



SANTA ROSA SUBREGIONAL WATER REUSE SYSTEM

Incremental Recycled
Water Program -
Santa Rosa Urban Reuse Project

FEASIBILITY STUDY



Incremental Recycled Water Program

Santa Rosa Urban Reuse Project

Feasibility Study

Santa Rosa Subregional Water Reuse System

Executive Summary

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In Association with



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List of Abbreviations and Acronyms

ADM	Allocation and Distribution Model
AF, ac-ft	Acre Feet
BPU	Board of Public Utilities
BV	Bennett Valley
City	City of Santa Rosa
C/I.....	Commercial and Industrial
CCI	Construction Cost Index
CEQA.....	California Environmental Quality Act
CN	Central
COP.....	Certificate of Participation
DAFT.....	Dissolved Air Flotation Thickening
EIR.....	Environmental Impact Report
ENR.....	Engineering News Record
FG	Fountaingrove
FY.....	Fiscal Year
GIS.....	Geographic Information System
GPL.....	Geysers Pipeline
HGL.....	Hydraulic Grade Line
HL.....	Head Loss
IRWMP	Integrated Regional Water Management Plan
IRWP	Incremental Recycled Water Program
LF.....	Linear Foot
MG.....	Million Gallons
MGD.....	Million Gallons per Day
MGY	Million Gallons per Year
MMWD.....	Marin Municipal Water District
MOU	Memorandum of Understanding
NCIRWMP	North Coast Integrated Regional Water Management Plan

NE.....	Northeast
NEPA	National Environmental Policy Act
NOP.....	Notice of Preparation
NPDES.....	National Pollutant Discharge Elimination System
NW	Northwest
O&M	Operations and Maintenance
OAK	Oakmont
P/I.....	Public Institutional
psi	Pounds per Square Inch
RP	Rohnert Park
RV.....	Rincon Valley
RWSA.....	Recycled Water Service Area
SCWRHRP	Sonoma County Water Recycling and Habitat Restoration Project
SCWA, Agency	Sonoma County Water Agency
SE.....	Southeast
SPA.....	Specific Plan Area
SW	Southwest
SWT.....	Surface Water Treatment
UGB.....	Urban Growth Boundary
UWMP	Urban Water Management Plan
WRP	Water Reclamation Plant
WSTSP	Water Supply and Transmission System Project

Executive Summary

ES-1 Purpose and Background

Santa Rosa is the owner and operator of the Subregional Water Reuse System (Subregional System), which provides service to the cities of Santa Rosa, Rohnert Park, Cotati and Sebastopol and the South Park County Sanitation District. Santa Rosa is also a full-service city with water and sewer utility authority.

In 2001, Santa Rosa began developing the Incremental Recycled Water Program (IRWP) for the Subregional System. The purpose of the IRWP is to outline a range of alternatives for managing additional wastewater flows generated by its member agencies and for managing increasingly stringent water quality regulations. In November 2003, Santa Rosa certified the Environmental Impact Report (EIR) for the IRWP and in March 2004 it adopted the IRWP Master Plan. The IRWP Master Plan's Selected Program is a combination of alternatives to manage future flows and regulatory issues including:

- Indoor Water Conservation
- Urban Reuse
- Discharge
- Agricultural Reuse
- Geysers Expansion

When evaluated from only a wastewater utility standpoint, Urban Reuse is the most expensive IRWP alternative. However, Urban Reuse could also benefit Santa Rosa's water utility, by providing a reliable, flexible long-term water supply. Santa Rosa's General Plan, Board of Public Utilities Resolution 776, 2000 Urban Water Management Plan and 2005 Urban Water Management Plan all identified Urban Reuse as a potential future water source.

This Feasibility Study is intended to develop and evaluate alternatives for Urban Reuse within Santa Rosa, with a particular focus on feasible cost allocation strategies between the Subregional System and Santa Rosa's water utility. Economically feasible Urban Reuse alternatives could then be used to carry out the IRWP Master Plan and support the IRWP objectives. This Feasibility Study has been funded in part by the State Water Resources Control Board's Recycled Water Planning Grant Program, which focuses on assisting local agencies with developing cost-effective recycled water projects.

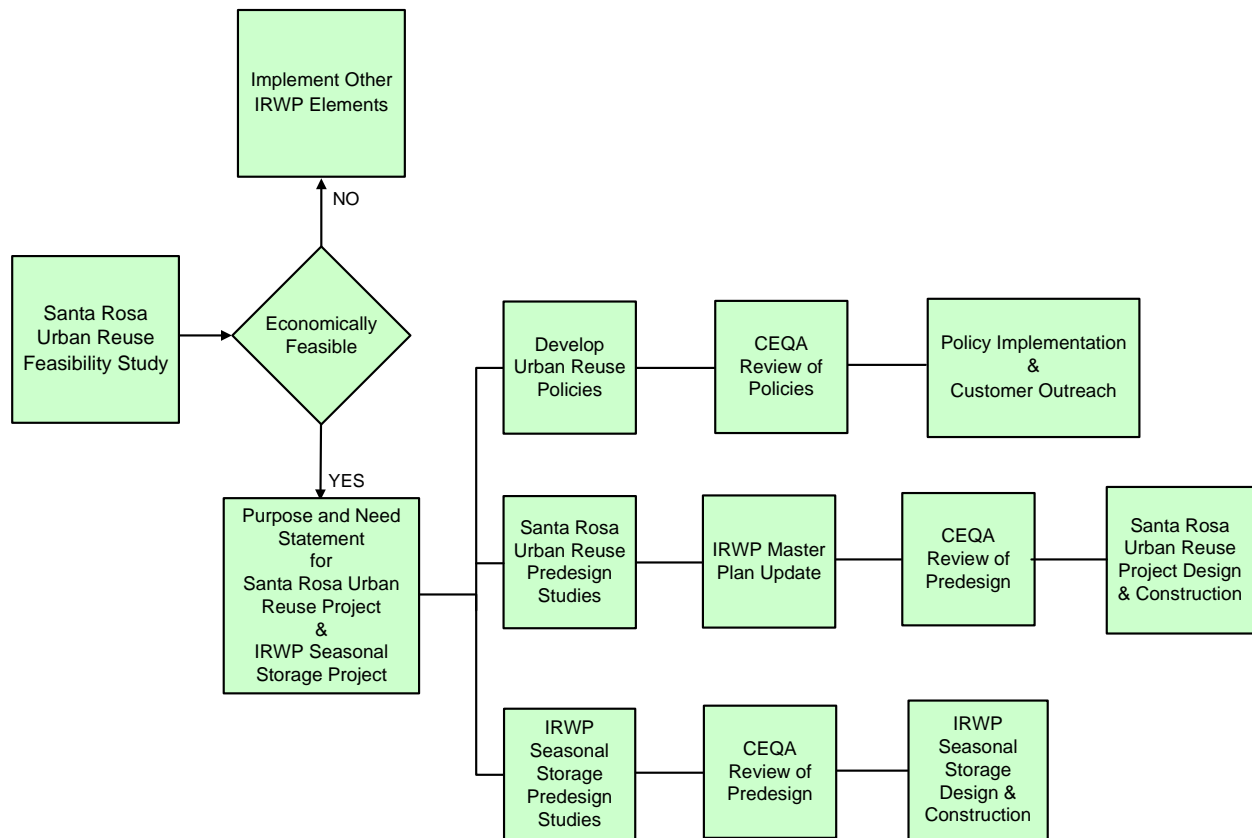
ES-2 Use of this Document

This Feasibility Study could be used by Santa Rosa's Board of Public Utilities and City Council to evaluate various alternatives for a Santa Rosa Urban Reuse Project and determine whether or not to initiate environmental review of a Santa Rosa Urban Reuse Project and whether or not to proceed with the next steps in engineering and policy development. Future actions that could be taken include:

- Adoption of a Purpose & Need Statement for the Santa Rosa Urban Reuse Project
- Development of policy related to recycled water use in Santa Rosa and cost sharing between utilities
- Predesign of the transmission and distribution systems for the Santa Rosa Urban Reuse Project
- Reconnaissance and predesign options for seasonal storage to support the Santa Rosa Urban Reuse Project and other IRWP projects
- CEQA review of both policies and proposed construction projects
- Outreach to recycled water users
- Design and construction of transmission, distribution and storage facilities

Figure ES-1 illustrates the Santa Rosa Urban Reuse Project Decision Tree.

Figure ES-1: Santa Rosa Urban Reuse Project Decision Tree



This Feasibility Study also provides baseline technical information that would allow Santa Rosa to apply for State assistance to fund the design and construction of the Santa Rosa Urban Reuse Project.

ES-3 Urban Reuse Alternatives for Santa Rosa

Chapter 1 provides general information on Santa Rosa, the City's Urban Growth Boundary (UGB) and its planning and population projections. Chapters 2 and 3 outline the projected wastewater disposal and water supply needs, the various alternatives available to meet those needs and the costs of implementing each alternative water supply and wastewater disposal strategy. These alternatives provide the basis for establishing the economic feasibility of a Santa Rosa Urban Reuse Project, as compared to other options.

Table ES-1 illustrates the water demand and wastewater flow projections.

Table ES-1: Current and Projected Population and Capacities¹

	2005 Estimates	2020 Estimates	2030 Estimates
Population	153,790	187,067	206,294
Potable Water Demand			
Acre Feet Year	26,235	32,692	36,186
Million Gallons Year	8,750	10,900	12,060
Million Gallons Day	24	30	33
Recycled Water Demand			
Acre Feet Year	300	6,600	N/A
Million Gallons Year	98	2,200	N/A
Million Gallons Day	0.3	15	N/A
Wastewater Flows (Average Dry Weather Flows)			
Million Gallons Year	4,800	7,080	N/A
Million Gallons Day	13.17	19.14	N/A

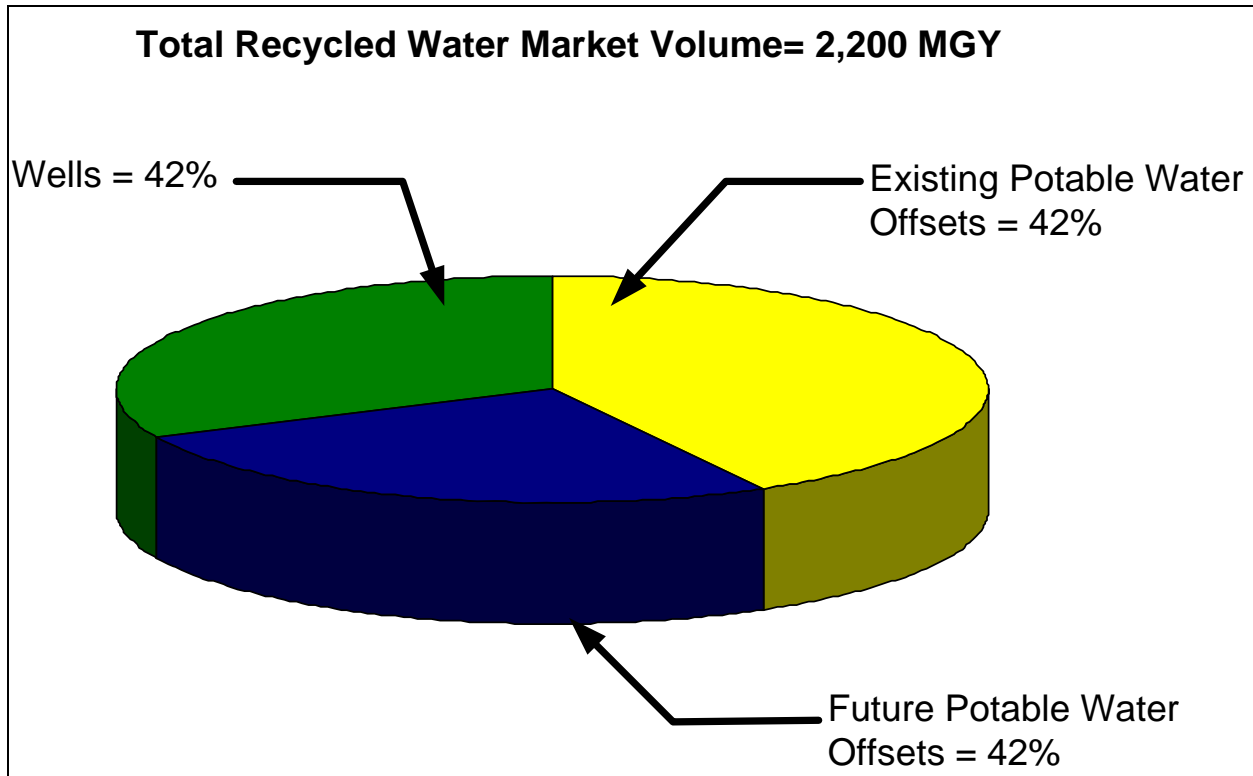
Santa Rosa's Urban Reuse Market

Chapter 4 describes Santa Rosa's potential recycled water market. The market has been analyzed using a GIS-driven database (the Demand Database) that incorporates both the City's water utility billing records from January 2000 through December 2004 and available information on irrigation wells. The market includes 2,200 million gallons per year (MGY) of water demand, within Santa Rosa's UGB, which could be satisfied by recycled water. This market includes over 5,700 potential customers. The market has been divided into two classes of customers: "Potable Offset" customers are current and future customers who would use City potable water for non-potable purposes (i.e., irrigation) if recycled water were available. Well customers use groundwater for non-potable purposes. Current and future potable offsets account for 1,530 MGY or approximately 68 percent of the demand; the remaining market

¹ Sources include Santa Rosa 2020 General Plan (2000); Incremental Recycled Water Program Recycled Water Master Plan (February 2004), Tech Memo No. 2 City of Santa Rosa Groundwater Supply Implementation Program Task 2: Evaluation of Modifications to City's Groundwater Supply Program (2002), and 2005 Urban Water Management Plan, City of Santa Rosa.

demands are for areas currently served by dedicated irrigation wells. Figure ES-2 illustrates the volume of water demand in each major segment of Santa Rosa's recycled water market.

Figure ES-2: Santa Rosa Urban Reuse Market Breakdown by Volume



The market was analyzed by size of customer, to identify large customers, with total demands over 1 MGY. The Demand Database was also used to group users in 0.5-square-mile grids so that clusters of customers with a demand of at least 1 MGY could be identified. The grouping process captured 97 percent of the market and the grouped user database was used for hydraulic modeling.

Urban Reuse Project Alternatives

Chapters 5 and 6 describe the development and analysis of various alternatives for a Santa Rosa Urban Reuse Project. Based on the IRWP Master Plan, Santa Rosa's water planning documents and the market data, alternatives were developed using a GIS-driven modeling tool (the Allocation and Distribution Model or ADM), which vary the overall size of the system from a capacity of 500 MGY to a capacity of 2,200 MGY. Sub-alternatives that vary the recycled water source used to supply the system and the users connected to the system were also developed. Each alternative included capital costs for polishing treatment, pump station improvements, transmission mains from the recycled water source to urban Santa Rosa, distribution system construction, site retrofits and ongoing operational costs. Table ES-2 summarizes the alternatives that were evaluated including the capacity, source information, and costs for each alternative. Detailed maps of each alternative are included in Chapter 6.

Table ES-2: Summary of Alternatives Analysis

Alt. No.	Capacity (MGY)	Users Served	Recycled Water Source Utilized				Capital Cost (\$million)	O&M Cost (\$million)	Cost/MG
			GPL	RP	OAK	Satellite			
Recycled Water Distribution Systems Delivering 500 MGY									
1a	500	All Potable	X				\$57	\$1.0	\$9,600
1b	500	All Potable		X			\$57	\$0.9	\$9,300
1c	500	Large Potable	X				\$65	\$1.1	\$10,700
2a	1,000	All Potable	X	X			\$110	\$1.7	\$8,900
2b	1,000	Large Potable	X	X	X		\$122	\$1.8	\$9,900
3a	1,500	All Potable	X	X	X		\$181	\$3.2	\$10,100
3b	1,450	All Potable	X	X	X	X	\$170	\$4.8	\$10,700
4	2,200	All	X	X	X		\$236	\$9.9	\$11,600

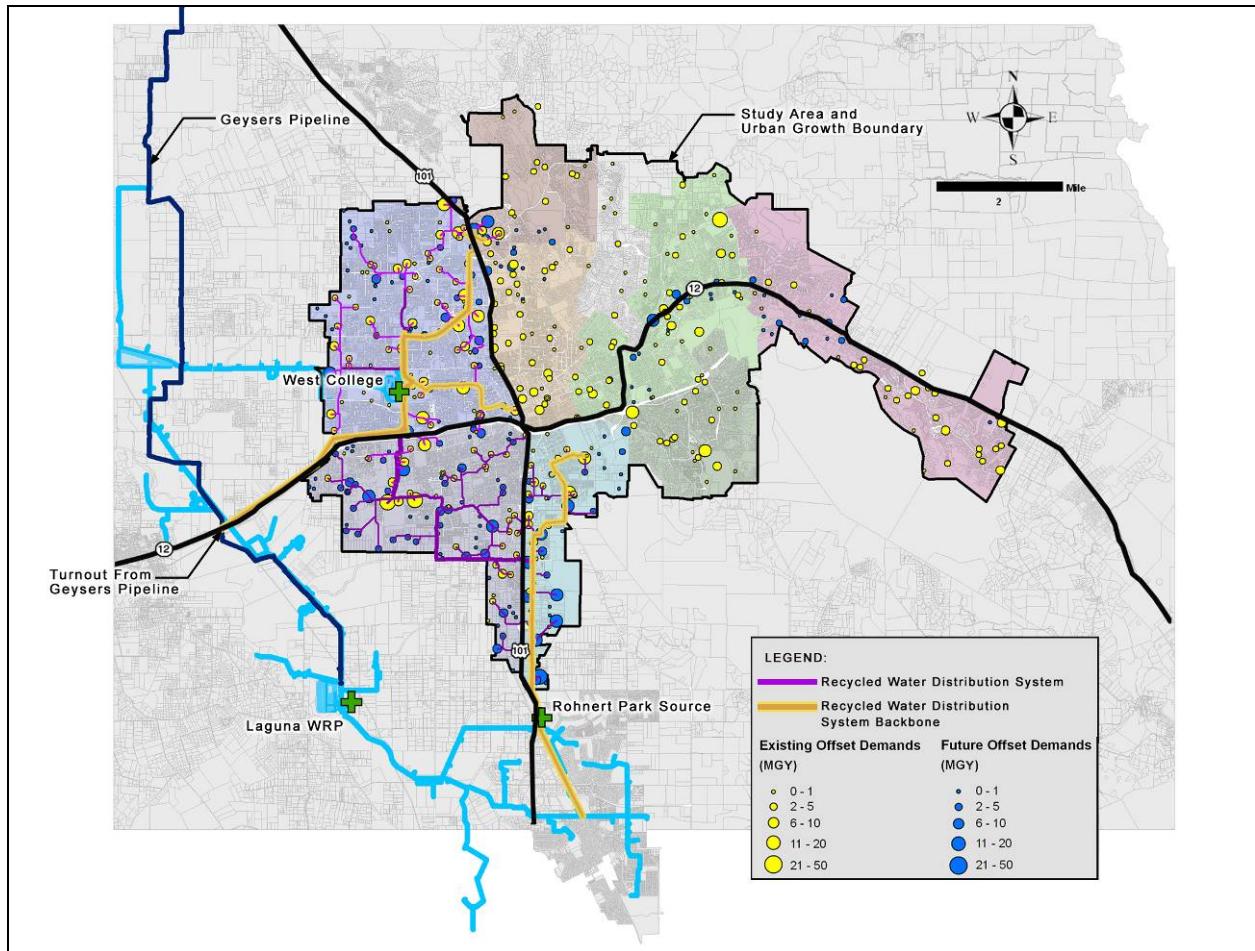
Recommended Project

Based upon review of the various system configurations and costs, a 1,000 MGY system focused on serving south and west Santa Rosa is the Recommended Project. This Recommended Project is based on Alternative 2a and as illustrated in Table ES-2 is the most cost-effective project to implement.

Review of each of the screened alternatives also indicated that the distribution system configurations were relatively similar. In fact, the recommended project is essentially the same as Alternatives 1a and 1b (each 500 MGY) connected together. Santa Rosa could strategically upsize components of the smaller recycled water system(s) and preserve the ability to extend the system to maximum size system with potable offsets of 1,500 MGY.

Figure ES- 3, illustrates the optimal Santa Rosa Urban Reuse Project resulting from the Alternatives Analysis. This system would deliver 1,000 MGY and includes strategic upsizing of two backbone pipelines. The cost of the recommended upsizing is \$9.0 million which includes both transmission mains and backbone distribution system infrastructure.

Figure ES-3: Recommended Urban Reuse Project



ES-4 Economic Feasibility of the Recommended Project

A Santa Rosa Urban Reuse Project could benefit both the water and wastewater utilities. As detailed below, if 60 percent of the Santa Rosa Urban Reuse Project is allocated to the Subregional System and 40 percent is allocated to the water utility, the Santa Rosa Urban Reuse Project is a cost-effective long-term capacity expansion project for both utilities.

Wastewater Disposal

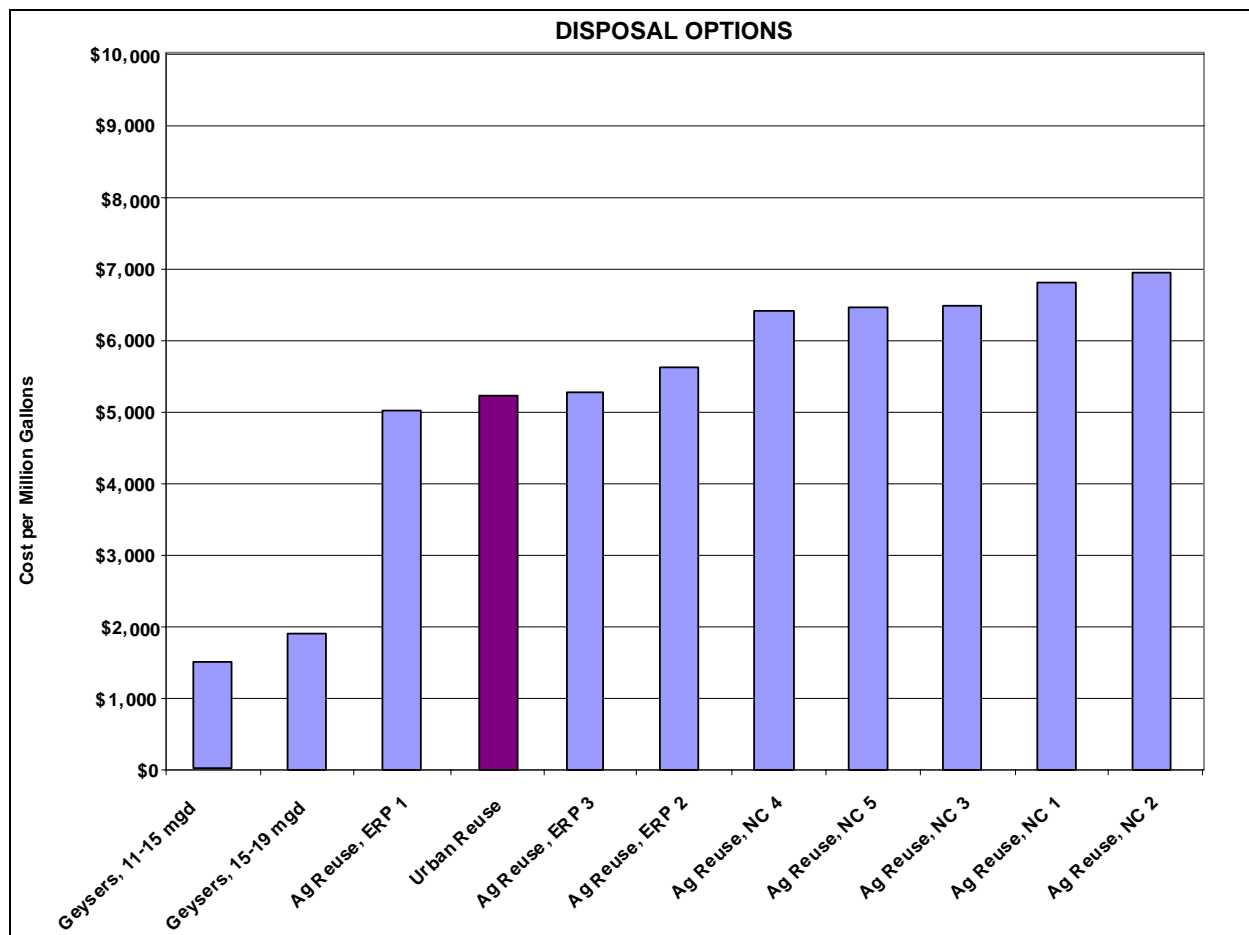
In addition to the Santa Rosa Urban Reuse Project, the wastewater disposal alternatives included in the IRWP are increased deliveries to the Geysers Steamfield, Agriculture Reuse East of Rohnert Park and Agricultural Reuse in North Sonoma County.

Increased deliveries to the Geysers steam field could occur in two distinct increments, each with a unique unit project cost. Agricultural Reuse East of Rohnert Park has been studied in three distinct increments and is ultimately limited by the capacity of the existing Rohnert Park Urban

Reuse system. North County Agricultural Reuse includes five distinct increments with unique project costs.

Figure ES-4 provides a comparative illustration of the range of potential costs for new wastewater disposal capacity, including the Santa Rosa Urban Reuse Project, with 60 percent of the costs allocated to the wastewater utility.

Figure ES-4: Disposal Options



Water Supply

Santa Rosa has identified the need for additional water supply to support its General Plan land use projections. In addition to the Santa Rosa Urban Reuse Project, Santa Rosa may be able to secure future water supply from the Sonoma County Water Agency, local groundwater and water conservation. For the purposes of economic comparison, this Feasibility Study also examined the cost of securing water supply from a Desalination Plant, similar to that currently proposed by Marin Municipal Water District.

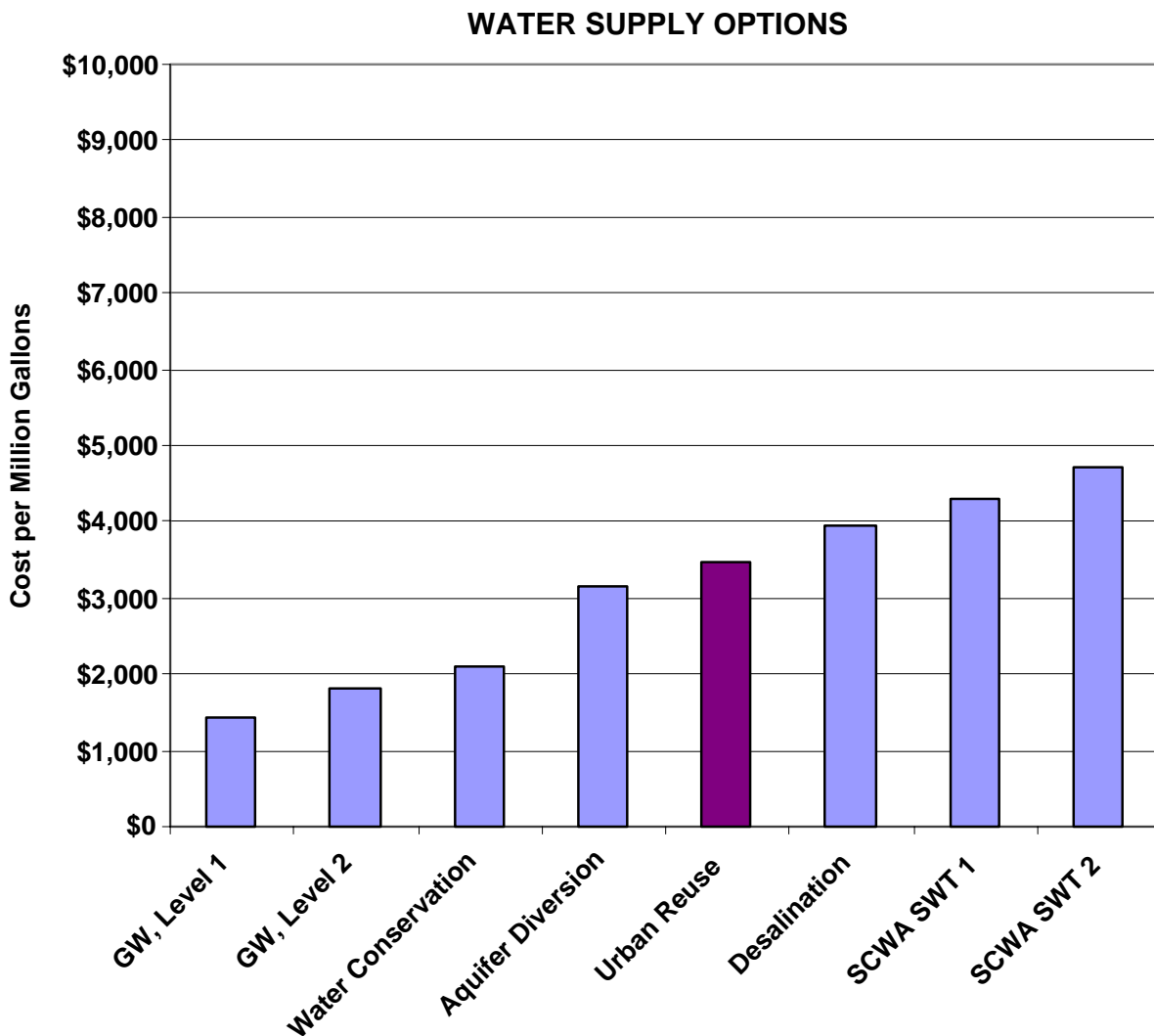
The Agency’s water supply planning has indicated that three alternative project implementation strategies, Aquifer Diversion and Surface Water Treatment at two capacity

levels (SWT 1 and SWT 2), are currently under study. Each alternative results in different unit project costs.

Santa Rosa has also been exploring the option of developing additional potable supply wells. Available information suggests groundwater development in two distinct increments, each with different unit project costs.

Figure ES-5 provides a comparative illustration of the range of potential costs for new water supply, including the Santa Rosa Urban Reuse Project with 40 percent of the costs allocated to the water utility.

Figure ES-5: Water Supply Options



ES-5 Santa Rosa Urban Reuse Project Phasing and Implementation Plan

While the Recommended Project would provide up to 1,000 MGY of new water supply and disposal capacity, Santa Rosa does not need the full capacity immediately. Project phasing focused on four 250 MGY increments, selected because they align well with the future demand and disposal projections and development plans, allowing recycled water infrastructure to be constructed concurrently with other infrastructure improvements. Figure ES-6 illustrates the various project phases, and Figure ES-7 provides a conceptual overview of the phasing plan and budgets.

Figure ES-6: Project Phasing

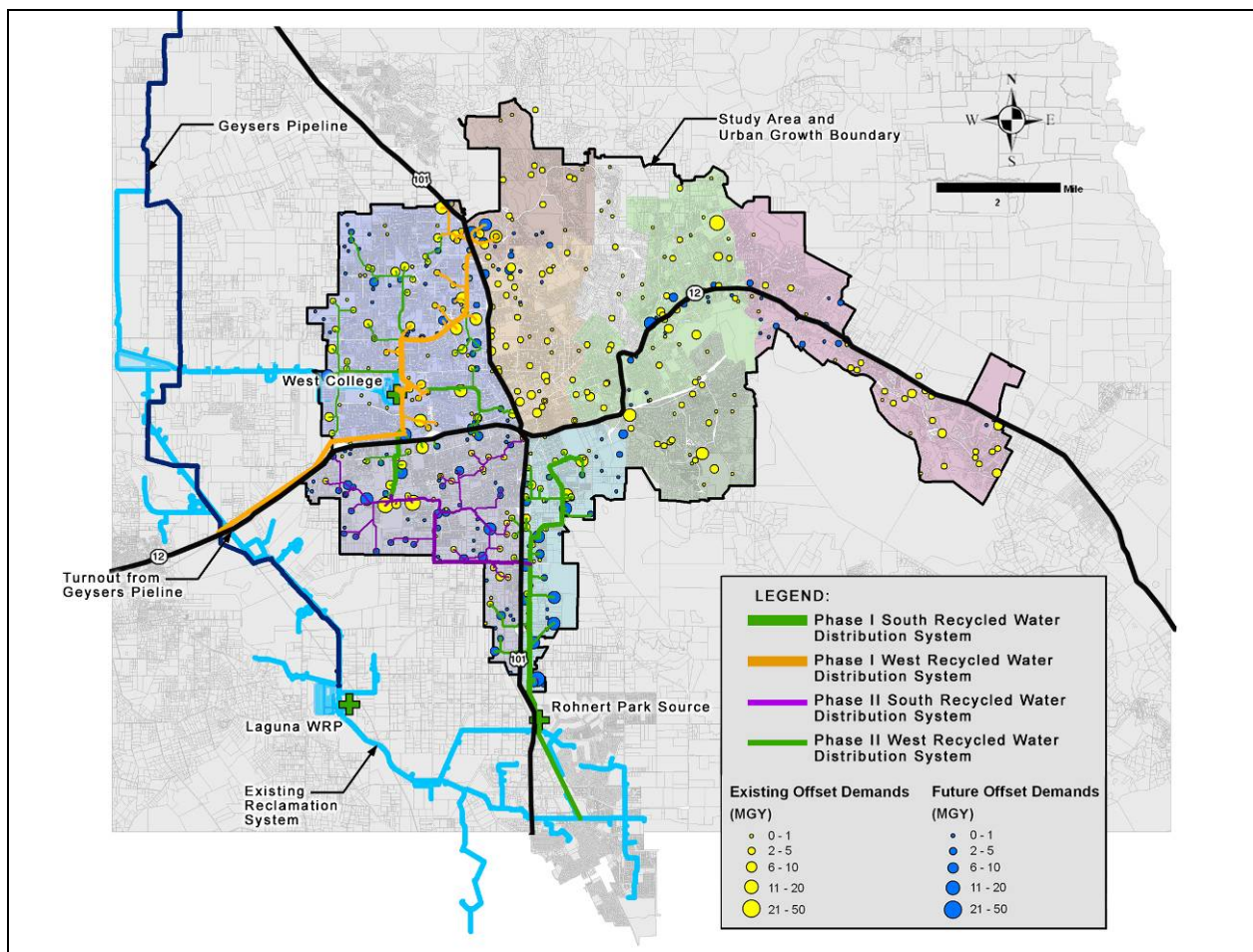
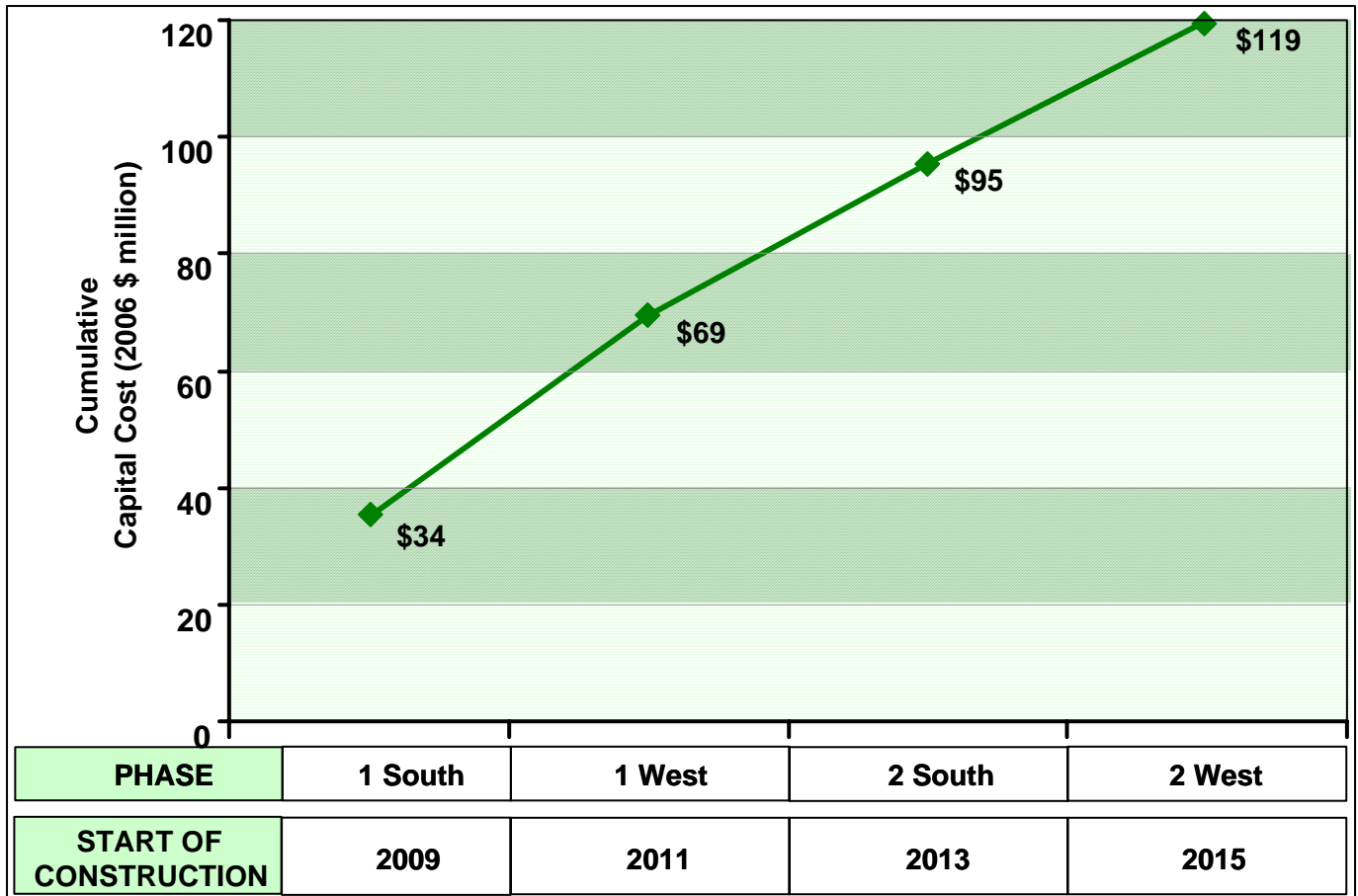


Figure ES-7: Summary of Phasing and Costs including Seasonal Storage (2006)



Chapter 7 provides a discussion of the various activities that Santa Rosa would need to undertake to implement a Santa Rosa Urban Reuse Project. This includes work related to public policy, CEQA compliance, permitting and user outreach and training.

The City’s Board of Public Utilities, and a Subcommittee of the Board, reviewed and evaluated key funding and financing options and provided preliminary guidance on the assumptions used to conceptually analyze project financing options. These assumptions are outlined in Table ES-3.

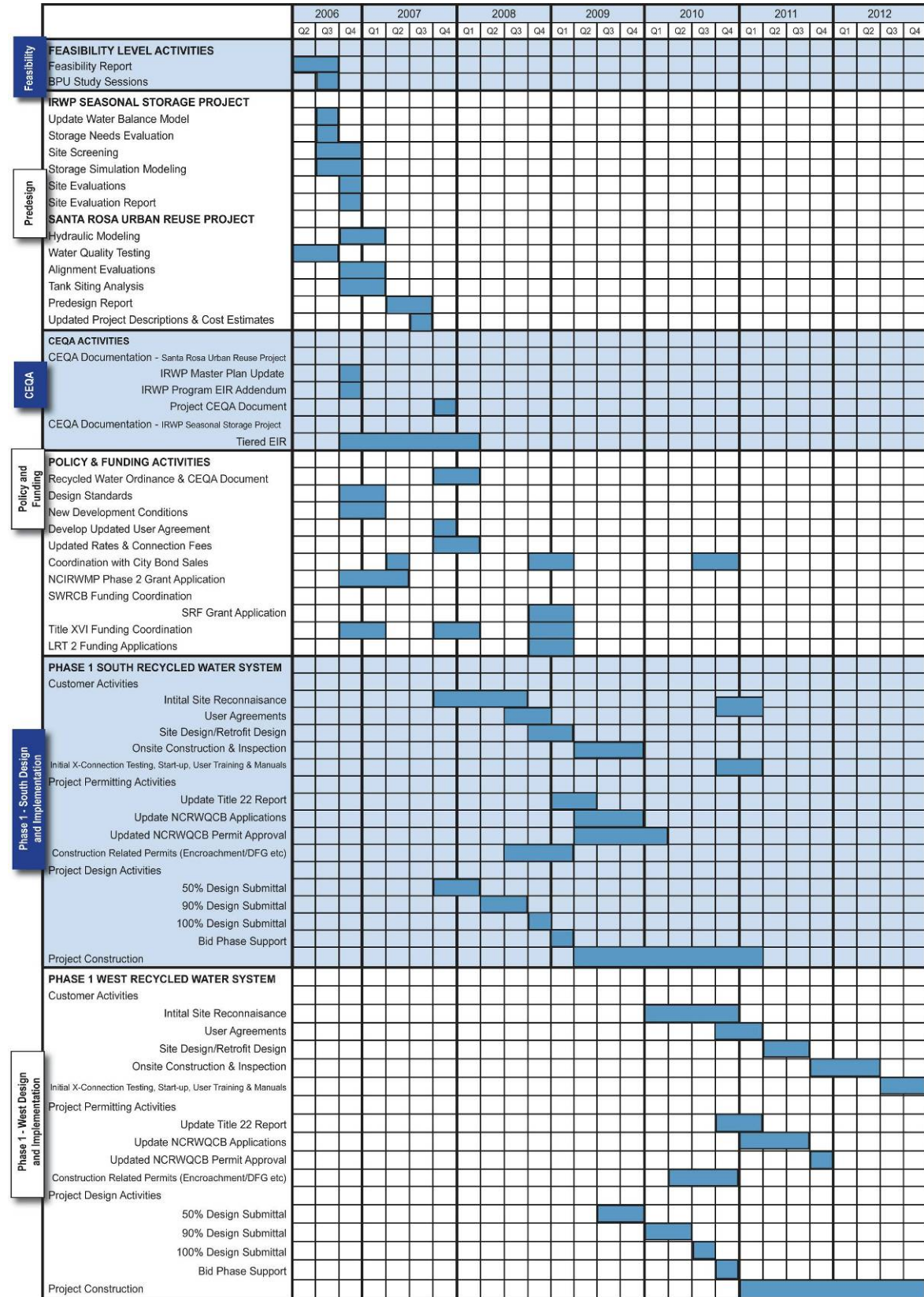
Table ES-3: Funding & Financing Assumptions

Topic	Options Considered	Assumptions Utilized
Funding Capital Costs	<p>The Santa Rosa Urban Reuse Project can be funded by the Subregional System, the water utility, or a combination of both utilities.</p> <p>The cost can be born by new users, existing users or some combination of both.</p>	<p>Capital costs will be allocated between the Subregional System and water utility on a 60/40 basis.</p> <p>New users will bear the capital costs because they receive the benefits. The existing rate base may provide additional security for the purposes of securing debt.</p>
Demand fees	<p>The cost to connect to the system can range from zero to as much or more than the cost of connecting to the potable water system.</p> <p>Current potable water users when connecting to recycled water do not have to be treated the same as new users who have never paid a water demand fee.</p>	<p>Recycled Water demand fees will be the same as Potable Water demand fees.</p> <p>Current potable water users who connect to the recycled water system will not pay a demand fee.</p>
Funding Operational Costs	<p>Operations can be funded by the Subregional System, the water utility, or a combination of both utilities.</p> <p>The cost can be born by recycled water users or the cost can be borne by the Subregional System, the water utility or both.</p>	<p>It is too early to establish a funding plan for operational costs.</p>
User rates and rate structure	<p>Based on experience with other urban recycled water systems, the water can cost from very little to as much or more than potable water. The rate structure can be a simple commodity rate, a tiered rate, or a flat fee, and the fixed charge can vary.</p> <p>The rate structure may help achieve regulatory compliance.</p>	<p>The rate structure has not been established. The rate revenue for recycled water was assumed for financial modeling purposes to be equal to that of potable water.</p>

A financial analysis was developed using this guidance. This analysis demonstrated that a 15 percent increase to the potable water and wastewater demand fees would be sufficient to initiate the Santa Rosa Urban Reuse Project and provide financial support through full implementation of the program.

The schedule shown on Figure ES-8 provides a graphic summary of the Implementation Plan.

Figure ES-8: Summary Implementation Plan





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