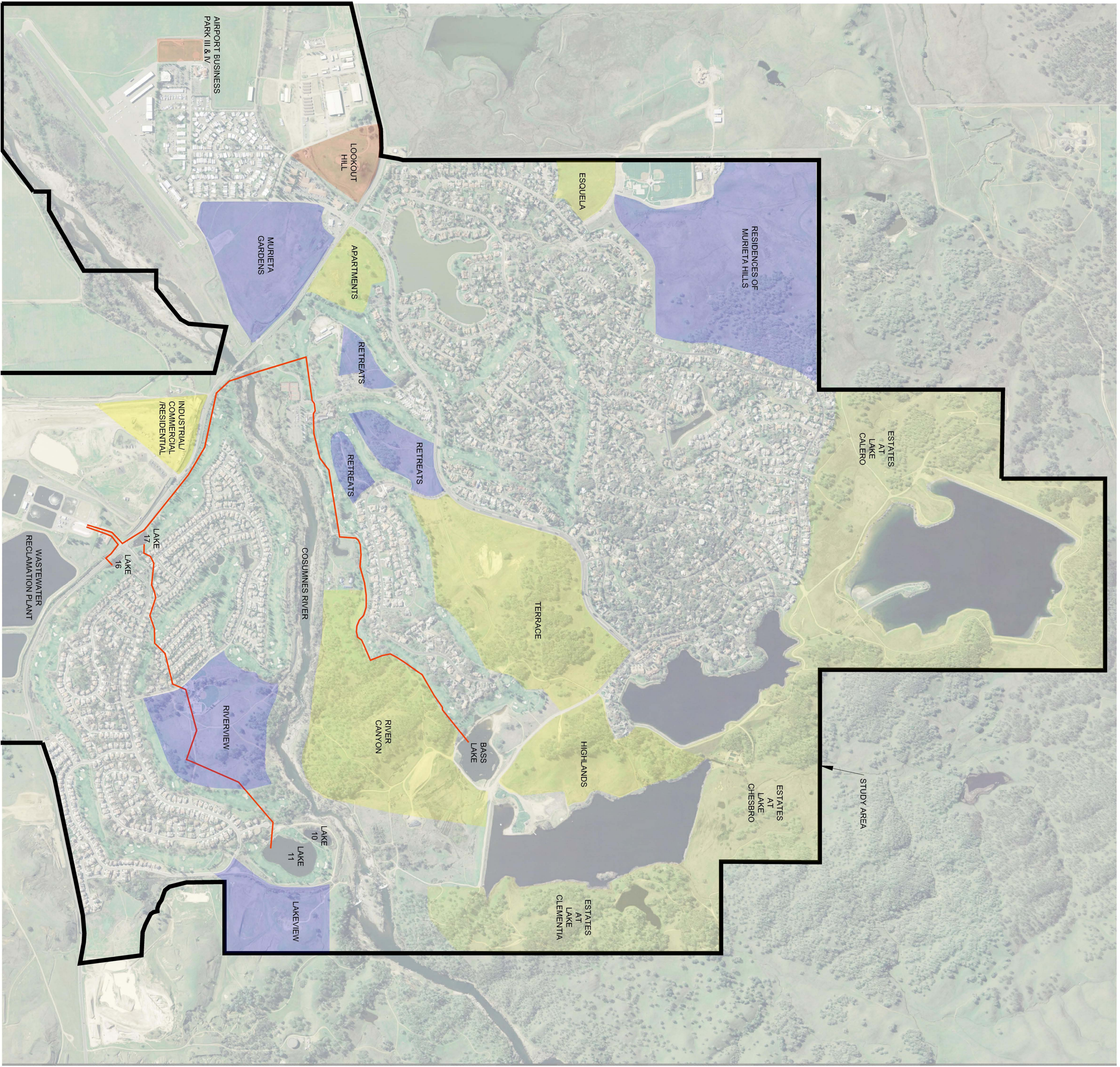
The tertiary treatment plant is generally operated each year from April through November. During the winter, secondary treated effluent is stored in the WWRP's two storage reservoirs which have a total capacity of 756 AF. After undergoing tertiary treatment, recycled water is pumped to the two golf courses located within the Study Area, stored in five reservoirs situated around the golf courses, and subsequently used for golf course irrigation throughout the dry season. Depending on demands, recycled water may be supplemented with raw water from the Cosumnes River. At buildout, all water used for golf irrigation will be recycled water. Currently, annual recycled water production is about 455 AFY. Based on historic irrigation demands, the golf courses require approximately 550 AFY of water based on average levels of precipitation (i.e. approximately 23 inches of rainfall per year).

2.3 Current and Projected Water Demands

Figure 2-1 shows the future developments planned within the District's Service Area and Table 2-1 shows the estimated number of residential, commercial, and park connections associated with current, infill, and future developments. As shown in Figure 2-1 and Table 2-1, the District anticipates two development phases; the first (Phase 1) is comprised of the 670 units which have been approved for development by Sacramento County. The second development phase (Phase 2) represents the addition of approximately 1,200 units. The exact timing of the Phase 1 development is dependent upon the local economy. However, for planning purposes, it has been assumed, based on discussions with District staff and the local developers, that occupancy of the Phase 1 residential developments will begin in 2016 and will extend through 2019. It is anticipated that occupancy of second development phase (Phase 2) will be initiated when the majority of the Phase 1 residential units have been occupied. Therefore, occupancy of the Phase 2 residential developments is assumed to begin in 2020 and extend through 2026.

Table 2-2 presents a summary of potable water supply sources and current and projected water demands for normal and drought conditions. These estimates were obtained from the District's Integrated Water Master Plan Update (October 2010)

⁴ The District will exceed the State's applicable criteria when the additional 670 units already approved by Sacramento County are constructed.



LEGEND:
 — EXISTING RECYCLED WATER PIPELINES
 ■ PHASE 1 DEVELOPMENTS
 ■ PHASE 2 DEVELOPMENTS
 ■ PHASE 2 DEVELOPMENT (INDUSTRIAL ONLY-NO RECYCLED WATER DEMAND)

HORIZONTAL GRAPHIC SCALE
 500 250 0 250 500
 1 inch = 500 ft.

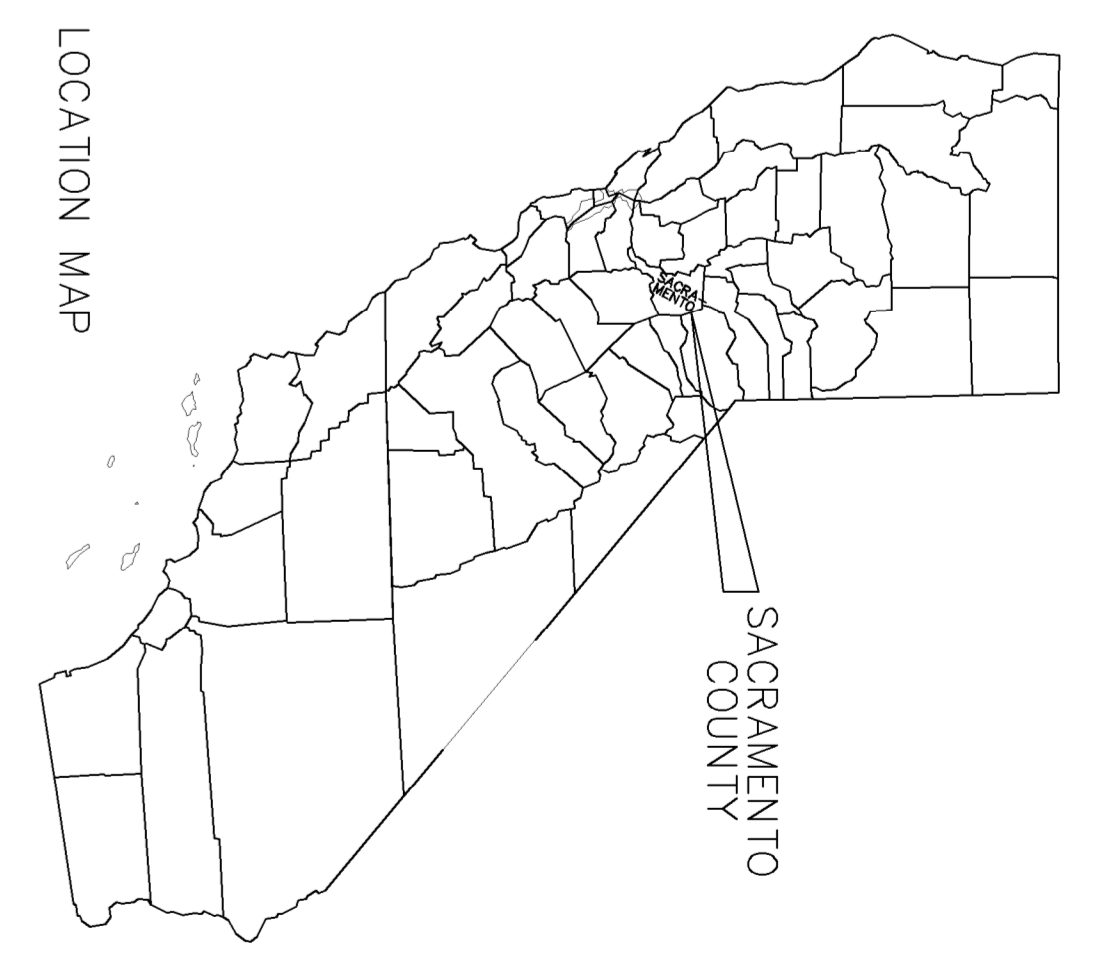
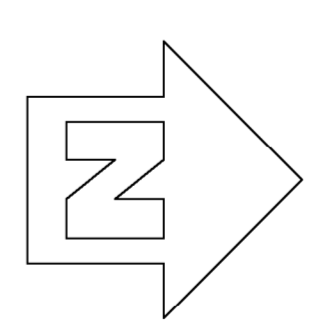


Figure 2-1, Future Phase 1 and 2 Developments
 Title XVII Recycled Water Feasibility Study

and are associated with the level of development shown in Figure 2-1. Water supply estimates account for system losses, direct rainfall and runoff, reservoir evaporation and seepage losses, compliance with California's Water Conservation Act (Senate Bill X7-7), and the District's mandatory drought water rationing measures.

Table 2-1. Existing and Projected Number of Connections at Buildout

Condition/Development Phase	Residential Units	Commercial Units	Parks	Total
Current Conditions	2,502	97	5	2,604
Infill	44			44
Phase 1 Development	620	50	1	671
Lakeview	99			
Murieta Gardens	99	50	1	
Residences of Murieta Hills	198			
Retreats	84			
Riverview	140			
Phase 2 Development	1,028		1	1,029
Apartments	170			
Esquela	40		1	
Estates of Calero	139			
Estates of Chesbro	78			
Estates of Clementia	94			
Highlands	110			
Industrial/Commercial/Residential	100			
River Canyon	120			
Terrace	177			
Total	4,194	147	7	4,348

Table 2-2. Current and Projected Water Demands

Sources of Supply	Current Conditions (AFY)		Future (Buildout) Conditions (AFY)	
	Normal Supply	Drought Supply	Normal Supply	Drought Supply
River Diversion (Potable Supply)	6,370	1,680	6,370	1,680
River Diversion (Golf Course)	95	95	0	0
Recycled Water ^a	455	455	920	920
Total Firm Supply	6,920	2,230	7,290	2,600
Conservation Savings (SB7 Compliance)	0	0	910	910
Voluntary/Mandatory Rationing	0	0	0	1,320
Total Planned Supply	6,920	2,230	8,200	4,830
Water Demands				
Residential and Non-Residential	1,905	1,905	3,660	3,660
Unaccounted for Water	715	715	890	890
Golf Course	550	465 ^b	550	465 ^b
Total Estimated Demand	3,170	3,085	5,100	5,015

^a Assumes the beneficial reuse (e.g., potable water offset) of the District's treated effluent/recycled water.

^b Golf course irrigation practices will be modified during extreme dry years to reduce demands by 15 to 18 percent as described in the *Delivery and Use of Recycled Water at the Rancho Murieta Country Club* (May 2010).

Comparison of the planned supplies and demands indicate that the District has adequate water supplies to meet projected demands under all conditions except for future drought conditions. Under this particular condition and assuming that the

Project was implemented, it is estimated that a 185 AFY deficit would occur. If the District decides to implement the No Project Alternative (as described in Chapter 4) the estimated drought deficit would increase to 635 AFY.

2.4 Potable Water Treatment Improvements

The District's first water treatment plant (Plant 1) was constructed in 1975. Plant components and processes include a drum screen, flash mixing, flocculation and sedimentation, traveling bridge filtration, chlorine disinfection, and booster pumps. The second water treatment plant (Plant 2) was constructed in 1988 and has similar components and processes as Plant 1.

In 1995, both Plants 1 and 2 were retrofitted to meet the Surface Water Treatment Rule. Since then, the plants have generally operated well and provide approximately 3.2 MGD of total combined capacity. According to the District's Annual Water Report to the California Department of Public Health, the maximum day demand in 2009 was estimated to be 3.4 MGD. However, since that time, demands appear to have been reduced due to the economic downturn and water conservation programs initiated by the District.

The District recently initiated the use of polyaluminium chloride to address taste and odor concerns. Prior to this recent change, there have been no concerns regarding the quality of water currently produced at either of the water treatment plants. However, to ensure adequate potable water supply for development, the District will initiate the Phase 3 Water Treatment Plant Expansion Project. Components associated with this project include raw water improvements and expanding the capacity of Plant 1.

It is anticipated that a Plant 2 expansion project (the Phase 4 Water Treatment Plant Expansion Project) will be required further in the future to serve development. It has been estimated that once these improvement projects are completed, the firm capacity of the District's water system will be on the order of 7.0 million gallons per day (MGD). However, if the proposed Project (i.e., expanded recycled water use for residential front and backyard irrigation) was to be implemented, the amount of capacity associated with the later improvement project could be reduced by 1.2 MGD. This estimated reduction in WTP capacity is based on historic 2009, 2010, and 2011 golf course irrigation demands. During these years, the average peak month irrigation demand was equal to 31 percent of the total annual recycled water demand.

2.5 Wastewater Treatment and Disposal Improvements

The wastewater treatment and disposal improvements listed below are required to accommodate growth within the community. As described later in Chapter 3, the majority of these improvements and their associated costs have been described in previous studies and reports. Where deemed appropriate, these descriptions served as the basis for developing the most plausible methods for upgrading the existing pastureland irrigation system (Alternative 1 as described in Chapter 4) and expanding the existing recycled water program (Alternative 2 as described in Chapter 4). However as part of this Study, each improvement and their associated costs was adjusted to reflect (1) the key design criteria described in this Study, (2) similar operating and performance requirements such as reliability, redundancy, and regulatory compliance, and (3) appropriate costs associated with administrative, engineering, and regulatory and environmental compliance. Attempts to minimize or optimize the costs associated with Alternatives 1 or 2 have not been conducted as part of this Study so that the two alternatives can be compared to one another with respect to a common level of service. Moreover, the minimization or optimization of costs is beyond the scope of this Study. It is anticipated that a detailed review of each improvement, which shall include cost minimization/optimization, associated with the recommended alternative will be conducted as part of a later effort.

- **Disinfection Facilities Upgrade:** The existing chlorine contact disinfection facilities have a rated capacity of 2.3 MGD, which is less than the rated capacity of 3.0 MGD provided by the other secondary and tertiary treatment processes within the WWRP. To address this issue, the District will be initiating an upgrade to their disinfection facilities by adding 195,000 gallons of chlorine contact basin capacity to increase its rated capacity to 3.0 MGD. This specific improvement will be made by installing concrete walls within the existing equalization basin.

The timing of this upgrade project is dependent upon development. However, the assumed timing for Phase 1 and 2 developments requires this project to be initiated in late 2014 and completed by the end of 2015. Estimated construction and project (capital) costs associated with this particular upgrade are \$930,000 and \$1,300,000, respectively. Once the disinfection facilities upgrade project has been completed, the rated treatment capacity of the WWRP will be 3.0 MGD, which is adequate to accommodate the community through buildout.

- **Seasonal Storage Expansion:** Approximately 240 AF of additional seasonal storage capacity is required to accommodate projected growth within the community. However, the assumed timing for Phase 1 and 2 developments requires this project to be initiated in mid- to late-2018 and completed by the end of 2019 when average dry weather flows to the WWRP approach 0.67 MGD. Estimated construction and project costs associated with this expansion are \$6,840,000 and \$9,750,000, respectively. Costs associated with this particular improvement are based on locating this new storage facility in the southwest corner of the existing WWTP site.
- **Treated Effluent Disposal / Recycled Water Capacity Expansion:** Preliminary development estimates indicate that golf course irrigation will provide adequate treated effluent disposal capacity through the year 2017, when treated effluent production is expected to exceed 550 AFY. To provide additional treated effluent disposal capacity to serve future development, the District is considering the following two alternatives to provide additional treated effluent disposal capacity or expanded recycled water use:
 - **Upgrading Existing Pastureland Irrigation System:** In 2007, the District entered into a temporary agreement with a nearby land owner (Van Vleck Ranching and Resources, Inc.) to dispose of excess treated effluent. This excess effluent had accumulated in the secondary storage ponds over an extended period of time in which the WWRP's disinfection facilities had to be taken out of service for improvements. The land owner has expressed interest in continuing to receive recycled water deliveries indefinitely. Recycled water is currently supplied to the pastureland through a temporary aboveground piping network. In order for the District to implement this option long-term, the Central Valley Regional Water Quality Control Board has indicated that the District must (1) undergo a formal California Environmental Quality Act (CEQA) compliance and review process and (2) upgrade the existing piping network and pumping system to reflect Title 22 compliance and long-term use.

Estimated construction and project costs associated with implementing the first of three improvement phases associated with this treated effluent disposal alternative are \$3,290,000 and \$4,280,000, respectively. The timing of this alternative is defined by the District's Waste Discharge Requirements Order No. R5-2009-0124, which allows use of the Van Vleck Ranch for a limited term through December 31, 2014.

Approximately 150 acres of additional land disposal area are required to accommodate projected growth within the community. The timing of this expansion is dependent upon future growth rates. However, the assumed timing of Phase 1 and 2 developments requires this expansion to be initiated in mid- to late 2020 and completed by the end of 2021. Estimated construction and project costs associated with the second and third improvement phase are \$5,740,000 and \$7,460,000, respectively. More detailed descriptions of these improvements are presented in Section 4.

- **Expansion of Existing Recycled Water Program to Serve Residential Homes:** This alternative assumes expansion of the District's existing recycled water program to serve future residential developments for front and backyard irrigation and irrigation of existing parks, roadway medians and commercial landscaping where deemed to be cost effective by the District. A more detailed description of this alternative and its estimated costs are provided in Chapters 4 and 5.

Regardless of which treatment effluent disposal / recycled water capacity expansion alternative is selected, both the disinfection facilities upgrade and seasonal storage expansion projects are required to accommodate projected growth within the Study Area.

3 Recycled Water Opportunities

This chapter describes the opportunities and sources for the expanded use of recycled water within the Study Area as well as a description of the existing recycled water program and the applied recycled water production technologies.

3.1 Potential Recycled Water Uses

The following projects were initiated by the District to identify and compare potential methods to dispose of treated effluent and/or use recycled water to serve future recycled water customers within the Service Area. Ultimately potential recycled water uses were identified through the execution of these separate but interrelated projects as described below.

3.1.1 Wastewater Facilities Expansion and Financing Plan⁵

This project was initiated in 2006 to identify the wastewater treatment, storage, and disposal improvements necessary to accommodate growth within the community through buildout. The following alternatives were identified and compared as part of the project:

- Spray field irrigation of nearby pasturelands
- Recycled water irrigation of new residential developments and parks
- Seasonal surface water discharge of excess treated effluent
- Connection (regionalization) to Sacramento Regional County Sanitation District

3.1.2 Integrated Water Master Plan⁶ and Integrated Water Master Plan Update⁷

The Integrated Water Master Plan (IWMP) was initiated in 2005 to address the projected drought deficits, improve storage reservoir aesthetics, and identify methods to encourage reductions in residential potable water demands. A total of ten strategies/components were identified to alleviate drought deficits, including the following three which dealt specifically with treated effluent disposal/expanded recycled water use:

- Expand recycled water program to offset potable water demands based on serving existing and future urban demands (residential, commercial, parks, common area irrigation)
- Exchange treated effluent/recycled water for groundwater
- Recharge local aquifer with recycled water

Workshops, open to the public, were held as part of the project to review preliminary findings and results and to identify and describe potential components and strategies that could achieve the project goals.

The IWMP Update was completed in 2010 and addressed changes in state legislation regarding water use targets and greenhouse gas emissions, federal and state guidance regarding recycled water use, and water supply reliability risks associated with climate change. The primary outcome of these studies was the recognition of the benefits (e.g., reduced costs and environmental impacts and improved storage reservoir aesthetics) recycled water provided when used to offset potable water demands within the community as compared to irrigation of agricultural lands located outside of the District's service area.

⁵ Completed July 2007

⁶ Completed November 2006

⁷ Completed October 2010

3.1.3 Recycled Water Feasibility Study⁸

The project was initiated in 2009 to identify future recycled water customers and provide the District and its Board of Directors (Board) with a better understanding of the specific steps necessary to expand the existing recycled water program. A total of four public workshops were conducted with the District's Board to present and discuss the recycled water program description, administrative structure, infrastructure standards and regulatory compliance, and program implementation.

The primary outcomes of this study were the determinations that:

- Retrofitting existing residential units to accommodate front and backyard recycled water irrigation would be cost prohibitive
- Some existing commercial and urban irrigation accounts located near the existing recycled water conveyance systems could be served cost-effectively
- At that time, the maximum potential commercial and urban recycled water irrigation demand was estimated at 140 AFY, which is considerably less than the demand needed to accommodate the District's long-term treated effluent disposal needs. Based on this finding, it was decided that the District's primary focus of the expanded recycled water system would be on serving future residential developments.

3.1.4 Direct and Indirect Potable Reuse

Water agencies have expressed interest in defining the guidelines and criteria needed to implement direct and indirect potable reuse due to increasing water scarcity, the limits of current conventional water supplies, and need for water agencies to maximize beneficial use of all available water resources. Although neither of these options is currently permissible at this time, the status of both direct and indirect potable reuse were reviewed as part of this Study to determine whether either of these options may represent a viable alternative for long-term effluent disposal in the future. For the purposes of this Study, direct potable reuse (DPR) is defined as the introduction of purified municipal wastewater into a water treatment plant intake or directly into the water distribution system. Indirect potable reuse (IPR) is defined as the planned incorporation of purified municipal wastewater into an environmental buffer (e.g., aquifer or storage reservoir) for a specified period of time before being withdrawn for subsequent potable water treatment and distribution purposes. In DPR, the purified municipal wastewater is not placed into an environmental buffer.

To address the increased interest expressed by water agencies, California's Governor signed Senate Bill 918 into law in September 2010. This bill requires the California Department of Public Health (CDPH):

- Adopt uniform water recycling criteria for IPR for groundwater recharge by the end of 2013. The bill also requires that if an expert panel convened pursuant to the bill finds that the criteria for surface water augmentation would adequately protect public health, criteria for surface water augmentation must be developed by the end of 2016.
- Investigate the feasibility of developing regulatory criteria for DPR and provide a final report on that investigation to the Legislature by the end of 2016.

Preliminary assessments of the IPR and DPR options indicate that the configuration of the District's existing raw water storage and recycled water conveyance systems could be modified for IPR via surface water augmentation cost-effectively and potentially eliminate the need for seasonal storage. Currently, there are no recycling criteria addressing IPR via surface water augmentation in which to determine water and/or wastewater treatment requirements. However, surface water augmentation has previously been addressed in *A Proposed Framework for Regulating the Indirect Potable Reuse of Advanced Treated Reclaimed Water by Surface Water Augmentation in California* (California Potable Reuse Committee, 1996). The committee that wrote the framework concluded that planned IPR of advanced treated recycled water via surface water augmentation would not adversely affect drinking water quality if the following conditions were met:

- Approved advanced wastewater treatment processes have been applied (e.g., oxidation process followed by reverse osmosis membrane treatment)
- All relevant water quality standards are achieved.

⁸ Completed June 2009

- Advanced treated recycled water is retained in a storage reservoir for sufficient time before treatment in a water treatment plant.
- Downstream drinking water treatment operations will not be negatively impacted.
- There are multiple barriers for the removal of pathogens and toxic chemicals. The report states that source control of discharges into the wastewater collection system, conventional wastewater treatment, membrane treatment, disinfection, reservoir retention, and surface water treatment are effective physical and chemical barriers.

The authors of the 1996 report considered the following six criteria to be critical for IPR:

- Application of best available technology in advanced wastewater treatment with the treatment plant meeting operating criteria.
- Maintenance of appropriate retention times based on reservoir dynamics.
- Maintenance of advanced wastewater treatment plant operational reliability to consistently meet primary microbiological, chemical and physical drinking water standards.
- Surface water augmentation projects using advanced treated recycled water must comply with applicable State of California criteria for groundwater recharge for direct injection with recycled water.
- Maintenance of reservoir water quality.
- Provision for an effective source control program.

The second criterion listed above calls for a reservoir retention time. A required retention time to provide adequate response time to identify treatment failures and implement mitigation measures/actions and/or provide some level of additional treatment via an environmental buffer has not yet been specified by the CDPH. Thus, discharges of recycled water into a raw water reservoir for IPR will be influenced by a science-based regulatory decision regarding the minimum retention time determined by the CDPH. This decision is complicated by the realities of reservoir hydrodynamics, particularly short-circuiting during reservoir turnover. The City of San Diego is conducting studies that will provide information to be considered by the CDPH in these deliberations. There will likely be similar concerns that will need to be addressed for direct potable reuse to be considered as an acceptable means to supplement drinking water supplies.

CDPH has developed and released draft regulations for groundwater recharge using recycled water (Draft GWR Regulations; last updated in November 2011) which provide guidance in establishing permitting criteria for IPRs. In addition to compliance with drinking water standards, the Draft GWR Regulations establish additional requirements for IPR projects such as control of contaminants, treatment standards, and monitoring requirements. Of importance to the District with respect to IPR via surface water augmentation is the need to monitor chemicals of emerging concern (CECs) (which would increase routine monitoring costs) and the removal of pathogens. According to the Draft GWR Regulations, the wastewater treatment train must consist of at least three separate treatment processes and the wastewater used for recharge must receive treatment that achieves at least 12-log enteric virus reduction, 10-log *Giardia* cyst reduction, and 10-log *Cryptosporidium* oocyst reduction. Based on these removal requirements, a review of wastewater processes currently being considered by CDPH for groundwater recharge for direct injection with recycled water, and the treatment requirements described in the Draft GWR Regulations, it appears likely that the existing WWRP would have to be modified to incorporate conventional activated sludge followed by tertiary filtration, microfiltration, reverse osmosis, and UV disinfection/advanced oxidation processes. Given the costs associated with these improvements, IPR does not appear to be cost-effective at this time. However, the District will continue to monitor the regulatory and implementation status of both IPR and DPR to determine when, or if, this approach becomes economically attractive.

3.1.5 Comparison of Alternatives and Recommended Course of Action

For each of the studies listed above, potential treated effluent disposal/recycled water alternatives were compared with respect to economic and non-economic factors. Both seasonal surface water discharge and regionalization were eliminated from further consideration due to timing and economic factors. Specifically, the implementation of seasonal surface water discharge would have required the District to obtain a NPDES discharge permit, construct and fund the outfall and associated pumping

facility well ahead of development, and could result in the need to significantly modify the WWRP in the foreseeable future to meet more stringent discharge requirements. Regionalization was eliminated because costs were significantly higher than the other competing alternatives.

The use of recycled water for residential irrigation was selected by the District's Board as the preferred alternative and recommended course of action because of the following comparison results and perceived benefits:

- **Economic Comparison:** Preliminary conceptual level cost estimates indicate that expansion of the existing recycled water program to serve future development (residential, park, commercial landscape irrigation) and existing parks, roadway median, and commercial landscape areas are approximately equal to the costs associated with the other competing alternatives based on installing a new recycled water conveyance system.

As part of this Study, the irrigation of relatively small land parcels, such as roadways medians and commercial landscaping areas was revisited. It was determined that serving these particular recycled water uses may not be cost-effective if (1) accurate as-built drawings of the existing irrigation system are unavailable and increased costs associated with complying with recycled water identification and cross-connection control requirements are anticipated, (2) significant alterations are required to the use area in order to reduce the potential for recycled water ponding and/or runoff and satisfy setback and/or irrigation system requirements, and (3) significant piping improvements are needed to serve recycled water to the irrigation area. Based upon these considerations, the recycled water system improvements described in Chapter 4 focused on serving future developments associated with new residential homes and the irrigation of existing roadway medians and commercial landscaping areas was not considered further in this Study. However, the District will consider these and other existing areas for potential recycled water use on a case-by-case basis as part of the future facilities planning effort.

- **Water Rights Permit 16762:** Condition 26 of the District's primary water right promotes the use of recycled water for irrigation purposes.
- **Financial Benefits:** It is anticipated that Rancho Murieta residents will receive indirect financial benefits due to (1) reduced raw water diversion and potable water treatment operations and maintenance costs, (2) maximizing the use and life span of the WWRP, (3) being regulated by recycled water based waste discharge requirements which have been perceived as being more consistent than surface water discharge requirements over the past 10 to 15 years, and (4) the potential reduction in scope for the Phase 4 Water Treatment Plant Expansion Project.
- **Fish and Wildlife Benefits:** The expanded use of recycled water for residential irrigation results in decreased surface water diversions from the Cosumnes River and Delta and increased potential for recharge of the Central Basin. Other environmental benefits include decreased wastewater discharges and the associated potential risk of surface water degradation.
- **Reduced Fertilization Needs:** Recycling treated effluent for landscape irrigation results in the beneficial reuse of both the water and associated nutrients (i.e. nitrogen and phosphorus) for landscape fertilization. For example, at the projected irrigation rate of 2.95 ft/year, it is estimated that recycled water provides an equivalent nitrogen load of 4 to 6.5 lb-N/1,000 sf-year which is comparable to recommended fertilization rates of 4 lb N/1000 sf per application for established lawns.
- **Reduced Greenhouse Gas Emissions:** The wastewater will be treated to a specific water quality standard regardless of the chosen disposal method. However, decreased potable water production, and thus lower greenhouse gas emissions, is associated with the expansion of the existing recycled water program.

3.2 Implementation Considerations and District's Recycled Water Policy

Many recycled water projects do not move forward due to lack of public acceptance and relatively high costs. More specifically, the construction of advanced wastewater treatment facilities coupled with the installation of seasonal storage and separated potable and recycled water conveyance and distribution systems often make recycled water projects cost-prohibitive when compared to other potential sources of supply. The District has attempted to proactively address obstacles that may inhibit the expanded use of recycled water by (1) adopting a Recycled Water Policy, (2) leveraging the existing recycled water conveyance system serving the North and South Golf Courses, (3) meeting with the developer stakeholders responsible for funding the expanded recycled water system, and (4) meeting with the state agencies responsible for

permitting and regulating recycled water use as described below. However, as described in Chapter 2, attempts to minimize or optimize the costs associated with Alternatives 1 or 2 have not been conducted as part of this Study so that the two alternatives can be compared to one another with respect to a common level of service. It is anticipated that a detailed review of each improvement, which shall include cost minimization/optimization, specific to the recommended alternative will be conducted as part of a later task.

- **Recycled Water Policy:** In July 2011, the District's Board adopted a policy regarding the use of recycled water. A copy of this policy is included in Appendix A for reference. This policy requires the following:
 - Future use of recycled water, wherever economically and physically feasible, as determined by the District's Board, for non-domestic purposes when such water is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and not injurious to plant life, fish, and wildlife. The type of use is defined by Title 22 of the California Code of regulations. In general, the lands subject to mandatory recycled water use are defined as undeveloped parcels within the existing Service Area.
 - Irrigation of existing parks, roadway median, and commercial landscaping areas may be converted to recycled water wherever economically and physically feasible, as determined by the District's Board. As previously described, it is recommended that recycled water irrigation of existing roadway medians and commercial landscaping be determined on a case by case basis once the recommended residential developments for service, and the general alignment of their associated recycled water conveyance system, have been identified.
- **Leveraging Existing Recycled Water System:** The Project relies upon the use of the existing conveyance systems shown in Figure 3-1 for recycled water conveyance and distribution. These existing systems currently deliver recycled water from the WWRP to the North and South Golf Courses. As illustrated in the next chapter, infrastructure requirements needed to serve future residential developments with recycled water can be minimized by leveraging the capacities readily available in these two systems.
- **Stakeholder Partnering:** District staff have met with the local development community and regulatory agencies (e.g., Central Valley Regional Water Quality Control Board (RWQCB) and CDPH) during the development of this report to (1) describe the proposed expanded recycled water program; (2) identify data and information (e.g., development timelines, phasing, parcel sizes, water supply needs, etc.) pertaining to the specific developments shown in Figure 2-1, (3) identify and discuss specific items which may be problematic from the standpoints of development and regulatory compliance, and (4) discuss potential methods for reducing costs.

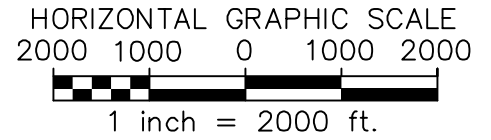
With regard to public acceptance, it is the District's impression that the proposed Project has been well received by the community. Moreover, in addition to having a drought proof water supply for irrigation, it is anticipated that future recycled water customers will save money as recycled water rates are typically priced at about 80 to 90% of potable water rates. It is likely that this anticipated savings will be greater in times of drought when the District has its Drought Management Plan in effect.

3.3 Water, Wastewater, and Recycled Water Jurisdiction

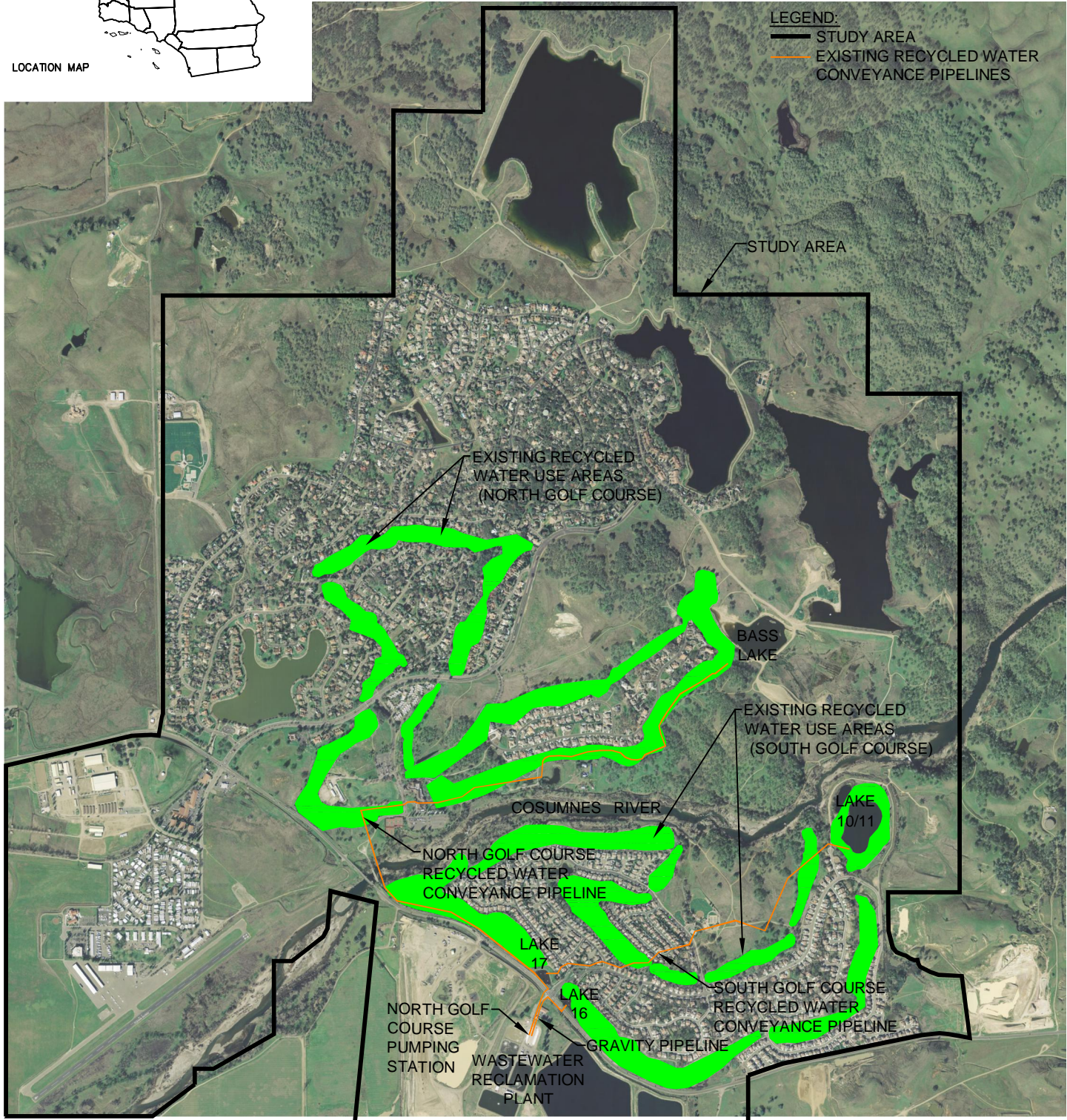
As previously described, the District has sole jurisdiction related to potable water supply and wastewater treatment within the Study Area. Both the District and the Rancho Murieta Country Club have jurisdiction related to the existing use of recycled water within the Study Area. For the Project, it is envisioned that the District would have sole jurisdiction related to the use of recycled water for front and backyard irrigation of future residential units as well as the potential irrigation of existing parks, roadway medians and commercial landscaping.

3.4 Source of Water To Be Recycled

The source of the District's recycled water is treated effluent from its WWRP. The WWRP currently receives approximately 0.5 MGD of residential and commercial wastewater from the Service Area. There are no known industrial contributions to the District's wastewater. In the future, the WWRP is projected to receive approximately 0.9 MGD based on the level of development shown in Figure 2-1.



LEGEND:
 — STUDY AREA
 — EXISTING RECYCLED WATER CONVEYANCE PIPELINES



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Figure 3-1. Existing Recycled Water System and Use Areas
 Title XVI Recycled Water Feasibility Study

3.5 Recycled Water Uses and Associated Water Quality and Treatment Requirements

Recycled water has been used for residential landscape irrigation in California since the early 1990s. In 1999, Serrano, a master-planned community located approximately 20 miles north of the District's service area in El Dorado Hills, became the first community in California, and among the first in the nation, to provide recycled water for irrigation of residents' front and back yards. Other agencies that have dual plumbed residences include the Irvine Ranch Water District in Orange County; Rancho California Water District in Riverside County; City of Windsor, California; and City of Pompano, Florida.

The proposed Project will deliver recycled water for landscape irrigation of new residential homes and existing parks, roadway medians, and commercial accounts. The recycled water will be treated to meet *Disinfected Tertiary Recycled Water* standards as described by the California Code of Regulations, Title 22, Chapter 3, Water Recycling Criteria (Title 22). This level of treatment is accepted by the applicable regulatory agencies for the intended uses. In addition, the Project is supported and encouraged by California's Recycled Water Policy and is permissible under the State Water Resources Control Board's General Recycled Water Permit (WQO No. 2009-006-DWQ).

The District has over 20 years of experience as a recycled water producer and distributor. The proposed Project will be an expansion of the District's existing and successful recycled water program which serves the two existing golf courses located within the community as described below.

3.5.1 Existing Wastewater Treatment and Recycled Water Systems

The District owns and operates the WWRP which receives domestic wastewater from the Study Area and has produced tertiary effluent used for golf course and landscape irrigation since the mid-1980s. The WWRP is designed to treat an annual average flow of up to 1.55 MGD. Currently annual average wastewater influent flows are approximately 0.5 MGD. The rated capacity of 1.55 MGD is adequate to serve the level of development originally envisioned at buildout (approximately 5,200 units). This buildout projection has since been reduced to approximately 4,348 units as described in Table 2-1.

The WWRP consists of both a secondary wastewater facility and a tertiary treatment plant. Wastewater receives secondary treatment through five aerated facultative ponds that are operated in series. Secondary effluent is conveyed into two large reservoirs which store the secondary effluent during the winter season when recycled water is not needed or produced. The two storage reservoirs have a combined capacity of 756 AF. The tertiary treatment system consists of a tertiary pumping station, dissolved air flotation units, sand filters, a chlorine contact basin and pipeline, and a pumping station which serves recycled water to the North Golf Course. The capacity of tertiary treatment plant is currently limited to 2.3 MGD by the chlorine contact basin and pipeline. Once the capacity of this particular process is expanded, the rated capacity of the tertiary treatment plant will be increased to 3.0 MGD. The existing 2.3 MGD capacity is sufficient to meet current recycled water demands. It has been estimated that the 3.0 MGD capacity will be sufficient to meet buildout recycled water demands associated with Alternatives 1 and 2 as described in Chapter 4.

Following secondary and tertiary treatment, the treated effluent is beneficially reused through the irrigation of two golf courses. All of these existing reuse areas are located within the Study Area. The total combined irrigation area and demand of the two golf courses is estimated to be 250 acres and 550 AFY, respectively. Currently recycled water deliveries provide 455 AFY, and the remaining 95 AFY golf course demands are met through raw water deliveries from the Cosumnes River. The WWRP is operated under Waste Discharge Requirements Order No. 5-01-124 (WDR) which was issued by the RWQCB. As described in the WDR, the recycled water produced by the WWRP meets the *Disinfected Tertiary Recycled Water* standards and is acceptable by the applicable regulatory agencies for the intended uses.

The existing WWRP has sufficient capacity, is approved by the CDPH and RWQCB, and produces recycled water of a quality suitable for the proposed Project. The WWRP operations and maintenance (O&M) costs are considered relatively low compared to more recently developed recycled water production technologies. For example, membrane filtration often requires more energy due to significantly higher headloss (e.g., pumping) and ballasted flocculation requires higher dosages, and the constant addition, of chemicals (e.g., polymer and alum). The need for these additional resources could be problematic from the standpoint of public acceptance given that both energy and chemical addition impact greenhouse gas emissions as well as treatment costs. Given these considerations, coupled with the fact that the continued use of the existing WWRP would minimize capital and O&M costs associated with the proposed Project, no alternative treatment technologies are deemed necessary.

4 Description of Alternatives

This chapter describes the alternatives that were considered to meet current and projected water demands and treated effluent disposal needs. As described previously, the two alternatives considered for implementation were upgrading the existing pastureland irrigation system (Alternative 1) and expanding the recycled water service program (Alternative 2). Alternative descriptions which include physical, institutional, and operational requirements along with construction and project cost estimates associated with major structures, facilities, infrastructure, etc. are presented below.

4.1 Upgrading Existing Pastureland Irrigation System (Alternative 1)

This alternative represents the “No Project” alternative and reflects the reasonable and foreseeable actions taken by the District to meet the projected potable water supply and treated effluent disposal needs of the Study Area. This alternative assumes that the existing recycled water program is not expanded within the community beyond satisfying the irrigation demands of the two golf courses (i.e., limited to 550 AFY) and that treated effluent beyond this amount is used offsite for pastureland irrigation. Specific improvements associated with this alternative are described below. Table 4-1 lists the estimated construction and project costs associated with the following improvements.

- Undergo a formal environmental review process for long-term treated effluent disposal on nearby pasturelands in accordance with the CEQA and NEPA,
- Upgrade the existing pipeline conveyance (approximately 5,850 lineal feet of 12-inch diameter pipe) and pumping systems to reflect long-term use and Title 22 requirements,
- Expand the treated effluent disposal system in the future to irrigate an additional 150 acres of pasturelands (through the installation of approximately 12,000 lineal feet of 12-inch diameter pipe),
- Provide an additional 1.2 MGD of potable water treatment capacity to serve projected peak month residential irrigation demands in the future,
- Replace the existing recycled water pumping station currently serving the South Golf Course with a 640 gallon per minute (gpm) facility, and
- Install the disinfection facilities upgrade and seasonal storage expansion as described in Section 2.5. These particular improvements are common to both alternatives.

As shown in Table 4-1, the total estimated project cost for this alternative is approximately \$24 million. Improvements common to both alternatives represents a little more than 50 percent of this total estimated costs. Detailed cost estimates associated with each of the improvements listed in Table 4-1 are attached in Appendix B for reference.

There are a few distinct differences between the two alternatives with respect to administrative and annual operation and maintenance (O&M) requirements. These differences are described below.

- There are differences in the anticipated repair and replacement costs associated with the pipeline conveyance systems and increased water treatment plant capacity. Estimated O&M costs for these particular assets are assumed to be equal to 2.5 and 1 percent of the costs associated with these improvements, respectively.
- Higher O&M costs associated with the production of additional potable water supply to satisfy future residential front and backyard irrigation demands are anticipated for Alternative 1. The estimated average potable water production

Table 4-1. Estimate of Probable Construction and Project Costs for Alternative 1

Improvement Project	Estimate of Probable Costs		Timeline When Improvement is Required to Be in Service
	Construction (\$)	Project (Capital) (\$)	
Improvements Specific to Alternative 1			
Spray Field Improvements	3,290,000	4,280,000	January 1, 2015
Phase 1 Spray Field Expansion	2,470,000	3,210,000	2020
Phase 2 Spray Field Expansion	3,270,000	4,250,000	2022
Subtotal	9,030,000	11,740,000	
Improvements Common to Both Alternatives			
Seasonal Storage	6,840,000	9,750,000	2020
Disinfection Facilities Upgrade	930,000	1,300,000	2016
South Golf Course Pump Station	900,000	1,240,000	2015
Subtotal	8,670,000	12,290,000	
Total	17,700,000	24,030,000	

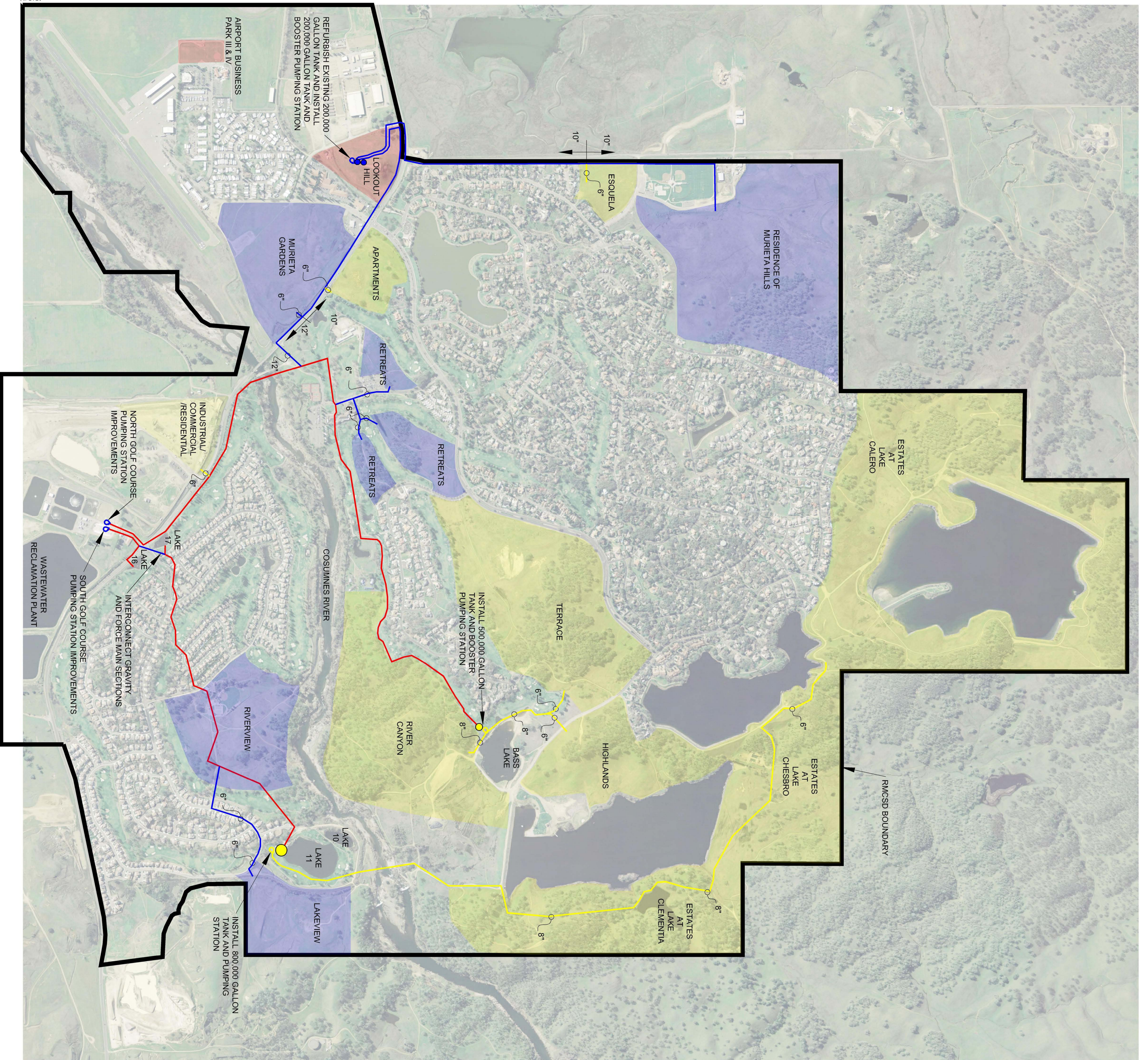
costs for the past three years⁹ is \$999.5 per acre-ft. Growth projections indicate that recycled water production will exceed combined demands of the North and South Golf Courses in 2018. During that year, approximately 30 AF of excess recycled water would be available. It is estimated that the full 370 AF of excess recycled water would be available in 2026 and beyond.

- The District entered into an agreement with Van Vleck Ranching and Resources, Inc. to supply treated effluent for irrigation of pasturelands located on portions of the Van Vleck Ranch. The District has expressed a desire to maintain the ability to send treated effluent to these pasturelands in the future; albeit under unusual circumstances and as a last resort. In order to maintain the ability to use this backup disposal method long-term, the District would have to modify their agreement with Van Vleck Ranching and Resources, Inc. and file for and obtain approval from the RWQCB for long-term use as part of their master reclamation permit.

4.2 Expanding Recycled Water Program to Serve Future Residential Irrigation (Alternative 2)

This alternative assumes the District expands its existing recycled water program to serve future residential developments and existing parks, roadway medians, and commercial landscaping. As shown in Figure 4-1, the existing recycled water conveyance system would be expanded through the addition of recycled water pipelines, pumping stations, and storage tanks to serve future developments. For the purposes of this Study, it was assumed that Stonehouse Park would be served with recycled water for irrigation purposes in the future. It is likely that other existing parks, roadway medians, and commercial landscaping located adjacent to the existing and proposed recycled water pipelines would also be served with recycled water. However, it is recommended that this determination be made as part of a future effort once the general alignment of the expanded recycled water conveyance system has been determined. Alternative 2 consists of the installation of up to 6.8 miles of underground recycled water transmission pipelines ranging from 6- to 12-inches in diameter and up to three new recycled water storage tanks assuming that all residential developments are served recycled water.

⁹ Fiscal years 2009-10, 2010-11, and 2011-12.



LEGEND:
 — EXISTING RECYCLED WATER PIPELINES
 — PHASE 1 RECYCLED WATER IMPROVEMENTS
 — PHASE 2 RECYCLED WATER IMPROVEMENTS
 — PHASE 2 RECYCLED WATER DISTRIBUTION SYSTEMS
 NOTE: RECYCLED WATER DISTRIBUTION SYSTEMS LOCATED WITHIN EACH FUTURE DEVELOPMENT ARE NOT SHOWN.

HORIZONTAL GRAPHIC SCALE
 500 250 0 250 500
 1 inch = 500 ft.

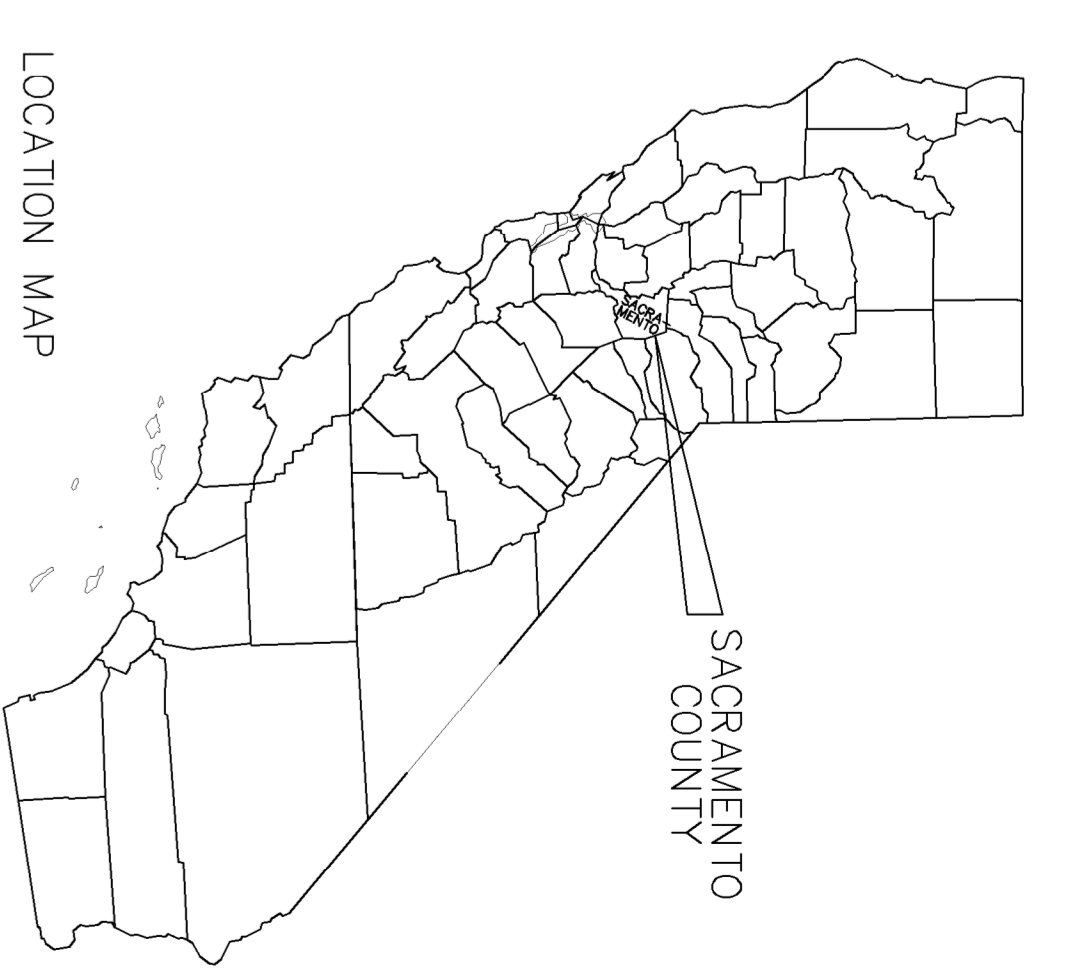
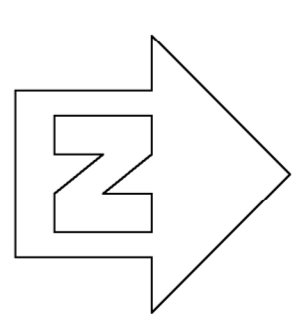


Figure 4-1. Proposed Recycled Water System Expansion (Alternative 2)
 Title XVI Recycled Water Feasibility Study

The estimated total project cost of Alternative 2 is \$30.8 million. However, the total estimated recycled water demand, assuming all residential developments are served with recycled water, is 1,050 AFY which exceeds the estimated 370 AFY of recycled water available for residential irrigation. Therefore, it has been determined that many of the residential developments will not be served recycled water due to their relatively higher estimated improvement costs. In order to determine which particular developments are to be served recycled water, each of the future developments were compared to one another with respect to estimated unit costs to deliver 1 AFY as described in Chapter 5.

Table 4-2. Estimate of Probable Construction and Project Costs for Alternative 2

Improvement Project	Estimate of Probable Costs		Timeline When Improvement is Required to Be in Service
	Construction (\$)	Project (Capital) (\$)	
Improvements Specific to Alternative 2			
Lakeview Pipeline (6-inch)	270,000	380,000	2016
Murieta Gardens (12- and 6-inch)	350,000	490,000	2016
Retreats (6-inch)	350,000	490,000	2016
Residences of Murieta Hills (10-inch)	2,170,000	3,040,000	2016
Lookout Hill Tanks and Pump Station	1,770,000	2,080,000	2016
North Course Pump Station	1,420,000	1,700,000	2016
Industrial, Commercial, Residential (6-inch)	160,000	220,000	2020
Apartments (6-inch)	150,000	210,000	2020
Esquela (6-inch)	60,000	80,000	2020
Bass Lake Tanks and Pump Station	2,070,000	2,900,000	2020
River Canyon (8-inch)	90,000	130,000	2020
Terrace and Highlands (8- and 6-inch)	280,000	390,000	2020
Lake Estates (8- and 6-inch)	4,570,000	6,400,000	2020
Subtotal	13,710,000	18,510,000	
Improvements Common to Both Alternatives			
Seasonal Storage	6,840,000	9,750,000	2020
Disinfection Facilities Upgrade	930,000	1,300,000	2016
South Golf Course Pump Station	900,000	1,240,000	2015
Subtotal	8,670,000	12,290,000	
Total	22,380,000	30,800,000	

4.3 Treatment and Disposal Water Quality Requirements

There are no alternative technologies necessary for either alternative. The existing WWRP currently produces treated effluent meeting unrestricted use (e.g., Disinfected Tertiary standards) and has been approved by the CDPH and RWQCB for the intended uses associated with Alternatives 1 and 2.

4.4 Alternative Measures or Technologies

There are no alternative measures or technologies necessary for either alternative. The existing WWRP is approved by the CDPH and produces treated effluent of sufficient quality for the intended uses. Infrastructure components associated with Alternative 2 will be in conformance with all applicable CDPH requirements specific to recycled water systems.

5 Economic Analyses

This chapter describes the economic analyses that were developed to compare:

- **Unit Capital Costs to Serve Individual Developments:** Each of the future residential developments were compared to one another with respect to estimated unit project costs (i.e., \$/AFY) for recycled water service. As described below, the results of this analysis served as the basis for recommending which particular developments would be served recycled water in the future.
- **Comparison of Competing Alternatives:** The two alternatives (Alternatives 1 and 2 as described in Chapter 4) were compared to one another with respect to total and incremental net present worth costs. The result of this analysis was used to determine which alternative was deemed to be more cost-effective.

5.1 Comparison of Capital Costs to Serve Individual Developments

Recycled water system improvements (see Figure 4-1) needed to serve future residential developments were identified. In general, these improvements were associated with recycled water conveyance (pipelines and pumping stations) and storage tanks to supplement recycled water production at the WWRP. Key criteria used to determine the improvements are:

- **Maximum Velocity in Recycled Water Mains:** To minimize pumping (energy) costs, a maximum velocity of 6 feet per second (fps) was used to size mains except for the existing 8-inch main serving the North Golf Course. The maximum velocity in this particular main was limited to 7 feet per second to satisfy the relatively high demand served by this particular asset.
- **Maximum Velocity in Recycled Water Pipelines Serving Individual Developments:** To minimize pumping (energy) costs, a maximum velocity of 5 fps was used to size new pipelines serving individual developments.
- **Minimum Pipe Diameter:** A minimum pipe diameter of 6-inches was assumed for all recycled water transmission mains (e.g., pipelines servicing individual developments).
- **Recycled Water Irrigation Schedule:** Both golf course and residential irrigation is assumed to occur over an 8 hour period, between the hours of 10 pm and 6 am to limit the public's potential exposure to recycled water in accordance with Title 22. This irrigation schedule is similar to that used by El Dorado Irrigation District for the Serrano residential irrigation program.
- **Bass Lake and Lake 16/17 Drawdowns:** During golf course irrigation, the maximum drawdown from these particular recycled water sources is limited to 6 and 4 inches, respectively. The WWRP and recycled water conveyance system must provide adequate production capabilities to refill these lakes on a daily basis during the peak month irrigation demand season.
- **Recycled Water Storage Tank Volume Requirements:** Recycled water storage requirements are equal to two times the difference between projected recycled water irrigation demands and the combined recycled water supply from the WWRP, WWRP Equalization Pond, Bass Lake, and Lakes 16 and 17. It is assumed that residential irrigation demands cannot be met using recycled water stored in Bass Lake or Lakes 16 and 17.¹⁰
- **Booster Pumping Stations and Residential Development Distribution Systems:** It is assumed that individual booster pumping stations (if needed) and distribution systems specific to each development will be provided and paid

¹⁰ This assumption was made to accommodate CDPH's concerns described in their November 16, 2012 letter addressed to the District.

for by the developers. These pumping stations will be used to boost the recycled water pressure to a level acceptable for service (in the range of 60 to 80 pounds per square inch (psi) measured at the residential recycled water meter). Costs associated with these particular stations and pipeline distribution systems are not included in any of the cost estimates described in this report.

Capital costs associated with each of the improvements shown in Figure 4-1 was assigned to a particular development or group of developments based on the area served by the improvement. For example, it is anticipated that a new 10-inch recycled water main and two 200,000 gallon storage tanks would be required to serve developments located in the west and northwest portion of the Study Area (e.g., Apartments, Esquela, and Residences of Murieta Hills). Capital costs associated with these particular improvements were assigned to these developments based on pipeline distance and projected recycled water demands. After assigning each of the improvements to a particular development or group of developments, the total project cost associated with each development was determined by adding the individual improvement cost allocations together. This sum was then divided by a development's projected recycled water demand. This factor (\$/AFY) was then used to rank individual developments with respect to one another. Developments associated with lower \$/AFY factors were deemed to be the most cost-effective to serve recycled water. Conversely, developments with higher \$/AFY factors were deemed to be the less cost-effective. Calculations associated with this particular analysis are attached in Appendix B for reference.

In general, the developments deemed to be the most cost-effective (e.g., Industrial/Commercial/Residential, Murieta Gardens, Apartments, and Retreats) are located along the existing recycled water main serving the North Golf Course and require minimal pipeline improvements for service. The next most cost-effective developments were those located adjacent to Holes 3 through 8 of the North Golf Course (e.g., River Canyon, Terraces, and Highlands). Although these developments require a significant amount of improvements, recycled water demands projected for these particular developments are relatively high, thereby reducing the overall \$/AFY factor to within a moderate level. The combined peak irrigation recycled water demands of these developments (e.g., Industrial/Commercial/Residential, Murieta Gardens, Apartments, Retreats, River Canyon, Terraces, and Highlands), the North Golf Course, Residences of Murieta Hills, and Esquela is equal to the estimated hydraulic capacity of the existing 12-inch North Golf Course Recycled Water Conveyance Pipeline. Therefore recycled water service to the other developments located in the north, northeast, and east (e.g., Estates at Lake Calero, Lake Chesbro, and Lake Clementia) must be provided by the South Golf Course Recycled Water Conveyance Pipeline. Higher \$/AFY factors were associated with the following three development groups.

- **Estates of Lake Clementia, Chesbro, and Calero:** As shown in Figure 4-1, serving recycled water to these developments would require improvements to (1) the existing South Golf Course conveyance system and (2) extend the recycled water system by approximately 3.4 miles and adding storage and pumping facilities. Given the total combined capital costs attributed to these improvements, service to these three developments does not appear to be cost-effective.
- **Riverview and Lakeview:** Serving recycled water to these developments requires improvements to the existing South Golf Course conveyance system, more specifically connecting the gravity and force main portions of the existing conveyance system and installing a new, higher capacity pumping station. Given the relatively low recycled water demands associated with these two developments, service to these areas does not appear to be cost-effective.¹¹
- **Esquela and Residences of Murieta Hills:** The conveyance system serving these two developments could be expanded to serve Stonehouse Park, which has an estimated recycled water demand of 14 AFY. With the addition of Stonehouse Park, this group of developments has a lower factor when compared to the two other developments

¹¹ It is anticipated that these developments could be served more cost-effectively if their source of recycled water supply could be drawn from Lakes 10, 11, 16, or 17. However, CDPH has expressed concerns with this methodology in their November 16, 2012 letter.

listed in the two previous bullets. Given this outcome, it is recommended that these two developments be served with recycled water.

Table 5-1 lists the developments along with their projected wastewater flow and recycled water production contributions. This table also lists the projected recycled water demands associated with each development. Developments NOT recommended for recycled water service are shown in *italics*.

Table 5-1. Projected Recycled Water Demands

Condition or Development	Projected ADFW Contribution (MGD)	Projected Recycled Water Production (AFY)	Projected Recycled Water Demand (AFY)
Existing Conditions	0.51	455	550 ^a
Existing Plus Infill	0.52	465	550 ^a
Existing, Infill, and Phase 1 Developments			
Murieta Gardens	0.02		19.6
Retreats	0.02		18.8
Residences of Murieta Hills	0.04		73.8 / 84.2 ^b
<i>Riverview</i>	<i>0.03</i>		<i>22.4</i>
<i>Lakeview</i>	<i>0.02</i>		<i>15.8</i>
Subtotal (rounded)	0.65	620	670
Existing, Infill, and Phases 1 and 2 Developments			
Indust/Com/Residential	0.02		50.9
Apartments	0.03		23.8
Esquela	0.01		25.9 / 29.6 ^b
Terrace	0.03		59.9
Highlands	0.02		42.1
River Canyon	0.02		46.4
<i>Estates at Lake Calero</i>	<i>0.03</i>		<i>52.2</i>
<i>Estates at Lake Chesbro</i>	<i>0.02</i>		<i>29.4</i>
<i>Estates at Lake Clementia</i>	<i>0.02</i>		<i>31.7</i>
Total (rounded)	0.90	920	920^b

^a Combined demand of North and South Golf Courses based on normal levels of precipitation.

^b Includes estimated Stonehouse Park irrigation demands of 14 AFY.

Comparison of projected recycled production and demands for the first three conditions (Existing, Existing Plus Infill, and Existing, Infill, and Phase 1 Developments) indicate the need for supplemental water to satisfy residential irrigation demands as the projected demand is greater than production. Following Phase 2 development, the recycled water demand and production is estimated to be in balance during normal levels of precipitation. It is anticipated that supplemental recycled water will be required during dry years and conversely, additional disposal capacity (e.g., conveyance to the Van Vleck Ranch for pasture irrigation) may be required for those years associated with high levels of precipitation.

5.2 Comparison of Alternatives 1 and 2

An economic analysis was conducted to compare Alternatives 1 and 2. This analysis was based on a 20-year life cycle and a discount rate of 6 percent, respectively, and the timeline in which individual potable water, wastewater, and recycled water/treated effluent disposal improvements are required to be in service to accommodate the assumed development timeline. In addition, the improvements and costs associated with Alternative 2 were revised to reflect the developments recommended for service in the previous section. A summary of the analysis results is presented below in Table 5-2. Calculations associated with this analysis are attached in Appendix B for reference.

The analysis results indicate that expanding the District's existing recycled water program to serve residential irrigation is more cost-effective than upgrading the existing pastureland irrigation system. Based on this finding, Alternative 2 is the recommended project described in the following chapter.

Table 5-2. Economic Comparison of Alternatives 1 and 2

Component	Alternative 1 – Upgrade Existing Pastureland Irrigation (No Project Alternative)	Alternative 2 – Expand Recycled Water Program to Serve Residential Irrigation
Costs Associated With All Wastewater, Recycled Water/Treated Effluent Disposal, and Differential Potable Water Improvements		
Base Project Costs (\$) ^a	\$21,585,000	\$18,200,000
O&M Costs (\$/yr) ^b	\$250,000	\$185,000
Net Present Worth Costs (\$)	\$24,430,000	\$20,345,000
Relative (Savings) Difference (%)		16.7
Costs Limited to Differential Potable Water and Recycled Water/Treated Effluent Disposal Improvements		
Base Project Costs (\$) ^a	\$12,730,000	\$9,345,000
O&M Costs (\$/yr) ^b	\$250,000	\$185,000
Net Present Worth Costs (\$)	\$15,575,000	\$11,490,000
Relative (Savings) Difference (%)		26.2

^a Base (capital) costs are net present worth costs of Alternative 1 and 2 improvements.

^b Value represents the 20-year average of relative O&M costs.

6 Recommended Improvements and Implementation Plan

This chapter describes the activities the District will undertake to implement the recommended project, including the recommended improvements and phasing, facility planning, environmental and regulatory compliance and permitting, coordination with ongoing programs, financing, stakeholder outreach, and updating the implementation schedule.

6.1 Phasing of Recommended Facilities and Implementation Schedule

The improvements required for the recommended project will be time-phased to correspond with development. The following two phases have been established for the addition of facilities and implementation planning based on the assumed occupancy of Phase 1 and 2 residential developments.

- Phase 1: 2013 – 2015
- Phase 2: 2016 – 2019

The individual improvements required for the recommended plan are illustrated in Figure 6-1. A summary of the required facilities by phase is presented in Table 6-1 and the recommended implementation schedule is presented in Table 6-2. The schedule describes the recommended timelines required for all activities associated with plan implementation.

Table 6-1. Summary of Required Facilities for Recommended Plan

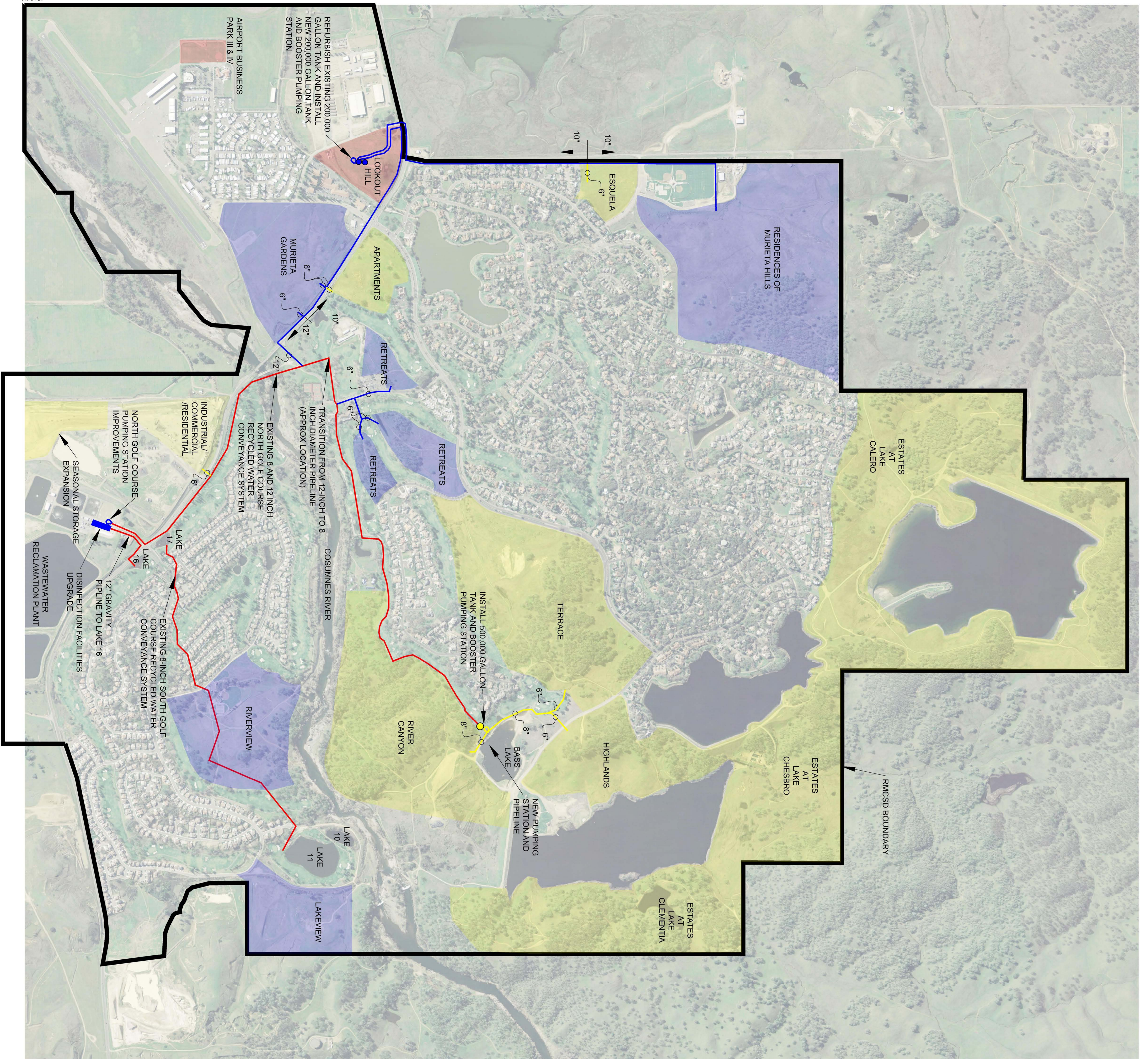
Facility / Improvement Description	Estimated Quantity	Estimate of Probable Project Costs (\$) ^{a, b}
Phase 1, 2013 – 2015		
Disinfection Facilities Upgrade	195,000 gallons	1,300,000
North Golf Course Pump Station	2,110 gpm	1,700,000
Northwest Transmission Main	11,640 LF	3,530,000
Lookout Hill Tanks and Pump Station	400,000 gallons & 700 gpm	2,080,000
Retreats Service Main	1,725 LF	490,000
	Subtotal	9,100,000
Phase 2, 2016 – 2019		
Seasonal Storage Expansion	240 AF	9,750,000
Industrial, Commercial, Residential	190 LF	220,000
Apartments Service Main	110 LF	210,000
Esquela Service Main	260 LF	80,000
North Conveyance System Extension	2,460 LF	520,000
Bass Lake Tanks and Pump Station	500,000 gallons & 1,040 gpm	2,900,000
	Subtotal	13,680,000
	Grand Total	22,780,000

^a Estimated project costs based upon ENR 20 City Average Construction Cost Index of 9437 (January 2013).

^b Project costs include estimated construction costs and allowances for contingency, engineering, administration, and permitting.

6.1.1 Phase 1 Improvements

The following are descriptions of the Phase 1 recycled water system improvements shown in Figure 6-1. The timing of these improvements will be contiguous with the occupancy timeline for the Retreats, Murieta Gardens, and Residences of Murieta Hills developments of 2016 through 2019.



LEGEND:
 — EXISTING RECYCLED WATER PIPELINES
 — PHASE 1 RECYCLED WATER IMPROVEMENTS
 — PHASE 2 RECYCLED WATER IMPROVEMENTS

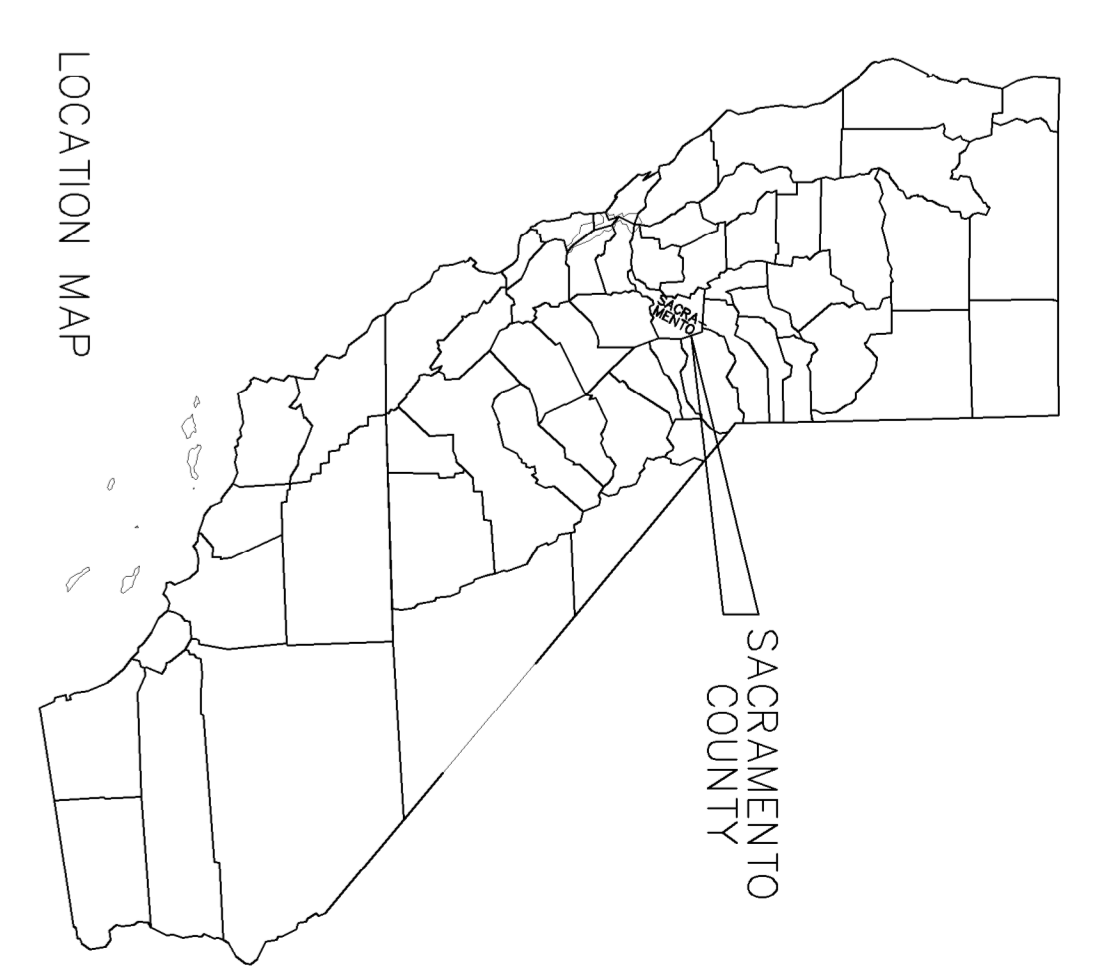
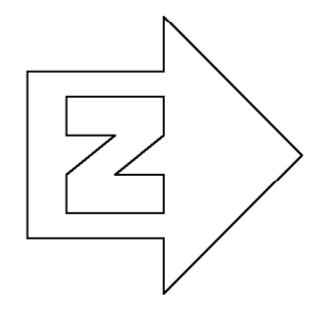
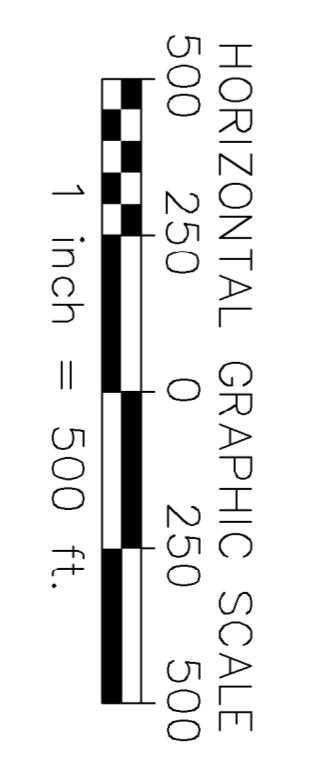


Figure 6-1. Recommended Improvements
 Title XVII Recycled Water Feasibility Study

Table 6-2. Project Implementation Schedule

Step	Lead Agency and Primary Participants	2012				2013				2014				2015				2016-2025					Desired Outcome										
		M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	16		17	18	19	20	21	22	23	24	25	
1	Title XVI Feasibility Study	RMCS																															Determine (1) which developments are the most cost-effective to serve recycled water with respect to one another and (2) which alternative is most cost-effective (No Project or Expanded Recycled Water Program). Identify phased approach and infrastructure improvements to cost effectively serve existing commercial, park, and open space as well as future residential (dual plumbed) and commercial customers.
2	System Design Standards	RMCS																															Develop recycled water standards to serve future commercial and residential customers. Standards will serve as the basis for (1) preparing construction cost estimates and (2) communicating minimum recycled water system requirements to serve future developments and existing commercial areas.
3	Detailed Project Description / Facility Planning	RMCS																															Incorporate commercial irrigation areas, prepare hydraulic model, refine key aspects, and implement methods to reduce project costs for the proposed recycled water system. Project description to serve as the starting point for the CEQA and NEPA compliance effort as well as the Title 22 Engineering Report and Updated WDR.
4	Agency Coordination	RMCS and RMCC																															Identify roles and responsibilities for program participants as described by Title 22 (e.g., Producers, Distributors, and Users) and coordinate use of common infrastructure (e.g., recycled water conveyance systems, North Golf Course Pumping Station, etc.). Identify scheduling/financing constraints and key metrics (e.g., what constitutes success) for each participant. Conduct coordination meetings with Regional Board and CDPH to keep them informed and obtain feedback.
5 Regulatory Permitting																																	
5a	Intended Use of Van Vleck Spray Field	RMCS and Van Vleck Ranch																															Submit a letter to the Regional Board describing the District's intended long-term use of the Van Vleck spray field to satisfy Article F, 12 of WDR R5-2009-0124. COMPLETED
5b	CEQA and NEPA Compliance	RMCS																															Analyze potential environmental impacts associated with the implementation of the expanded recycled water program; satisfy CEQA and NEPA (if federal funding obtained) review requirements. Estimated cost is based on preparing initial study/mitigated negative declaration (CEQA) and environmental assessment/FONSI (NEPA).
5c	Title 22 Engineering Report Preparation	RMCS and RMCC																															Prepare Title 22 Engineering Report. Recycled water use areas to include existing golf courses, commercial, parks, open space, Van Vleck spray fields, and future residential (dual plumbed) and commercial customers.
5d	MRP and Updated WDR Application	RMCS and RMCC																															Complete Form 200 and prepare Report of Waste Discharge requesting the Regional Board's preparation of a Master Reclamation Permit (MRP) and Updated Waste Discharge Requirements (WDRs).
5e	Salt and Nutrient Management Plan	RMCS and RMCC																															Prepare salt and nutrient management plan and antidegradation analysis specific to the expanded recycled water program.
5f	Title 22 Engineering Report Review and Approval	RMCS and RMCC																															Submit Title 22 Engineering Report (completed in Step 5c) to CDPH and Regional Board for review and approval.
5g	Updated WDR Review, MRP Negotiations and Adoption	RMCS and RMCC																															Submit Form 200 and Report of Waste Discharge (completed in Step 5d) to the Regional Board. Negotiate updated Waste Discharge Requirements (WDRs), Master Reclamation Permit (MRP), and monitoring requirements with Regional Board and CDPH staff.
6 Improvements to Existing Infrastructure																																	
6a	Chlorine Contact Basin	RMCS																															Existing WWRP chlorine contact disinfection facilities has a rated capacity of 2.3 MGD, which is less than the 3.0 MGD capacity provided by the tertiary treatment facilities and required by the future recycled water system. Efforts associated with this task are based on planning, design, and construction a 195,000 gallon contact basin within the existing equalization basin.
6b	Seasonal Storage Expansion	RMCS																															Install 240 acre-ft (AF) of additional seasonal storage capacity within the WWRP site. Efforts associated with this task are based on planning, design, and construction of new 240 AF storage, conveyance pipeline, and pumping facilities.
7	Detailed Design (Phase 1 RW Program)	RMCS																															Prepare preliminary design report and final hydraulic model, 60, 90, and bid documents (design drawings and specifications) of the proposed recycled water system infrastructure.
8	Bid and Award (Phase 1 RW Program)	RMCS																															Respond to questions from potential bidders, conduct pre-bid meeting, prepare addenda, evaluate bids, and recommend award.
9	Construction (Phase 1 RW Program)	RMCS																															Construct recycled water system expansion and administer contract for the installation of system infrastructure, provide construction management oversight/inspection, respond to contractor requests for information, prepare necessary change orders, review contractor submittals, and participate in construction meetings. Improvements to be limited to those needed to serve Phase 1 development (e.g., 670 Group).
10	Startup (Phase 1 RW Program)	RMCS and RMCC																															Verify that recycled water system operates and performs as designed; modify system to further enhance and optimize system operation and performance.
11 RMCS Management and Administration																																	
11a	Appoint Recycled Water Program Manager	RMCS																															Hire recycled water program manager. Specific duties to include pre-qualifying landscape designers and construction contractors, regulatory compliance, stakeholder interaction, and recycled water accounting.
11b	Operations and Maintenance Plan	RMCS																															Develop operation and irrigation management plans pertaining to the expanded recycled water system.
11c	Landscape Designers and Contractors	RMCS																															Compile a list of companies authorized to design and work on residential recycled water systems. Authorized companies shall have attended training (Step 11d) and shall be familiar with system design standards (Step 2) and other pertinent recycled water regulatory requirements.
11d	Training (Orientation and Education) Program	RMCS																															Develop and conduct workshops. Target audience is future homeowners and landscape designers and contractors. Workshop content to include description of recycled water standards (Step 2), need to hire authorized companies (Step 11c), and the preparation of recycled water plans.
11e	Inspection and Testing Program	RMCS																															Develop program to verify compliance with recycled water standards and regulatory requirements.
12	Public Outreach	RMCS																															Manage information and promote understanding and communication with key stakeholder groups, demonstrate organizational commitment, promote communication and public dialog, ensure fair and sound decision making, and build and maintain trust.
13	Expand RW System to Serve Phase 2 Development	RMCS																															Plan, permit, design, and construction recycled water system to serve expanded recycled water service area associated with Phase 2 developments.

- Development of Deliverables
- Ongoing Efforts Not Associated with Specific Deadlines or Milestones
- ★ Draft Deliverables
- ★ Final Deliverables

Footnotes
 * Dates shown in this table are considered preliminary estimates and are based on Phase 1 and 2 development occupancy timeframes of 2016 and 2020, respectively. Actual timeframes will depend on actual residential and commercial development timeframes.

- **Disinfection Facilities Upgrade:** Currently the disinfection facilities have a rated capacity of 2.3 MGD, which limits recycled water production capabilities at the WWRP. These facilities will be upgraded to provide a rated capacity of 3.0 MGD in accordance with Title 22 requirements.¹² The construction and capital costs estimated for this improvement are \$930,000 and \$1,300,000, respectively. These costs are based on installing a 195,000 gallon chlorine contact basin within the existing equalization basin.
- **North Golf Course Pumping Station Improvements:** Currently this facility is configured to pump recycled water to either the North Golf Course or the Van Vleck Ranch. The objectives of this improvement project will be to (1) separate the functions of this station (one dedicated station for the North Golf Course and one dedicated for the Van Vleck Ranch) and (2) expand the firm capacity¹³ of the pumping station serving the North Golf Course to 2,110 gpm. The 2,110 gpm flow rate represents the estimated capacity of the existing 12-inch recycled water pipeline serving the North Golf Course. The construction and project costs estimated for this improvement are \$1,420,000 and \$1,700,000, respectively. These costs are based on installing a new pumping station to serve the North Golf Course and having the existing station configured to serve Van Vleck Ranch.
- **Northwest Recycled Water Transmission Main:** A new 12- and 10-inch recycled water transmission main will be installed to serve future developments located along the northwest portion of Jackson Highway and Stonehouse Road. It is envisioned that this main will also serve recycled water to Stonehouse Park for irrigation as well as the Apartments and Esquela in the future. As shown in Figure 6-1, this transmission main will be connected to the existing 12-inch North Golf Course conveyance pipeline immediately north of the Yellow Bridge. It is recommended that a 12-inch highway undercrossing and transmission main be installed up to the point at which the Murieta Gardens development is served; beyond this point the transmission main can be reduced to 10-inch diameter. The lengths of the 12-inch and 10-inch pipelines are estimated to be 1,010 and 10,630 lineal feet, respectively. The construction and project costs estimated for this improvement are \$2,520,000 and \$3,530,000, respectively. These costs include the installation of 220 lineal feet of 6-inch diameter pipe to deliver recycled water to the Murieta Gardens development.
- **Lookout Hill Recycled Water Storage Tanks and Pumping Station:** Recycled water storage tanks are required to supplement recycled water production capacities needed to satisfy peak irrigation demands. Peak demands associated with the Residences of Murieta Hills and Esquela developments require 200,000 gallons of supplemental recycled water during the 8 hour irrigation schedule described in Section 5.1. It is recommended that a total capacity of 400,000 gallons be provided based on the prescribed storage criteria. To minimize cost, the existing 200,000 gallon water storage tank, which is currently not in service, will be rehabilitated and used for recycled water storage. In addition, a new 200,000 gallon storage tank will be installed at this site along with a 700 gpm pumping station that is needed to deliver recycled water to the developments located in the northwest corner of the Study Area. The construction and capital costs estimated for this improvement are \$1,770,000 and \$2,080,000, respectively.
- **Retreats Recycled Water Service Pipeline:** A new 6-inch diameter recycled water pipeline will be installed to serve the Retreats development. As shown in Figure 6-1, this pipeline will be connected to the existing 8-inch North Golf Course conveyance pipeline. The estimated length of this pipeline is 1,730 lineal feet. The construction and project costs estimated for this improvement are \$350,000 and \$490,000, respectively.

¹² For chlorine disinfection and *Disinfected Tertiary Recycled Water* production, Title 22 requires a minimum CT of 450 mg-min/L and 90 minute (minimum) modal contact time.

¹³ The firm pumping capacity is defined as a station's capacity with the largest pump out of service.

6.1.2 Phase 2 Improvements

The following are descriptions of the Phase 2 recycled water system improvements shown in Figure 6-1. The timing of these improvements is contiguous with the occupancy timeline for the Esquela, Apartments, Industrial/Commercial/Residential, Terrace, Highlands, and River Canyon developments of 2020 through 2026.

- **Seasonal Storage Expansion:** Approximately 240 AF of additional seasonal storage is required to accommodate the Phase 2 developments. This facility is to be located within the existing WWRP site as shown in Figure 6-1. The construction and project costs estimated for this improvement are \$6,840,000 and \$9,750,000, respectively.
- **Industrial/Commercial/Residential Service Pipeline:** A new 6-inch diameter recycled water pipeline will be installed to serve this development. As shown in Figure 6-1, this pipeline will be connected to the existing 12-inch North Golf Course conveyance pipeline. The construction and capital costs estimated for this improvement are \$160,000 and \$220,000, respectively which includes a highway undercrossing.
- **Apartments Service Pipeline:** A new 6-inch diameter recycled water pipeline will be installed to serve this development. As shown in Figure 6-1, this pipeline will be connected to the Northwest Recycled Water Transmission Main. The construction and capital costs estimated for this improvement are \$150,000 and \$210,000, respectively which includes a highway undercrossing.
- **Esquela Service Pipeline:** A new 6-inch diameter recycled water pipeline will be installed to serve this development. As shown in Figure 6-1, this pipeline will be connected to the Northwest Recycled Water Transmission Main. The construction and capital costs estimated for this improvement are \$60,000 and \$80,000, respectively.
- **North Conveyance System Extension:** New 8- and 6-inch recycled water transmission mains will be installed to serve the Terrace, Highlands, and River Canyon developments. As shown in Figure 6-1, the proposed 8-inch transmission main will be connected to the existing 8-inch North Golf Course conveyance pipeline near Bass Lake. The construction and capital costs estimated for these improvements are \$370,000 and \$520,000, respectively.
- **Bass Lake Storage Tank and Pumping Station:** Peak demands associated with the project require an additional 250,000 gallons of supplemental recycled water during the 8 hour irrigation schedule. A total capacity of 500,000 gallons will be provided based on the prescribed storage criteria along with a new 1,040 gpm pumping station which is needed to deliver recycled water to the Terrace, Highlands, and River Canyon developments. The construction and capital costs estimated for this improvement are \$2,070,000 and \$2,900,000, respectively.

6.2 Facility Planning

The technical work completed for the Study provides the rationale and framework for the recommended alternative and improvements. Preliminary locations of all new facilities are shown in Figure 6-1. Facility planning is required to develop hydraulic models of the existing and expanded recycled water delivery system, optimize and finalize facility locations and alignments, refine design criteria and sizing, identify land requirements, and update cost estimates. Following completion of facility planning, environmental and regulatory permitting efforts can commence as described in Table 6-2.

6.3 Environmental Compliance and Permitting

The recommended improvements will require compliance with the CEQA and possibly National Environmental Policy Act (NEPA) to evaluate the environmental impacts associated with the projects. The required environmental compliance

documents will be initiated after facility planning and in conjunction with predesign. To facilitate implementation of recommended project, a programmatic environmental impact report will be considered as an initiate step.

Numerous federal, state and local permits will also be required for implementation. The required permits will be identified during the preparation of the predesign report and environmental compliance documents. A permitting strategy will be developed to minimize project delays and potential mitigation costs.

6.4 Coordination with Ongoing Projects and Programs

Implementation of the recommended project will be coordinated with other ongoing projects and programs. Specifically, expansion of the recycled water program will be coordinated with the development of the water conservation program, Phase 3 and 4 Water Treatment Plant Expansion Projects, and drought augmentation efforts.

6.5 Financing

The estimated project costs are summarized in Table 6-1. All costs are presented in 2013 dollars.

The recommended facilities will be incorporated into the District's five-year capital improvement program in accordance with the proposed phasing plan. Specific project financing will be addressed as part of the District's regular budgeting, rates and facility capacity charge program updates.

The District will pursue additional funding through the United States Bureau of Reclamation Title XVI program. This program allows the Bureau to provide up to 25 percent matching grants for authorized recycled water projects. The remaining 75 percent will be provided by a non-federal source (the applicant). Grant funds can be used for many of the subsequent tasks described in Table 6-2 such as environmental and regulatory permitting, detailed design, and construction.

6.6 Stakeholder Outreach

District staff has met with the local development community and regulatory agencies during the development of this report. Continued successful implementation of the recommended project requires ongoing, proactive stakeholder outreach. Two specific items that will be discussed during these future outreach efforts are described below.

- The CDPH has expressed concerns regarding the commingling of recycled water with surface water and local runoff prior to residential irrigation. It has been determined as part of this Study that routing recycled water directly to future residential customers and installing a storage tank and booster pumping station at Bass Lake would be the most cost-effective option for addressing CDPH concerns. The estimated cost associated with these particular facilities is \$2,900,000. The District will attempt to change CDPH's position such that the storage tank is not required.
- Local developers have expressed concern that the recommended project may not be affordable. Attempts to minimize or optimize project costs associated with the implementation of the expanded recycled water program were beyond the scope of this Study. However, potential areas for cost reduction have been identified and are described in Appendix B. These areas of potential cost reductions will be used as a starting point to determine methods for optimizing facility requirements and reducing the overall costs of the recommended project during the facility planning effort.

6.7 Implementation Schedule

The recommended implementation schedule has been presented in Table 6-2. This implementation schedule covers Phases 1 and 2. Future efforts and updates to the recommended project will provide opportunities for adjusting the timelines based on actual development schedules and other factors.

7 Environmental Considerations and Potential Side Effects

This chapter provides an overview of potential environmental effects associated with the recommended project. As described in Chapter 6, the recommended project is to expand the existing recycled water program to serve future residential homes for front and backyard irrigation and existing parks and commercial landscaping. The anticipated regulatory requirements and compliance measures associated with these particular uses are also described.

7.1 Potential Environmental Effects

As shown in Figure 6-1, the Project would tie into the existing 12- and 8-inch recycled water conveyance pipelines serving the North Golf Course. Environmental impacts from the Project would occur during construction and operation. However, the Project is not expected to have any potential significant environmental effects or involve unique or undefined environmental risks. Construction would involve activities such as site preparation, grading, excavation, and site restoration and would have relatively short-term, temporary impacts. The activities, and thus the extent of impact would vary with project components (e.g., treatment plant upgrades, pipelines, storage tanks, and pump stations). Project operation would involve the supply of recycled water for front and backyard and limited urban irrigation. A brief discussion of the nature of anticipated construction and operational impacts is provided below.

As described in California's Recycled Water Policy, "the State Water Board finds that the use of recycled water in accordance with this Policy, that is, which supports the sustainable use of groundwater and/or surface water, which is sufficiently treated so as not to adversely impact public health or the environment and which ideally substitutes for use of potable water, is presumed to have a beneficial impact. Other public agencies are encouraged to use this presumption in evaluating the impacts of recycled water projects on the environment as required by the California Environmental Quality Act."

7.1.1 Project Construction

Project construction impacts will be consistent with those of any construction project and are anticipated to include short-term impacts to hydrology and water quality, biological resources, cultural resources, land use, traffic and transportation, air quality, noise, utilities, and temporary access to existing facilities within the community. Because the majority of the proposed facilities would lie within the existing WWRP site, along roadways, or within areas to be developed, the impacts are anticipated to be minimal.

7.1.2 Project Operation

Project operation includes the distribution and use of recycled water for residential and urban irrigation. The Project will be consistent with the state, regional, and local policies that encourage recycled water use. The recycled water would be treated to a level stipulated under California Code of Regulations (CCR) Title 22 requirements and will be protective of the environment and public health. Overall, the Project will increase recycled water use thereby offsetting potable water use and reducing the amount of water diverted from the Cosumnes River.

7.2 Environmental Review Status and Requirements

Environmental compliance with the CEQA will be required prior to construction. Compliance with the NEPA will be required for the Project to receive federal funding or other federal approvals. Neither of these efforts has been initiated. However, an environmental constraints analysis will be completed within the next phases to gain a preliminary understanding of impacts associated with the Project. Communication with regulatory agencies (e.g., RWQCB and CDPH) will continue during all subsequent phases.

When the District is ready to move forward with the Project, it will prepare a checklist to document the evaluation of the proposed activity and would use the checklist to determine the appropriate type of tiered environmental review document. If

significant impacts are anticipated, then an Environmental Impact Report (EIR) would be prepared; if less-than-significant effects are expected to occur, a Negative Declaration would be prepared. In either case, the EIR or Negative Declaration will be completed before the completion of detailed design so that the Project can be modified to address environmental impacts and considerations.

7.3 Public Health and Safety

Project construction is expected to increase vehicular and truck traffic in the Project area. Short-term air emissions and increase in noise levels would occur in and around construction corridors. Construction activities may involve the use of hazardous materials during construction; however implementation of best management practices (BMPs) related to fueling, vehicle washing and handling, use, and storage of chemicals would minimize any risk to either workers or the public.

The use of recycled water is highly regulated in California by CCR Title 22. Project operation will include distribution and use of recycled water for residential and urban irrigation. The Project will be consistent with the state, regional, and local policies that encourage recycled water use. The recycled water will be treated at a level stipulated under Title 22 requirements and will be protective of the environment and public health.

7.4 Regional Water Supply and Water Quality

In terms of hydrology, water quality, and hazardous materials impacts, the proper implementation of BMPs will minimize any potential impacts to receiving waters and groundwater. Typical construction related BMPs include scheduling or limiting activities to certain times of the year based on hydrologic considerations, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction in good working condition.

The Project will increase the beneficial use of recycled water for residential and urban irrigation within the Study Area. This increased recycled water use will also increase the reliability of potable water supplies for the community as a whole in addition to residential and urban landscape irrigation. In turn, increased reliability in the community's potable water supply will help to alleviate concerns that surround the potential of future drought conditions. During times of drought, and as the community's population increases, the expanded use of recycled water for landscape irrigation will help reduce demand on existing potable water supplies by 370 AFY and save that potable water for other municipal and environmental uses.

The recycled water produced by the WWRP will meet Title 22 standards for unrestricted use. Having already implemented the use of recycled water for golf course irrigation, both the District and Rancho Murieta Country Club have adopted several mechanisms to manage the design and operation of the recycled water systems in order to safeguard the health and safety of the public and the environment. The environmental analysis of the alternatives prepared for the EIR or Negative Declaration will analyze these impacts in more detail and will include recommended mitigation measures, as necessary.

7.5 Public Involvement

As described in Chapter 3, the District initiated public outreach efforts to discuss the potential expansion of the existing recycled water program as part of this and other previous studies. As part of these efforts, the relative advantages and disadvantages of several competing alternatives were discussed in an open forum. The District intends to continue to solicit public input in a similar fashion during the environmental compliance and detailed design phases.

7.6 Historical Properties

Because the majority of the recycled water pipelines will be placed underground and along existing roads, no buildings or structures of historic significance are anticipated to be affected by the Project, directly or indirectly. Proposed improvements at the WWRP or selected offsite storage tank sites are not anticipated to affect historical properties either.

8 Legal and Institutional Requirements

This chapter describes legal and institutional requirements and potential barriers to implementing the Project.

8.1 Water Rights

In many recycled water programs, decreased or eliminated effluent discharge to waterways has the potential to affect the water rights of downstream users. In this Project, however, the District does not discharge effluent or plan to do so in the future. Therefore, the Project will not adversely affect water rights of downstream water users and there are no unresolved water rights issues potentially resulting from the implementation of the Project. In addition, the District has rights to all of the wastewater conveyed to and treated at the WWRP.

The District and some potential recipients of recycled water may be concerned that decreased use of their existing surface water supplies may jeopardize their surface water diversion rights. Past legal investigations into this issue have shown, however, that shifting from surface water to recycled water will not create the potential to lose the initial surface water right.

California Water Code Section 1010 asserts that no claim of water right (riparian, pre-1914 appropriative, post-1914 appropriative) will be reduced or lost as a result of the use of recycled water. The use of recycled water in lieu of surface water is equivalent to maintaining that right and will be a beneficial use. Section 1010 states:

“(a) (1) The cessation of, or reduction in, the use of water under any existing right regardless of the basis of right, as the result of the use of recycled water, desalinated water, or water polluted by waste to a degree which unreasonably affects the water for other beneficial uses, is deemed equivalent to, and for purposes of maintaining any right shall be construed to constitute, a reasonable beneficial use of water to the extent and in the amount that the recycled, desalinated, or polluted water is being used not exceeding, however, the amount of such reduction.

(2) No lapse, reduction, or loss of any existing right shall occur under a cessation of, or reduction in, the use of water pursuant to this subdivision, and, to the extent and in the amount that recycled, desalinated, or polluted water is used in lieu of water appropriated pursuant to Chapter 6 (commencing with Section 1375) of Part 2, the board shall not reduce the appropriation authorized in the user’s permit.” (California Water Code §1010(a))

California Water Code Section 13551 establishes that potable water shall not be used for nonpotable uses if suitable recycled water is available. The use of recycled water constitutes beneficial use under any existing water right. Section 13551 states,

“ A person or public agency, including a state agency, city, county, city and county, district, or any other political subdivision of the state, shall not use water from any source of quality suitable for potable domestic use for nonpotable uses, including cemeteries, golf courses, parks, highway landscaped areas, and industrial and irrigation uses if suitable recycled water is available as provided in Section 13550; however, any use of recycled water in lieu of water suitable for potable domestic use shall, to the extent of the recycled water so used, be deemed to constitute a reasonable beneficial use of that water and the use of recycled water shall not cause any loss or diminution of any existing water right.” (California Water Code §13551)

8.2 Regulatory Requirements

Several State and Federal agencies have regulatory power over projects that affect water quality and sources of supply. Implementation of the Project will require coordination with such agencies, as well as with county and private agencies. Other than consultation with the RWQCB, CDPH, and the Rancho Murieta Country Club, no other consultation has occurred between the District and federal, state, regional, and local authorities during the development of this Study. Prior to Project implementation, consultation with the appropriate agency or agencies will be made, as deemed necessary. The Project will

meet all federal, state, and local requirements. It is anticipated the use of recycled water will be permitted by a master reclamation permit to be issued by the RWQCB.

Most, if not all, of the pipelines envisioned for the Project are proposed to be constructed within public roads or right-of-ways. Modifications and improvements to the WWRP as well as expansion of the seasonal storage facilities are proposed to be constructed within the current treatment plant area. Additional pump stations and storage tanks would be proposed to be sited such as not to disturb habitat or other area that could adversely impact endangered species, wetland, waters of the United States, etc. as described in federal, state, regional or local authority requirements.

8.2.1 Title 22 California Code of Regulations

According to Title 22 of the California Code of Regulations (CCR), recycled water can be used for landscape irrigation (residential and non-residential), wetlands, restricted and unrestricted recreational impoundments, landscape impoundments, toilet flushing, and industrial and construction applications. As described previously, all recycled water produced by the WWRP will be treated to the highest standard – *Disinfected Tertiary Recycled Water* as defined by Title 22. Treatment to this standard has been, and will continue to be, readily achieved using the existing WWRP.

In addition to defining recycled water quality requirements, Title 22 also sets requirements specific to dual plumbed recycled water systems, sampling and analysis, engineering report preparation, design and reliability, operations, and the protection of potable water systems.

8.2.2 California Water Code

Division 7 of the California Water Code is designated the Porter-Cologne Water Quality Control Act, which includes the permitting of wastewater treatment plants and water recycling facilities, as well as other water quality-related provisions. The Porter-Cologne Water Quality Control Act established the State Water Resources Control Board and each Regional Water Quality Control Board as the principal State agencies with primary responsibilities for coordinating and controlling water quality and water rights in California. The Porter-Cologne Act is the primary implementation tool for California's responsibilities to regulate pollutant discharge as established under the Clean Water Act.

Division 7, Chapter 7.5 of the California Water Code (Code), also known as the Water Recycling Act of 1991, recognizes the interest to develop water recycling facilities to supplement existing surface water and groundwater supplies in order to meet the State's future water needs. The Code authorizes each regional board, after consulting with and receiving recommendations from the California Department of Public Health, to set requirements which may be placed on the entity reclaiming water, the user, or both, for water that will be used as recycled water. The Code establishes reporting and permitting requirements for the regional boards, which must work collaboratively with the CDPH. Additionally, it generally defines conditions under which recycled water may be used. The conditions for use include:

- If the source of recycled water is of adequate quality, which is determined by CDPH criteria, and does not harm plants, wildlife, and the public health;
- If recycled water may be furnished at a reasonable cost to the user; and
- If the use of recycled water will not adversely affect water rights.

8.2.3 Permits and Administrative Provisions

The RWQCB is assigned with the protection, coordination, and control of water quality within the Sacramento region and, therefore, is responsible for the issuance and enforcement of requirements given to producers, distributors, and users of

recycled water. The RWQCB issues Waste Discharge Requirements (WDRs) for activities which can affect groundwater quality, including recycled water discharges. In addition, Water Reclamation Requirements (WRRs) can also be issued to place conditions on recycled water use. Regional Water Quality Control Boards may issue Master Reclamation Permits (MRPs) in lieu of individual WRRs for projects involving multiple users. These MRPs are issued to a producer or distributor, or both, of recycled water and combine the WDRs and WRRs. It is the District's intent to apply for and obtain a MRP to cover all intended uses (e.g., residential, park, roadway median, commercial, and golf course irrigation). The process for applying for and obtaining approval is summarized below:

1. **Prepare and Submit Title 22 Engineering Report:** The preparation, submission, and approval of a Title 22 Engineering Report describing the manner in which the Project will comply with Title 22 will be required prior to initiating expanded recycled water use. The CDPH's guidance document, entitled *Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water*, describes the information required for approval of recycled water projects. The report should contain sufficient information to assure the regulatory agencies that the degree and reliability of treatment is commensurate with the requirements for the proposed use, and that the use of the recycled water will not create a health hazard or nuisance. In general, CDPH is the primary regulatory agency that will review and approve this engineering report to ensure the protection of public health. However, it is likely that the RWQCB will also participate in this review and approval process.
2. **Prepare and Submit Report of Waste Discharge:** Agencies proposing to use recycled water must prepare and submit a Report of Waste Discharge (RWD) to the Regional Water Quality Control Board to identify potential impacts to surface water and groundwater. The RWD typically consists of a package containing a completed Form 200 (Application/Report of Waste Discharge), discharge characterization, site maps, an anti-degradation analysis, and water, salt, and nutrient (nitrogen) management plans.

As shown in Table 6-2 which was presented in the previous chapter, the District initiated the preparation of the Title 22 Engineering Report and Report of Waste Discharge and submitted these documents prior to the end of 2013 to the CDPH and RWQCB for approval..

The District has initiated the process of developing administrative procedures and User Agreements to ensure Title 22 and, and in the future, MRP compliance. Once these procedures and agreements have been approved by the RWQCB, the District may authorize additional recycled water uses on a case-by-case basis in accordance with the MRP. Specific items to be developed by the District include recycled water system guidelines, design and construction standards, homeowner notification form, residential recycled water irrigation installation requirements, and inspection requirements pertaining to the proper installation and routine operations. Residential installation requirements will include the need to submit residential irrigation plans for District approval prior to initiating recycled water service.

8.3 Interagency Agreements

The Project will serve customers within the District's service area. Customers will be served through the use of the existing recycled water conveyance system, a portion of which is owned and operated by the Rancho Murieta Country Club. Therefore, an interagency agreement between the District and the Rancho Murieta Country Club will be required.

9 Financial Capability of Sponsor

This chapter describes the implementation schedule and the District's willingness and ability to pay for its share of the Project capital costs and the full operation, maintenance, and replacement costs.

9.1 Project Implementation Schedule

Table 6-2 shows the proposed implementation schedule illustrating all subsequent Project phases. As shown, the next phases include the development of recycled water system standards, detailed project description, preparation of the environmental review and engineering report documents, and master reclamation permit application. Detailed design of the expanded recycled water system is expected to be initiated during the fourth quarter of 2013, whereas construction and startup are anticipated to occur between October 2014 and the end of 2015. Phase 1 bidding, award, and construction phases are expected to follow the completion of the environmental review process. Actual timing of these phases may be altered depending on project financing and actual development timelines.

9.2 District's Willingness to Pay

The District recognizes the value of recycled water and, as described in Policy 2011-07, is committed to expanding its use when deemed to be cost-effective. As demonstrated by the completion of the previous studies described in Chapters 2 and 3, the District has already invested money and staff time to plan the Project, communicate to the community its intention of expanding the recycled water program, and discuss infrastructure and regulatory requirements with local developers and regulators. The District will utilize developer fees (e.g., Water Supply Augmentation fees and developer contributions) to pay for its share of the capital costs if federal funding becomes available. The District's ability and willingness to pay for the Project is demonstrated in a letter from the District's General Manager. This letter is provided in Appendix C. The District will pay for the full operation, maintenance and replacement costs of the Project through user rates and capital replacement reserve funds.

9.3 Project Funding Plan

The Project will be funded by the District through developer fees (Water Supply Augmentation fees), developer contributions, and Title XVI funding. The Title XVI funding request will not exceed 25% of the Project costs. The District will pay the remaining 75% through developer fees (Water Supply Augmentation fees) and developer contributions. The District has no funding limitations for the Project at this time. The on-going operation and maintenance of the Project will be funded by a user rate structure to be developed by the District. Future replacement costs of the project infrastructure will be addressed through the collection of replacement reserve fees, which will be incorporated in a user monthly base rate.

10 Research Needs

The methodologies and framework needed to complete the remaining planning and detailed design efforts have been successfully demonstrated in the past through the development of similar residential irrigation programs. The Project will be constructed using conventional pipeline, storage tank, and pumping station construction methods. Pipelines will be installed primarily using conventional open trench construction techniques; directional drilling may be considered for portions of the Project if cost-effective. There is no further research necessary to complete and implement the Project.

Appendix A

District Recycled Water Policy

RANCHO MURIETA COMMUNITY SERVICES DISTRICT

Category:	Improvements	Policy # 2011-07
Title:	Authorized and Mandated Use of Recycled Water	

PURPOSE

This policy is to authorize the use of recycled water in future developments and existing uses

FINDINGS

1. The District has historically provided for the reuse of tertiary treated effluent on the two golf courses. They have a combined irrigation of approximately 250 acres and have a peak demand of about 1.4 million gallons a day (MGD) during the summer months. The tertiary treatment plant typically operates from late April through October.
2. The disposal method for additional effluent from the District is land application according to the District's Waste Discharge Requirements (WDRs). Currently, the excess recycled water above the demand from the golf course irrigation is discharged outside the District's service area using a sprinkler application system at the Van Vleck ranch.
3. In the future, additional storage will be required for each of the service area's buildout scenarios. Supplementary water is needed to satisfy overall golf course irrigation needs under current conditions as recycled water production is less than the amount required annually. In the future, reclaimed water production may surpass golf course irrigation needs and an additional means of effluent disposal will be needed.
4. The projected influence from reduced indoor potable water demand assuming SB7 (2020) compliance is achieved is an estimated eight percent (8%) reduction. This indoor potable demand is projected to also reduce recycled water storage and disposal needs by 8 percent. Future recycled water available for reuse may be on the order of 1,000 acre-ft/yr (medium growth scenario) assuming 2020 compliance is achieved.
5. Condition No. 26 of Water Rights Permit 16762, District's primary water right, requires the use of recycled water for irrigation purposes.

6. The priority of recycled water availability shall be in accordance with the Agreement for Availability and use of Reclaimed Wastewater dated May 16, 1988,

POLICY

1. The District mandates the future use of recycled water, wherever economically and physically feasible, as determined by the Board, for non-domestic purposes when such water is of adequate quality and quantity, available at a reasonable cost, not detrimental to public health, and not injurious to plant life, fish, and wildlife. The type of use is defined in Title 22 of the California Code of Regulations. In general, the lands subject to mandatory recycled water use are defined as undeveloped parcels within the existing District service area.
2. Existing parks, median landscaping and commercial landscape areas may be converted to recycled water irrigation wherever economically and physically feasible, as determined by the Board.

Adopted by Rancho Murieta Community Services District's Board of Directors

July 20, 2011

Appendix B

Cost Estimates, Economic Analyses, and Potential Cost Saving Measures

COST ALLOCATIONS TO INDIVIDUAL DEVELOPMENTS WITH RMCC CONTRIBUTIONS (Initial Analysis - All Developments In)

	Estimated Demand (AFY)	Total Capital Cost Allocation (\$)	Relative Unit Cost (\$/AFY)	Improvement and Allocation										Apartment 17 (\$)	Esquela (\$)	River Canyon (\$)	Terrace & Highlands (\$)
				South Golf Course (\$)	Pumping Station and Tank Improvements North Golf Course (\$)	Bass Lake PS and Tank (\$)	Lookout Hill (\$)	Phase 3 (\$)	Lakeview & Riverview (\$)	Murieta Gardens (\$)	Retreats (\$)	Res of Murieta Hills (\$)	Ind/Com/Res (\$)				
Total				2,130,000	1,700,000	2,900,000	2,080,000	6,400,000	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Golf Course				1,240,000													
Phase 1 Developments																	
Riverview	22.4	354,238	15,814	131,644						222,594							
Lakeview	15.8	250,497	15,814	93,091						157,406							
Residences of Murieta Hills	73.8	4,451,422	60,303		347,352		1,539,231				252,642	490,000	2,312,197				
Retreats	18.8	578,557	30,742		88,557												
Murieta Gardens	19.6	159,419	8,128		92,292						67,127						
Subtotal	150																
Phase 2 Developments													220,000			130,000	
Industrial/Commercial/Residential	50.9	459,735	9,024		239,735												
River Canyon	46.4	1,254,450	27,059		218,144	906,306											160,732
Highlands	42.0	1,180,175	28,079		197,773	821,670											229,268
Terrace	60.0	1,683,393	28,079		282,101	1,172,024											
Apartments	23.8	508,325	21,354		112,013						81,472		104,840		210,000		
Esquela	25.9	1,454,523	56,086		122,033		540,769				88,759		622,962		80,000		
Estates of Lake Clementia	31.7	1,539,823	48,556	186,374				1,353,450									
Estates of Lake Chesbro	29.4	1,783,492	60,755	172,520				1,610,972									
Estates of Lake Calero	52.1	3,741,949	71,780	306,370				3,435,579									
Subtotal	362			890,000	1,700,000	2,900,000	2,080,000	6,400,000	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Total - All Projects	513	19,400,000			0	0	0	0	0	0	0	0	0	0	0	0	0

Relative Ranking of Developments

Phase	Development	Relative Unit Cost (\$/AFY)	Notes
Phase 1 Developments	Murieta Gardens	8,100	
	Riverview	15,814	May or may not be cost-effective depending on how South GC Pumping Station is allocated
	Lakeview	15,814	May or may not be cost-effective depending on how South GC Pumping Station is allocated
	Retreats	30,714	
	Residences of Murieta Hills	54,653	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Phase 2 Developments	Industrial/Commercial/Residential	8,996	
	Apartments	21,283	
	River Canyon	26,829	
	Highlands	27,849	
	Terrace	27,849	
	Estates of Lake Clementia	48,089	High unit cost; unlikely RMCC will contribute to South GC Pump Station
	Esquela	50,508	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
	Estates of Lake Chesbro	60,155	High unit cost; unlikely RMCC will contribute to South GC Pump Station
	Estates of Lake Calero	71,059	High unit cost; unlikely RMCC will contribute to South GC Pump Station
Both Phases Combined	Murieta Gardens	8,100	
	Industrial/Commercial/Residential	8,996	
	Riverview	15,814	
	Lakeview	15,814	
	Apartments	21,283	
	River Canyon	26,829	
	Highlands	27,849	
	Terrace	27,849	
	Retreats	30,714	
	Estates of Lake Clementia	48,089	
Esquela	50,508		
Residences of Murieta Hills	54,653		
Estates of Lake Chesbro	60,155		
Estates of Lake Calero	71,059		

Analysis 1 - Determination of Most Cost-Effective Developments for RW Service (Step 1 Assume RW to All Developments)

Title XVI Recycled Water Feasibility Study

Alternative 2 - Recycled Water Service to All Developments; Without RMCC Contribution for South Golf Course Pumping Station

COST ALLOCATIONS TO INDIVIDUAL DEVELOPMENTS WITHOUT RMCC CONTRIBUTIONS (Initial Analysis All Developments In)

	Estimated Demand (AFY)	Total Capital Cost Allocation (\$)	Relative Unit Cost (\$/AFY)	Improvement and Allocation													
				South Golf Course (\$)	Pumping Station and Tank Improvements North Golf Course (\$)	Bass Lake PS and Tank (\$)	Lookout Hill (\$)	Phase 3 (\$)	Lakeview & Riverview (\$)	Murieta Gardens (\$)	Retreats (\$)	Res of Murieta Hills (\$)	Ind/Com/Res (\$)	Apartment 17 (\$)	Esquela (\$)	River Canyon (\$)	Terrace & Highlands (\$)
Total				2,130,000	1,700,000	2,900,000	2,080,000	6,400,000	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Golf Course																	
Phase 1 Developments																	
Riverview	22.4	537,653	24,002	315,059						222,594							
Lakeview	15.8	380,197	24,002	222,791						157,406							
Residences of Murieta Hills	73.8	4,451,422	60,303		347,352		1,539,231				252,642		2,312,197				
Retreats	18.8	578,557	30,742		88,557							490,000					
Murieta Gardens	19.6	159,419	8,128		92,292						67,127						
Subtotal	150																
Phase 2 Developments													220,000			130,000	
Industrial/Commercial/Residential	50.9	459,735	9,024		239,735												
River Canyon	46.4	1,254,450	27,059		218,144												160,732
Highlands	42.0	1,180,175	28,079		197,773	906,306											229,268
Terrace	60.0	1,683,399	28,079		282,101	1,172,024											
Apartment 17	23.8	508,325	21,354		112,013						81,472		104,840	210,000			
Esquela	25.9	1,454,523	56,086		122,033		540,769				88,759		622,962		80,000		
Estates of Lake Clementia	31.7	1,799,490	56,744	446,041				1,353,450									
Estates of Lake Chesbro	29.4	2,023,858	68,943	412,886				1,610,972									
Estates of Lake Calero	52.1	4,168,802	79,968	733,224				3,435,579									
Subtotal	362			2,130,000	1,700,000	2,900,000	2,080,000	6,400,000	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Total - All Projects	513			0	0	0	0	0	0	0	0	0	0	0	0	0	0

Relative Ranking of Developments

Development	Relative Unit Cost (\$/AFY)	Notes
Phase 1 Developments		
Murieta Gardens	8,128	
Lakeview	24,002	May or may not be cost-effective depending on how South GC Pumping Station is allocated
Riverview	24,002	May or may not be cost-effective depending on how South GC Pumping Station is allocated
Retreats	30,742	
Residences of Murieta Hills	60,303	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Phase 2 Developments		
Industrial/Commercial/Residential	9,024	
Apartment 17	21,354	
River Canyon	27,059	
Highlands	28,079	
Terrace	28,079	
Esquela	56,086	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Estates of Lake Clementia	56,744	Highest unit cost; not cost-effective for service - eliminate from contention in Analysis 2
Estates of Lake Chesbro	68,943	Highest unit cost; not cost-effective for service - eliminate from contention in Analysis 2
Estates of Lake Calero	79,968	Highest unit cost; not cost-effective for service - eliminate from contention in Analysis 2
Both Phases Combined		
Murieta Gardens	8,128	
Industrial/Commercial/Residential	9,024	
Apartment 17	21,354	
Lakeview	24,002	May or may not be cost-effective depending on how South GC Pumping Station is allocated
Riverview	24,002	May or may not be cost-effective depending on how South GC Pumping Station is allocated
River Canyon	27,059	
Highlands	28,079	
Terrace	28,079	
Retreats	30,742	
Esquela	56,086	May or may not be cost-effective depending on how South GC Pumping Station is allocated and whether Stonehouse Park included
Estates of Lake Clementia	56,744	Highest unit cost; not cost-effective for service - eliminate from contention in Analysis 2
Residences of Murieta Hills	60,303	May or may not be cost-effective depending on how South GC Pumping Station is allocated and whether Stonehouse Park included
Estates of Lake Chesbro	68,943	Highest unit cost; not cost-effective for service - eliminate from contention in Analysis 2
Estates of Lake Calero	79,968	Highest unit cost; not cost-effective for service - eliminate from contention in Analysis 2

COST ALLOCATIONS TO INDIVIDUAL DEVELOPMENTS WITH RMCC CONTRIBUTIONS Second Analysis - Lake Estates Out

	Estimated Demand (AFY)	Total Capital Cost Allocation (\$)	Relative Unit Cost (\$/AFY)	Improvement and Allocation														
				South Golf Course (\$)	Pumping Station and Tank Improvements		Lookout Hill (\$)	Phase 3 (\$)	Lakeview & Riverview (\$)	Murieta Gardens (\$)	Retreats (\$)	Res of Murieta Hills (\$)	Ind/Com/Res (\$)	Apartment 17 (\$)	Esquela (\$)	River Canyon (\$)	Terrace & Highlands (\$)	
Total				1,990,000	1,700,000	2,900,000	2,080,000			380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Golf Course				1,240,000														
Phase 1 Developments																		
Riverview	22.4	661,925	29,550	439,331						222,594								
Lakeview	15.8	468,075	29,550	310,669						157,406								
Residences of Murieta Hills	73.8	4,451,422	60,303		347,352		1,539,231				252,642		2,312,197					
Retreats	18.8	578,557	30,742		88,557							490,000						
Murieta Gardens	19.6	159,419	8,128		92,292						67,127							
Subtotal	150																	
Phase 2 Developments														220,000			130,000	
Industrial/Commercial/Residential	50.9	459,735	9,024		239,735													
River Canyon	46.4	1,254,450	27,059		218,144													
Highlands	42.0	1,180,175	28,079		197,773	906,306												160,732
Terrace	60.0	1,683,393	28,079		282,101	1,172,024												229,268
Apartments	23.8	508,325	21,354		112,013						81,472		104,840		210,000			
Esquela	25.9	1,454,523	56,086		122,033		540,769				88,759		622,962			80,000		
Estates of Lake Clementia	31.7	0	0					0										
Estates of Lake Chesbro	29.4	0	0					0										
Estates of Lake Calero	52.1	0	0					0										
Subtotal	249			750,000	1,700,000	2,900,000	2,080,000	0		380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Total - All Projects	400				0	0	0	0		0	0	0	0	0	0	0	0	0

Relative Ranking of Developments

Development	Relative Unit Cost (\$/AFY)	Notes
Phase 1 Developments		
Murieta Gardens	8,100	
Riverview	29,550	May or may not be cost-effective depending on whether RMCC contributes to South GC improvements
Lakeview	29,550	May or may not be cost-effective depending on whether RMCC contributes to South GC improvements
Retreats	30,714	
Residences of Murieta Hills	54,653	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Phase 2 Developments		
Industrial/Commercial/Residential	8,996	
Apartments	21,283	
River Canyon	26,829	
Highlands	27,849	
Terrace	27,849	
Esquela	50,508	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Both Phases Combined		
Murieta Gardens	8,100	
Industrial/Commercial/Residential	8,996	
Apartments	21,283	
River Canyon	26,829	
Highlands	27,849	
Terrace	27,849	
Riverview	29,550	May or may not be cost-effective depending on whether RMCC contributes to South GC improvements
Lakeview	29,550	May or may not be cost-effective depending on whether RMCC contributes to South GC improvements
Retreats	30,714	
Esquela	50,508	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Residences of Murieta Hills	54,653	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela

Analysis 2 - Determination of Most Cost-Effective Developments for RW Service (Step 2 All Developments Served RW Except for Lake Estates)
Title XVI Recycled Water Feasibility Study
Alternative 2 - Recycled Water Service to All Developments Except for the Three Lake Estates; Without RMCC Contribution for South Golf Course Pumping Station

COST ALLOCATIONS TO INDIVIDUAL DEVELOPMENTS WITHOUT RMCC CONTRIBUTIONS (Second Analysis - Lake Estates Out)

	Estimated Demand (AFY)	Total Capital Cost Allocation (\$)	Relative Unit Cost (\$/AFY)	Improvement and Allocation													
				South Golf Course (\$)	Pumping Station and Tank Improvements North Golf Course (\$) Bass Lake PS and Tank (\$)	Lookout Hill (\$)	Phase 3 (\$)	Lakeview & Riverview (\$)	Murieta Gardens (\$)	Retreats (\$)	Res of Murieta Hills (\$)	Ind/Com/Res (\$)	Apartment 17 (\$)	Esquela (\$)	River Canyon (\$)	Terrace & Highlands (\$)	
Total				2,130,000	1,700,000	2,900,000	2,080,000	6,400,000	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Golf Course																	
Phase 1 Developments																	
Riverview	22.4	1,470,293	65,638	1,247,699						222,594							
Lakeview	15.8	1,039,707	65,638	882,301					157,406								
Residences of Murieta Hills	73.8	4,451,422	60,303		347,352		1,539,231			252,642		2,312,197					
Retreats	18.8	578,557	30,742		88,557						490,000						
Murieta Gardens	19.6	159,419	8,128		92,292					67,127							
Subtotal	150																
Phase 2 Developments													220,000			130,000	
Industrial/Commercial/Residential	50.9	459,735	9,024		239,735												160,732
River Canyon	46.4	1,254,450	27,059		218,144	906,306											229,268
Highlands	42.0	1,180,175	28,079		197,773	821,670											
Terrace	60.0	1,683,393	28,079		282,101	1,172,024											
Apartment 17	23.8	508,325	21,354		112,013					81,472		104,840	210,000				
Esquela	25.9	1,454,523	56,086		122,033		540,769			88,759		622,962		80,000			
Estates of Lake Clementia	31.7	0	0														
Estates of Lake Chesbro	29.4	0	0														
Estates of Lake Calero	52.1	0	0														
Subtotal	249			2,130,000	1,700,000	2,900,000	2,080,000	0	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Total - All Projects	400			0	0	0	0	-6,400,000	0	0	0	0	0	0	0	0	0

Relative Ranking of Developments

Phase 1 Developments		
Murieta Gardens	8,128	
Retreats	30,742	
Residences of Murieta Hills	60,303	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Riverview	65,638	Unlikely RMCC with Contribute and Developments May or May Not Occur in the Future; Deemed to Have Highest Unit Costs
Lakeview	65,638	Unlikely RMCC with Contribute and Developments May or May Not Occur in the Future; Deemed to Have Highest Unit Costs
Phase 2 Developments		
Industrial/Commercial/Residential	9,024	
Apartment 17	21,354	
River Canyon	27,059	
Highlands	28,079	
Terrace	28,079	
Esquela	56,086	May or may not be more cost-effective depending on whether Stonehouse Park included in the demands associated with Res of Murieta Hills and Esquela
Both Phases Combined		
Murieta Gardens	8,128	
Industrial/Commercial/Residential	9,024	
Apartment 17	21,354	
River Canyon	27,059	
Highlands	28,079	
Terrace	28,079	
Retreats	30,742	
Esquela	56,086	
Residences of Murieta Hills	60,303	
Riverview	65,638	Unlikely RMCC with Contribute and Developments May or May Not Occur in the Future; Deemed to Have Highest Unit Costs
Lakeview	65,638	Unlikely RMCC with Contribute and Developments May or May Not Occur in the Future; Deemed to Have Highest Unit Costs

Analysis 3 - Determination of Most Cost-Effective Developments for RW Service (Step 3 All Developments Served RW Except for Three Lake Estates; No RMCC Contribution for South GC Improvements; Allocate Stonehouse Park Demand to Res of Murieta Hills and Esquela)

Title XVI Recycled Water Feasibility Study

Alternative 2 - Recycled Water Service to All Developments Except for Three Lake Estates; Without RMCC Contribution for South Golf Course Pumping Station; Addition of Stonehouse Park Demand

COST ALLOCATIONS TO INDIVIDUAL DEVELOPMENTS WITHOUT RMCC CONTRIBUTIONS (Third Analysis - Lake Estates Out)

	Estimated Demand (AFY)	Total Capital Cost Allocation (\$)	Relative Unit Cost (\$/AFY)	Improvement and Allocation													
				South Golf Course (\$)	Pumping Station and Tank Improvements North Golf Course (\$)	Bass Lake PS and Tank (\$)	Lookout Hill (\$)	Phase 3 (\$)	Lakeview & Riverview (\$)	Murieta Gardens (\$)	Retreats (\$)	Res of Murieta Hills (\$)	Ind/Com/Res (\$)	Apartment 17 (\$)	Esquela (\$)	River Canyon (\$)	Terrace & Highlands (\$)
Total				2,130,000	1,700,000	2,900,000	2,080,000	6,400,000	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Golf Course																	
Phase 1 Developments																	
Riverview	22.4	1,470,293	65,638	1,247,699						222,594							
Lakeview	15.8	1,039,707	65,638	882,901						157,406							
Residences of Murieta Hills	84.2	4,505,290	53,519		381,338		1,539,284				262,446	490,000	2,322,222				
Retreats	18.8	575,253	30,567		85,253												
Murieta Gardens	19.6	149,997	7,648		88,849						61,148						
Subtotal	123																
Phase 2 Developments																	
Industrial/Commercial/Residential	50.9	450,792	8,848		230,792								220,000			130,000	
River Canyon	46.4	1,246,312	26,884		210,006	906,306											160,732
Highlands	42.0	1,172,797	27,904		190,395	821,670											229,268
Terrace	60.0	1,672,869	27,904		271,577	1,172,024											
Apartment 17	23.8	484,245	20,342		107,835						74,214		92,196	210,000			
Esquela	29.6	1,472,445	49,794		133,956		540,716				92,192		625,582		80,000		
Estates of Lake Clementia	31.7	0	0														
Estates of Lake Chesbro	29.4	0	0														
Estates of Lake Calero	52.1	0	0														
Subtotal	253			2,130,000	1,700,000	2,900,000	2,080,000	0	380,000	490,000	490,000	3,040,000	220,000	210,000	80,000	130,000	390,000
Total - All Projects	375			0	0	0	0	-6,400,000	0	0	0	0	0	0	0	0	0

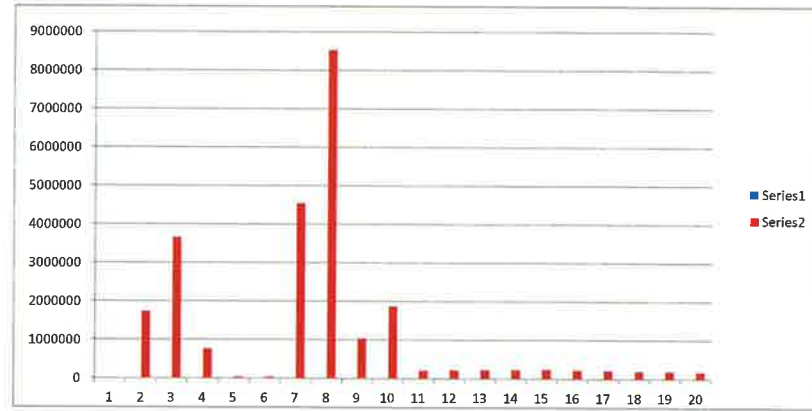
Relative Ranking of Developments

Phase 1 Developments			
Murieta Gardens	7,648		
Retreats	30,567		
Residences of Murieta Hills	53,519		
Riverview	65,638	Eliminate and assume these developments not served RW in the future	
Lakeview	65,638	Eliminate and assume these developments not served RW in the future	
Phase 2 Developments			
Industrial/Commercial/Residential	8,848		
Apartment 17	20,342		
River Canyon	26,884		
Highlands	27,904		
Terrace	27,904		
Esquela	49,794		
Both Phases Combined			
Murieta Gardens	7,648		
Industrial/Commercial/Residential	8,848		
Apartment 17	20,342		
River Canyon	26,884		
Highlands	27,904		
Terrace	27,904		
Retreats	30,567		
Esquela	49,794		
Residences of Murieta Hills	53,519		
Riverview	65,638	Eliminate and assume these developments not served RW in the future	
Lakeview	65,638	Eliminate and assume these developments not served RW in the future	

Analysis 4 - Economic Comparison of Alternatives 1 and 2
Title XVI Recycled Water Feasibility Study
Alternative 1 - No Project Alternative - Van Vleck Sprayfield

Inflation Rate (%/yr) 0
Discount Rate (%/yr) 6

		Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capital Costs																						
No.1 Improvement	Description																					
1	Secondary Effluent Storage Capacity Expansion	Provide 240 AF of additional storage capacity; Facility required to be in service when projected ADWFs exceed 0.67 MGD.									3,250,000	6,500,000										
2	Chlorine Contact Basin Replacement	Install new 3.0 MGD chlorine contact basin			433,333	866,667																
3	South Golf Course Pump Station Improvements	Install new 640 gpm pumping station to meet existing South Golf Course MDD irrigation demands																				
4	Van Vleck Improvements	Modify Van Vleck Sprayfield to serve as permanent effluent disposal facility		413,333	826,667																	
5	Phase 1 Van Vleck Sprayfield Expansion	Expand Van Vleck Sprayfield to accommodate Phase 1 development (add 60 acres total)		1,426,667	2,853,333																	
6	Phase 2 Van Vleck Sprayfield Expansion	Expand Van Vleck Sprayfield to accommodate Phase 2 development (add 100 acres total)								1,070,000	2,140,000											
		Residential Recycled Water Alternative Provides 370 AFY of RW to serve future residential irrigation; Equivalent to a reduction of 1.1-1.2 MGD WTP capacity during peak month; Reduced WTP capacity anticipated to be associated with Phase 2 development which is expected to begin occupation in 2020											1,416,667	2,833,333								
7	Water Treatment Plant Expansion										2,016,000	4,032,000										
Operations and Maintenance Cost Components																						
4	Incremental Potable Water Production Costs	Compared to Alternative 2, this alternative requires the production of 370 AFY of potable water at buildout; Excess RW is projected to be available starting in 2018	0	0	0	0	0	0	29,669	71,208	113,757	156,305	198,854	241,403	283,952	326,500	369,049	369,049	369,049	369,049	369,049	369,049
5	Van Vleck Sprayfield Repair and Replacement	Assumed to be equal to 2.5 % /yr of estimated pipeline and pumping station costs				48,844	48,844	48,844	87,979	87,979	87,979	140,740	140,740	140,740	140,740	140,740	140,740	140,740	140,740	140,740	140,740	140,740
6	Incremental WTP Repair and Replacement	Assume to be equal to 1% /yr of incremental WTP reduction											43,200	43,200	43,200	43,200	43,200	43,200	43,200	43,200	43,200	43,200
	Subtotal (All Improvements and O&M)		0	1,840,000	4,113,333	915,511	48,844	48,844	6,453,648	12,831,187	1,661,602	3,173,579	382,794	425,343	467,892	510,440	552,989	552,989	552,989	552,989	552,989	552,989
	Net Present Worth Costs (All Improvements and O&M)		0	1,735,849	3,660,852	768,680	38,689	36,499	4,549,567	8,533,472	1,042,510	1,878,437	213,750	224,065	232,528	239,314	244,588	230,743	217,682	205,361	193,736	182,770
	Grand Total - Net Present Worth Costs (All Improvements and O&M)		24,429,093																			
	Subtotal (Incremental Improvements and O&M)		0	1,426,667	2,853,333	48,844	48,844	48,844	3,203,648	6,331,187	1,661,602	3,173,579	382,794	425,343	467,892	510,440	552,989	552,989	552,989	552,989	552,989	552,989
	Net Present Worth Costs (Incremental Improvements and O&M)		0	1,345,912	2,539,457	41,010	38,689	36,499	2,258,445	4,210,601	1,042,510	1,878,437	213,750	224,065	232,528	239,314	244,588	230,743	217,682	205,361	193,736	182,770
	Grand Total - Net Present Worth Costs (Incremental Improvements and O&M)		15,576,097																			
	Estimated Recycled Water Production		458	460	463	466	497	538	580	621	664	706	749	791	834	877	919	919	919	919	919	919
																						2130216.9





Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 240 AF Secondary Effluent Storage Pond
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						
Mobilization (5%)		5%	LS	6,840,000	342,000	622,200
Bid, Bonds, and Insurance (3%)		3%	LS	6,840,000	205,200	
Submittals		10	Number	5,000	50,000	
O&M Manuals		5	Number	5,000	25,000	
Division 2 - Site Work						
Excavation (unclassified, 1.5 cy bucket)		348,480	CY	5.85	2,038,608	3,649,429
Offsite Hauling (30 miles) and Disposal		116,160	CY	11.3	1,312,608	
Unconfined Backfill and Compaction		193,600	CY	1.5	290,400	
Trenching		1,042	CY	5	5,208	
Confined Backfill and Compaction		1,042	CY	2.5	2,604	
Division 3 - Concrete						
Concrete Allowance		1.0	LS	100,000	100,000	100,000
Division 4 - Masonry						
				NOT USED		
Division 5 - Metals						
Miscellaneous Metals Allowance		1	LS	50,000	50,000	50,000
Division 6 - Wood and Plastics						
				NOT USED		
Division 7 - Thermal and Moisture Protection						
				NOT USED		
Division 8 - Doors and Windows						
				NOT USED		
Division 9 - Finishes						
				NOT USED		
Division 10 - Specialties						
Reservoir Liner (25-ft deep reservoir)	Hypalon	522,720	SF	1.5	784,080	784,080
Division 11 - Equipment						
Pumps, Valves, and Appurtenance Allowance		1	LS	250,000	250,000	250,000
Division 12 - Furnishings						
				NOT USED		
Division 13 - Special Construction						
				NOT USED		
Division 14 - Conveying Systems						
				NOT USED		
Division 15 - Mechanical						
14-inch DIP - Storage Pond Feed		1,000	LF	168	168,000	420,000
14-inch DIP - Storage Pond Return		1,500	LF	168	252,000	
Division 16 - Electrical and Instrumentation						
Electrical - 15% of Pumping Station Costs		15%	LS	350,000	52,500	70,000
Instrumentation and Controls		5%	LS	350,000	17,500	
					Subtotal	5,945,709
					Contingency - Construction Costs (15%)	891,856
					Estimate of Probable Construction Costs	6,840,000
					Administrative Fees (10%)	684,000
					Regulatory (CEQA) Compliance (5%)	342,000
					Engineering and Construction Management (17.5%)	1,197,000
					Contingency - Soft Costs (10%)	684,000
					Land Cost	0
					Grand Total	9,750,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 195,000 gallon Chlorine Contact Basin Within Existing 1.8 MG Equalization Basin
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						
Mobilization (5%)		5%	LS	930,000	46,500	174,400
Bid, Bonds, and Insurance (3%)		3%	LS	930,000	27,900	
Submittals		10	Number	5,000	50,000	
O&M Manuals		10	Number	5,000	50,000	
Division 2 - Site Work						
Excavation (unclassified, 1.5 cy bucket)		0	CY	5.85	0	0
Offsite Hauling (30 miles) and Disposal		0	CY	11.3	0	
Unconfined Backfill and Compaction		0	CY	1.5	0	
Trenching		0	CY	5	0	
Confined Backfill and Compaction		0	CY	2.5	0	
Aggregate Base		0	CY	15	0	
Division 3 - Concrete						
Interior Walls		183.7	CY	1,150	211,259	496,639
Exterior Walls		198.5	CY	1,150	228,296	
Slab on Grade (Allowance for concrete repair)		58.3	CY	550	32,083	
Miscellaneous		1	LS	25,000	25,000	
Division 4 - Masonry						
NOT USED						
Division 5 - Metals						
Effluent Weir Plate		5	LF	125	625	5,625
Miscellaneous Metals - Allocation		1	LS	5,000	5,000	
Division 6 - Wood and Plastics						
Baffles		3	Each	1,250	3,750	3,750
Division 7 - Thermal and Moisture Protection						
NOT USED						
Division 8 - Doors and Windows						
NOT USED						
Division 9 - Finishes						
NOT USED						
Division 10 - Specialties						
NOT USED						
Division 11 - Equipment						
Mixing System	Induction Mixer	2	Each	35,000	70,000	70,000
Division 12 - Furnishings						
NOT USED						
Division 13 - Special Construction						
NOT USED						
Division 14 - Conveying Systems						
NOT USED						
Division 15 - Mechanical						
16-inch Pipe Connection		1	LS	5,000	5,000	15,000
Sprays and Miscellaneous Piping Allowance		1	LS	10,000	10,000	
Division 16 - Electrical and Instrumentation						
Electrical - Allowance		1	LS	10,000	10,000	40,500
Ultrasonic Level Sensor		1	EA	7,500	7,500	
Chlorine/Dechlorination Residual Analyzers		2	EA	6,500	13,000	
Instrumentation and Controls		1	LS	10,000	10,000	
					Subtotal	805,914
					Contingency - Construction Costs (15%)	120,887
					Estimate of Probable Construction Costs	930,000
					Administrative Fees (10%)	93,000
					Regulatory (CEQA) Compliance (2.5%)	23,250
					Engineering and Construction Management (17.5%)	162,750
					Contingency - Soft Costs (10%)	93,000
					Grand Total	1,300,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Modify Van Vleck to Serve As Permanent Effluent Disposal Facility (approximately 90 acres)
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						363,200
Mobilization (5%)		5%	LS	3,290,000	164,500	
Bid, Bonds, and Insurance (3%)		3%	LS	3,290,000	98,700	
Submittals		10	Number	5,000	50,000	
O&M Manuals		10	Number	5,000	50,000	
Division 2 - Site Work						44,522
Offsite Hauling (30 miles) and Disposal		170	CY	11.3	1,923	
Trenching		1,950	CY	12.5	24,375	
Confined Backfill and Compaction		1,780	CY	7.5	13,349	
Aggregate Base		325	CY	15	4,875	
Division 3 - Concrete						85,000
Pumping Station		1	LS	50,000	50,000	
Miscellaneous		1	LS	35,000	35,000	
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment						419,419
Pump Station		60	HP	294,419	294,419	
Reconfigure/Refurbish Existing Pump Station		1	LS	125,000	125,000	
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction						585,000
Sprayfield Irrigation System		90	Acres	6,500	585,000	
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						1,074,338
12-inch Recycled Water Main		5,850	LF	137	803,088	
12-inch Distribution Valves and Appurtenances		5,850	LF	25	146,250	
Miscellaneous Piping		1	LS	125,000	125,000	
Division 16 - Electrical and Instrumentation						167,768
Electrical (25% of Pumping Station)		1	EA	104,855	104,855	
Instrumentation and Controls (15% of Pumping Station)		1	EA	62,913	62,913	
					Subtotal	2,739,246
					Contingency - Construction Costs (20%)	547,849
					Estimate of Probable Construction Costs	3,290,000
					Administrative Fees (5%)	164,500
					Regulatory (CEQA) Compliance (2.5%)	82,250
					Engineering and Construction Management (17.5%)	575,750
					Contingency - Soft Costs (5%)	164,500
					Grand Total	4,280,000

B/10



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Phase 1 Sprayfield Disposal Expansion (Add 60 acres; 150 acres total)
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						297,600
Mobilization (5%)		5%	LS	2,470,000	123,500	
Bid, Bonds, and Insurance (3%)		3%	LS	2,470,000	74,100	
Submittals		10	Number	5,000	50,000	
O&M Manuals		10	Number	5,000	50,000	
Division 2 - Site Work						38,847
Offsite Hauling (30 miles) and Disposal		157	CY	11.3	1,775	
Trenching		1,800	CY	12.5	22,500	
Confined Backfill and Compaction		1,643	CY	7.5	12,322	
Aggregate Base		150	CY	15	2,250	
Division 3 - Concrete						20,000
Miscellaneous		1	LS	20,000	20,000	
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment						204,075
Pump Station Expansion		35	HP	204,075	204,075	
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction						390,000
Sprayfield Irrigation System		60	Acres	6,500	390,000	
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						971,312
12-inch Recycled Water Main		5,400	LF	137	741,312	
12-inch Distribution Valves and Appurtenances		5,400	LF	25	135,000	
Miscellaneous Piping		1	LS	95,000	95,000	
Division 16 - Electrical and Instrumentation						51,019
Electrical (15% of Pumping Station)		1	LS	30,611	30,611	
Instrumentation and Controls (10% of Pumping Station)		1	EA	20,407	20,407	
					Subtotal	1,972,852
					Contingency - Construction Costs (25%)	493,213
					Estimate of Probable Construction Costs	2,470,000
					Administrative Fees (5%)	123,500
					Regulatory (CEQA) Compliance (2.5%)	61,750
					Engineering and Construction Management (17.5%)	432,250
					Contingency - Soft Costs (5%)	123,500
					Grand Total	3,210,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Phase 2 Sprayfield Disposal Expansion (Add 100 acres; 250 acres total)
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						361,600
	Mobilization (5%)	5%	LS	3,270,000	163,500	
	Bid, Bonds, and Insurance (3%)	3%	LS	3,270,000	98,100	
	Submittals	10	Number	5,000	50,000	
	O&M Manuals	10	Number	5,000	50,000	
Division 2 - Site Work						47,480
	Offsite Hauling (30 miles) and Disposal	192	CY	11.3	2,169	
	Trenching	2,200	CY	12.5	27,500	
	Confined Backfill and Compaction	2,008	CY	7.5	15,060	
	Aggregate Base	183	CY	15	2,750	
Division 3 - Concrete						20,000
	Miscellaneous	1	LS	20,000	20,000	
Division 4 - Masonry						0
NOT USED						
Division 5 - Metals						0
NOT USED						
Division 6 - Wood and Plastics						0
NOT USED						
Division 7 - Thermal and Moisture Protection						0
NOT USED						
Division 8 - Doors and Windows						0
NOT USED						
Division 9 - Finishes						0
NOT USED						
Division 10 - Specialties						0
NOT USED						
Division 11 - Equipment						294,419
	Pump Station Expansion	60	HP	294,419	294,419	
Division 12 - Furnishings						0
NOT USED						
Division 13 - Special Construction						650,000
	Sprayfield Irrigation System	100	Acres	6,500	650,000	
Division 14 - Conveying Systems						0
NOT USED						
Division 15 - Mechanical						1,166,048
	12-inch Recycled Water Main	6,600	LF	137	906,048	
	12-inch Distribution Valves and Appurtenances	6,600	LF	25	165,000	
	Miscellaneous Piping	1	LS	95,000	95,000	
Division 16 - Electrical and Instrumentation						73,605
	Electrical (15% of Pumping Station)	1	LS	44,163	44,163	
	Instrumentation and Controls (10% of Pumping Station)	1	EA	29,442	29,442	
Subtotal						2,613,151
Contingency - Construction Costs (25%)						653,288
Estimate of Probable Construction Costs						3,270,000
Administrative Fees (5%)						163,500
Regulatory (CEQA) Compliance (2.5%)						81,750
Engineering and Construction Management (17.5%)						572,250
Contingency - Soft Costs (5%)						163,500
Grand Total						4,250,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: South Course Pumping Station (Alt 1 - RW System NOT Expanded; 640 gpm)
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						
Mobilization (5%)		5%	LS	900,000	45,000	172,000
Bid, Bonds, and Insurance (3%)		3%	LS	900,000	27,000	
Submittals		10	Number	5,000	50,000	
O&M Manuals		10	Number	5,000	50,000	
Division 2 - Site Work						
Offsite Hauling (30 miles) and Disposal		96	CY	11.3	1,088	7,013
Excavation		325	CY	12.5	4,063	
Confined Backfill and Compaction		229	CY	7.5	1,715	
Aggregate Base		10	CY	15	147	
Division 3 - Concrete						
Walls		30	CY	1,350	40,500	104,007
Slab on Grade		19	CY	550	10,507	
Elevated Slab		10	CY	1,350	13,000	
Miscellaneous Concrete		1	LS	40,000	40,000	
Division 4 - Masonry						
			NOT USED			0
Division 5 - Metals						
			NOT USED			0
Division 6 - Wood and Plastics						
			NOT USED			0
Division 7 - Thermal and Moisture Protection						
			NOT USED			0
Division 8 - Doors and Windows						
			NOT USED			0
Division 9 - Finishes						
			NOT USED			0
Division 10 - Specialties						
Prefabrated Building		450	SF	75	33,750	33,750
Division 11 - Equipment						
Pumps, Station Valves, and Appurtenances		50	HP	260,089	260,089	260,089
Division 12 - Furnishings						
			NOT USED			0
Division 13 - Special Construction						
			NOT USED			0
Division 14 - Conveying Systems						
			NOT USED			0
Division 15 - Mechanical						
Miscellaneous Piping Allowance		1	LS	75,000	75,000	75,000
Division 16 - Electrical and Instrumentation						
Electrical (15% of Pumping Station)		1	LS	39,013	39,013	65,022
Instrumentation and Controls (10% of Pumping Station)		1	EA	26,009	26,009	
					Subtotal	716,881
					Contingency - Construction Costs (25%)	179,220
					Estimate of Probable Construction Costs	900,000
					Administrative Fees (10%)	90,000
					Regulatory (CEQA) Compliance (0%)	0
					Engineering and Construction Management (17.5%)	157,500
					Contingency - Soft Costs (10%)	90,000
					Grand Total	1,240,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: South Course Pumping Station (Alt 2 - RW System Expanded; Analysis 1; 995 gpm)
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						
	Mobilization (5%)	5%	LS	1,520,000	76,000	221,600
	Bid, Bonds, and Insurance (3%)	3%	LS	1,520,000	45,600	
	Submittals	10	Number	5,000	50,000	
	O&M Manuals	10	Number	5,000	50,000	
Division 2 - Site Work						
	Offsite Hauling (30 miles) and Disposal	96	CY	11.3	1,088	7,013
	Excavation	325	CY	12.5	4,063	
	Confined Backfill and Compaction	229	CY	7.5	1,715	
	Aggregate Base	10	CY	15	147	
Division 3 - Concrete						
	Walls	40	CY	1,350	54,000	121,009
	Slab on Grade	25	CY	550	14,009	
	Elevated Slab	10	CY	1,350	13,000	
	Miscellaneous Concrete	1	LS	40,000	40,000	
Division 4 - Masonry						
			NOT USED			0
Division 5 - Metals						
			NOT USED			0
Division 6 - Wood and Plastics						
			NOT USED			0
Division 7 - Thermal and Moisture Protection						
			NOT USED			0
Division 8 - Doors and Windows						
			NOT USED			0
Division 9 - Finishes						
			NOT USED			0
Division 10 - Specialties						
	Prefabrated Building	600	SF	75	45,000	45,000
Division 11 - Equipment						
	Pumps, Station Valves, and Appurtenances	75	HP	342,661	342,661	342,661
Division 12 - Furnishings						
			NOT USED			0
Division 13 - Special Construction						
	Connection of Gravity and Forcemain Pipeline Sections	1	LS	300,000	300,000	300,000
Division 14 - Conveying Systems						
			NOT USED			0
Division 15 - Mechanical						
	Miscellaneous Piping Allowance	1	LS	90,000	90,000	90,000
Division 16 - Electrical and Instrumentation						
	Electrical (15% of Pumping Station)	1	LS	51,399	51,399	85,665
	Instrumentation and Controls (10% of Pumping Station)	1	EA	34,266	34,266	
Subtotal						1,212,948
Contingency - Construction Costs (25%)						303,237
Estimate of Probable Construction Costs						1,520,000
Administrative Fees (10%)						152,000
Regulatory (CEQA) Compliance (2.5%)						38,000
Engineering and Construction Management (17.5%)						266,000
Contingency - Soft Costs (10%)						152,000
Grand Total						2,130,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: South Course Pumping Station (Alt 2 - RW System Expanded; Analysis 2; 730 gpm)
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						213,600
Mobilization (5%)		5%	LS	1,420,000	71,000	
Bid, Bonds, and Insurance (3%)		3%	LS	1,420,000	42,600	
Submittals		10	Number	5,000	50,000	
O&M Manuals		10	Number	5,000	50,000	
Division 2 - Site Work						7,013
Offsite Hauling (30 miles) and Disposal		96	CY	11.3	1,088	
Excavation		325	CY	12.5	4,063	
Confined Backfill and Compaction		229	CY	7.5	1,715	
Aggregate Base		10	CY	15	147	
Division 3 - Concrete						110,315
Walls		36	CY	1,350	48,600	
Slab on Grade		21	CY	550	11,315	
Elevated Slab		8	CY	1,350	10,400	
Miscellaneous Concrete		1	LS	40,000	40,000	
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties						35,625
Prefabrated Building		475	SF	75	35,625	
Division 11 - Equipment						294,419
Pumps, Station Valves, and Appurtenances		60	HP	294,419	294,419	
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction						300,000
Connection of Gravity and Forcemain Pipeline Sections		1	LS	300,000	300,000	
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						100,000
Miscellaneous Piping		1	LS	100,000	100,000	
Division 16 - Electrical and Instrumentation						73,605
Electrical (15% of Pumping Station)		1	LS	44,163	44,163	
Instrumentation and Controls (10% of Pumping Station)		1	EA	29,442	29,442	
					Subtotal	1,134,576
					Contingency - Construction Costs (25%)	283,644
					Estimate of Probable Construction Costs	1,420,000
					Administrative Fees (10%)	142,000
					Regulatory (CEQA) Compliance (2.5%)	35,500
					Engineering and Construction Management (17.5%)	248,500
					Contingency - Soft Costs (10%)	142,000
					Grand Total	1,990,000

B15



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Pipelines Serving Riverview and Lakeview Developments From Existing 8-Inch RW Main
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						71,600
Mobilization (5%)		5%	LS	270,000	13,500	
Bid, Bonds, and Insurance (3%)		3%	LS	270,000	8,100	
Submittals		5	Number	5,000	25,000	
O&M Manuals		5	Number	5,000	25,000	
Division 2 - Site Work						5,268
Offsite Hauling (30 miles) and Disposal		4	CY	11.3	45	
Excavation		237	CY	12.5	2,965	
Confined Backfill and Compaction		233	CY	7.5	1,750	
Aggregate Base		34	CY	15	508	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						139,568
6-inch PVC pipeline		1,220	LF	114	139,568	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	216,436
					Contingency - Construction Costs (25%)	54,109
					Estimate of Probable Construction Costs	270,000
					Administrative Fees (10%)	27,000
					Regulatory (CEQA) Compliance (2.5%)	6,750
					Engineering and Construction Management (17.5%)	47,250
					Contingency - Soft Costs (10%)	27,000
					Grand Total	380,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 12-inch Murieta Gardens Recycled Water Pipeline; Serves Other Northwest Developments As Well
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						
	Mobilization (5%)	5%	LS	350,000	17,500	78,000
	Bid, Bonds, and Insurance (3%)	3%	LS	350,000	10,500	
	Submittals	5	Number	5,000	25,000	
	O&M Manuals	5	Number	5,000	25,000	
Division 2 - Site Work						
	Offsite Hauling (30 miles) and Disposal	9	CY	11.3	101	5,330
	Excavation	239	CY	12.5	2,990	
	Confined Backfill and Compaction	230	CY	7.5	1,727	
	Aggregate Base	34	CY	15	513	
Division 3 - Concrete						
			NOT USED			0
Division 4 - Masonry						
			NOT USED			0
Division 5 - Metals						
			NOT USED			0
Division 6 - Wood and Plastics						
			NOT USED			0
Division 7 - Thermal and Moisture Protection						
			NOT USED			0
Division 8 - Doors and Windows						
			NOT USED			0
Division 9 - Finishes						
			NOT USED			0
Division 10 - Specialties						
			NOT USED			0
Division 11 - Equipment						
			NOT USED			0
Division 12 - Furnishings						
			NOT USED			0
Division 13 - Special Construction						
	Jackson Highway Undercrossing	1	Each	50000		50,000
Division 14 - Conveying Systems						
			NOT USED			0
Division 15 - Mechanical						
	6-inch PVC pipeline	220	LF	86	18,876	145,974
	12-inch PVC pipeline	1,010	LS	126	127,098	
Division 16 - Electrical and Instrumentation						
			NOT USED			0
Subtotal						279,304
Contingency - Construction Costs (25%)						69,826
Estimate of Probable Construction Costs						350,000
Administrative Fees (10%)						35,000
Regulatory (CEQA) Compliance (2.5%)						8,750
Engineering and Construction Management (17.5%)						61,250
Contingency - Soft Costs (10%)						35,000
Grand Total						490,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 6-inch Retreats Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						78,000
Mobilization (5%)		5%	LS	350,000	17,500	
Bid, Bonds, and Insurance (3%)		3%	LS	350,000	10,500	
Submittals		5	Number	5,000	25,000	
O&M Manuals		5	Number	5,000	25,000	
Division 2 - Site Work						7,448
Offsite Hauling (30 miles) and Disposal		6	CY	11.3	63	
Excavation		335	CY	12.5	4,193	
Confined Backfill and Compaction		330	CY	7.5	2,474	
Aggregate Base		48	CY	15	719	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						197,340
6-inch PVC pipeline		1,725	LF	114	197,340	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	282,788
					Contingency - Construction Costs (25%)	70,697
					Estimate of Probable Construction Costs	350,000
					Administrative Fees (10%)	35,000
					Regulatory (CEQA) Compliance (2.5%)	8,750
					Engineering and Construction Management (17.5%)	61,250
					Contingency - Soft Costs (10%)	35,000
					Grand Total	490,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 10-Inch Residences of Murieta Hills and Esquela (Future) Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						223,600
Mobilization (5%)		5%	LS	2,170,000	108,500	
Bid, Bonds, and Insurance (3%)		3%	LS	2,170,000	65,100	
Submittals		5	Number	5,000	25,000	
O&M Manuals		5	Number	5,000	25,000	
Division 2 - Site Work						45,899
Offsite Hauling (30 miles) and Disposal		34	CY	11.3	388	
Excavation		2,067	CY	12.5	25,837	
Confined Backfill and Compaction		2,033	CY	7.5	15,244	
Aggregate Base		295	CY	15	4,430	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						1,466,072
10-Inch PVC pipeline		10,630	LF	114	1,216,072	
Valves and Appurtenances		1	LS	250,000	250,000	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	1,735,571
					Contingency - Construction Costs (25%)	433,893
					Estimate of Probable Construction Costs	2,170,000
					Administrative Fees (10%)	217,000
					Regulatory (CEQA) Compliance (2.5%)	54,250
					Engineering and Construction Management (17.5%)	379,750
					Contingency - Soft Costs (10%)	217,000
					Grand Total	3,040,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Lookout Hill RW Storage Tanks (refurnished and new) and Pumping Station
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						191,600
Mobilization (5%)		5%	LS	1,770,000	88,500	
Bid, Bonds, and Insurance (3%)		3%	LS	1,770,000	53,100	
Submittals		5	Number	5,000	25,000	
O&M Manuals		5	Number	5,000	25,000	
Division 2 - Site Work						8,366
Offsite Hauling (30 miles) and Disposal		127	CY	11.3	1,432	
Excavation		352	CY	12.5	4,400	
Backfill and Compaction		225	CY	7.5	1,689	
Aggregate Base		56	CY	15	845	
Division 3 - Concrete						126,027
Tank Base/Foundation		56	CY	1,350	76,027	
Miscellaneous Concrete		1	LS	50,000	50,000	
Division 4 - Masonry						0
Division 5 - Metals						0
Division 6 - Wood and Plastics						0
Division 7 - Thermal and Moisture Protection						0
Division 8 - Doors and Windows						0
Division 9 - Finishes						0
Division 10 - Specialties						278,040
Prefabrated Building		150	SF	100	15,000	
New Tank (200,000 gallons)		200000	each	0.9	183,040	
Refurbish Tank (200,000 gallons)		1	LS	80000	80,000	
Division 11 - Equipment						484,978
Pumps, Station Valves, and Appurtenances		125	HP	484,978	484,978	
Division 12 - Furnishings						0
Division 13 - Special Construction						0
Division 14 - Conveying Systems						0
Division 15 - Mechanical						130,000
Tank Piping, Valves, and Appurtenances		1	LS	85000	85,000	
Repair and Replace Piping		1	LS	45000	45,000	
Division 16 - Electrical and Instrumentation						193,991
Electrical (25% of Pumping Station)		1	LS	121,244	121,244	
Instrumentation and Controls (15% of Pumping Station)		1	EA	72,747	72,747	
Subtotal						1,413,001
Contingency - Construction Costs (25%)						353,250
Estimate of Probable Construction Costs						1,770,000
Administrative Fees (5%)						88,500
Regulatory (CEQA) Compliance (2.5%)						44,250
Engineering and Construction Management (5%)						88,500
Contingency - Soft Costs (5%)						88,500
Grand Total						2,080,000

B20



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: North Coarse Pumping Station; 2110 gpm
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						163,600
Mobilization (5%)		5%	LS	1,420,000	71,000	
Bid, Bonds, and Insurance (3%)		3%	LS	1,420,000	42,600	
Submittals		5	Number	5,000	25,000	
O&M Manuals		5	Number	5,000	25,000	
Division 2 - Site Work						0
Offsite Hauling (30 miles) and Disposal		0	CY	11.3	0	
Trenching		0	CY	12.5	0	
Confined Backfill and Compaction		0	CY	7.5	0	
Aggregate Base		0	CY	15	0	
Division 3 - Concrete						25,000
Miscellaneous Concrete		1	LS	25,000	25,000	
Division 4 - Masonry						0
NOT USED						
Division 5 - Metals						0
NOT USED						
Division 6 - Wood and Plastics						0
NOT USED						
Division 7 - Thermal and Moisture Protection						0
NOT USED						
Division 8 - Doors and Windows						0
NOT USED						
Division 9 - Finishes						0
NOT USED						
Division 10 - Specialties						0
NOT USED						
Division 11 - Equipment						777,002
Pumps, Station Valves, and Appurtenances		250	HP	777,002	777,002	
Division 12 - Furnishings						0
NOT USED						
Division 13 - Special Construction						0
NOT USED						
Division 14 - Conveying Systems						0
NOT USED						
Division 15 - Mechanical						75,000
Miscellaneous Piping		1	LS	75,000	75,000	
Division 16 - Electrical and Instrumentation						194,251
Electrical (20% of Pumping Station)		1	EA	155,400	155,400	
Instrumentation and Controls (5% of Pumping Station)		1	EA	38,850	38,850	
					Subtotal	1,234,853
					Contingency - Construction Costs (15%)	185,228
					Estimate of Probable Construction Costs	1,420,000
					Administrative Fees (5%)	71,000
					Regulatory (CEQA) Compliance (0%)	0
					Engineering and Construction Management (10%)	142,000
					Contingency - Soft Costs (5%)	71,000
					Grand Total	1,700,000

B21



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 6-inch Industrial/Commercial/Residential Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						32,800
	Mobilization (5%)	5%	LS	160,000	8,000	
	Bid, Bonds, and Insurance (3%)	3%	LS	160,000	4,800	
	Submittals	2	Number	5,000	10,000	
	O&M Manuals	2	Number	5,000	10,000	
Division 2 - Site Work						820
	Offsite Hauling (30 miles) and Disposal	1	CY	11.3	7	
	Excavation	37	CY	12.5	462	
	Confined Backfill and Compaction	36	CY	7.5	272	
	Aggregate Base	5	CY	15	79	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction						75,000
	Jackson Road Undercrossing	1	LS	75000	75,000	0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						21,736
	6-inch PVC pipeline	190	LF	114	21,736	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	130,356
					Contingency - Construction Costs (25%)	32,589
					Estimate of Probable Construction Costs	160,000
					Administrative Fees (10%)	16,000
					Regulatory (CEQA) Compliance (2.5%)	4,000
					Engineering and Construction Management (17.5%)	28,000
					Contingency - Soft Costs (10%)	16,000
					Grand Total	220,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 6-inch Apartments Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						32,000
Mobilization (5%)		5%	LS	150,000	7,500	
Bid, Bonds, and Insurance (3%)		3%	LS	150,000	4,500	
Submittals		2	Number	5,000	10,000	
O&M Manuals		2	Number	5,000	10,000	
Division 2 - Site Work						475
Offsite Hauling (30 miles) and Disposal		0	CY	11.3	4	
Excavation		21	CY	12.5	267	
Confined Backfill and Compaction		21	CY	7.5	158	
Aggregate Base		3	CY	15	46	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction						75,000
Jackson Highway Undercrossing		1	Each	75000	75,000	
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						12,584
6-inch PVC pipeline		110	LF	114	12,584	
Division 16 - Electrical and Instrumentation			NOT USED			0
Subtotal						120,059
Contingency - Construction Costs (25%)						30,015
Estimate of Probable Construction Costs						150,000
Administrative Fees (10%)						15,000
Regulatory (CEQA) Compliance (2.5%)						3,750
Engineering and Construction Management (17.5%)						26,250
Contingency - Soft Costs (10%)						15,000
Grand Total						210,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 6-inch Esquela Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						24,800
Mobilization (5%)		5%	LS	60,000	3,000	
Bid, Bonds, and Insurance (3%)		3%	LS	60,000	1,800	
Submittals		2	Number	5,000	10,000	
O&M Manuals		2	Number	5,000	10,000	
Division 2 - Site Work						1,123
Offsite Hauling (30 miles) and Disposal		1	CY	11.3	9	
Excavation		51	CY	12.5	632	
Confined Backfill and Compaction		50	CY	7.5	373	
Aggregate Base		7	CY	15	108	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						22,308
6-inch PVC pipeline		260	LF	86	22,308	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	48,231
					Contingency - Construction Costs (25%)	12,058
					Estimate of Probable Construction Costs	60,000
					Administrative Fees (10%)	6,000
					Regulatory (CEQA) Compliance (2.5%)	1,500
					Engineering and Construction Management (17.5%)	10,500
					Contingency - Soft Costs (10%)	6,000
					Grand Total	80,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Bass Lake Tank and Pumping Station; 1040 gpm
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
						215,600
Division 1 - General Requirements						
	Mobilization (5%)	5%	LS	2,070,000	103,500	
	Bid, Bonds, and Insurance (3%)	3%	LS	2,070,000	62,100	
	Submittals	5	Number	5,000	25,000	
	O&M Manuals	5	Number	5,000	25,000	
						22,955
Division 2 - Site Work						
	Offsite Hauling (30 miles) and Disposal	215	CY	11.3	2,435	
	Excavation	921	CY	12.5	11,509	
	Confined Backfill and Compaction	705	CY	7.5	5,290	
	Aggregate Base	248	CY	15	3,721	
						324,077
Division 3 - Concrete						
	Walls	31	CY	1,350	42,500	
	Slab on Grade	18	CY	550	10,102	
	Elevated Slab	4	CY	1,350	5,625	
	Tank Base/Foundation	119	CY	1,350	160,850	
	Miscellaneous Concrete	1	LS	105,000	105,000	
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
						495,100
Division 10 - Specialties						
	Prefabrated Building	250	SF	150	37,500	
	500,000 gallon Storage Tank	500000	LS	0.9	457,600	
Division 11 - Equipment						
	Pumps, Station Valves, and Appurtenances	85	HP	373,102	373,102	
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
						75,000
Division 15 - Mechanical						
	Miscellaneous Piping	1	LS	75,000	75,000	
Division 16 - Electrical and Instrumentation						
	Electrical (25% of Pumping Station)	1	LS	93,276	93,276	
	Instrumentation and Controls (15% of Pumping Station)	1	EA	55,965	55,965	
						149,241
						1,655,075
						413,769
						2,070,000
						207,000
						51,750
						362,250
						207,000
						2,900,000

B25



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 8-inch River Canyon Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						27,200
Mobilization (5%)		5%	LS	90,000	4,500	
Bid, Bonds, and Insurance (3%)		3%	LS	90,000	2,700	
Submittals		2	Number	5,000	10,000	
O&M Manuals		2	Number	5,000	10,000	
Division 2 - Site Work						1,900
Offsite Hauling (30 miles) and Disposal		1	CY	11.3	16	
Excavation		86	CY	12.5	1,069	
Confined Backfill and Compaction		84	CY	7.5	631	
Aggregate Base		12	CY	15	183	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						40,269
8-inch PVC pipeline		440	LF	92	40,269	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	69,369
					Contingency - Construction Costs (25%)	17,342
					Estimate of Probable Construction Costs	90,000
					Administrative Fees (10%)	9,000
					Regulatory (CEQA) Compliance (2.5%)	2,250
					Engineering and Construction Management (17.5%)	15,750
					Contingency - Soft Costs (10%)	9,000
					Grand Total	130,000



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: 6- and 8-inch Terrace and Highlands Recycled Water Pipeline
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						42,400
Mobilization (5%)		5%	LS	280,000	14,000	
Bid, Bonds, and Insurance (3%)		3%	LS	280,000	8,400	
Submittals		2	Number	5,000	10,000	
O&M Manuals		2	Number	5,000	10,000	
Division 2 - Site Work						5,052
Offsite Hauling (30 miles) and Disposal		4	CY	11.3	43	
Excavation		228	CY	12.5	2,844	
Confined Backfill and Compaction		224	CY	7.5	1,678	
Aggregate Base		33	CY	15	488	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties			NOT USED			0
Division 11 - Equipment			NOT USED			0
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction			NOT USED			0
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						180,008
6-inch PVC pipeline		850	LF	86	72,930	
8-inch PVC pipeline		1,170	LF	92	107,078	
Division 16 - Electrical and Instrumentation			NOT USED			0
					Subtotal	227,460
					Contingency - Construction Costs (25%)	56,865
					Estimate of Probable Construction Costs	280,000
					Administrative Fees (10%)	28,000
					Regulatory (CEQA) Compliance (2.5%)	7,000
					Engineering and Construction Management (17.5%)	49,000
					Contingency - Soft Costs (10%)	28,000
					Grand Total	390,000

B27



Project: Rancho Murieta Title XVI Recycled Water Feasibility Study
Job Number: 60273784
Component/Element: Phase 3 Pipelines to Lake Estates; 795 gpm
Path:

Date: 3/29/2013
Developed By: Kevin Kennedy
Checked By:

Specification Section	Description	Quantity	Units	Unit Cost	Subtotal	Total
Division 1 - General Requirements						465,600
Mobilization (5%)		5%	LS	4,570,000	228,500	
Bid, Bonds, and Insurance (3%)		3%	LS	4,570,000	137,100	
Submittals		10	Number	5,000	50,000	
O&M Manuals		10	Number	5,000	50,000	
Division 2 - Site Work						77,781
Offsite Hauling (30 miles) and Disposal		131	CY	11.3	1,475	
Excavation		3,490	CY	12.5	43,628	
Confined Backfill and Compaction		3,360	CY	7.5	25,198	
Aggregate Base		499	CY	15	7,479	
Division 3 - Concrete			NOT USED			0
Division 4 - Masonry			NOT USED			0
Division 5 - Metals			NOT USED			0
Division 6 - Wood and Plastics			NOT USED			0
Division 7 - Thermal and Moisture Protection			NOT USED			0
Division 8 - Doors and Windows			NOT USED			0
Division 9 - Finishes			NOT USED			0
Division 10 - Specialties						769,660
Prefabrated Building		250	SF	150	37,500	
800,000 gallon Storage Tank		800000	Each	0.9	732,160	
Division 11 - Equipment						402,416
Pumps, Station Valves, and Appurtenances		95	HP	402,416	402,416	
Division 12 - Furnishings			NOT USED			0
Division 13 - Special Construction						100,000
Consumnes River Crossing		1	Each	100000		
Division 14 - Conveying Systems			NOT USED			0
Division 15 - Mechanical						1,740,110
6-inch PVC pipeline		17,950	LF	86	1,540,110	
Misceallaneous Piping		1	LS	200000	200,000	
Division 16 - Electrical and Instrumentation			NOT USED			100,604
Electrical (15% of Pumping Station)		1	LS	60,362	60,362	
Instrumentation and Controls (10% of Pumping Station)		1	EA	40,242	40,242	
						Subtotal
						3,656,171
						Contingency - Construction Costs (25%)
						914,043
						Estimate of Probable Construction Costs
						4,570,000
						Administrative Fees (10%)
						457,000
						Regulatory (CEQA) Compliance (2.5%)
						114,250
						Engineering and Construction Management (17.5%)
						799,750
						Contingency - Soft Costs (10%)
						457,000
						Grand Total
						6,400,000

Potential Cost Savings Measures

Local developers expressed their concern with the overall costs of the expanded recycled water program during the developer outreach meetings. During this meeting, AECOM indicated to meeting attendees that the primary objectives of this study were to:

- Identify which developments appear to be the most cost-effective to serve with respect to one another,
- Determine which alternative was more cost-effective, and
- Prepare a feasibility study report which met the requirements for pursuing additional Title XVI granting funding.

Although optimizing the expanded recycled water program to minimize/reduce costs was beyond the scope of this study, AECOM developed several areas where costs may be reduced or eliminated. The following are descriptions of these areas:

- Pursue additional Title XVI grant funding for detailed design and construction activities. The District should consider joining a coalition to increase their potential for funding.
- Ask CDPH to re-evaluate their position with respect to the need for providing recycled water storage tanks at Bass Lake. The estimated cost associated with this particular tank is on the order of \$1 million dollars.
- Costs can be reduced by coordinating and packaging developer and District infrastructure improvements. For example, it is our understanding that the existing storm drainage channel located along the northeast perimeter of Murieta Gardens is to be replaced with a new pipeline. This proposed storm drain pipeline alignment is contiguous with the proposed 12- and 10-inch recycled water pipelines serving the west and northwest developments. Potential savings may be achieved by installing these two pipelines as part of the same contract and within a common trench provided that this is accomplished in accordance with regulatory requirements (e.g., adequate vertical and horizontal separations).
- Discussions with RMCC indicated that the existing pumping station serving the South Golf Course will require replacement in the near future. Once the North Golf Course Pumping Station is replaced with a higher capacity facility, this existing facility could potentially be configured to serve both Van Vleck and the South Golf Course.

Appendix C

General Manager Letter Regarding District Commitment