SANTA ROSA SUBREGIONAL WATER REUSE SYSTEM

Incremental Recycled Water Program

2007 UPDATE TO THE RECYCLED WATER MASTER PLAN

CITY OF SANTA ROSA

March 2007

Incremental Recycled Water Program

2007 Update to the Recycled Water Master Plan

Prepared for

City of Santa Rosa

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2007 Update Prepared by

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Master Plan Summary

Purpose and Background

The purpose of this Master Plan is to assist the City in deciding how to manage additional wastewater flows into the Subregional Water Reuse System resulting from updates to the general plans of Santa Rosa and Rohnert Park. It also must describe methods for managing current and future flows that are discharged and which are affected by new regulations, including the California Toxics Rule (CTR). The sum of these flows is the incremental flow to be addressed by the Incremental Recycled Water Program (IRWP). The City of Santa Rosa (City) is the managing partner for the Subregional System. This Master Plan formulates a course of actions for implementing facilities under the IRWP to manage the incremental flow.

The 2004 Master Plan built on the findings of the *Incremental Recycled Water Program Feasibility Report* (CH2M HILL, 2003) and its associated technical memoranda. The IRWP Feasibility Report is a part of a Program Environmental Impact Report (EIR) prepared by the City of Santa Rosa (2003) to evaluate potentially significant environmental impacts associated with implementing the alternatives in accordance with the California Environmental Quality Act (CEQA).

The purpose of this 2007 Update to the Master Plan is to set forth the implementation actions taken since 2004, and specifically to incorporate the results of the *Incremental Recycled Water Program - Santa Rosa Urban Reuse Project Feasibility Study* (Winzler & Kelly with CH2MHILL, 2007) into the Master Plan. The 2007 Santa Rosa Urban Reuse Project Feasibility Study provided additional focused study on Urban Reuse (EIR Alternative 3) within the Urban Growth Boundary of Santa Rosa, resulting in minor changes to the Master Plan.

Incremental Recycled Water Program Objectives

The Santa Rosa Board of Public Utilities (BPU) and the City Council have adopted the following Purpose and Need Statement for the IRWP. The IRWP goal is to accomplish all primary and one or more of the secondary IRWP objectives.

Primary Objectives

- Provide wastewater treatment, recycling, and disposal for the Santa Rosa Subregional Reclamation System to accommodate projected growth as indicated in the adopted general plans of each Subregional System member effective as of July 2002.
- Develop and operate the wastewater treatment and disposal system in ways that protect public health and safety, protect natural resources including the Russian River and its tributaries, promote use of recycled water, meet current regulatory requirements, and provide flexibility to comply with future regulatory requirements.

- Maintain a system and components that are economically feasible and continue to be successfully financed.

Secondary Objectives

- Maximize use of recycled water.
- Maximize reuse opportunities where recycled water would increase the availability of potable water supplies.
- Dispose of reclaimed water in a manner that protects beneficial uses of receiving waters.
- Optimize water conservation.
- Maintain the level of weather-independence (as defined by Regional Water Quality Control Board policy) that is provided by the addition of the Geysers Recharge Project to the Subregional Reclamation System.
- Maximize use of existing infrastructure.
- Maintain a disposal system that is manageable and reliable.
- Provide flexibility to accommodate use of recycled water made available by neighboring agencies as deemed appropriate by the City of Santa Rosa.

Background

The existing Subregional System consists of the following components:

- Sewer collection systems
- Laguna Plant
- Agricultural reuse system
- Urban reuse system
- Geysers Recharge Project (pump stations, pipelines, and a tank)[1]
- Discharge system

The City's current National Pollutant Discharge Elimination System (NPDES) permit allows the City to treat, reuse, and discharge the annual flow resulting from receiving a daily average dry weather flow (ADWF) of 21.34 million gallons per day (mgd) at the Laguna Plant. Higher winter flows that cannot be stored for agricultural or urban reuse during summer or delivered to the Geysers Steamfield are currently discharged to the Laguna and, ultimately, the Russian River. The current permit allows discharge to occur only from October 1 through May 14 of each year.

[1] The Geysers injection facilities are owned by Calpine and are not part of the Subregional System.

Since the Geysers Recharge Project was approved, several important changes to the basis of system planning have occurred:

- Two Subregional System partners (Rohnert Park and Santa Rosa) have updated their general plans from 2010 to 2020, increasing population and resulting wastewater flow beyond that anticipated during planning for the Geysers project.
- The State of California enacted the CTR. These rules are implemented by the North Coast Regional Water Quality Control Board (NCRWQCB) according to the State Water Resources Control Board's (SWRCB) *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (2000), also known as the State Implementation Plan (SIP). Pursuant to the SIP, effluent quality limits for copper, lead, nickel, and cyanide have been imposed for the Laguna Plant discharge. According to the terms of the NPDES permit adopted in September 2006, final effluent quality limits for copper, lead, and cyanide will go into effect in May 2010. Interim limits for these constituents were imposed in 2006, as immediate compliance with the final limits is considered by NCRWQCB to be infeasible. The final limit for nickel is in effect and compliance with the nickel limit is considered feasible by NCRWQCB. .
- The City's current discharge permit requires that certain pH, dissolved oxygen, temperature, and turbidity limits be met in the Laguna. These limits cannot be met under all conditions at the existing discharge locations. More stringent temperature and dissolved oxygen water quality objectives have been proposed by NCRWQCB, which would, if adopted, increase the likelihood of permit violations unless action is taken by the City to avoid such violations.

Future Subregional System Flows

To achieve the IRWP objectives, the future system must be capable of the following:

- Providing adequate, reliable capacity to accommodate future flows generated by population and employment growth of the member entities
- Achieving the quality of recycled water that would be required by regulatory agencies to protect human health and aquatic life

Project dry weather and wet weather flows were described in Technical Memorandum (TM) No. 1 of the IRWP Feasibility Report. The dry weather flow projections indicate that additional system capacity beyond the Geysers Recharge Project could be needed as early as 2010 as shown in Figure S-1.

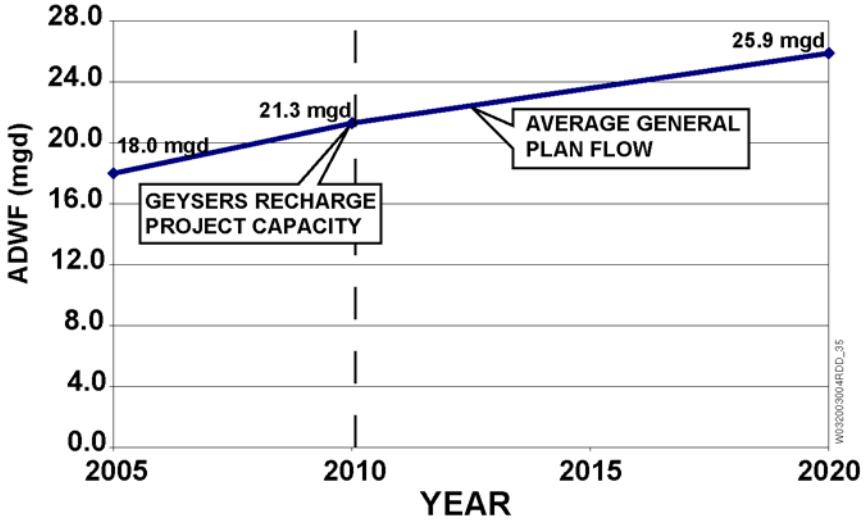

FIGURE S-1
Future System Capacity Requirements

The total volume of incremental flow to be managed is estimated to be 6,700 million gallons (MG) during the wettest year.

Description of Master Plan Alternatives

To provide consistent presentation, all costs have been updated to a 2006 cost basis consistent with the Santa Rosa Urban Reuse Project Feasibility Study.

Indoor Water Conservation and I&I Reduction (EIR Alternatives 1 and 2)

Indoor water conservation (Alternative 1) is included in all programs and is discussed in the next section under "Common Program Elements." The amount of cost-effective I&I reduction (Alternative 2) cannot currently be quantified, and further study is needed.

Urban Reuse (EIR Alternative 3)

TM No. 4 of the Feasibility Report describes the potential for urban reuse within the areas of Santa Rosa, Rohnert Part, Cotati, and the Golf and Country Club area. The analysis in TM No. 4 has been augmented by the 2007 Santa Rosa Urban Reuse Project Feasibility Study. Up to 2,100 MG of flow could be managed annually by using urban reuse.

The demands, potable water offset, and estimated capital costs (rounded to the nearest million dollars) of the urban reuse increments are shown in Table S-1. As described in the Santa Rosa Urban Reuse Project Feasibility Study, using recycled water in lieu of potable water for urban irrigation provides a water supply benefit to the City that can be quantified at approximately $3,570 per million gallons. The estimated contribution from the Subregional System, to the Santa Rosa, Rohnert Park and Cotati Urban Reuse Projects is 60 percent of the total cost shown in Table S-1, which reflects the expectation that 40 percent of the cost of providing potable offset would be borne by the various water enterprises. Costs

for seasonal storage and algae removal are included in the estimates for Santa Rosa and Rohnert Park/Cotati Urban Reuse.

TABLE S-1
Urban Reuse Increments

Description of Increment	Demand (MG/yr)	Potable Offset Volume (MG/yr)	Potable Offset Volume (acre-feet/yr)	Estimated Capital Cost ($million)[a]	Estimated Subregional System Contribution ($ million)[b]
1 – Golf and Country Club Area	81	0	0	5	5
2 – SRURP Phase 1 South	250	250	750	34	20
3 – SRURP Phase 1 West	250	250	750	35	21
4- SRURP Phase 2 South	250	250	750	26	16
5 – SRURP Phase 2 West	250	250	750	24	14
6 – SRURP Max Potable	500	500	1500	62	37
7 – Rohnert Park Cotati	196	196	602	20	12
Total	**1,777**	**1,696**	**5,102**	**206**	**125**

[a] SRURP costs taken from 2007 SRURP Feasibility Study and include costs for algae removal and storage. Golf and Country Club and Rohnert Park Cotati costs adjusted to include costs for algae removal and storage and to account for inflation through 2006
[b] Subregional System contribution estimated to be 60% of cost; other 40% of cost could be borne by water utility

Agricultural Reuse (EIR Alternative 4)

Agricultural reuse categories include North County (NCAA, EIR Alternative 4A) and East of Rohnert Park (ERP, EIR Alternative 4B) agricultural irrigation and City-owned farms irrigation (EIR Alternative 4C). Up to 10,500 MG of flow could be managed annually using agricultural reuse.

TABLE S-2
Agricultural Reuse Increments

Description of Increment	Demand (MG/yr)	Cumulative Demand (MG/yr)	Estimated Capital Cost ($ million)[d]	Estimated Cumulative Capital Cost ($ million)[d]
NCAA Increment 1	370	370	27	27
NCAA Increment 2	170	540	12	39
NCAA Increment 3	240	780	16	55
NCAA Increment 4[a]	2,700	3,480	132	187
ERP Increment 1[b]	440	440	24	24
ERP Increment 2	377	817	24	48
ERP Increment 3[c]	783	1,600	44	93

[a] Costs for Increment 4 were projected by using cost criteria defined in TM No. 5 of the IRWP Feasibility Report. Costs for Increments 1, 2, and 3 were estimated using more detailed information on specific areas.

[b] This increment represents the estimated maximum usage of the existing Rohnert Park pipeline to supply ERP Agricultural Area reuse without the development of dedicated storage in the ERP Agricultural Area.

[c] This increment, along with increments 1 and 2, represents the maximum demand that can be supplied by the existing Rohnert Park Pipeline while the existing Rohnert Park Reuse system is in use, including potential expansions of the urban reuse system in this area.

[d] Master Plan costs have been adjusted to include storage costs and for inflation through 2006, consistent with the Santa Rosa Urban Reuse Project Feasibility Study. (see Table 2-2)

Geysers Expansion (EIR Alternative 5)

The Geysers Recharge Project is a system of pump stations and pipelines that conveys recycled water from the Llano Pump Station at the Laguna Plant to the Geysers Steamfield injection wells, currently operated by Calpine Corporation, for the purpose of generating electricity. As presented in TM No. 7, up to 6,400 MG of flow could be managed annually using Geysers recharge.

TABLE S-3
Geysers Reuse Increments

Description of Increment	Demand (MG/yr)	Cumulative Demand (MG/yr)	Estimated Capital Cost ($ million)[a]	Estimated Cumulative Capital Cost ($ million) [a]
Increment 1 – 16 mgd	1,825	1,825	17	17
Increment 2 – 19 mgd	1,095	2,920	20	37
Increment 3 – 25 mgd	2,190	5,110	50	86
Increment 4 – 25 mgd	1,290	6,400	133	220

[a]Master Plan costs have been adjusted for inflation through 2006. Also, capital costs for Increment 4 include cost of storage taken from the Master Plan and adjusted for inflation through 2006.

Discharge (EIR Alternative 6)

Discharge could annually manage the entire incremental volume of 6,400 MG.

Direct Discharge

Discharge to the Laguna will likely be limited to ensure compliance with the receiving water quality objectives; the remainder of the discharge would be conveyed to the Russian River. A new pipeline from the Geysers Pipeline to the river would need to be constructed, along with a river discharge structure. The Llano Pump Station would also have to be expanded to 80 mgd. The estimated capital cost of implementing this alternative is $30 million. Depending on the location of the river discharge point, a booster pump station on the Geysers Pipeline may be required. The estimated cost of $30 million does not include the cost of an intermediate booster pump station, which could approach $20 million.

Indirect Discharge

Indirect discharge could utilize injection wells, percolation ponds, or infiltration basins. The development of infiltration basins with capacity for a full 6,400 MG (wet year volume, year 2020 ADWF) is estimated to cost $99 million. These costs derive from the cost estimates

presented in TM No. 10 of the IRWP Feasibility Report with the most restrictive soil conditions. The expansion of the Llano Pump Station to 80 mgd is included to convey the flow out of the Santa Rosa Plain.

Based on pilot studies conducted with soils similar to those at indirect discharge sites, and based on consultation with the North Coast Regional Water Quality Control Board staff, indirect discharge is no longer considered feasible for implementation within the time allotted for CTR compliance by 2010 (see Discharge Compliance Project Final Screening Report, Spring 2007).

Advanced Membrane Treatment

It is currently uncertain whether new discharge limits would be attainable without advanced membrane treatment (AMT). As presented in the IRWP Feasibility Report, the AMT facilities could range in cost from $360 million to $573 million, with annual O&M costs ranging from $21 to $36 million. Because of the high cost to construct and operate AMT facilities, the City may not choose to implement AMT because there are other, less costly programs identified in this Master Plan that would provide greater benefits.

Demand Cost/Capacity Comparisons

The various uses for recycled water can be compared for their relative unit costs, including storage.

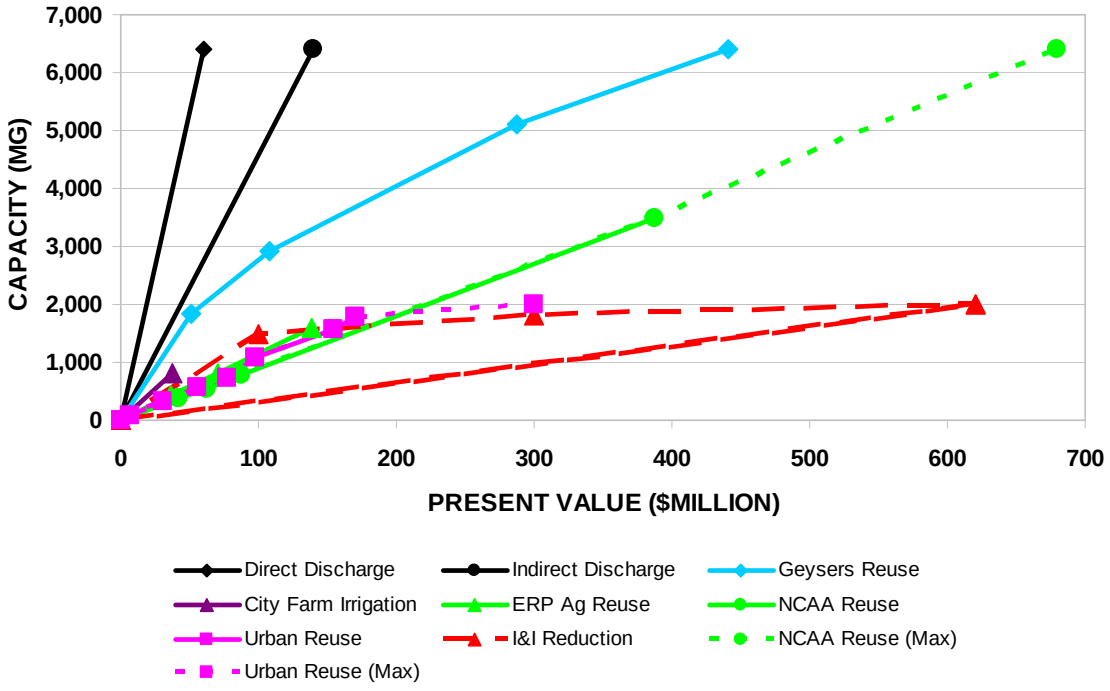

FIGURE S-2
Demand/Cost Capacity Comparisons (Including Discharge)

The estimated costs presented on Figure S-2 reflect the updated value of potable water offset. The steeper lines on Figure S-2 indicate lower unit costs than flatter lines. Discharge

(without AMT) has the lowest unit cost, followed by Geysers reuse. City-owned farm irrigation is similar in cost to Geysers reuse. ERP and NCAA agricultural reuse and urban reuse are similar in cost, when the potable offset benefit of urban reuse is accounted for.

Storage

Seasonal storage may be required to implement IRWP alternatives, with the exception of indoor water conservation. The amount and timing of storage depends on the amount and timing of reuse implementation. Costs in Tables S1-3 and Figure S-2 above include the cost of storage for urban and agricultural reuse, as well as for the 4th increment of Geysers expansion.

2004 Selected Program

The Selected Program consists of a combination of alternatives analyzed in the Program EIR. It was designed to meet the Subregional System's capacity requirements of 25.9 mgd ADWF and disposal of up to a 6,700-MG annual flow increment in the wettest year. The Selected Program is based on and meets the IRWP's primary objectives and many of the secondary objectives adopted by the Council and BPU in 2001 at the outset of the IRWP.

The Selected Program caps future discharge at an amount consistent with the existing permit (4,500 MG) and manages flows resulting from growth with conservation and reuse. The Selected Program establishes both a target and range for recycled water use and discharge as summarized in Table S-4.

TABLE S-4
Size of Selected Program

Program Elements	Target	Range	Maximum Size Studied in the Program EIR
Alternative 1 – Indoor Water Conservation	300 MG	150 to 300 MG	300 MG
Alternative 3 – Urban Reuse	500 MG	0 to 2,200 MG	2,200 MG
Alternative 4 – Agricultural Reuse	1,000 MG	0 to 2,200 MG	6,400 MG
Alternative 5 – Geysers Expansion	400 MG	0 to 2,200 MG	6,700 MG
Alternative 6 – Discharge	4,500 MG	1,600 to 4,500 MG[a]	6,700 MG
Total Recycled Water Use	**6,700 MG**	**6,700 MG**	**6,700 MG**
Laguna Plant Upgrade	25.9 mgd	25.9 mgd	25.9 mgd
Storage	1,200 MG	0 to 3,190 MG[b]	3,190 MG
Created Wetlands	0	0 to 30 acres	30 acres

[a]Range represents the maximum discharge in driest and wettest years. If discharge is precluded, the lower end of the range could be 0 MG. Laguna discharge is within permit limits (lower end of range could be 0 MG), with remainder to the Russian River. River discharge can be direct or indirect.

[b]Storage may be needed for Urban Reuse, Agricultural Reuse, Geysers Expansion, or Discharge.

2007 Update – Revisions to the Selected Program

The revisions to the Selected Program are minor and result from continued implementation of the Master Plan since 2004. The Subregional System's design requirements of 25.9 mgd ADWF and disposal of up to a 6,700-MG annual flow increment in the wettest year have not changed. None of the Subregional System members have adopted General Plan Updates since the 2004 Master Plan.

The range of flows for each component remains the same as the Selected Program. However, because implementation of the Master Plan has progressed, the target volumes are no longer being used. Instead, volumes that have been completed or are in the process of being completed, are shown in Table S-5.

TABLE S-5
Size of Revised Program

Program Elements	Range identified in 2004 Master Plan	Completed or in Process
Alternative 1 – Indoor Water Conservation	150 to 300 MG	220 MG
Alternative 3 – Urban Reuse	0 to 2,200 MG[a]	1,000 MG
Alternative 4 – Agricultural Reuse	0 to 2,200 MG[a]	0 MG
Alternative 5 – Geysers Expansion	0 to 2,200 MG[a]	0 MG
Alternative 6 – Discharge	1,600 to 4,500 MG[b]	4,500 MG
Total Recycled Water Use	**6,700 MG**	**5,720 MG**
Laguna Plant Upgrade	25.9 mgd	Master Plans completed
Storage	0 to 1,200 MG[c]	500 MG
Created Wetlands	0 to 30 acres	0 acres

[a]The original range for the 3 reuse alternatives, as identified in the 2004 Master Plan, included 300 MG of capacity in case Indoor Water Conservation was not fully implemented. Because Indoor Water Conservation has already saved 220 MG, the upper range for reuse capacity should now be reduced by 220 MG.

[b]Range represents the maximum discharge in driest and wettest years. If discharge is precluded, the lower end of the range could be 0 MG. Laguna discharge is within permit limits (lower end of range could be 0 MG), with remainder to the Russian River.

[c]Storage may be needed for Urban Reuse, Agricultural Reuse, Geysers Expansion, or Discharge.

Program Implementation

The following implementation actions have been initiated since the approval of the Master Plan in March of 2004.

Common Elements

Delta Pond Flow Control and Measurement. This project was completed in 2005.

Laguna Plant Upgrade. The *Laguna Subregional Water Reclamation Facility Improvement Master Plan* was completed in August 2005, and the *Santa Rosa Power Master Plan* was completed in June 2006.

I&I Study. The City embarked on a pilot project in 2006 in the Proctor Terrace neighborhood to identify what percentage of flow is coming from private laterals and to quantify the cost of removal of the I&I.

Monterey filtration pilot work. The Filter Loading Evaluation for Water Reuse (FLEWR) study to determine if tertiary filters, operated under controlled conditions, can be operated at loading rates up to 7.5 gal/sq ft-min while producing effluent that meets DHS equivalency criteria. The FLEWR pilot testing is complete; full-scale tests have not yet started.

Laguna, direct discharge, and indirect discharge studies. In May 2005, Santa Rosa authorized a number of discharge studies as part of the Discharge Compliance Project. These studies are expected to be published as part of the Discharge Compliance Project Draft EIR in Summer of 2007.

California tiger salamander (CTS) habitat studies. Studies of the distribution of CTS and CTS habitat have been completed to support permitting of projects that may be developed in locations where CTS could be affected.

Indoor Water Conservation

Two hundred twenty MGY of conservation has been accomplished through the end of the 2005 (see Appendix B). The cities of the Subregional System continue to implement their commitment to the Best Management Practices (BMPs) recommended by the State of California Urban Water Conservation Council.

Urban Reuse

The Santa Rosa Urban Reuse Project Feasibility Study was completed in October 2006. Based on this document, the City of Santa Rosa has initiated the predesign for a 1,000-MG project. The predesign report and CEQA documentation for the first phase of 250 MG is expected to be complete in the Fall of 2007. In addition, the Subregional System is undertaking a Feasibility Study for additional urban reuse in the City of Rohnert Park.

Agricultural Reuse

The Subregional System has not begun implementation of this reuse option, however, the Sonoma County Water Agency is preparing CEQA and NEPA documentation for a project which may use some of the Subregional System's recycled water, entitled North Sonoma County Agricultural Reuse Project. The Draft EIR/EIS is expected to be available in Spring 2007.

Geysers Expansion

The Subregional System has begun negotiations with Calpine to expand the Geysers system. In addition, if the Discharge Compliance Project is configured to include an Advanced Membrane Treatment Plant, brine from the membrane filtration would be sent to the Geysers steamfield.

Discharge

In May 2005, the City of Santa Rosa initiated the Discharge Compliance Project to identify options for discharging up to 4,500 MG of recycled water in the wettest year. The Discharge Compliance Project EIR is expected to be completed in late 2007.

Storage

The City of Santa Rosa initiated the Seasonal Storage Project in September 2006 to identify options for storage for an additional 500 MG of recycled water. The Seasonal Storage Project EIR is expected to be completed in late 2007.

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Acronyms and Abbreviations

µg/L	micrograms per liter
ac-ft/yr	acre-feet per year
ADWF	average dry weather flow
AMT	advanced membrane treatment
BLM	Biotic Ligand Model
BPU	Board of Public Utilities
CEQA	California Environmental Quality Act
CII	Commercial/Industrial/Institutional
CIP	capital improvements program
City	City of Santa Rosa
CMOM	Capacity, Management, Operations and Maintenance
CTR	California Toxics Rule
CTS	California tiger salamander
ESU	equivalent single-family unit
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ERP	East Rohnert Park
gpm/ft^2	gallons per minute per square foot
GWI	groundwater infiltration
I&I	infiltration and inflow
IRWP	Incremental Recycled Water Program
Laguna	Laguna de Santa Rosa (a tributary to the Russian River)
Laguna Plant	Laguna Subregional Water Reuse Facility
MG	million gallons
MG/yr	million gallons per year
mgd	million gallons per day
mg/L	milligrams per liter

MWPCA	Monterey Water Pollution Control Agency
NCAA	North County Agricultural Area
NCRWQCB	North Coast Regional Water Quality Control Board
NPDES	National Pollutant Discharge Elimination System
PV	present value
RDI	rainfall-dependent infiltration
RDI&I	rainfall-dependent infiltration and inflow
SCWA	Sonoma County Water Agency
SECAP	System Evaluation and Capacity Assurance Plan
SIP	State Implementation Plan (*Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California*)
SRURP	Santa Rosa Urban Reuse Project
SWI	stormwater inflow
SWRCB	State Water Resources Control Board
TM	technical memorandum
UGB	Urban Growth Boundary
USFWS	U.S. Fish and Wildlife Service
UWMP	Urban Water Management Plan
WER	water effect ratio

Glossary of Terms

alternative	The Incremental Recycled Water Program (IRWP), which is the "Project" evaluated in the Environmental Impact Report, consists of six alternatives that include a range of components to achieve IRWP objectives. The IRWP components are the individual elements or building blocks that make up the IRWP. Some components, such as pipelines, are common to several alternatives, while others, such as agricultural reuse or infiltration and inflow reduction, may be part of only one alternative.
common program elements	These comprise several elements, including treatment plant upgrade and relocation of the treatment plant discharge to the Russian River, that are common to and must be undertaken in conjunction with all programs regardless of which program is selected to implement the IRWP.
complexation	Formation of complex compounds.
demand	The known or projected need for recycled water for urban and agricultural irrigation, injection into the Geysers Steamfield, and other uses.
implementation strategies	Two overall strategies that were developed for the IRWP to manage current flows and future flows associated with population growth in the context of regulatory uncertainties that will not be resolved for several years.
increment	A portion of a reuse alternative.
incremental flow	The sum of flow currently discharged under the existing National Pollutant Discharge Elimination System permit and the increase in flow resulting from population growth projections in the general plans of the Subregional partners. This flow is 6,700 million gallons during the wettest year.
infiltration and inflow (I&I)	Flows that enter the sewer system through either infiltration of groundwater or inflow of rainfall runoff that must be treated and discharged or recycled.
potable water offset	An existing or future use of potable water that is made available for other purposes because it is replaced by recycled water; in other words, the recycled water offsets the use of potable water.
Program	A combination of alternatives that would achieve all primary IRWP objectives and one or more of the secondary IRWP objectives.

receiving water	A body of water, such as a creek or river, into which highly treated wastewater is discharged under strict permitting requirements.
supply	Water available for recycling; the recycled water produced by the Laguna Subregional Water Reuse Facility.

Section 1
Purpose and Background

SECTION 1

Purpose and Background

Introduction to the 2007 Update

This Section presents the purpose of and background for the Master Plan and this Update.

Purpose

The purpose of this Master Plan is to assist the City in deciding how to manage additional wastewater flows into the Subregional Water Reuse System resulting from updates to the general plans of Santa Rosa and Rohnert Park approved as of July 2002. The Master Plan also must describe methods for managing current and future flows that are discharged and which are affected by new regulations, including the California Toxics Rule (CTR). The sum of these flows is the incremental flow to be addressed by the Incremental Recycled Water Program (IRWP). The City of Santa Rosa (City) is the managing partner for the Subregional System (shown schematically on Figure 1). This Master Plan formulates a course of actions for implementing facilities under the IRWP to manage the incremental flow.

The 2004 Master Plan built on the findings of the *Incremental Recycled Water Program Feasibility Report* (CH2M HILL, 2003) and its associated technical memoranda. The IRWP Feasibility Report described the development and screening of alternatives for managing flow. The IRWP Feasibility Report is a part of a Program Environmental Impact Report (EIR) prepared by the City of Santa Rosa (2003) to evaluate potentially significant environmental impacts associated with implementing the alternatives in accordance with the California Environmental Quality Act (CEQA).

The purpose of this 2007 Update to the Master Plan is to set forth the implementation actions taken since 2004, and specifically to incorporate the results of the *Incremental Recycled Water Program - Santa Rosa Urban Reuse Project Feasibility Study* (Winzler & Kelly with CH2MHILL, 2007) into the Master Plan. The 2007 Santa Rosa Urban Reuse Project Feasibility Study provided additional focused study on Urban Reuse (EIR Alternative 3) within the Urban Growth Boundary of Santa Rosa, resulting in minor changes to the Master Plan.

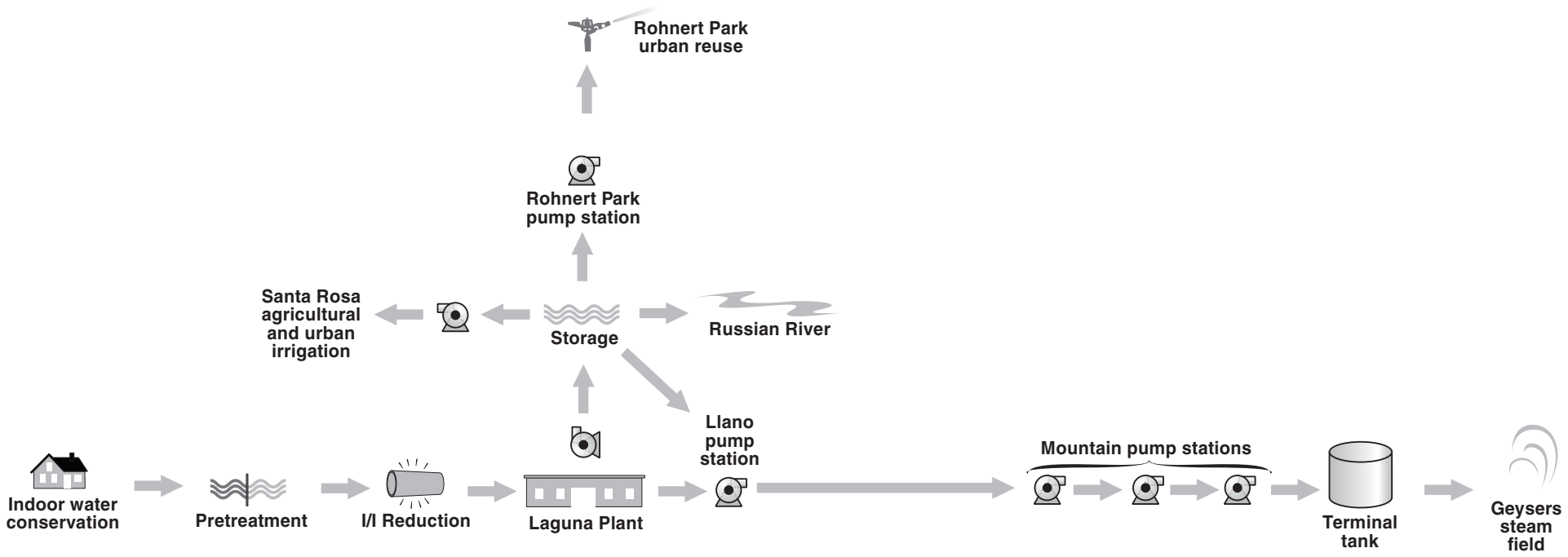

FIGURE 1
EXISTING SUBREGIONAL SYSTEM
SANTA ROSA INCREMENTAL RECYCLED WATER PROGRAM
FEASIBILITY REPORT

W032003004RDD_007 (11/11/03)

CH2MHILL WINZLER&KELLY CONSULTING ENGINEERS

Use of this Document

The purpose of the 2004 Master Plan was to provide the City of Santa Rosa Board of Public Utilities (BPU) and City Council with information to evaluate and select a course of actions to manage current and projected Laguna Plant flow and achieve compliance with new regulations. This 2007 Update to the Master Plan moves Chapters 3, 4, 5, and 6 of the 2004 Master Plan to the Appendices, as these Chapters provide the information used by the BPU and Council to consider and approve the Selected Program in March 2004. The Updated Master Plan is divided into the following sections:

- Section 1 – Purpose and Background
  This section provides minor updates.
- Section 2 – Description of Master Plan Alternatives
  Each EIR alternative is discussed at the maximum size studied in the 2004 certified EIR. The costs of a Santa Rosa Urban Reuse Project are incorporated from the 2007 Santa Rosa Urban Reuse Feasibility Study. The costs of the Laguna Plant Upgrade are taken from the 2005 Laguna Plant Master Plan (CH2MHill) and the 2006 Santa Rosa Power Master Plan (Brown and Caldwell). Other alternatives have costs updated for inflation only, consistent with the convention used in the 2007 Santa Rosa Urban Reuse Feasibility Study.
- Section 3 – Selected Program
  This section first describes the Selected Program, as presented in the 2004 Master Plan, and approved in March 2004. Then the changes to the selected program are described.
- Section 4 – Program Implementation
  This section provides updated information regarding Master Plan implementation.
- Section 5 – References

Appendices

A Sections 3, 4, 5, and 6 from the 2004 Master Plan, which outline the development of the Selected Program during 2003 and 2004, have been moved from the body of the Master Plan to the Appendices. These sections have not been updated with new costs, as they represent the record which was used to adopt the 2004 Master Plan.

Section 3 – Program Development

Section 4 – Summary of Estimated Program Costs and Economic and Financial Analysis

Section 5 – Program Evaluation

Section 6 – Program Selection Process

B Status of Indoor Water Conservation Alternative of IRWP

Section 1 includes the IRWP objectives, briefly summarizes IRWP Feasibility Report findings, describes IRWP background and assumptions, and describes the master planning process. Section 1 also describes the Subregional Water Reuse System flows that must be managed under the IRWP and provides the basis for Master Plan cost estimating.

Section 2 describes the alternatives that were evaluated in the EIR and screened in the IRWP Feasibility Report and includes the results of additional feasibility-level analysis performed specifically for the Santa Rosa Urban Reuse Project. These alternatives are the building blocks of the programs developed and evaluated in this Master Plan.

Section 3, describes both the Selected Program and changes to the Selected Program. Section 4 outlines the process by which the selected program will be implemented.

Section 5 presents references.

IRWP Objectives

The BPU and the City Council have adopted a Purpose and Need Statement that includes primary and secondary IRWP objectives. The IRWP goal is to accomplish all primary and one or more of the secondary IRWP objectives. The primary and secondary IRWP objectives follow.

Primary IRWP Objectives

- Provide wastewater treatment, recycling, and disposal for the Santa Rosa Subregional Reclamation System to accommodate projected growth as indicated in the adopted general plans of each Subregional System partner effective as of July 2002.
- Develop and operate the wastewater treatment and disposal system in ways that protect public health and safety, protect natural resources including the Russian River and its tributaries, promote use of recycled water, meet current regulatory requirements, and provide flexibility to comply with future regulatory requirements.
- Maintain a system and components that are economically feasible and continue to be successfully financed.

Secondary IRWP Objectives

- Maximize use of recycled water.
- Maximize reuse opportunities where recycled water would increase the availability of potable water supplies.
- Dispose of reclaimed water in a manner that protects beneficial uses of receiving waters.
- Optimize water conservation.
- Maintain the level of weather-independence (as defined by Regional Water Quality Control Board policy) that is provided by the addition of the Geysers Recharge Project to the Subregional Reclamation System.
- Maximize use of existing infrastructure.
- Maintain a disposal system that is manageable and reliable.
- Provide flexibility to accommodate use of recycled water made available by neighboring agencies as deemed appropriate by the City of Santa Rosa.

IRWP Feasibility Report Findings

The 2003 IRWP Feasibility Report presented and evaluated nine alternatives. These alternatives were developed through a public process involving public meetings, a project website, and comments received on both the Initial Study and Scoping Report for the 2003 IRWP Program EIR prepared to comply with CEQA. All areas where alternatives would be implemented are within Sonoma County, except for a portion of the Geysers Steamfield, which is located in Lake County (Figure 2). The nine alternatives developed during this process were narrowed to six alternatives that were found to be feasible and capable of achieving IRWP objectives. These alternatives are listed below in the order they were presented in the Program EIR:

- Alternative 1: Indoor water conservation
- Alternative 2: Infiltration and inflow reduction
- Alternative 3: Urban reuse
- Alternative 4: Agricultural reuse
- Alternative 5: Geysers expansion
- Alternative 6: Discharge to the Laguna de Santa Rosa (a tributary to the Russian River, hereafter referred to as the Laguna), direct to the Russian River, or indirect to the Russian River

The feasibility of the alternatives was evaluated against technological, logistical, and economic considerations.

Technological criteria include constructability and reliability. Logistical considerations include the ability to obtain the permits, approvals, or rights necessary for construction and ongoing operation of the alternative within the allotted schedule. Economic considerations include total cost to all project participants of constructing and operating a project, net cost (i.e., cost of an alternative after the costs of benefits have been credited), and user fees. The IRWP Feasibility Report considered total capital cost, annual operating cost, and present value in comparing alternatives and combinations of alternatives. Information on the value of benefits and user fee impacts was developed for the 2004 IRWP Master Plan and is presented in Appendix A, Section 4.

2007 Update to the Recycled Water Master Plan

The alternatives in the Updated Master Plan are the same as those in the 2004 Master Plan. Because of the incorporation of minor changes from the 2007 Santa Rosa Urban Reuse Project Feasibility Study, new areas have been added to the Master Plan's Concept-level Map to accommodate additional options for pump stations and tanks (see Figure 3).

Background and Assumptions

Background

The existing Subregional System consists of the following components:

- Sewer collection systems
- Laguna Plant
- Agricultural reuse system
- Urban reuse system
- Geysers Recharge Project (pump stations, pipelines, and a tank)[1]
- Discharge system

The City's current National Pollutant Discharge Elimination System (NPDES) permit allows the City to treat, reuse, and discharge the annual flow resulting from receiving a daily average dry weather flow (ADWF) of 21.34 million gallons per day (mgd) at the Laguna Plant. Higher winter flows that cannot be stored for agricultural or urban reuse during summer or delivered to the Geysers Steamfield are currently discharged to the Laguna and, ultimately, the Russian River. The current permit allows discharge to occur only from October 1 through May 14 of each year.

Since the Geysers Recharge Project was approved, several important changes to the basis of system planning have occurred:

- Two Subregional System partners (Rohnert Park and Santa Rosa) have updated their general plans from 2010 to 2020, increasing population and resulting wastewater flow beyond that anticipated during planning for the Geysers project.
- The State of California enacted the CTR. These rules are implemented by the North Coast Regional Water Quality Control Board (NCRWQCB) according to the State Water Resources Control Board's (SWRCB) *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California* (2000), also known as the State Implementation Plan (SIP). The SIP outlines a process for developing wastewater treatment plant discharge limits for 126 U.S. Environmental Protection Agency (EPA) Priority Pollutants (mostly pesticides and metals). Pursuant to the SIP, effluent quality limits for copper, lead, nickel, and cyanide have been imposed for the Laguna Plant discharge. According to the terms of the NPDES permit adopted in September 2006, final effluent quality limits for copper, lead, and cyanide will go into effect in May 2010. Interim limits for these constituents were imposed in 2006, as immediate compliance with the final limits is considered by NCRWQCB to be infeasible. The final limit for nickel is in effect and compliance with the nickel limit is considered feasible by NCRWQCB. .
- The City's current discharge permit requires that certain pH, dissolved oxygen, temperature, and turbidity limits be met in the Laguna. These limits cannot be met under all conditions at the existing discharge locations. More stringent temperature and dissolved oxygen water quality objectives have been proposed by NCRWQCB, which

[1] The Geysers injection facilities are owned by Calpine and are not part of the Subregional System.

would, if adopted, increase the likelihood of permit violations unless action is taken by the City to avoid such violations.

- The Sonoma County Water Agency (SCWA) and the cities of Santa Rosa and Cotati have developed their 2005 Urban Water Management Plans which include recycled water as a potable water offset, increasing the urban water supply.

Assumptions

The outcome of the regulatory changes and their associated impacts on permit renewals and compliance schedules is uncertain. For the purpose of developing this Master Plan, the following assumptions have been made regarding how regulatory changes and compliance would affect the Subregional System:

- CTR limits were imposed when the Laguna Plant NPDES permit was re-issued in September, 2006. Interim limits were imposed for copper, lead, and cyanide since attainment at the time of permit adoption was infeasible. As expected, the permit contains a compliance schedule requiring final limits to be attained in 2010. Programs have been developed for two possible outcomes of the CTR/SIP process:
  - Current effluent quality attains final effluent quality limits
  - Current effluent quality does not attain final effluent quality limits
- The City would continue to fulfill Geysers contract recycled water delivery volume and water quality obligations for the volume currently under contract.
- The City would continue to operate the existing agricultural and urban irrigation systems as they were planned to be operated at the time of Geysers Recharge Project startup (i.e., approximately 2,100 million gallons per year [MG/yr]).
- For the purpose of developing the 2007 Update, the Subregional System is assuming that the SCWA's Water Supply, Transmission and Reliability Project, which will increase the reliability of SCWA water to the City, will not be complete and operational until after 2015.

Master Planning Process

Preparation of the IRWP Master Plan began after completion of the IRWP Feasibility Report to address engineering, environmental, and economic data and issues. The alternatives and combinations of alternatives described in the EIR were considered during the master planning process in relation to IRWP objectives. The alternatives were further analyzed and formulated into 10 combinations or "programs." See Appendix A for a description of the Master Plan development process in 2003 and 2004. The Subregional System adopted the Selected Program described in Section 3 in March 2004. The Subregional System may, from time to time, undertake additional updates of the Master Plan, such as this 2007 Update, to reflect additional information regarding its selected course of action.

Future Subregional System Flows

To achieve the IRWP objectives, the future system must be capable of the following:

- Providing adequate, reliable capacity to accommodate future flows generated by population and employment growth of the member entities
- Achieving the quality of recycled water that would be required by regulatory agencies to protect human health and aquatic life

Different methods were used to project dry weather and wet weather flows, as summarized below and described in Technical Memorandum (TM) No. 1 of the IRWP Feasibility Report.

Dry Weather Flow

Future flow projections for the Subregional System are based on the population, housing, and employment growth projected by the general plans (effective as of July 2002) of the Subregional System partners. Flow projections for these projected populations were predicated on actual 2000 population (the most recent year for which data were available when the analysis was conducted) and Laguna Plant daily ADWF for each Subregional partner. In summary, the total projected ADWF at the Laguna Plant for the horizon planning year of each Subregional partner is 25.9 mgd. For Master Plan purposes, this maximum capacity of the IRWP is identified as occurring at the earliest in 2020; however, Sebastopol and Cotati general plans extend only to 2013 and 2010 respectively, and growth in all jurisdictions could occur more slowly than projected in the general plans. Table 1 summarizes ADWF projections.

TABLE 1
ADWF Projections
Santa Rosa Incremental Recycled Water Program

	2000 Flows[a]		Flows Accommodated by Geysers Recharge Project		2020 Projected Flows[b]	
Member Entity	**mgd**	**Percent**	**mgd**	**Percent**	**mgd**	**Percent**
Rohnert Park and SSU	3.60	20.11	3.43	16.07	5.15	19.89
SR/SPCSD	13.17	73.51	16.31	76.43	19.14	73.93
Sebastopol	0.63	3.54	0.84	3.94	0.84	3.24
Cotati	0.51	2.84	0.76	3.56	0.76	2.94
Total	17.91	100.00	21.34	100.00	25.89	100.00

[a] Includes 0.39 mgd for Oakmont and 0.05 mgd correction for Cotati metering in addition to actual Laguna Plant metered flow. Including unmetered flows for seepage and landfill leachate, total ADWF would be 18.1 mgd.

[b] General plans for Santa Rosa and Rohnert Park project populations through 2020; the Sebastopol general plan projects through 2013, and the Cotati general plan projects through 2010.

Note:

SR/SPCSD = Santa Rosa and South Park County Sanitation District.
SSU = Sonoma State University.

The flow projections in Table 1 and Figure 4 indicate that additional system capacity beyond the Geysers Recharge Project could be needed as early as 2010. Figure 3 also shows the additional capacity needs through 2020.

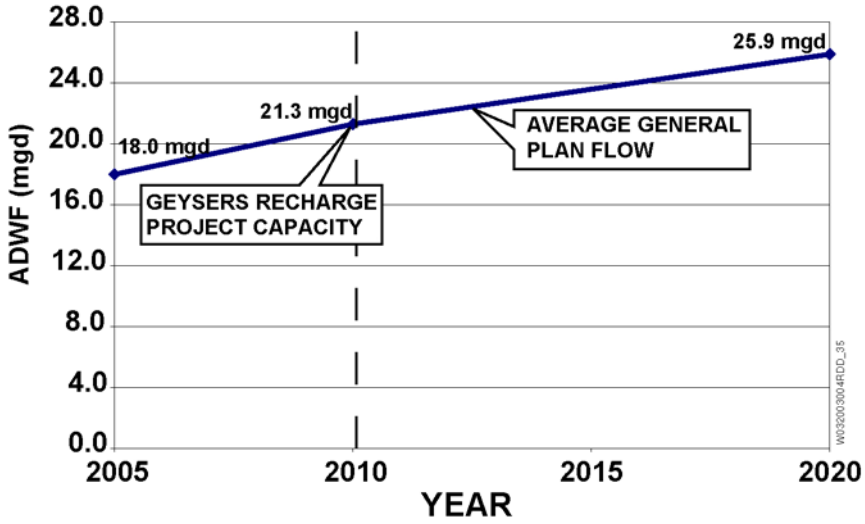

FIGURE 4
Future System Capacity Requirements

Wet Weather Flow

Annual wet weather flow projections are needed to determine how to manage total system inflows and outflows throughout each year. Wet weather inflow to the plant is sensitive to hydrologic conditions, including rainfall events, Russian River flows, and groundwater levels. Among these factors, Laguna Plant wet weather inflow correlates most consistently with Russian River flow.

A water balance model was developed to simulate Laguna Plant daily inflow and daily outflows to storage, reuse, and discharge. The model uses 67 years of Russian River flow data in an algorithm to project future flows. The model yielded a peak wet weather daily inflow to the Laguna Plant of 101 mgd, corresponding to an ADWF of 25.9 mgd. This represents the highest daily plant inflow based on 67 years of record. The water balance model was further used to simulate the amount of water in storage, being discharged, or reused at any time of year for future programs. Table 2 shows the makeup of the total volume of annual flow that needs to be managed under the IRWP. Additional details regarding the water balance model are presented in Appendix C of the 2004 Master Plan. The total volume of incremental flow to be managed is estimated to be 6,700 million gallons (MG) during the wettest year.

TABLE 2
Future Capacity of the Subregional System (all values in MG)
Santa Rosa Incremental Recycled Water Program

Year Type (in 67-year Analysis)	Existing Irrigation System	Geysers Recharge Project	Discharge	Growth[a]	Total Subject to CTR[b,c]	Total System Capacity at 25.9 mgd[c, d]
Driest	2,200	4,000	1,600	1,700	3,300	9,500
10th Percentile	2,100	4,000	1,800	1,800	3,700	9,800
Median (50th Percentile)	2,100	4,000	2,400	1,900	4,400	10,500
90th Percentile	1,900	4,000	4,300	2,100	6,400	12,300
Wettest	1,900	4,000	4,500	2,200	6,700	12,600

[a]Growth represents the total volume of Subregional System flow associated with an ADWF increase from 21.3 mgd (Geysers Recharge Project permit) to 25.9 mgd.

[b]Sum of Discharge and Growth.

[c]Values do not always total exactly because values are rounded to the nearest 100 MG.

[d]Total system capacity at 25.9 mgd is the sum of existing irrigation system, Geysers Recharge Project, discharge and growth.

Figure 5 shows how the incremental flow develops over time.

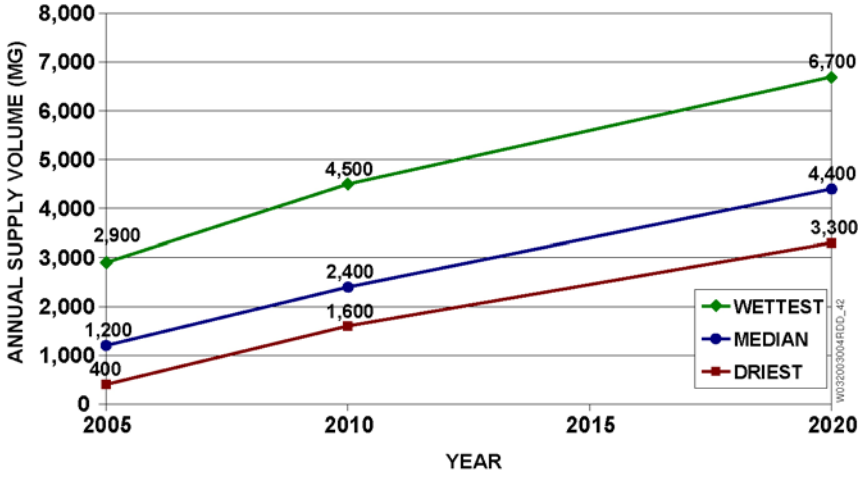

FIGURE 5
Wet Weather Flows

Estimated Costs

The "Class 5" cost estimates presented in this Updated Master Plan were prepared in accordance with the guidelines of the Association for the Advancement of Cost Engineering (AACE) International. Capital costs were originally presented in 2004 dollars. Costs for a Santa Rosa Urban Reuse Project and for the Laguna Plant Upgrade are updated based on

new information (Santa Rosa Urban Reuse Project Feasibility Report, 2007; Laguna Plant Master Plan, 2005; Santa Rosa Power Master Plan, 2006); all costs have been updated to 2006 dollars to provide consistency. Present values were figured at a discount rate of 3 percent, and operation and maintenance (O&M) annual costs through 2035 were included in the present value calculations.

The cost estimates, and any resulting conclusions on project financial or economic feasibility or funding requirements, have been prepared for guidance in project evaluation and implementation from the information available at the time of the estimate. Final costs and feasibility will depend on actual labor and material costs, competitive market conditions, actual site conditions, scope of work, implementation schedule, and other variable factors. Therefore, final costs will vary from the estimate presented here. Because of these factors, project feasibility, benefit/cost ratios, risks, and funding needs must be carefully reviewed prior to making specific financial decisions or establishing project budgets to help ensure proper project evaluation and adequate funding.

The cost estimates shown include contingencies for the following:

- Contractor mobilization/bonds/permits
- Field detail allowance
- Contractor overhead and profit
- Project contingency at 30 percent
- Engineering and construction management
- City administration

Section 2
Description of Master Plan Alternatives

SECTION 2

Description of Master Plan Alternatives

Introduction to the 2007 Update

This Section updates the original description of Master Plan Alternatives to incorporate minor updates and the findings of the Santa Rosa Urban Reuse Project Feasibility Study. To provide consistent presentation, all costs in this section have been updated to a 2006 cost basis consistent with the Santa Rosa Urban Reuse Project Feasibility Study.

Description of Master Plan Alternatives

The six alternatives that constitute the building blocks of the IRWP Master Plan are as follows:

- Indoor Water Conservation (EIR Alternative 1)
- I&I Reduction (EIR Alternative 2)
- Urban Reuse (EIR Alternative 3)
- Agricultural Reuse (North County, East of Rohnert Park, or City-owned farms) (EIR Alternatives 4A, 4B, and 4C)
- Geysers Expansion (EIR Alternative 5)
- River Discharge (direct or indirect) (EIR Alternatives 6A, 6B, 6C, 6D, and 6E)

Cost-effective phasing of urban and agricultural reuse components is described so that lower-cost opportunities initially (within approximately 5 years or less) provide infra-structure to facilitate subsequent growth of the reuse system.

Programs involving urban, agricultural, or Geysers reuse usually require additional surface storage capacity. However, the phasing and size of the alternatives within a program impact the size and timing of the storage.

Urban and agricultural reuse provides a potable water offset benefit. A potable water offset benefit is realized when recycled water can serve an existing or future use that would otherwise require use of potable water. In other words, the recycled water offsets the use of potable water. Based on the updated economic analysis, the value of this potable water offset, within the urbanized area of Sonoma County, is approximately $3,570 per million gallons (MG) or $1,190 per acre-foot. This value is based on the avoided costs of developing other new water supplies that can serve urban water users.

Because of these potable water benefits, the urban reuse projects can be funded by water utilities as well as wastewater utilities, and the capital costs carried by the Subregional System for urban reuse can be reduced by the value of the water supply. Where indicated,

this update provides a credit against the total capital cost of the Santa Rosa Urban Reuse Project and the Rohnert Park/Cotati Urban Reuse Project for potable water benefits, which is taken into account in the comparison of alternatives and cost estimates for IRWP programs. This credit is not provided to the Santa Rosa Golf and Country Club Project because the Santa Rosa Golf and County Club currently relies on groundwater, not potable water, to meet its irrigation needs.

Indoor Water Conservation and I&I Reduction (EIR Alternatives 1 and 2)

Up to 300 MG of flow reduction can be achieved through Indoor Water Conservation (Alternative 1).

The amount of cost-effective I&I reduction (Alternative 2) cannot currently be quantified, and further study is needed.

Urban Reuse (EIR Alternative 3)

TM No.4 of the IRWP Feasibility Report describes the potential for urban reuse within the areas of Santa Rosa, Rohnert Part, Cotati, and the Golf and Country Club area. The analysis in TM No. 4 has been augmented by the 2007 Santa Rosa Urban Reuse Project Feasibility Study. Urban reuse in Sebastopol was not considered because there are relatively few potential users, and those users are located farther away from existing reuse facilities than in the areas of the other Subregional System partners. Up to 2,100 MG of flow could be managed annually by using urban reuse.

Santa Rosa

As described in the Santa Rosa Urban Reuse Project Feasibility Study, using recycled water in lieu of potable water for urban irrigation provides a water supply benefit to the City that can be quantified at approximately $3,570 per million gallons. Existing Santa Rosa urban irrigators use water either from the City's potable water distribution system or wells. Customers using City potable water have irrigation meters. The existing well users draw their irrigation supply from groundwater. Future development would have to be brought into the recycled water system as the development occurs. This would provide the opportunity to serve recycled water to new development that otherwise would use City potable water.

The Santa Rosa Urban Reuse Project Feasibility Study quantified the recycled water market within the Urban Growth Boundary (UGB) of Santa Rosa at just over 2,250 million gallons per year, (however, the maximum size of this alternative remains at 2,100 MG per year). The analysis included existing irrigation customers, existing Commercial/Industrial/Institutional (CII) customers, existing well users and future demands. Table 3 below provides a summary of the recycled water market in Santa Rosa.

TABLE 3[a]
Recycled Water Market Assessment within Santa Rosa UGB
Santa Rosa Incremental Recycled Water Program

Customer Class	Demand (MG/yr)
Existing Potable Offsets	
Irrigation Customers	900
CII Customers	74
Future Potable Offsets	
Industrial Uses	85
Commercial Uses	208
Multi-Family Residential Common Areas	187
Single Family Residential Common Areas	54
Single Family Residential Front and Back Yards	52
Subtotal Potable Offsets	**1,560**
Well Users	**722**
Total Recycled Water Market	**2,282**

[a] Santa Rosa Urban Reuse Project Feasibility Study, Table 4-2.

The Santa Rosa Urban Reuse Project Feasibility Study recommends constructing a 1,000 MGY urban reuse system in Santa Rosa in four 250 MGY increments. This system would serve potable offset or well customers that are located within Santa Rosa's UGB.

Rohnert Park and Cotati

Rohnert Park has an existing high-pressure recycled water distribution network located generally along Rohnert Park Expressway and Copeland Creek and an existing low-pressure recycled water distribution network that extends along the Wilfred-Bellevue Flood Control Channel to Wilfred Drive/Golf Course Drive and terminating in the Fox Tail Golf Course ponds. A lateral from the high pressure system also serves the Gallo Vineyard site, south and west of Rohnert Park. Laterals from both the low and high pressure systems could be used to extend recycled water into new areas to offset existing irrigation demands or to serve new development. Cotati could also be served from this system. The anticipated demand for Rohnert Park development is in close proximity to existing system. Therefore, the demand is easily served, and it provides a full potable offset benefit.

Santa Rosa Golf and Country Club Area

Another potential urban reuse area identified in TM No. 4 is the Santa Rosa Golf and Country Club area. Serving this area with recycled water would require a pipeline extension from the existing reclamation system. However, serving recycled water to this area would not provide potable water offset, because it currently is served by a well. Converting this well to municipal supply would not be practical.

Urban Reuse Increments

The demands, potable water offset, and estimated capital costs (rounded to the nearest million dollars) of the urban reuse increments described above are shown in Table 4. The estimated contribution from the Subregional System, to the Santa Rosa, Rohnert Park and Cotati Urban Reuse Projects is 60 percent of the total cost shown in Table 4, which reflects the expectation that 40 percent of the cost of providing potable offset would be borne by the various water enterprises (as described in the Santa Rosa Urban Reuse Project Feasibility Study). The estimated contribution from the Subregional System to the Santa Rosa Golf and Country Club Project is 100 percent of the total cost shown in Table 4 because this project does not provide direct benefits to the various water utilities. Costs for seasonal storage and algae removal are included in the estimates for Santa Rosa and Rohnert Park/Cotati Urban Reuse.

TABLE 4
Urban Reuse Increments
Santa Rosa Incremental Recycled Water Program

Description of Increment	Demand (MG/yr)	Potable Offset Volume (MG/yr)	Potable Offset Volume (acre-feet/yr)	Estimated Capital Cost ($million)[a]	Estimated Subregional System Contribution ($ million)[b]
1 – Golf and Country Club Area	81	0	0	5	5
2 – SRURP Phase 1 South	250	250	750	34	20
3 – SRURP Phase 1 West	250	250	750	35	21
4- SRURP Phase 2 South	250	250	750	26	16
5 – SRURP Phase 2 West	250	250	750	24	14
6 – SRURP Max Potable	500	500	1500	62	37
7 – Rohnert Park Cotati	196	196	602	20	12
Total	**1,777**	**1,696**	**5,102**	**206**	**125**

[a] SRURP costs taken from 2007 SRURP Feasibility Study and include costs for algae removal and storage. Golf and Country Club and Rohnert Park Cotati costs adjusted to include costs for algae removal and storage and to account for inflation through 2006
[b] Subregional System contribution estimated to be 60% of cost; other 40% of cost could be borne by water utility

The estimate of potable water offset volume shown in Table 4 is based on the amount of potable supply currently used in the area and does not include irrigation well uses. For the well water to be considered as offset, the wells would have to be converted from irrigation to municipal wells. Because of the large number of wells, the method of construction[1], the geographic spread, and the small capacity, adding these wells to Santa Rosa's potable water distribution system is not considered practical. Existing information indicates that groundwater from these unused wells is not likely to be available to existing municipal wells because of the geologic composition of the aquifers underlying Santa Rosa. However,

[1] Irrigation wells are typically too shallow and lack the appropriate sanitary seal.

as further information is developed on Santa Rosa's underground water resources, it is possible that some of these unused wells could contribute to potable water supply.

For Rohnert Park and Cotati, the new recycled water users are either existing irrigation customers, or near-term, new developments. These users would otherwise have connected to a potable supply from the cities of Rohnert Park or Cotati via SCWA or local municipal wells. Therefore, potable offset benefit is considered fully applicable to the Rohnert Park/ Cotati reuse areas.

Agricultural Reuse (EIR Alternative 4)

Agricultural reuse categories include North County (EIR Alternative 4A) and East of Rohnert Park (EIR Alternative 4B) agricultural irrigation and City-owned farms irrigation (EIR Alternative 4C). Up to 10,500 MG of flow could be managed annually using agricultural reuse. Increments of this volume that have the lowest unit cost for delivering recycled water were used to develop programs.

North County and East of Rohnert Park Agricultural Areas

As part of the master planning effort, contacts were made with agricultural or viticultural interests in the two key areas defined in the IRWP Feasibility Report: the North County Agricultural Area (NCAA) and the East of Rohnert Park (ERP) Agricultural Area. During public meetings that were held as a part of the IRWP program development, some Dry Creek agricultural water users requested inclusion in the Master Plan. The Dry Creek area is considered to be a part of the NCAA.

In addition to these contacts, the following criteria were used to develop the agricultural areas for the Master Plan. The criteria are consistent with the primary and secondary IRWP objectives.

- For the NCAA, first consideration was given to areas irrigated from underflow or surface flow in the Russian River or tributary areas
- Priority was given to areas within reasonable proximity to existing conveyance infra-structure, primarily the Geysers Pipeline or the Rohnert Park Pipeline
- No new river crossings for distribution pipeline networks were considered
- Priority was given to areas that have existing storage or the ability to provide storage
- Large blocks of land were given preference
- Priority was given to interested landowners
- Town of Windsor's target irrigation area (along East Side Road and Old Redwood Highway from Windsor River Road to Highway 101) was not included

Using the above criteria, agricultural reuse increments were developed as shown in Table 5. Storage costs required for agricultural reuse are included.

TABLE 5
Agricultural Reuse Increments
Santa Rosa Incremental Recycled Water Program

Description of Increment	Demand (MG/yr)	Cumulative Demand (MG/yr)	Estimated Capital Cost ($ million)[d]	Estimated Cumulative Capital Cost ($ million) [d]
North County Agricultural Area				
Increment 1	370	370	27	27
Increment 2	170	540	12	39
Increment 3	240	780	16	55
Increment 4[a]	2,700	3,480	132	187
East of Rohnert Park Agricultural Area				
Increment 1[b]	440	440	24	24
Increment 2	377	817	24	48
Increment 3[c]	783	1,600	44	93

[A] Costs for Increment 4 were projected by using cost criteria defined in TM No. 5 of the IRWP Feasibility Report. Costs for Increments 1, 2, and 3 were estimated using more detailed information on specific areas.

[B] This increment represents the estimated maximum usage of the existing Rohnert Park pipeline to supply ERP Agricultural Area reuse without the development of dedicated storage in the ERP Agricultural Area.

[C] This increment, along with increments 1 and 2, represents the maximum demand that can be supplied by the existing Rohnert Park Pipeline while the existing Rohnert Park Reuse system is in use, including potential expansions of the urban reuse system in this area.

[d] Master Plan costs have been adjusted to include storage costs and for inflation through 2006, consistent with the Santa Rosa Urban Reuse Project Feasibility Study. (see Table 2-2)

Although these criteria were developed for the purposes of identifying reuse increments for the Master Plan, it is not intended that the criteria limit the location or quantity of reuse to be implemented. For example, although only areas currently under irrigation were considered for master planning, it is possible that currently unirrigated NCAA land could be served with recycled water, as described in the EIR.

In contrast to urban reuse, no potable offset was attributed to the agricultural reuse areas. For the NCAA, there is potentially potable offset, but it is presently unquantifiable. Therefore, no potable water offset credit was included in the cost estimate for NCAA reuse. Likewise for the ERP Agricultural Area, serving recycled water to land that is currently irrigated could contribute to the Rohnert Park or Cotati water supply, but insufficient information is available to estimate this potential benefit.

City-owned Farms

When the Geysers Pipeline began operation, supply to the existing reuse system decreased from approximately 3,700 MG to a level near 2,200 MG (based on a dry year) because there will be a reduction in available system storage after the Geysers system is on line.

Discussions with Santa Rosa staff indicate that some of the reuse system could be returned to production as part of the IRWP. But it would not attain its previous capacity because of

economic pressures on the dairy industry, expiration of reuse contracts, and changes in crop water demands (feed/fodder crops converting to vineyards). Nevertheless, regrowth (resupply) from approximately 2,200 MG to 3,000 MG annual irrigation volume is feasible. To accomplish this, higher supply flow from the Laguna Plant and additional storage would be needed. The 800-MG regrowth also corresponds to capacity available on the City-owned farms. However, the City could use its own farms or privately owned farms for system regrowth.

In summary, this increment would be the regrowth on the City-owned farms of 800 MG. The capital cost for this regrowth would be associated with storage only, because the other distribution facilities already exist.

Geysers Expansion (EIR Alternative 5)

The Geysers Recharge Project is a system of pump stations and pipelines that conveys recycled water from the Llano Pump Station at the Laguna Plant to the Geysers Steamfield injection wells, currently operated by Calpine Corporation. The system includes two sections: the Valley Section and the Mountain Section. The Valley Section, which extends from the Laguna Plant to the Bear Canyon Pump Station, includes a 48-inch-diameter section and a 30-inch-diameter section of pipeline. The Valley Section can deliver water to locations along the pipeline route to The Geysers. The Mountain Section extends from the Bear Canyon Pump Station to the terminal tank at the Geysers Steamfield. This pipeline section includes a 30-inch-diameter pipe and three pump stations (Bear Canyon, Mayacmas, and Pine Flat). The Mountain Section cannot be used for purposes other than delivery of recycled water to The Geysers.

Up to 6,400 MG of flow could be managed annually using Geysers recharge. As more recharge occurs, the unit cost for delivering water to the Geysers Steamfield increases.

The expansion of the flow to the Geysers Steamfield for injection was discussed in TM No. 7 of the IRWP Feasibility Report. The capacity expansions assumed in this Master Plan are essentially the same.

As presented in TM No. 7, the logical progressions in the flow expansions are:

- Increment 1 – Increase from existing contracted supply of 11 mgd (average annual flow) to 16 mgd. This utilizes the maximum design capacity of the Geysers conveyance system. No capital improvements are required within the City's conveyance system; however, any flow increase requires improvements within the Steamfield based on data provided by Calpine.
- Increment 2 – Increase from 16 mgd to 19 mgd (average annual flow). This requires utilizing the redundant fifth pump at each of the three mountain pump stations within the Geysers Recharge Project, thereby increasing the peak conveyance capacity to 20 mgd. An annual average flow of 19 mgd is used to allow for maintenance down time, because no redundant pumping units would be installed. This increment also requires additional capital improvements within the Geysers Steamfield, according to the Calpine information.

- Increment 3 – Increase from 19 mgd to 25 mgd (average annual flow). This requires expanding the three north Geysers pump stations to a maximum capacity of 27 mgd and using the Mountain Section of the Geysers Pipeline to its full capacity. The average annual flow is assumed to be 25 mgd to allow for pipeline maintenance down time, which would be needed even though the expanded pump stations could be designed to make installed redundant pumping units available. This pump station expansion would likely require at each pump station three more pumping units, with additional surge tanks and equipment, and a separate building.
- Increment 4 – This increment is the same as Increment 3, but with added storage.

Using the above increments of flow expansion, Geysers reuse increments were developed as shown in Table 6, including the cost of storage for Increment 4.

TABLE 6
Geysers Reuse Increments
Santa Rosa Incremental Recycled Water Program

Description of Increment	Demand (MG/yr)	Cumulative Demand (MG/yr)	Estimated Capital Cost ($ million)[a]	Estimated Cumulative Capital Cost ($ million)[a]
Increment 1 – 16 mgd	1,825	1,825	17	17
Increment 2 – 19 mgd	1,095	2,920	20	37
Increment 3 – 25 mgd	2,190	5,110	50	86
Increment 4 – 25 mgd	1,290	6,400	133	220

[a]Master Plan costs have been adjusted for inflation through 2006. Also, capital costs for Increment 4 include cost of storage taken from the Master Plan and adjusted for inflation through 2006.

Discharge (EIR Alternative 6)

Discharge could annually manage the entire incremental volume of 6,400 MG. Discharge could continue through two possible means:

- Direct discharge to the Laguna and/or Russian River (EIR Alternatives 6A and 6B)
- Indirect discharge to the Russian River (EIR Alternatives 6C, 6D, and 6E)

These options are discussed in the following sections. In May 2005, the Subregional System initiated the Discharge Compliance Project and EIR, to prepare conceptual engineering designs and project-level CEQA documentation for up to 4,500 MG discharge in accordance with the Selected Master Plan Program described in Section 3. Results of this work are expected to be available late in 2007.

Direct Discharge to the Laguna or Russian River

As concluded in TM No. 16 of the IRWP Feasibility Report, discharge to the Laguna will likely be limited to 10 percent of the Laguna flow to ensure compliance with the receiving water quality objectives. New facilities include improving the Laguna discharge by adding flow measurement and control, at an estimated cost of approximately $1.1 million. Construction of this flow control facility was completed in 2005.

To implement direct discharge to the Russian River, a new pipeline from the Geysers Pipeline to the river would need to be constructed, along with a river discharge structure. The Llano Pump Station would also have to be expanded to 80 mgd. The estimated capital cost of implementing this alternative is $30 million. Depending on the location of the river discharge point, a booster pump station on the Geysers Pipeline may be required. The estimated cost of $30 million does not include the cost of an intermediate booster pump station, which could approach $20 million.

Indirect Discharge to the Russian River

Indirect discharge could utilize injection wells, percolation ponds, or infiltration basins. Similar to direct discharge, this alternative would require regulatory approval. The criteria for defining an indirect discharge have not been developed by the NCRWQCB. If discharge using injection wells, percolation ponds, or infiltration basins is considered to be indirect for regulatory purposes, such a discharge would not be subject to the CTR/SIP. However, if the NCRWQCB considers a discharge using any of these methods to be a direct discharge and subject to the CTR/SIP, discharge using injection wells, percolation ponds, or infiltration basins may help achieve compliance with the CTR/SIP through the natural treatment process that occurs as water moves through soil. The estimated costs presented in this document are based on the development of infiltration basins.

The development of infiltration basins with capacity for a full 6,400 MG (wet year volume, year 2020 ADWF) is estimated to cost $99 million. These costs derive from the cost estimates presented in TM No. 10 of the IRWP Feasibility Report with the most restrictive soil conditions. The expansion of the Llano Pump Station to 80 mgd is included to convey the flow out of the Santa Rosa Plain.

Based on pilot studies conducted with soils similar to those at indirect discharge sites, and based on consultation with the North Coast Regional Water Quality Control Board staff, indirect discharge is no longer considered feasible for implementation within the time allotted for CTR compliance by 2010 (see Discharge Compliance Project Final Screening Report, Spring 2007).

Advanced Membrane Treatment

It is currently uncertain whether new discharge limits would be attainable without advanced membrane treatment (AMT). As presented in the IRWP Feasibility Report, the AMT facilities could range in cost from $360 million to $573 million, with annual O&M costs ranging from $21 to $36 million. Because of the high cost to construct and operate AMT facilities, the City may not choose to implement AMT because there are other, less costly programs identified in this Master Plan that would provide greater benefits.

Demand Cost/Capacity Comparisons

The various uses for recycled water can be compared for their relative unit costs, including storage. The reuse alternatives are shown on Figure 6 and in Table 7, which compare the capacity increments and unit costs. The estimated costs presented on Figure 6 and in Table 7 reflect the updated value of potable water offset. River discharge (both direct and indirect) is also shown for comparison.

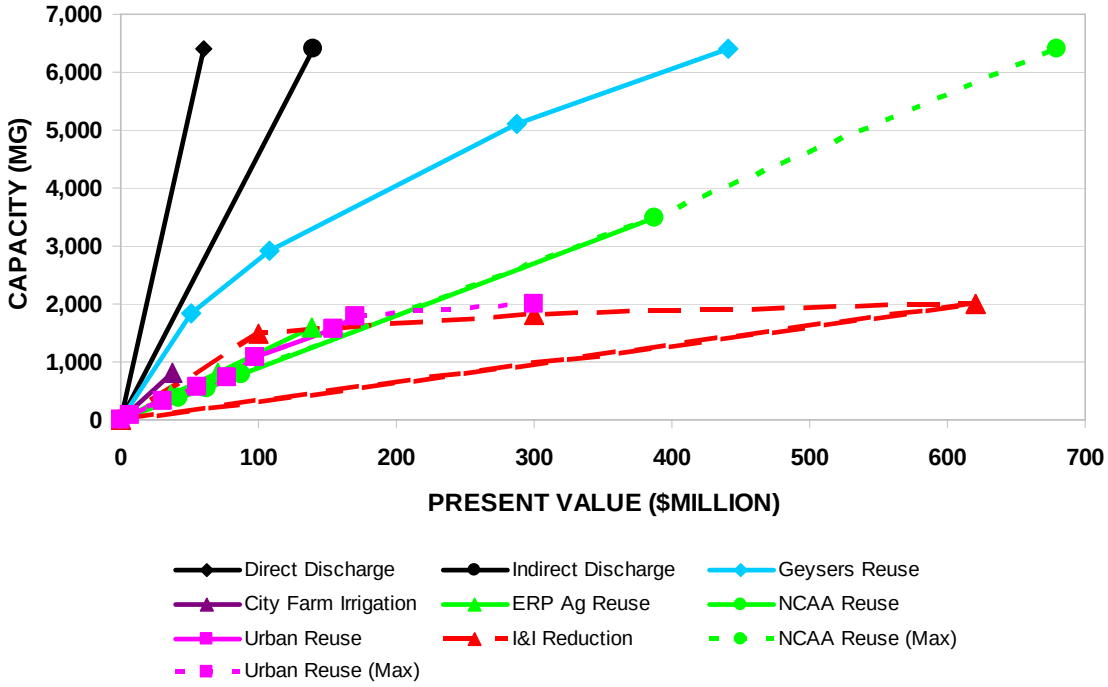

FIGURE 6
Demand/Cost Capacity Comparisons (Including Discharge)

The steeper lines on Figure 6 indicate lower unit costs than flatter lines. Direct and indirect discharge (without AMT) are the alternatives having the lowest unit cost, followed by Geysers reuse. City-owned farm irrigation is similar in cost to Geysers reuse. ERP and NCAA agricultural reuse and urban reuse are similar in cost, when the potable offset benefit of urban reuse is accounted for. For reuse alternatives without the discharge or Geysers reuse alternatives, City-owned farm irrigation is expected to be the alternative with the lowest unit cost. ERP Agricultural Area reuse, NCAA agricultural reuse and urban reuse are expected to be very similar in unit cost, particularly the first increments.

TABLE 7
Cost/Capacity Comparisons[a,b]
Santa Rosa Incremental Recycled Water Program

Increment	Description	Capacity (MG/yr)	Estimated Present Value ($ million)	Subregional System Share of Estimated Present Value ($ million)	Estimated Unit Present Value ($ thousand/MG)
Urban Reuse - 1	G&CC Area	81	$7	$7	$83
Urban Reuse - 2	SRURP Phase 1 South [c]	250	$41	$24	$98
Urban Reuse - 3	SRURP Phase 1 West [c]	250	$42	$25	$101
Urban Reuse - 4	SRURP Phase 2 South [c]	250	$35	$21	$85
Urban Reuse – 5	SRUPR Phase 2 West [c]	250	$34	$21	$83
Urban Reuse – 6	SRUPR Max Potable [c]	500	$95	$57	$114
Urban Reuse - 7	Rohnert Park/Cotati	196	$26	$15	$78
ERP Agricultural - 1	Max without ERP storage	440	$36	$36	$82
ERP Agricultural - 2		377	$35	$35	$92
ERP Agricultural - 3	Max size	783	$68	$68	$87
NCAA – 1		370	$42	$42	$113
NCAA – 2		170	$20	$20	$115
NCAA – 3		240	$26	$26	$107
NCAA – 4	Max size	2,700	$300	$300	$111
City-owned Farm Irrigation		800	$38	$38	$47
Geysers - 1	16 mgd	1,825	$51	$51	$28
Geysers - 2	19 mgd	1,095	$57	$57	$52
Geysers - 3	25 mgd	2,190	$180	$180	$82
Geysers - 4	Ultimate capacity with additional storage	1,290	$153	$153	$119
River Discharge		6,400	$60	$60	$9
Indirect Discharge		6,400	$140	$140	$22

[a] Does not include potential AMT cost, which could range from $346 to $551 million in capital cost and from $20 to $35 million in annual O&M costs. AMT is not included because reuse options are more cost-effective than AMT. Estimated storage costs are included.

[b] Increment costs are additive. For example, the present value of NCAA increments 1 and 2 is $40.1 million + 18.8 million or $58.9 million.

[c] Subregional System contribution estimated to be 60% of cost; other 40% of cost could be borne by water utility

The estimated capital and O&M costs for the required storage facilities were then combined with the estimated capital and O&M costs for the infrastructure required for a given program, and estimated present value costs were developed. Present value costs calculated at a discount rate of 3 percent, including O&M costs through 2035, are shown on the figures in Section 3 illustrating each program, as well as in Section 4 of this Master Plan.

Seasonal Storage

Seasonal storage may be required to implement IRWP alternatives, with the exception of indoor water conservation. The amount and timing of storage depends on the amount and timing of reuse implementation. For the purpose of the comparisons presented here, the water balance calculations are assumed to result in a ratio of storage to demand of 5:8 for either agricultural or urban reuse. In other words, for every 80 MG of agricultural or urban reuse demand, approximately 50 MG of storage must be provided. Direct and indirect discharge is assumed not to require storage beyond that which would be added to support reuse. Costs in Tables 4 - 7 and Figure 6 above include the cost of storage for urban and agricultural reuse, as well as for the 4th increment of Geysers expansion.

Estimated unit costs for storage are shown in Table 8. These estimated costs were developed according to the location of storage as defined in TM No. 5 of the IRWP Feasibility Report. It is important to note that, since the Master Plan was adopted in 2004, land costs and habitat mitigation costs for the California tiger salamander have increased substantially; such increases are not included in the costs in Table 8.

TABLE 8
Estimated Unit Capital Costs of Storage
Santa Rosa Incremental Recycled Water Program

Storage Location	Unit Cost[a] ($ thousand/MG)
Santa Rosa Plain	54
East of Rohnert Park	66
East of Santa Rosa	85
North County	50

[a] Master Plan costs have been adjusted for inflation through 2006.

Section 3
Selected Program and Revisions

SECTION 3

Selected Program and Revisions

Introduction to the 2007 Update

This Section presents the original description of the Master Plan Selected Program as adopted in March 2004. Following the description of the 2004 Selected Program, the 2007 changes in the Master Plan are described.

2004 Selected Program

The Selected Program consists of a combination of alternatives analyzed in the Program EIR. The Selected Program was designed to meet the Subregional System's design requirements of 25.9 mgd ADWF and disposal of up to a 6,700-MG annual flow increment in the wettest year. The future capacity of the Subregional System is reflected in Table 9.

TABLE 9
Future Capacity of the Subregional System (all values in MG except where noted)
Santa Rosa Incremental Recycled Water Program

Year Type (in 67-Year Analysis)	Existing System		IRWP			Total System Capacity at 25.9 mgd[c]
	Irrigation	Geysers	Reuse[a]	Discharge[b]	Total	
Driest	2,200	4,000	2,200	1,100	3,300	9,500
10th percentile	2,100	4,000	2,200	1,500	3,700	9,800
Median (50th percentile)	2,100	4,000	2,200	2,200	4,400	10,500
90th percentile	1,900	4,000	2,200	4,200	6,400	12,300
Wettest	1,900	4,000	2,200	4,500	6,700	12,600

[a]Includes urban, agricultural, and Geysers reuse plus conservation.
[b]1,100 MG is the discharge in the 2020 driest year flow conditions, but discharge in the driest year may be greater (up to 1,600 MG) prior to 2020, depending on when reuse is implemented.
[c]Total system capacity at 25.9 mgd ADWF is the sum of existing irrigation system, Geysers Recharge Project, IRWP reuse and discharge.

The Selected Program is based on and meets the IRWP's primary objectives and many of the secondary objectives adopted by the Council and BPU in 2001 at the outset of the IRWP. This chapter describes the Selected Program and discusses its relationship to the size of the alternatives analyzed in the Program EIR.

For the complete project description of alternatives and components, please refer to the certified Program EIR (October, 2003). Where alternatives or components in the Selected Program differ from the Program EIR, those differences are described in this section. If no differences are identified, the description remains the same as in the Program EIR. The City

certified an Addendum to the Program EIR on March 4, 2004, that evaluates the environmental effects specifically associated with implementing the Selected Program.

The Selected Program combines the following five alternatives from the Program EIR.

- Alternative 1 – Indoor Water Conservation
- Alternative 3 – Urban Reuse
- Alternative 4 – Agricultural Reuse
- Alternative 5 – Geysers Expansion
- Alternative 6 – Discharge

In addition to these five alternatives, the Selected Program also includes Laguna Plant upgrade, storage, and the option of creating wetlands. Alternative 2, I&I Removal, is not included in the Selected Program because insufficient information is available to determine if a greater extent of I&I removal beyond that achieved by the City's existing I&I program would be cost-effective. A study is recommended to better quantify the effectiveness of I&I removal.

The Selected Program establishes both a target and range for recycled water use and discharge as summarized in Table 10.

TABLE 10
Size of Selected Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Target	Range	Maximum Size Studied in the Program EIR
Alternative 1 – Indoor Water Conservation	300 MG	150 to 300 MG	300 MG
Alternative 3 – Urban Reuse	500 MG	0 to 2,200 MG	2,200 MG
Alternative 4 – Agricultural Reuse	1,000 MG	0 to 2,200 MG	6,400 MG
Alternative 5 – Geysers Expansion	400 MG	0 to 2,200 MG	6,700 MG
Alternative 6 – Discharge	4,500 MG	1,600 to 4,500 MG[a]	6,700 MG
Total Recycled Water Use	**6,700 MG**	**6,700 MG**	**6,700 MG**
Laguna Plant Upgrade	25.9 mgd	25.9 mgd	25.9 mgd
Storage	1,200 MG	0 to 3,190 MG[b]	3,190 MG
Created Wetlands	0	0 to 30 acres	30 acres

[a]Range represents the maximum discharge in driest and wettest years. If discharge is precluded, the lower end of the range could be 0 MG. Laguna discharge is within permit limits (lower end of range could be 0 MG), with remainder to the Russian River. River discharge can be direct or indirect.

[b]Storage may be needed for Urban Reuse, Agricultural Reuse, Geysers Expansion, or Discharge.

The Selected Program preserves a wide range of alternatives for future reuse and disposal. It fulfills all of the following IRWP primary objectives:

- Provide wastewater treatment, recycling, and disposal for the Santa Rosa Subregional Reuse System to accommodate projected growth as indicated in the adopted general plans of each Subregional System partner effective as of July 2002.
- Develop and operate the wastewater treatment and disposal system in ways that protect public health and safety, protect natural resources including the Russian River and its tributaries, promote use of recycled water, meet current regulatory requirements, and provide flexibility to comply with future regulatory requirements.
- Maintain a system and components that are economically feasible and continue to be successfully financed.

Each of the alternatives presents its own distinct advantages, satisfying many of the secondary objectives, as follows:

- Indoor Water Conservation. This alternative provides cost-effective flow reduction and a water supply benefit. Conservation is a reliable means of avoiding wastewater disposal.
- Urban Reuse. Urban reuse provides a water supply benefit. This alternative provides a reliable means for disposal of recycled water, while protecting the beneficial uses of receiving waters.
- Agricultural Reuse. This alternative potentially provides a water supply benefit and maximizes use of existing facilities. This alternative provides a reliable means for disposal of recycled water, while protecting the beneficial uses of receiving waters. This alternative also provides the flexibility to accommodate flows from neighboring agencies.
- Geysers Expansion. This alternative maximizes the use of existing facilities and provides the flexibility to accommodate use of recycled water made available by neighboring agencies. This alternative provides a reliable means for disposal of recycled water, while protecting the beneficial uses of receiving waters. Additional flow to The Geysers also helps to maintain system weather independence. This alternative also provides the flexibility to accommodate flows from neighboring agencies.
- Direct Discharge. This is a relatively low-cost method of disposal that preserves weather independence for the Subregional System. Discharge may provide a water supply benefit, although it is currently unquantifiable. It is a reliable disposal system that can accommodate flows from neighboring agencies, while protecting beneficial uses of receiving waters.

The IRWP objectives were used as program selection criteria. Figure 7 summarizes the evaluation of the Selected Program based on these criteria.

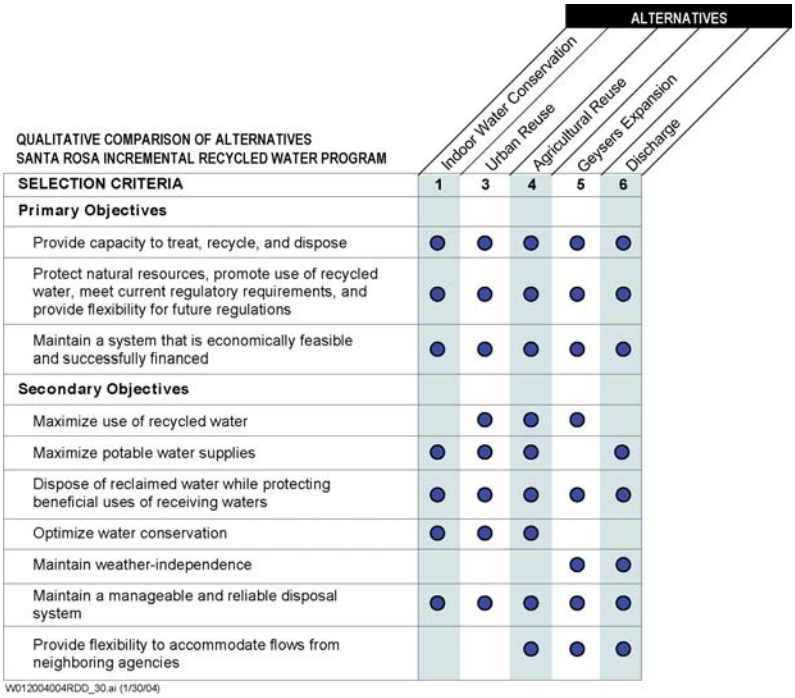

FIGURE 7
Qualitative Comparison of Alternatives

Two strategies were developed for program implementation: some reuse early (Early Implementation) or just in time to meet capacity needs and regulatory requirements (Just-in-Time Reuse). These two strategies are illustrated on Figure 7. Early Implementation has the following advantages.

- Increases ability to meet potential regulatory compliance schedules
- Provides early water supply benefit
- Provides flexibility for implementation
- Increases commitment to reuse

Actual implementation is planned to occur between these two schedules; projects will be implemented sooner than needed but not as rapidly as possible.

The Selected Program caps future discharge at an amount consistent with the existing permit (4,500 MG) and manages flows resulting from growth with conservation and reuse.

Studies are needed to better define the I&I Alternative (EIR Alternative 2), define discharge compliance, and guide the location of future storage (the California tiger salamander habitat studies are already in progress). The City also is participating in an ongoing study in Monterey involving pilot testing and plant trials to evaluate alternative filtration technologies that could optimize future filtration at the Laguna Plant. For a more detailed description of these studies, refer to Section 3, Program Development.

A summary of the Selected Program, including location, cost, rate impacts, and volume of water managed through the planning horizon of 2020, is shown on Figure 8.

Alternative 1 – Indoor Water Conservation

The target for indoor water conservation is 300 MG and could range from 150 to 300 MG (Table 11). The 300-MG target represents the conservation to be achieved if all Subregional Partners implement the Indoor Water Conservation Best Management Practices (BMPs) in their jurisdictions. The volume of conservation that can be achieved through implementation of only the City of Santa Rosa Indoor Water Conservation BMPs is 150 MG.

This alternative is intended to reduce sewer flows through conservation in the indoor use of water, thereby reducing the need to treat sewage and reuse or dispose of recycled water. This focus is on indoor water use as opposed to outdoor water use, landscape, or irrigation programs, which do not affect sewer flows.

TABLE 11
Indoor Water Conservation in the Selected Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for Target ($)[a]	Target (MG)	Range (MG)	Maximum Size Studied in the Program EIR (MG)
Alternative 1 – Indoor Water Conservation	3 million	300	150 to 300	300

[a]Costs are not updated, as this section presents the Selected Program as adopted in March 2004.

Figure 8 Master Plan Summary

Alternative 3 – Urban Reuse

The target for recycled water disposal by means of the Urban Reuse Alternative is 500 MG annually and could range from 0 to 2,200 MG annually (Table 12). Urban Reuse occurs in any area identified for potential urban reuse in the Program EIR.

Urban reuse is already occurring in Santa Rosa, Rohnert Park, and Sebastopol with recycled water from the Subregional System. This alternative increases the amount of urban reuse within Santa Rosa, Cotati, and Rohnert Park supplied by recycled water. Disposal of recycled water via urban reuse provides not only irrigation water, but may also replace potable water currently used for urban irrigation. It also provides for the potential use of dual piping systems in new development, gray water systems for onsite reuse, and other urban reuse as listed in the certified EIR project description.

TABLE 12
Urban Reuse in the Selected Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for Target ($)[a]	Target (MG)	Range (MG)	Maximum Size Studied in the Program EIR (MG)
Alternative 3 – Urban Reuse	$27 million	500	0 to 2,200	2,200

[a]Costs are not updated, as this section presents the Selected Program as adopted in March 2004.

Components under this alternative include:

- **Urban Irrigation.** Urban irrigation provides recycled water from the Laguna Plant to urban reuse sites to replace either potable, municipally supplied water or well water used for irrigating landscaped areas, or for commercial/industrial reuse. Under this component, recycled water is supplied to replace existing irrigation systems, as well as to irrigate landscaped areas in new development.

  Industrial reuse replaces water in industrial processes and for indoor plumbing (such as fire sprinklers and toilets) in commercial buildings.

  Gray water systems, which could be allowed by the Subregional Partners under this component (subject to regulatory approval), reduce sewage flows by reusing or disposing of residential or commercial wash water onsite at the residence or commercial buildings.

- **Pipelines.** Pipelines will be constructed to carry recycled water from the Laguna Plant to the irrigation sites in the urban reuse area (possibly including a series of storage tanks). Pipelines may also be required to convey recycled water to and from storage facilities.

- **Pump Stations and Tanks.** Pump stations and tanks include a new pump station at the West College Ponds and booster pump stations at various locations within the urban reuse system. Any storage facility in the Santa Rosa Plain may also require construction of a booster pump station to pump water back to the reuse system. Also, if storage is provided east of Santa Rosa, a booster pump station may be required at storage facilities

located at higher elevations. Storage tanks could be located within the urban reuse areas. If storage tanks were provided, smaller pipelines could serve portions of the system.

Alternative 4 – Agricultural Reuse

The target for recycled water disposal by means of the Agricultural Reuse Alternative is 1,000 MG annually, and could range from 0 to 2,200 MG annually. Agricultural reuse could occur in any area identified for potential agricultural reuse in the Program EIR.

This alternative involves providing recycled water for agricultural irrigation within areas of Sonoma County. This alternative has three options:

- **North County Agricultural Reuse**. Within the North County, there are 51,500 acres currently cultivated or uncultivated but potentially suitable for irrigation. Recycled water for North County Agricultural Reuse comes from the Geysers Pipeline or from new storage facilities located in the North County that are supplied by the Geysers Pipeline.
- **East of Rohnert Park Agricultural Reuse.** This area includes approximately 5,700 acres that may be suitable for cultivation. Recycled water for East of Rohnert Park agricultural reuse is conveyed from the Laguna Plant using the existing Rohnert Park urban reuse pipeline or from storage facilities.
- **City-owned Farms**. Within the City-owned farms reuse area identified in the IRWP EIR, about 2,800 acres of land are potentially available for irrigation. City-owned farms would continue to be served through the existing reclamation system or by recycled water conveyed from storage facilities.

Recycled water would potentially be available to a wide variety of agricultural uses including vineyards, pasture, and silviculture (e.g., redwoods cultivation). This alternative includes irrigation on lands currently being irrigated, as well as lands that are not currently being irrigated. The recycled water supplied for agricultural reuse may also be used for frost control. In portions of the County, this alternative is being developed in coordination with local agricultural groups and individual operators who may be interested in using recycled water for agricultural crops in the future.

The Geysers Recharge Project began operating in December 2003. At that time, water that had formerly been delivered to the existing irrigation system was delivered to the Geysers Recharge Project. The amount of land irrigated by the existing irrigation system was reduced by 40 percent to approximately 3,600 acres because of the reduced availability of recycled water. The annual irrigation volume declined from about 3,700 MG to about 2,100 MG in a normal rainfall year, a reduction of 1,600 MG. With additional supply provided by the IRWP and construction of storage, City-owned land remains at production levels similar to those prior to implementation of the Geysers Recharge Project (Table 13).

TABLE 13
Agricultural Reuse in the Selected Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for Target ($)[a]	Target (MG)	Range (MG)	Maximum Size Studied in the Program EIR (MG)
Alternative 4 – Agricultural Reuse	3 million	1,000	0 to 2,200	6,400

[a]Costs are not updated, as this section presents the Selected Program as adopted in March 2004.

Components of this alternative include the following:

- **Agricultural Irrigation.** This component provides water for irrigation and frost control to agricultural users in the North County, the area East of Rohnert Park, and City-owned Farms.
- **Pipelines.** Distribution pipelines from the existing Geysers Pipeline carry recycled water to the Alexander Valley, Dry Creek Valley, and Russian River irrigation areas.

  The system of distribution pipelines for the area east of Rohnert Park would be constructed from the end of the existing urban reuse pipeline in Rohnert Park. No new pipelines are required for the City-owned farms, as this area would continue to be served through the existing reclamation system. Pipelines may be needed to convey recycled water to and from new storage facilities.
- **Pump Stations**. Expansion of the Geysers Llano Pump Station capacity, along with construction of up to two new pump stations and four surge tanks in the Valley section of the Geysers Pipeline between the Laguna Plant and Healdsburg, may be required to provide sufficient capacity in the Geysers Pipeline to fully implement this alternative in the North County area (conveyance of recycled water to the area east of Rohnert Park and City-owned farms areas would not use the Geysers Pipeline). For any storage facilities located at higher elevations, or providing recycled water to parcels located at higher elevations, booster pump stations are required.

Alternative 5 – Geysers Expansion

The Geysers Expansion Alternative has a target of recycling 400 MG (1.1 mgd). Annually, the volume could range from 0 to 2,200 MG (6 mgd) (Table 14).

Calpine is the steamfield operator. Under its existing contract with Calpine, the City supplies the Geysers Steamfield with an average daily flow rate of 11 mgd of recycled water. Under this alternative, the City would supply up to 6 mgd of additional recycled water to the Geysers Steamfield over and above the 11-mgd in the existing contract. For Geysers expansion, no modifications to the Subregional System pipelines or pump stations are necessary, with the exception of some changes in the pump station controls and operational procedures. The private steamfield operators construct steamfield improvements and manage the injection of the recycled water for electricity production.

TABLE 14
Geysers Expansion in the Selected Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for Target ($)[a]	Target (MG)	Range (MG)	Maximum Size Studied in the Program EIR (MG)
Alternative 5 – Geysers Expansion	3 million	400 (1.1 mgd)	0 to 2,200 (up to 6 mgd)	6,700

[a]Costs are not updated, as this section presents the Selected Program as adopted in March 2004.

This alternative involves the following components:

- **Pipelines.** No modification to the Geysers Pipeline is necessary to accommodate additional flows under this alternative. However, additional pipelines within the Geysers Steamfield are required to convey the recycled water to the additional injection wells; these pipelines are included in the Geysers Steamfield Expansion component below. Pipelines may be required to convey recycled water to and from storage facilities.
- **Pump Stations.** To accommodate the maximum delivery of an additional 2,200 MG for a total annual average flow of 17 mgd to The Geysers, expansion of the Geysers Llano Pump Station capacity may be required to provide sufficient capacity in the Geysers Pipeline. For storage facilities located at higher elevations, booster pump stations could be required at the reservoir sites. Depending on the location and volume of North County agricultural reuse or Russian River discharge, booster pump station(s) and surge tanks could be required on the Geysers Pipeline.
- **Geysers Steamfield Expansion.** With the increased potential for recycled water disposal up to 17 mgd annual average flow, additional injection capacity is required at The Geysers. To provide this capacity, the target disposal volume may require one geothermal well to be converted from production to injection. Additional disposal of 2,200 MG of recycled water at The Geysers, the maximum allowable under the Selected Program, requires up to six well conversions and three new wells. For either the target or maximum range of recycled water annual volumes, up to 7 miles of aboveground pipelines would be constructed within the Geysers Steamfield. Under this component, recycled water could also be provided to the cooling towers at the Geysers Steamfield.

Alternative 6 – Discharge

The target for recycled water disposal by means of discharge is 4,500 MG annually of direct discharge to the Laguna and/or Russian River. The range is from 1,600 to 4,500 MG annually via direct discharge to the Laguna or Russian River or indirect discharge to the River. If discharge were precluded at some point in the future because effluent limits are imposed pursuant to the California Toxics Rule (CTR) or other reasons, the volume of discharge could be 0 MG.

The California Toxics Rule (CTR) is expected to result in new requirements for recycled water quality for water that is discharged to surface waters. Additional treatment to improve the quality of recycled water may be necessary to meet CTR requirements under all five discharge options. This treatment could be provided by an AMT facility that would be located at a point along the Geysers Pipeline or at the point of discharge.

With AMT, the treatment process would remove solids from the recycled water, including constituents regulated under the CTR, specifically copper, lead, gamma-BHC, and endosulfan II. The solids removed from the recycled water are left in a residual concentrate called "brine." The brine may be disposed of by conveying the brine (either mixed with recycled water or as pure brine) to The Geysers for injection or by processing the brine through "crystallization," a procedure that reduces the liquid brine to crystalline-like solids, which are then trucked to an appropriate solid waste disposal facility. If the AMT facility processes 4,500 MG annually of recycled water, the capacity of the Geysers Pipeline (20 mgd) would be insufficient to convey all brine, and so disposal of brine at the Geysers Steamfield would need to be augmented by crystallization. If the volume of recycled water through the facility is less than 4,500 MG, Geysers disposal alone may be feasible. Crystallization along (i.e., without Geysers brine disposal) is feasible up to 4,500 MG.

The target Discharge Alternative does not include the cost of constructing AMT facilities. The City would not likely implement AMT because reuse is less costly and provides greater benefits.

The maximum discharge of 4,500 MG, combined with the existing irrigation system and Geysers Recharge Project, meets the anticipated system needs up to 21.3 mgd, expected to occur in approximately 2010. Recycled water generated from growth occurring between approximately 2010 and 2020, which will increase ADWF from 21.3 to 25.9 mgd, is disposed of through conservation and reuse.

Discharge may occur through several combinations of the discharge alternatives, 6A through 6E, as shown in Table 15.

TABLE 15
Annual Discharge Volumes in the Selected Program (MG)[a]
Santa Rosa Incremental Recycled Water Program

Discharge Combinations	6A[b] (Laguna Direct)	6B (River Direct)	6C, D, and/or E (River Indirect)	Total
Direct to Laguna and River[c,d]	3,900	600[e]	0	4,500
Direct to River Only	0	4,500	0	4,500
Direct to Laguna, Indirect to River[c,e]	3,900	0	600	4,500
Indirect to River[e]	0	0	4,500	4,500

[a] Reflects conditions under 2020 flows, wettest year.

[b] In drier conditions when total discharge volume is reduced, Laguna discharge will decrease and River discharge will increase.

[c] Laguna discharge is within permit limits (lower end of range could be 0 MG), with remainder to Russian River.

[d] This is the target discharge combination.

[e] Some portion of discharge may also be direct to the River, but the amount is not known at this time.

This alternative includes the following options:

- **Direct Discharge from Delta Pond to the Laguna (Alternative 6A)**. Under this option, discharge from Delta Pond to the Laguna at its confluence with Santa Rosa Creek occurs between October 1 through May 14. Other permitted discharge points, including the discharge from Meadowlane Pond, may also be used when and where effluent and receiving water limits can be achieved. Improvements are required for the discharge facilities at Delta Pond to regulate and measure flows. Discharge occurs at a rate that

meets permit limits, expected to be between 0 and 10 percent of flow in the Laguna. At 25.9 mgd ADWF, a 10 percent discharge restriction on the Laguna results in insufficient discharge capacity. The remainder of the discharge occurs in the Russian River consistent with Alternatives 6B, 6C, 6D, and/or 6E.

- **Direct Discharge to the Russian River (Alternative 6B).** Discharge volume could range from 0 to 4,500 MG maximum during the wettest year. A new discharge directly to the Russian River is located at a point between north of Healdsburg and Mirabel (to be determined in future studies). Recycled water is pumped from the Laguna Plant through the Geysers Pipeline to a location near the discharge point and conveyed through new pipeline, pumping, and discharge facilities on the Russian River. Discharge occurs between October 1 and May 14.
- **Indirect Discharge into the Russian River or Dry Creek (Alternatives 6C, D, and E).** Indirect discharge volume could range from 0 to 4,500 MG maximum in the wettest year. Indirect discharge may occur via percolation ponds (6C), infiltration basins (6D), or injection wells (6E). Indirect discharge potentially allows for additional treatment of the recycled water through the soil-aquifer system before it reaches surface water or deeper aquifers.

Under all of the options, the Discharge Alternative includes additional pretreatment for commercial and industrial dischargers to address effluent limitations under the CTR. All options under the Discharge Alternative also include a community education program to reduce contaminants in sewage, particularly from residential sources that are not subject to the pretreatment requirements. Table 16 summarizes this alternative.

TABLE 16
Discharge in the Selected Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for Target[a,c] ($)	Target (MG)	Range[b] (MG)	Maximum Size Studied in the Program EIR (MG)
Alternative 6 – Discharge	30 million	4,500	1,600 to 4,500	6,700

[a] The estimated capital costs do not include AMT or brine disposal.

[b] Range represents maximum discharge in driest and wettest years.

[c] Costs are not updated, as this section presents the Selected Program as adopted in March 2004.

Under all of the options, implementation of direct or indirect discharge involves the following components:

- **Pipelines.** None of the discharge options requires modifications to the Geysers Pipeline (pump station modifications to increase capacity are addressed below). Under each direct or indirect discharge option, pipelines are required to carry recycled water from the Geysers Pipeline to the discharge facilities. Pipelines may also be required to convey recycled water to and from storage facilities.
- **Pump Stations.** Expansion of the Geysers Pipeline capacity to 80 mgd for Russian River Direct Discharge (Alternative 6B) or for Indirect Discharge (Alternatives 6C, 6D, and 6E)

requires construction of up to two additional pump stations with storage facilities and four surge tanks along the Geysers Pipeline valley segment between the Llano Pump Station and the Alexander Valley. These options also require expansion of the Llano Pump Station.

- **Geysers Steamfield Expansion**. To dispose of "brine" from the AMT plant, up to 20 mgd may be injected at the Geysers Steamfield. To provide this capacity, up to six well conversions and three new injection wells will be constructed. To convey the brine to the new or converted wells, up to approximately 7 miles of aboveground pipelines will be constructed within the steamfield. Expansion of the Geysers mountain pump stations is not included.
- **Direct Discharge.** Volumes of discharge are presented in Table 16. Under Alternative 6A (Laguna Discharge), improvements to the existing facilities at Delta Pond are required, while under Alternative 6B (Russian River Direct Discharge), new discharge facilities are located on the Russian River.

Facilities for indirect discharge consist of any of the following:

- **Percolation Ponds (Alternative 6C)**. Percolation ponds are constructed along the Russian River or Dry Creek. These ponds are shallow basins that allow the recycled water to infiltrate indirectly into the groundwater through the unsaturated soils and then into the waterway.
- **Infiltration Basins (Alternative 6D).** Basins are used to infiltrate recycled water directly into the groundwater through the saturated soil layer and then into the waterway. These basins are deeper than percolation ponds.
- **Injection Wells (Alternative 6E).** Wells are constructed to inject recycled water underground into groundwater and the Russian River underflow prior to infiltrating into the River. The wells are constructed along the Russian River or Dry Creek.

Laguna Plant Upgrade

Laguna Plant upgrade includes additional pumping capacity as well as upgrades to in-plant processes to accommodate the anticipated increase in future flows from 21.3 mgd to 25.9 mgd ADWF. The option for secondary-treated discharge of recycled water during peak storm events is not included in the Selected Program.

Storage

For Urban Reuse, Agricultural Reuse, Geysers Expansion, and Discharge alternatives, storage facilities are needed for recycled water. The target reuse volume may require up to 1,200 MG of storage capacity. The details of how this volume was derived are shown in a water balance technical memorandum prepared specifically for the Selected Program, presented as Appendix E of the 2004 Master Plan. The maximum range of reuse could require up to 3,190 MG of storage capacity. These facilities are located in any of the geographic areas analyzed for storage in the Program EIR.

Created Wetlands

Wetlands using recycled water may be constructed as an optional component under the Master Plan, but it is not included in the target volume for recycled water disposal. These wetlands would be constructed for the purpose of habitat enhancement and could include marsh or open water as well as riparian or upland habitat. These habitats could support a variety of plant species valuable to wildlife and ecosystem functions. The created wetlands also may provide opportunities to mitigate IRWP impacts. Locations for these created wetlands have not been determined, but could be along any IRWP pipeline, as well as adjacent to any of the indirect discharge facilities or storage reservoirs. The wetlands could be of a variety of sizes and types, and interpretive trails and viewing points could also be provided.

2007 Update – Revisions to the Selected Program

The revisions to the Selected Program are minor and result from continued implementation of the Master Plan since 2004. The Subregional System's design requirements of 25.9 mgd ADWF and disposal of up to a 6,700-MG annual flow increment in the wettest year have not changed. None of the Subregional System members have adopted General Plan Updates since the 2004 Master Plan.

The range of flows for each component remains the same as the Selected Program. However, because implementation of the Master Plan has progressed, the target volumes are no longer being used. Instead, volumes that have been completed or are in the process of being completed, are shown in Table 17.

TABLE 17
Size of Revised Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Range identified in 2004 Master Plan	Completed or in Process
Alternative 1 – Indoor Water Conservation	150 to 300 MG	220 MG
Alternative 3 – Urban Reuse	0 to 2,200 MG[a]	1,000 MG
Alternative 4 – Agricultural Reuse	0 to 2,200 MG[a]	0 MG
Alternative 5 – Geysers Expansion	0 to 2,200 MG[a]	0 MG
Alternative 6 – Discharge	1,600 to 4,500 MG[b]	4,500 MG
Total Recycled Water Use	**6,700 MG**	**5,720 MG**
Laguna Plant Upgrade	25.9 mgd	Master Plans completed
Storage	0 to 1,200 MG[c]	500 MG
Created Wetlands	0 to 30 acres	0 acres

[a]The original range for the 3 reuse alternatives, as identified in the 2004 Master Plan, included 300 MG of capacity in case Indoor Water Conservation was not fully implemented. Because Indoor Water Conservation has already saved 220 MG, the upper range for reuse capacity should now be reduced by 220 MG.

[b]Range represents the maximum discharge in driest and wettest years. If discharge is precluded, the lower end of the range could be 0 MG. Laguna discharge is within permit limits (lower end of range could be 0 MG), with remainder to the Russian River.

[c]Storage may be needed for Urban Reuse, Agricultural Reuse, Geysers Expansion, or Discharge.

A summary of the Revised Selected Program, including location, cost, rate impacts, and volume of water managed through the planning horizon of 2020, is shown in Figure 9.

Figure 9 Updated Master Plan Summary

Alternative 1 – Indoor Water Conservation

The Master Plan target for indoor water conservation was 300 MG, and the range was from 150 to 300 MG (Table 18). The 300-MG target represented the conservation to be achieved if all Subregional Partners implement the Indoor Water Conservation Best Management Practices (BMPs) in their jurisdictions.

The Subregional System has already achieved 220 MG of indoor water conservation annually through 2005 (see Appendix B, Status of Indoor Water Conservation Alternative of IRWP).

TABLE 18

Indoor Water Conservation in Revised Program

Program Elements	Estimated Capital Costs for 300 MG ($)[a]	Subregional System Share of Capital Costs ($)[a]	Original Range (MG)	Completed (MG)
Alternative 1 – Indoor Water Conservation	3 million	3 million	150 to 300	220

[a]Costs are taken from the Master Plan and adjusted for inflation through 2006.

2007 Revisions

No revisions to the Indoor Water Conservation element of the Selected Program are included.

Alternative 3 – Urban Reuse

The Master Plan target for recycled water disposal by means of the Urban Reuse Alternative was 500 MG annually, and the range was from 0 to 2,200 MG annually (Table 19). In September 2006, the Santa Rosa Board of Public Utilities and Council authorized the initiation of engineering predesign for a 1,000 MG urban reuse system within Santa Rosa[1].

TABLE 19

Urban Reuse in Revised Program

Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for 1,000 MG ($)[a]	Subregional System Share of 1,000 MG Capital Costs ($)[a]	Original Range (MG)	Completed or in Process (MG)
Alternative 3 – Urban Reuse	$119 million	$71 million	0 to 2,200	1,000

[a] Costs are from the 2007 SRURP Feasibility Study and represent increments 2-5 in Table 4. Also, Capital Costs include costs of storage as taken from the Master Plan and adjusted for inflation through 2006.

[1] The City has not approved the 1,000-MG Santa Rosa Urban Reuse Project. The pre-design engineering work is being performed to evaluate the feasibility of such a project and to provide the information necessary to perform an environmental analysis of the proposal. The City will consider whether to approve the 1,000-MG Santa Rosa Urban Reuse Project only after performing a project-specific analysis of the environmental impacts of this proposal.

2007 Revisions

The following changes are included to the components making up the Urban Reuse Alternative:

- **Urban Irrigation.** The area in which urban irrigation may occur would be expanded to include all lands within the Santa Rosa Urban Growth Boundary, as well as lands at Sonoma State University.
- **Pipelines.** Two additional pipelines may be constructed from the Geysers pipeline to Santa Rosa between Piner Road and Ludwig Avenue. An additional pipeline may be needed to convey recycled water from the Rohnert Park reuse system to Santa Rosa between the Bellevue flood control channel and Santa Rosa Avenue. An additional transmission pipeline may be constructed near the Farmers Lane extension outside the Santa Rosa Urban Growth Boundary. Additional pipelines may also be needed to convey backwash from the algae removal systems to storage or sanitary sewers and to convey water to and from storage tanks. Pipelines could be sized to allow urban irrigation to be expanded to serve the full potable offset recycled water market in Santa Rosa (approximately 1,500 MGY), the estimated total incremental cost of which is $10 million.
- **Pump Stations and Tanks.** Additions to the pump stations and tanks component include an upgrade to the Rohnert Park pump station; a new pump station west of Santa Rosa, southeast of Santa Rosa, east of Rohnert Park, or west of Cotati; and diurnal storage tanks northwest of Rohnert Park, east of Rohnert Park, southeast of Santa Rosa, west of Santa Rosa near the Geysers pipeline, the Laguna Plant, and/or west of Cotati.

  In addition, new facilities to prevent the growth of algae so that irrigation systems will not clog may be needed. These facilities may be located at the Laguna Plant, the West College facility or near a pump station, tank or along a pipeline.
- **Source**. In addition to using recycled water from the Laguna Plant, recycled water may be used from the Oakmont Plant.

The Santa Rosa Urban Reuse Project Feasibility Study identified the following phases, each with a capacity of 250 MGY. These four phases are envisioned to be:

- Phase 1 South: pipelines generally located in southeast Santa Rosa extending from the south transmission main. Diurnal storage may be included in Phase 1 South and would be located between elevation 300 and 400 feet within the Santa Rosa UGB or in the southeast of Santa Rosa area.
- Phase 1 West: pipelines generally located in northwest Santa Rosa extending from either the west transmission main or the West College Facility. Diurnal storage may be included in Phase 1 West and would be located between elevation 300 and 400 feet in the Fountaingrove area.
- Phase 2 South: pipelines extending from the Phase 1 South system into southwest Santa Rosa. Connections between the south and west system may be made during this phase. Diurnal storage may be included in Phase 2 South and would be located

between elevation 300 and 400 feet or at lower elevations in northwest Rohnert Park or west of Cotati.

- Phase 2 West: pipelines extending from the Phase 1 West system to interconnect with the south system. Diurnal storage may be included in Phase 2 West and would be located between elevation 300 and 400 feet or at lower elevations near the Geysers pipeline or east of Rohnert Park.

These four phases may be constructed in slightly different order to maximize coordination with Santa Rosa's Capital Improvement Program or with various private development proposals. Tank and pumping facilities may be constructed in a different phase than indicated.

Alternative 4 – Agricultural Reuse

The Master Plan target for recycled water disposal by means of the Agricultural Reuse Alternative was 1,000 MG annually, and the range was from 0 to 2,200 MG annually.

TABLE 20
Agricultural Reuse in Revised to the Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for 1,000 MG ($)[a]	Subregional System Share of 1,000 MG Capital Costs ($)[a]	Original Range (MG)	Completed or in Process (MG)
Alternative 4 – Agricultural Reuse	62 million	62 million	0 to 2,200	0

[a]Costs are taken from the Master Plan and adjusted for inflation through 2006. Also, Capital Costs include costs for storage as taken from the Master Plan and adjusted for inflation through 2006. Costs reflect an average of North County and East of Rohnert Park costs.

2007 Revisions

No revisions to the Agricultural Reuse element of the Selected Program are included.

Alternative 5 – Geysers Expansion

The Master Plan target for the Geysers Expansion Alternative was 400 MG (1.1 mgd) and the range was from 0 to 2,200 MG (6 mgd) (Table 21).

TABLE 21
Geysers Expansion in Revised Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for 1,000 MG ($)[a]	Subregional System Share of 1,000 MG ($)[a, b]	Original Range (MG)	Completed or in Process (MG)
Alternative 5 – Geysers Expansion	9 million (2.7 mgd)	9 million (2.7 mgd)	0 to 2,200 (up to 6 mgd)	0

[a]Costs are taken from the Master Plan and adjusted for inflation through 2006.
[b]An unknown portion of the costs may be shared with steamfield operator.

2007 Revisions

No revisions to the Geysers Expansion element of the Selected Program are included.

Alternative 6 – Discharge

The Master Plan target for recycled water disposal by means of discharge is 4,500 MG annually of direct discharge to the Laguna and/or Russian River. The range is from 1,600 to 4,500 MG annually to the Laguna or Russian River. If discharge were precluded at some point in the future because effluent limits are imposed pursuant to the California Toxics Rule (CTR) or other reasons, the volume of discharge could be 0 MG. In May 2005, the Santa Rosa Board of Public Utilities and City Council authorized the initiation of the Discharge Compliance Project to provide options for discharging up to 4,500 MG in the wettest year.

CTR compliance challenges include copper, lead, and cyanide. New compliance challenges have arisen since 2004 from new requirements in the City's NPDES renewal in 2006, namely temperature and dissolved oxygen in the Laguna and the Russian River and nutrients in the Laguna. Indirect discharge is no longer considered feasible for implementation within the time allotted for CTR compliance by 2010.

TABLE 22
Discharge in Revised Program
Santa Rosa Incremental Recycled Water Program

Program Elements	Estimated Capital Costs for 4,500 MG ($)[a]	Subregional System Share of Capital Costs ($)[a]	Original Range (MG) [b]	Completed or in Process (MG)
Alternative 6 – Discharge	30 million	30 million	1,600 to 4,500	4,500

[a]The estimated capital costs do not include AMT, brine disposal, cooling towers, nutrient removal, or storage. Costs are taken from the Master Plan and adjusted for inflation through 2006.

[b]Range represents maximum discharge in driest and wettest years.

2007 Revisions

No revisions are included. If a Discharge Compliance Project requires revisions to the Master Plan, such changes will be proposed at the time of project selection, which is expected to be in early 2008.

Laguna Plant Upgrade

Laguna Plant upgrade still includes additional pumping capacity as well as upgrades to in-plant processes to accommodate the anticipated increase in future flows from 21.3 mgd to 25.9 mgd ADWF. The *Laguna Subregional Water Reclamation Facility Improvement Master Plan* was completed in August 2005, and the *Santa Rosa Power Master Plan* was completed in June 2006. Updated costs from the two documents are approximately $135 million, adjusted for inflation through 2006.

Storage

Storage costs for reuse and discharge are included in updated costs listed in Section 2 and the 2007 revisions in Section 3. No other changes to the Storage element of the Selected Program are included.

Created Wetlands

No changes to the Created Wetlands element of the Selected Program are included.

Section 4
Program Implementation

SECTION 4

Program Implementation

The Master Plan defines the size, sequencing, timing, general location, and estimated cost of the program selected for implementation. Individual projects that constitute the program are in the process of being implemented. The 2007 Update conforms the Master Plan to the developing elements of the program. The following implementation actions have been initiated since the approval of the Master Plan in March of 2004.

Common Elements

Delta Pond Flow Control and Measurement. This project was completed in 2005.

Laguna Plant Upgrade. The *Laguna Subregional Water Reclamation Facility Improvement Master Plan* was completed in August 2005, and the *Santa Rosa Power Master Plan* was completed in June 2006.

I&I Study. During large rain events, the City of Santa Rosa sees an increase in flow to the treatment plant caused by rain water flowing into the collection system through various sources (groundwater, cracks, roof leaders, sump pumps, etc). This flow is referred to as Rain Derived Inflow and Infiltration (RDII). The ability to understand where and how this RDII enters the system and how to remove it cost effectively has become an important part of managing our collection system. RDII affects the sizing of the collection system, treatment capacity and disposal capacity. Recent research (WERF) has shown that addressing the mainline pipe in the ROW is not enough to address the large increase in RDII. Studies have shown that reductions of 50% to 70% could be seen by addressing private sewers from the ROW to the house as part of the CIP program. To determine if these same results could be seen in Santa Rosa, the City embarked on a small pilot project in 2006 in the Proctor Terrace neighborhood to understand better where this RDII is coming from and what it costs to remove it. The Project consists of pre-monitoring, closed circuit TV inspection and smoke testing, mainline replacement, private lateral replacement and post monitoring. The goal will be twofold: to identify what percentage of flow is coming from the private side that is not currently being addressed through the current CIP program; and to quantify the cost of removal of the RDII through pipe replacement, trenchless technologies and other rehabilitation techniques.

Monterey filtration pilot work. The Filter Loading Evaluation for Water Reuse (FLEWR) in Monterey is a study to determine if tertiary filters, operated under controlled conditions, can be operated at loading rates up to 7.5 gal/sq ft-min while producing effluent that meets DHS equivalency criteria. Recycled water produced at these higher rates would need to be proven equivalent in quality to that produced by the California Title 22 maximum rate of 5 gal/sq ft-min. If proven and accepted by DHS, the 14 existing filters at the Laguna Plant, which currently have the capacity to filter up to approximately 64 MGD could potentially be operated at up to 96 MGD thus negating the need for construction of additional filters. The FLEWR pilot testing is complete; full-scale tests have not yet started.

Laguna, direct discharge, and indirect discharge studies. In May 2005, Santa Rosa authorized a number of discharge studies as part of the Discharge Compliance Project. These studies are expected to be published as part of the Discharge Compliance Project Draft EIR in Summer of 2007.

California tiger salamander (CTS) habitat studies. Studies of the distribution of CTS and CTS habitat have been completed to support permitting of projects that may be developed in locations where CTS could be affected.

Selected Components

Indoor Water Conservation

Two hundred twenty MGY of conservation has been accomplished through the end of the 2005 (see Appendix B). The cities of the Subregional System continue to implement their commitment to the Best Management Practices (BMPs) recommended by the State of California Urban Water Conservation Council.

Urban Reuse

The Santa Rosa Urban Reuse Project Feasibility Study was completed in October 2006. Based on this document, the City of Santa Rosa has initiated the predesign for a 1,000-MG project. The predesign report and CEQA documentation for the first phase of 250 MG is expected to be complete in the Fall of 2007. In addition, the Subregional System is undertaking a Feasibility Study for additional urban reuse in the City of Rohnert Park.

Agricultural Reuse

The Subregional System has not begun implementation of this reuse option, however, the Sonoma County Water Agency is preparing CEQA and NEPA documentation for a project which may use some of the Subregional System's recycled water, entitled North Sonoma County Agricultural Reuse Project. The Draft EIR/EIS is expected to be available in Spring 2007.

Geysers Expansion

The Subregional System has begun negotiations with Calpine to expand the Geysers system. In addition, if the Discharge Compliance Project is configured to include an Advanced Membrane Treatment Plant, brine from the membrane filtration would be sent to the Geysers steamfield.

Discharge

In May 2005, the City of Santa Rosa initiated the Discharge Compliance Project to identify options for discharging up to 4,500 MG of recycled water in the wettest year. The Discharge Compliance Project EIR is expected to be completed in late 2007.

Storage

The City of Santa Rosa initiated the Seasonal Storage Project in September 2006 to identify options for storage for an additional 500 MG of recycled water. The Seasonal Storage Project EIR is expected to be completed in late 2007.

Section 5
References

SECTION 5

References

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Sections 3, 4, 5, and 6 from the 2004 Master Plan, which outline the development of the Selected Program during 2003 and 2004, have been moved from the body of the 2004 Master Plan to these Appendices. These sections have not been updated with new costs, as they represent the record which was used to adopt the 2004 Master Plan. References to figures, tables, and appendices in the following sections refer to numbering in the 2004 Master Plan, not to the numbering in this Updated Master Plan.