
Appendix J
Recycled Water Implementation Plan

AMERICAN CANYON

RECYCLED WATER IMPLEMENTATION PLAN



September 22, 2005



WINZLER & KELLY
CONSULTING ENGINEERS

495 Tesconi Circle
Santa Rosa, CA 95401
(707) 523-1010
www.w-and-k.com



RECYCLED WATER IMPLEMENTATION PLAN

AMERICAN CANYON, CALIFORNIA

Project No. 04-253606-010

Prepared for:

Mr. Robert C. Weil
Public Works Director
City of American Canyon
205 Wetlands Edge Road
American Canyon, CA 94503

Prepared by:

Handwritten signature of Rod Houser in black ink.

Rod Houser, P.E., DEE
Civil Engineer



Reviewed by:

Handwritten signature of Mary Grace Pawson in black ink.

Mary Grace Pawson, P.E.
Quality Assurance Engineer



Handwritten signature of Ted Whiton in black ink.

Ted Whiton, P.E.
Principal Manager



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EXECUTIVE SUMMARY

The City of American Canyon (the City) has developed a recycled water implementation strategy with several distinct elements that include:

- An optimized plan for the phasing of system installation
- A funding strategy and proposed recycled water rate schedule
- A program for customer hook-ups

This Recycled Water Implementation Plan (the Implementation Plan) outlines the best approach to getting the job done by incorporating the City Council policy guidance and building on both the original Recycled Water Facilities Plan and the more recent Technical Report to the Regional Water Quality Control Board. The implementation schedule shown on Figure ES-1 (following page) shows it will be possible to complete system construction and start up by the end of 2008.

System Layout and Phasing

After Section 1 provides a brief introduction and some background information, Section 2 discusses system layout, phasing, and the associated capital costs (as shown on Table ES-1). Fundamentally, the City’s system requires the construction of recycled water storage, either in tanks or in ponds, to connect any users beyond Green Island Vineyard. The City is working to construct both a recycled water storage tank and a recycled water storage pond (in partnership with Hess Vineyards). The ultimate phasing of the system will depend on whether the tank or the pond is completed first.

Construction of the tank will allow recycled water service in the western and southern portions of the City, which includes exclusively landscape irrigation uses. This “southern urban system” is illustrated in Figure ES-2 (following the schedule).

Construction of the pond will allow recycled water service in the northern portion of the City, which includes landscape irrigation along Green Island Road, vineyard irrigation, and industrial uses. This “northern system” is also illustrated in Figure ES-2. Ultimately the “southern” and “northern” systems will connect in a completed loop with a 12-inch recycled water main along New Main Street.

The estimated cost of completing the recycled water system is outlined in Table ES-1. This estimate includes all necessary costs. Actual funding will come from a number of sources.

Funding and Rate Setting

Section 3 discusses funding and recycled water rates. The Implementation Plan proposes that

Project Phase & Description	Grand Total Escalated to Mid- Point of Construction
Phase 1 Wetlands Edge Road	\$713,500
Phase 2 American Canyon Road	\$4,020,000
Phase 3 Green Island Road	\$6,595,000
Phase 4 New Main Street	\$1,335,000
Phase 5 Tower Road	\$1,190,000
Phase 6 Private Vineyard Project	\$1,590,000
Totals	\$15,443,500

City of American Canyon Recycled Water Implementation Schedule

Schedule Activity	2005	2006				2007				2008			
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Recycled Water Policies													
Recycled Water Rates	█												
Phases 5 and 6 Assessment District		█	█	█	█								
Mandatory Use Ordinance	█												
Public Education and Outreach	█	█	█	█	█	█	█	█	█	█	█	█	█
Recycled Water Distribution System Expansion													
Phase 1 Wetlands Edge Road Pipeline Laterals													
Construction						█	█						
Phase 2 American Canyon Road Pipeline and Reservoir													
Pipeline Bid and Construction	█	█	█	█	█								
Reservoir Design and CEQA Documents	█	█	█	█	█								
Reservoir Bid and Construction						█	█	█	█				
Phase 3 Green Island Road Pipeline and Pond													
Pipeline Design	█	█	█	█									
Pipeline Bid and Construction				█	█	█	█	█	█				
Hess Pond (Private) Design/Construction			█	█	█	█	█	█	█				
Phase 4 New Main Street Pipeline													
Design	█	█	█	█									
Bid and Construction													
Phase 5 Tower Road Pipeline													
Design										█	█	█	█
Bid and Construction													
Phase 6 Private Vineyard Pipeline and Reservoir													
Design										█	█	█	█
Bid and Construction													
Customer Retrofits and Hook-Ups													
Phase 1, 2, 3 and 4 Customers													
Customer Contact and Agreements			█	█	█	█	█						
Use Permit and Retrofit Design						█	█						
Initial CC Test and Retrofit Construction													
Phase 5 and 6 Customers													
Customer Contact and Agreements										█	█	█	█
Use Permit and Retrofit Design											█	█	█
Initial CC Test and Retrofit Construction		█					█			█			



LEGEND	
EXISTING	
PHASE 1 - WELL AND EDGE ROAD	
PHASE 2 - AMERICAN CANYON ROAD	
PHASE 3 - GREEN ISLAND ROAD PIPELINE	
PHASE 4 - NEW DAM STREET	
PHASE 5 - TOWER ROAD	
PHASE 6 - TWIN ISLAND ROAD PROJECT	

WINZLER & KELLY
 CONSULTING ENGINEERS
 495 TESCONI CIRCLE, SANTA ROSA, CA 95401
 PH (707) 523-1010 • FAX (707) 527-8679
 WWW.W-AND-K.COM



CITY OF AMERICAN CANYON
 RECYCLED WATER IMPLEMENTATION PLAN
 SYSTEM PHASING

FIGURE NO.
ES-2
 JOB NO. 04253606

construction of the recycled water system will be funded by Wastewater Impact Fees or developer contributions, with grants utilized as they can be secured (the City has been placed on a priority list to receive over \$2.0 million from the State Water Resources Control Board's Proposition 50, Chapter 7 program). The Implementation Plan proposes that operational costs will be funded through recycled water rates.

The Implementation Plan reviews a range of project implementation phases including a "southern urban system" only, a "northern system" only, and a complete system. The goal of this review is to assure that any phase can be cost-effectively implemented.

The Implementation Plan proposes that recycled water rates be set as 50% of the established water rate for Landscape Irrigation, School Use, and Industrial Use; and 75% of the established raw water rate for vineyard use. The slightly higher recycled water rate for vineyards reflects the fact that the base water rate for vineyards is low and the vineyard users are all located above the hydraulic grade line of the main system, which increases the cost to pump to them.

This schedule of rates allows the "southern system" or the "northern system" to be implemented and pay for itself as a stand-alone system. When the complete system is implemented, the recommended rate structure results in a blended rate of just under \$1.00/unit. The proposed rate structure is presented in Table ES-2.

Customer Hook-Ups

Sections 4 through 6 discuss recycled water educational outreach activities, general utility procedures, and the continuation of customer hook-ups in parallel to the system expansion.

Landscaping In City:	\$1.25/unit
Landscaping Outside of City	\$1.75/unit
School Use:	\$1.15/unit
Industrial Use:	\$0.90/unit
Vineyard Use:	\$0.83/unit
Blended Rate @ Full Implementation \$0.98/unit	
Recycled Water Uses that are Not Charged:	
• Irrigation at the Water Recycling Facility	

1.0 INTRODUCTION AND BACKGROUND

1.1 Adopted Recycled Water Facilities Plan

The City has integrated water recycling into its utility planning since 1992. The planned recycled water system will assist the City in complying with the terms of its NPDES permit (which discourages summer discharge to North Slough) and will provide a valuable water supply to support urban, industrial, and agricultural land uses within the City's water service area.

The City received a recycled water planning grant from the State Water Resources Control Board (SWRCB) and completed a Recycled Water Facilities Plan (Facilities Plan) in 2003 that established a planning-level system layout and budget for distribution piping, pumping, and storage facilities. The associated environmental document for the Facilities Plan was prepared under the California Environmental Quality Act.

The Facilities Plan identified 60 potential customers with an immediate need for recycled water, and another 22 potential customers that would most likely develop in the future. Additionally, the Facilities Plan established the design basis for three recycled water system alternatives with capital costs ranging between \$12 and \$14 million.

Of the three alternatives presented in the Facilities Plan, Alternative No. 1 was the recommended approach because although it would initially cost the most to construct, Alternative No. 1 would also supply the greatest quantity of recycled water to revenue-generating customers, and would result in the lowest unit cost (\$2.45 per hundred cubic feet).

On November 20, 2003, the City Council formally adopted Resolution 2003-45 accepting the Facilities Plan and certifying the associated environmental document. This same Council Resolution included several new recycled water system policy guidelines that would modify the Facilities Plan recommendations, resulting in a new document entitled the Recycled Water Implementation Plan (the Implementation Plan).

1.2 Recycled Water Implementation Plan

The Implementation Plan starts from the Facilities Plan, and as such, draws extensively from the data and analysis presented in the original document. From City Council Resolution 2003-45, specific policy guidance addressed by the Implementation Plan includes:

- The general approach of Alternative No. 1 in the Facilities Plan is acceptable.
- The Alternative No. 1 capital cost estimate of \$14.05 million must be minimized through a combination of outside sources of funds, optimization of pipeline segments, etc. such that the City's net capital costs are reduced by at least 25%.
- The feasibility of seasonal storage ponds, which are privately owned and operated, will be investigated. The possibility of eliminating spray fields through the use of vineyards

after the crush but before the end of the dry season (May 1st to October 31st) will also be addressed.

- The phasing of the recycled water system shall ensure the system is no larger than needed to meet disposal needs.
- The need for external financing shall be minimized or eliminated with the use of wastewater connection fees.
- The City's goal for recycled water unit costs shall be \$1.00 per hundred cubic feet.
- Neither sewer nor water rates shall be raised to finance the recycled water system.

The Implementation Plan presents a revised basis of design and construction budget for the optimized recycled water distribution facilities consistent with the latest City Council policy guidelines.

1.3 Existing Distribution System Status

Because water recycling has been included in the City's planning efforts since 1992, significant portions of the recycled water distribution system have already been constructed in conjunction with recent developments, particularly east of Highway 29. As a result, approximately 4.9 miles of distribution pipeline is already in place, which represents about one third of the ultimate recycled water distribution system.

Since the adoption of Resolution 2003-45, the City has connected its first recycled water customer, Green Island Vineyards. Green Island Vineyards was connected in July 2005 and currently pays a recycled water rate of \$0.55/unit¹ or 50% of the City's established raw water rate of \$1.10 per unit. This Implementation Plan focuses on the work necessary to connect customers beyond Green Island Vineyard.

¹ One Unit, per the City's rate schedule, is one hundred cubic feet.

2.0 SYSTEM LAYOUT, PHASING, AND STORAGE

The system layout and phasing plan included in this Implementation Plan was developed to address the policy guidelines outlined in Resolution 2003-045. Specifically, the system was optimized to reduce its overall length, unit costs were confirmed, phasing was adjusted to account for the time required to construct necessary storage, and seasonal storage ponds were designed to eliminate the need for supplemental irrigation fields.

The proposed recycled water system layout and phasing is shown in Figure 2-1 (on the following page).

Summary of System Optimization

- Overall pipeline length reduced by 33%
- Pricing adjusted to current price base to avoid "surprises"
- Seasonal storage utilized to eliminate supplemental irrigation fields
- System phasing adjusted
- Proposed north and south systems can stand alone and create a functional whole

2.1 Distribution System Layout and Phasing

In order to serve additional recycled water customers, the City needs to bring some recycled water storage facilities on line. As Figure 2-1 illustrates, the planned system includes a recycled water storage tank (located near and constructed with a new potable water tank) and a recycled water pond developed in partnership with Hess Vineyards. The storage is necessary because the recycled water supply varies throughout the day and is subject to normal diurnal variations that exist with sewer flows into the treatment plant. Thus, treatment plant output will not always match the demand. The storage facilities' tank provides the ability to make up the difference between peak demands and the treatment plant effluent flows.

Expansion Phase 1 – Wetlands Edge Pipeline: This phase is a joint project with the Napa Vallejo Waste Management Agency. The pipeline is largely complete. Recycled water laterals will need to be installed before customers can be served. This work will occur in early 2007 so that customers can come on line as soon as the tank is complete.

Expansion Phase 2 – American Canyon Road Pipeline: Phase 2 will connect the existing recycled water distribution systems that lie east and west of Highway 29 and includes construction of the new recycled water storage tank. The pipeline construction will be completed in two separate construction contracts. The current American Canyon Road improvement contract is installing a portion of 16-inch piping. The remaining 8-inch piping will be installed with a trunk sewer improvement in summer 2006. The recycled water tank will be constructed with the potable water tank. Construction is expected in 2007.

Expansion Phase 3 – Green Island Road Pipeline: Phase 3 will develop the recycled water infrastructure along the northern edge of the City. Portions of it will be constructed concurrently with a planned waterline upgrade. Phase 3 could be complete as early as the end of 2006, allowing users to begin receiving water in 2007.



WINZLER & KELLY
CONSULTING ENGINEERS

495 TESCONI CIRCLE, SANTA ROSA, CA 95401
PH (707) 523-1010 • FAX (707) 527-8679
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RECYCLED WATER IMPLEMENTATION PLAN

SYSTEM PHASING

FIGURE NO.

2-1

JOB NO. 04253606

This phase of the project includes the acquisition of seasonal storage ponds constructed in partnership with the Hess Collection. The proposed seasonal storage ponds will provide the City the ability to store excess recycled water during the shoulder months when irrigation demands are very low and to supplement the supply during the summer when demand is at its highest. In this way, the seasonal storage facilities will help minimize (if not eliminate) the need for supplemental water, while also minimizing the amount of treated effluent that must be discharged to the Napa River. The construction cost estimate assumes a total storage volume of 160 acre-feet based on preliminary engineering work provided by the Hess Collection. However, ponds with a volume of as little as 50 acre-feet will provide the benefits described above.

This phase of the project also includes construction of a high-zone pump station. This leg of the system generally operates at a higher pressure than the southern system because of elevation differences. The proposed pump station will be needed to serve the vineyard customers in the northeast portion of the service area (high zone). Initially, a hydropneumatic tank will be needed at the station for pump control and pressure regulation. Ultimately, the pump station will connect to a future (Phase 6) storage reservoir that will be located on or near the Raymond/Azevedo Vineyard (Customer No. 304C). This pump station could also be configured to pump back into the low zone if variable-speed drives are used to control the pumps.

Expansion Phase 4 – New Main Street Pipeline: This expansion includes extension of recycled water pipeline parallel to and east of Highway 29, linking the recycled water tank to the Green Island Road pipeline. The route generally follows proposed “New Main Street”. This pipeline is currently in the planning stage. Construction is expected in 2007.

Expansion Phase 5 – Tower Road Pipeline: This pipeline extension will begin at Green Island Road and will extend to industrial users in the northern part of the service area. The City has received commitment from one property owner to participate in an Assessment District, and the construction schedule will likely be driven by the willingness of other users to support an Assessment District.

Expansion Phase 6 – Private Vineyard Pipeline and Reservoir: This pipeline will be constructed to serve two vineyards located in the high elevation area near Jameson Canyon. In addition, this phase allows construction of a 100,000-gallon reservoir that will be needed to help regulate service pressures in the high zone. The reservoir could also serve as redundant storage for the low zone, if needed.

2.2 Capital Cost Estimates

The costs developed in Table 2-1 below are based on unit pipeline costs that have been verified with recent bid tabulations received by public agencies in Napa and Sonoma Counties. These estimated costs are for pipelines installed within public rights-of-way and include the cost of repaving the trench section. A 25% deduct is applied to the pipeline cost where pipelines are proposed in unpaved areas.

Costs for the seasonal storage pond facility were based on an estimate of probable construction costs prepared by the design engineer, Riechers-Spence. The cost estimate was dated May 26, 2004 and is based on conceptual plans that were dated June, 2004. It should be noted that the proposed location for these facilities is next to an existing wetland area, and has not been approved by the regulatory agencies. Costs may increase if the site has to be moved to a different location.

It should also be noted that costs could increase significantly if additional easements and/or rights-of-way are required beyond those specifically listed in this document.

Table 2-1 - Capital Cost Summary

Project Phase & Description	Construction Costs	Incidental Costs	Rights of Way	Grand Total	Grand Total Escalated to Mid-Point of Construction
Phase 1 Wellands Edge Road	\$422,000	\$291,460	\$0	\$713,460	\$713,500
Phase 2 American Canyon Road	\$2,478,800	\$1,295,900	\$50,000	\$3,824,700	\$4,020,000
Phase 3 Green Island Road	\$3,233,500	\$1,510,400	\$1,500,000	\$6,243,900	\$6,595,000
Phase 4 New Main Street	\$870,100	\$394,100	\$0	\$1,264,200	\$1,335,000
Phase 5 Tower Road	\$714,500	\$357,200	\$0	\$1,071,700	\$1,190,000
Phase 6 Private Vineyard Project	\$903,100	\$408,300	\$121,200	\$1,432,600	\$1,590,000
Totals	\$8,622,000	\$4,257,360	\$1,671,200	\$14,550,560	\$15,443,500

2.3 Operating and Maintenance Cost Estimates

Operating and maintenance costs include the fixed costs of operating the system, such as staffing, renewal, and replacement budgets; and contingencies and variable costs such, as electrical costs for pumping and chemical costs for disinfection. Table 2-2 below outlines the estimates for the City's system.

Table 2-2 – Operational Cost Summary

Item	Unit	Unit Cost	Current Program		Full Program	
			Units	Unit Cost	Units	Unit Cost
Annual Fixed Costs						
Replacement and Renewal	LS	1.5% of capital	0	\$0.00		\$129,328.9
Electrical Demand Charge	LS	\$6,000.00	1	\$6,000.00	1	\$6,000.0
FTE Maintenance Worker	EA	\$60,000.00	0	\$0.00	0.5	\$30,000.0
FTE Operations Worker	EA	\$66,000.00	0.125	\$7,500.00	0.5	\$33,000.0
FTE Clerical Worker	EA	\$54,000.00	0	\$0.00	0.5	\$27,000.0
Program Contingency	LS	20% of Annual Fixed	1	\$3,375.00		\$56,332.2
Annual O&M Costs						
Low Zone Energy Costs	AF	\$41.30	107	\$4,419.10	416	\$17,180.8
High Zone Energy Costs	AF	\$82.60	0	\$0.00	442	\$36,509.2
Chlorination	AF	\$20.00	107	\$2,140.00	858	\$17,160.0
Total Estimated Costs				\$23,434		\$352,51

3.0 FINANCING, REVENUE AND RATES

3.1 Financial Strategy for Recycled Water Program

As noted earlier, significant portions of the recycled water distribution system have already been constructed in conjunction with recent developments, particularly east of Highway 29. As a result, approximately 4.9 miles of distribution pipeline is already in place, which represents about one third of the ultimate recycled water distribution system. The remaining 56,000 feet of pipeline and associated storage facilities are the subject of this Implementation Plan.

The water recycling facilities are programmed into the City's Capital Improvement Program and the City's Wastewater Impact Fees include the estimated cost of constructing this infrastructure. To date, the City has not incurred significant operating and maintenance costs associated with the recycled water distribution system because it has not delivered a significant volume of water. The City recently connected its first recycled water customer, Green Island Vineyards, in July 2005.

The City's overall financial strategy has been to fund the capital construction portion of the recycled water system with Wastewater Impact Fees, and to fund the operational cost component with revenue generated by the sale of recycled water. This Implementation Plan maintains the overall financial strategy, provides clarity on capital cost reduction strategies outlined by the City Council, and develops a recommended rate structure that covers operational and maintenance costs while still offering customers a price advantage for using recycled water.

3.2 Outside Sources of Capital Funding

Council Resolution 2003-45 directed staff to use a number of strategies to help reduce the overall cost of the recycled water program to the Wastewater Impact Fee Fund. Table 3-1 outlines the funding strategy applied for each project phase and presents an estimate of the overall savings to the Wastewater Impact Fee Fund. The combination of strategies reduces the overall estimated project cost by \$3.8 million, or approximately 25% of the remaining program costs.

Table 3-1 - Project Funding Strategies and Projected Capital Cost Savings

Project Phase & Description	Funding Strategy	Total Estimated Value	Total Estimated Cost to Wastewater Impact Fee Fund	Savings to Wastewater Impact Fee Fund
Phase 1 Wetlands Edge Road	Construct with M/WMA Leachate Line to reduce costs	\$1,150,000	\$713,500 *	\$436,500
Phase 2 American Canyon Road	Fund 16-inch portion with Assessment District	\$125,825	\$0	\$125,825
	Construct Tank with Potable Tank to Reduce Costs	\$1,500,000	\$1,000,000	\$500,000
	Fund Remainder with Wastewater Impact Fee Funds	\$2,894,175	\$2,894,175	\$0
Phase 3 Green Island Road	Partner with Hess to remove acquisition costs	\$1,500,000	\$0	\$1,500,000
	Fund Remainder with Wastewater Impact Fee Funds	\$5,095,000	\$4,743,879	\$351,121
Phase 4 New Main Street	Fund with Wastewater Impact Fee Funds	\$1,335,000	\$1,000,000	\$335,000
Phase 5 Tower Road	Fund with Assessment District	\$1,190,000	\$0	\$1,190,000
Phase 6 Private Vineyard Project	Partner with vineyards to remove acquisition costs	\$121,229	\$0	\$121,229
	Fund Remainder with Wastewater Impact Fee Funds	\$1,468,771	\$1,168,424	\$300,347
Totals		\$16,380,000	\$11,519,978	\$4,860,022
Utilize State Grants			-\$2,000,000	\$2,000,000
Estimated Remaining Capital Costs Funded from Wastewater Impact Fees			\$9,519,978	

* Total Estimated Value is based on Winzler & Kelly's independent take-off. Total Estimated Cost the Wastewater Improvement Fund is based on the City's current budget of \$420,000, which reflects bid costs, and an allowance for lateral installation a future date

In addition to these activities, the City has made application to the Proposition 50, Chapter 7 (Recycled Water) Grant Program and the Proposition 50, Chapter 8 (Integrated Regional Water Management) Grant Program.

The City has been placed on the fundable portion of the Chapter 7 Grant Program list with an award of \$2.02 million. These grant funds can be securely committed when the City completes its design efforts.

The Chapter 8 Grant application is still pending. The City has requested approximately \$2 million under this program. Receipt of either grant will reduce the City's contribution to the remaining program costs to \$8.5 million, or about 58% of the estimated total program costs.

3.3 Recycled Water Rates

For urban and school irrigation, the Implementation Plan proposes a rate of 50% of the City's established potable water rate. This translates into the following proposed rates:

- \$1.25/unit for Landscape Irrigation Inside the City
- \$1.75/unit for Landscape Irrigation Outside the City
- \$1.15/unit for School Use
- \$0.90/unit for Large Industrial Use

This system of rates allows Phases 1 and 2 to be implemented and pay for themselves as a stand-alone system.

The Implementation Plan also proposes a rate 75% of the raw water rate, or \$0.83/unit for vineyard use. The larger percentage for vineyards takes into account two facts:

- The base water rate for vineyards is low at \$1.10/unit compared to \$2.25/unit for Landscape Irrigation.

- The vineyard users are all located above the hydraulic grade line of the main system, which increases the cost to pump to them.

This system of rates allows Phases 3, 5, and 6 to be implemented and pay for itself as a stand-alone system.

When the complete system is implemented, the recommended rate structure results in a blended rate of approximately \$0.98/unit.

4.0 MARKETING AND PUBLIC OUTREACH

4.1 General Public Education and Outreach Activities

The City will perform a periodic review and update their recycled water marketing and public outreach activities. Other successful Northern California city and agency recycled water marketing and outreach programs will be consulted for possible improvements.

As needed, the City will organize and conduct community workshops, meetings, and presentations on recycled water with future customers, homeowner associations, schools, and neighborhood groups. The City will quickly evaluate any public concerns or questions regarding recycled water use permitting, health issues, additional environmental mitigation activities, and ongoing construction impacts with recommended responses and/or actions.

4.2 Communications Materials

The City will update as needed their recycled water outreach communications materials. Such communications materials may include postcards for special announcements, newsletters, brochures, give-away items, news media kits, and press releases.

5.0 RULES, REGULATIONS AND ORDINANCES

5.1 City General Water Reuse Permit

In order to connect its first customer, the City developed a Technical Report and Notice of Intent to comply with the San Francisco Bay Regional Water Quality Control Board's (RWQCB) Order 96-011 (the General Water Reuse Permit for the San Francisco Bay Region). The Technical Report outlines the major procedures required by the City's new recycled water utility.

The RWQCB accepted and approved the City's Technical Report and Notice of Intent, thereby granting the necessary City-wide General Water Reuse Permit, allowing customer hook-ups for the entire recycled water system expansion. This Implementation Plan highlights some of the important procedures included in the Technical Report and Notice of Intent, along with additional details for hooking up specific customer sites.

5.2 Recycled Water User Rules and Regulations

The City will develop and execute Recycled Water User Agreements and issue Use Permits with each of its users to ensure recycled water is safely and legally applied in compliance with the City-wide General Water Reuse Permit. There will be two types of users in the City: Metered Recycled Water Users and Trucked Recycled Water Users. Their Use Permits are different but both types of users will be subject to the same User Guidelines included in Appendix 2 (vi) of the City's Technical Report and Notice of Intent.

As future Metered Recycled Water Users develop their sites and apply for Use Permits, the City will develop more specific on-site guidelines for the design, installation, and inspection of recycled water facilities. These on-site rules and regulations will likely address:

- Design Requirements at the Service Connection
 - ✓ Exceptions for Existing Irrigations Systems
 - ✓ Pressure
 - ✓ Required Wye Strainer and Pressure Regulator
 - ✓ Point-of-Connection Location
 - ✓ Separation Requirements
 - ✓ Backflow Prevention
- Design Requirement for On-Site Facilities
 - ✓ No Cross-Connections
 - ✓ Pipe Separation: Horizontal and Vertical
 - ✓ Pipe Class
 - ✓ Depth of Cover and Thrust Blocking
 - ✓ Prevention of Overspray, Runoff, and Ponding
 - ✓ Protection of Drinking Fountains and Outdoor Eating Areas
 - ✓ Protection of Aquifers
 - ✓ Protection of Public Potable Water Systems
 - ✓ Hose Bibs

- Design Approval and Information Required on Plans
- Installation and Construction Inspection
 - ✓ Pipe Identification
 - ✓ Valve Boxes
 - ✓ Quick Coupling Valves
 - ✓ Other Valves and Devices
 - ✓ Identification Tags and Stickers
 - ✓ Irrigation Controllers
 - ✓ Irrigation and Water Feature Advisory Signs
 - ✓ Temporary Connection to Potable Water Service
 - ✓ Cross-Connection Test
 - ✓ Coverage Test and Final Inspection
 - ✓ Record Drawings

5.3 Proposed Recycled Water Use Ordinance

While the City intends to develop and execute Recycled Water User Agreements with each of its customers, this Implementation Plan still recommends the City adopt a Recycled Water Use Ordinance as additional assurance that recycled water is used uniformly throughout the distribution system. It is understood that the City has already required several agricultural customers as a condition of issuing them a “Will Serve” letter, to agree to use recycled water if and when available. If the rates for recycled water recommended in this Implementation Plan are put in place, they will be less than the rate of alternative sources of water for the City’s targeted customers.

The Recycled Water Use Ordinance will satisfy the State Water Resources Control Board’s grant funding requirements. If no other reason than working to secure its grants, the City should develop and adopt the Use Ordinance as soon as possible.

6.0 CUSTOMER RETROFITS AND HOOK-UPS

6.1 Customer Contact, Site Reconnaissance and Agreements

It has been over two years (mid-2003) since the City contacted many of the potential recycled water customers. In some cases, the customer signed a City-requested Letter of Intent (LOI) from the customers interested in using recycled water, however a large number of customers were only contacted by telephone.

The City needs to make initial and/or renewed contact with customers. On a phase-by-phase basis, the City needs to set up and perform an initial site visit to assess potential for recycled water use at each site. The City needs to again explain the water recycling program with customers and identify general on-site retrofit requirements. It would be prudent to follow up each initial site visit with telephone contacts for each customer to answer additional questions or address concerns.

The City will develop and execute Recycled Water User Agreements as part of this early customer contact. However, if negotiations stall with the occasional customer, the City may need to invoke the Recycled Water Use Ordinance.

6.2 Use Permits and On-Site Retrofit Design

As each Recycled Water User Agreement nears completion and a draft Use Permit is developed for each customer, the City will take the next step in preparing their site to receive recycled water. The City will then perform detailed reconnaissance of each customer site.

The City will investigate the setup of an existing landscape irrigation system to assess the feasibility of separation of potable and non-potable uses. For industrial customers, an assessment of their existing piping system will be conducted to identify separation of potable and non-potable systems. Unless the site is already dual-plumbed for recycled water, detailed cross-connection testing of each customer's system, prior to retrofit construction, will be performed only if necessary. As appropriate for each customer site, detailed reconnaissance shall consider the following items:

- Site Characteristics
 - ✓ Type of soil, landscape, or crop to be irrigated
 - ✓ Area of reclaimed water use
 - ✓ Potential areas of overspray, ponding, or runoff
 - ✓ Presence of drinking fountains and other potable water facilities
 - ✓ Existing backflow protection on potable water service
 - ✓ Appropriate locations for advisory signs
 - ✓ Surrounding land use or other site restrictions (e.g., wells)
 - ✓ Site drainage and subdrains

- Irrigation Facilities
 - ✓ Irrigation system record drawings (if available)
 - ✓ Potential cross-connections between potable and other services
 - ✓ Reservoirs, pumps, strainers, filters, piping, and control systems
 - ✓ Valves, quick couplers, and irrigation components (e.g., drip or spray)
- Customer Management Practices
 - ✓ Maintenance personnel duties and training programs
 - ✓ Irrigation system inspection and repair procedures
 - ✓ Schedule of operation and record keeping (e.g., water application)

Site maps, as-builts, or record drawings of the existing water use systems will be obtained, if available. Aerial photos and utility maps will be reviewed for utility locations in the general vicinity of the recycled water hook-up.

As required by the RWQCB, a recycled water use area drawing will be prepared for each customer. This drawing is part of the information required for each customer's Application for Recycled Water use Permit. These drawings will show the irrigation areas, locations of all public facilities and play areas, and the location of both the potable and recycled water distribution systems as developed during the detailed site reconnaissance. The sketch of each site will be scaled to fit on 11" x 17" sheets.

Retrofit equipment design criteria and/or constraints will be identified for each site and will include:

- RWQCB, Department of Health Services, and City requirements/standards
- Location of existing meters and backflow preventers
- Recycled water demands/irrigation schedules/service pressure
- Number of desired controls (for irrigation customers)
- Site-specific physical constraints, such as:
 - ✓ Restrooms and drinking fountains
 - ✓ Picnic tables and playground equipment
 - ✓ Park animals
 - ✓ Existing irrigation system elements (hose bibs or other above-ground extensions)
 - ✓ Other utilities, facilities, or equipment
 - ✓ Accommodation of events during night irrigation scheduling (baseball games, etc.)

A cost estimate will be prepared by the City for retrofitting each site. This cost estimate will include construction, testing, and hook-up costs.

6.3 On-Site Retrofit Construction and Supervisor Training

The City will visit the customer retrofit sites to observe construction at critical points and discuss with the customer and/or their contractor the ongoing work. As requested, the City will provide office engineering services in support of the retrofit construction. Services may include review of shop drawings and responses to requests for information and clarification.

The City's permit procedures require that recycled water users contract with an AWWA-certified cross-connection control specialist to conduct backflow device and cross-connection tests. These tests will be conducted before connecting the customer's recycled water system to the City's recycled water system at any use-site where both recycled and potable water are present. Following initial hook-up and issuance of a Use Permit, each customer will be responsible for any additional backflow device and cross-connection tests.

Upon completion of the individual site retrofit construction, the City will confirm that the retrofit has been completed in accordance with the documents and any changes are in accordance with all applicable codes, ordinances, and regulations. The City will conduct a final on-site inspection to satisfy RWQCB and Department of Health Services requirements. This inspection will be coordinated with the final cross-connection test and will cover the following:

- Check for use of proper equipment for retrofit installation
- Placement of all required tags, labels, and signs
- Check for runoff or windblown spray outside the approved use area
- Check for ponding of recycled water within the use area
- Check spray patterns for encroachment on public facilities

Each customer shall designate a Recycled Water Supervisor and a Supervisor Backup to be a liaison with the City and state agencies with jurisdiction over the use of recycled water. The City will provide training to each Recycled Water Supervisor and Supervisor Backup for ongoing operations and maintenance and prevention of potential hazards on the recycled and potable water systems.

The training sessions will address the provisions contained in Title 17 and Title 22 relating to the safe use of recycled water and the maintenance of accurate records; attaining knowledge of basic concepts of backflow and cross-connection prevention, system testing, and related emergency procedures; undertaking a preventive maintenance program involving regular inspections of the entire recycled water system; inspection and replacement of all damaged or missing warning signs, tags, stickers, and pipe markings; inspection of spray patterns, possible ponding, and runoff; periodic cross-connection testing; maintaining accurate records of all inspections, modifications, and repair work; and review of required report submittals to local and state agencies summarizing periodic inspections.

APPENDIX A DISTRIBUTION SYSTEM AND STORAGE ANALYSIS

Water recycling has been included in the City's planning efforts since incorporation in 1992. Significant portions of the recycled water distribution system have already been constructed in conjunction with recent developments, particularly east of Highway 29. As a result, approximately 4.9 miles of distribution pipeline is already in place, which represents about one third of the ultimate recycled water distribution system.

Similarly, the City's wastewater treatment plant has been designed to produce high-quality effluent that meets the State of California's Title 22 requirements for reclamation. Currently, however, very little water is recycled because there are no transmission mains that connect the treatment plant to the existing distribution piping.

The City is currently undertaking an expansion program that will connect the treatment plant to existing and future recycled water customers. The program consists of constructing the pipeline and storage infrastructure necessary to tie the City's water reclamation facilities in to the existing infrastructure future users. In addition to the pipeline infrastructure, the program includes two new recycled water storage tanks and the acquisition of a seasonal storage pond.

The proposed program is divided into six expansion phases, which are described below and shown in Figure A-1 (on the following page).

A-1.0 System Expansion Phases

In order to serve additional recycled water customers, the City needs to bring some recycled water storage facilities on line. As Figure 2-1 illustrates, the planned system includes a recycled water storage tank (located near and constructed with a new potable water tank) and a recycled water pond developed in partnership with Hess Vineyards. The storage is necessary because the recycled water supply varies throughout the day and is subject to normal diurnal variations that exist with sewer flows into the treatment plant. Thus, treatment plant output will not always match the demand. The storage facilities' tank provides the ability to make up the difference between peak demands and the treatment plant effluent flows.

Expansion Phase 1 – Wetlands Edge Pipeline: This phase is a joint project with the Napa Vallejo Waste Management Agency. The pipeline is largely complete. Recycled water laterals will need to be installed before customers can be served. This work will occur in early 2007 so that customers can come on line as soon as the tank is complete.

Expansion Phase 2 – American Canyon Road Pipeline: Phase 2 will connect the existing recycled water distribution systems that lie east and west of Highway 29 and includes construction of the new recycled water storage tank. The pipeline construction will be completed in two separate construction contracts. The current American Canyon Road improvement contract is installing a portion of 16-inch piping. The remaining 8-inch piping will be installed



WINZLER & KELLY
 CONSULTING ENGINEERS
 495 TESCONI CIRCLE, SANTA ROSA, CA 95401
 PH (707) 523-1010 • FAX (707) 527-8679
 WWW.W-AND-K.COM



CITY OF AMERICAN CANYON
 RECYCLED WATER IMPLEMENTATION PLAN
SYSTEM PHASING

FIGURE NO.

A-1

JOB NO. 04253606

with a trunk sewer improvement in summer 2006. The recycled water tank will be constructed with the potable water tank. Construction is expected in 2007.

Expansion Phase 3 – Green Island Road Pipeline: Phase 3 will develop the recycled water infrastructure along the northern edge of the City. Portions of it will be constructed concurrently with a planned waterline upgrade. Phase 3 could be complete as early as the end of 2006, allowing users to begin receiving water in 2007.

This phase of the project includes the acquisition of seasonal storage ponds constructed in partnership with the Hess Collection. The proposed seasonal storage ponds will provide the City with the ability to store excess recycled water during the shoulder months when irrigation demands are very low and to supplement the supply during the summer when demand is at its highest. In this way, the seasonal storage facilities will help minimize (if not eliminate) the need for supplemental water, while also minimizing the amount of treated effluent that must be discharged to the Napa River. The construction cost estimate assumes a total storage volume of 160 acre-feet based on preliminary engineering work provided by the Hess Collection. However, ponds with a volume of as little as 50 acre-feet will provide the benefits described above.

This phase of the project also includes construction of a high-zone pump station. This leg of the system generally operates at a higher pressure than the southern system because of elevation differences. The proposed pump station will be needed to serve the vineyard customers in the northeast portion of the service area (high zone). Initially, a hydropneumatic tank will be needed at the station for pump control and pressure regulation. Ultimately, the pump station will connect to a future (Phase 6) storage reservoir that will be located on or near the Raymond/Azevedo Vineyard (Customer No. 304C). This pump station could also be configured to pump back into the low zone if variable-speed drives are used to control the pumps.

At the treatment plant, a third pump and variable-speed drive will be needed.

Expansion Phase 4 – New Main Street Pipeline: This expansion includes extension of recycled water pipeline parallel to and east of Highway 29, linking the recycled water tank to the Green Island Road pipeline. The route generally follows proposed “New Main Street”. This pipeline is currently in the planning stage. Construction is expected in 2007.

Expansion Phase 5 - Tower Road Pipeline: This pipeline extension will begin at Green Island Road and will extend to industrial users in the northern part of the service area. The City has received commitment from one property owner to participate in an Assessment District, and the construction schedule will likely be driven by the willingness of other users to support an Assessment District.

Expansion Phase 6 – Private Vineyard Pipeline and Reservoir: This pipeline will be constructed to serve two vineyards located in the high elevation area near Jameson Canyon. In addition, this phase allows construction of a 100,000-gallon reservoir that will be needed to help regulate service pressures in the high zone. The reservoir could also serve as redundant storage for the low zone, if needed.

A-2.0 Recycled Water Demands

Each phase of the program connects new customers to the recycled water system. When the program is completed, recycled water demand is projected to reach 929 acre-feet per year. Tables A-1 and A-2 break down the recycled water demands by phase and provide the basis for estimating the storage facilities that will be required. The demand estimates also provide the basis for determining the amount of supplemental water that would be needed to satisfy peak demands.

Table A-1 - Recycled Water Demand Summary Phases 1 and 2

User ID	Customer Name	Future Annual Use [AFPY]	Current Minimum Day Demand [mgd]	Future Minimum Day Demand [mgd]	Future Average Day Demand [mgd]	Future Peak Day Demand [mgd]	Current Peak Hour Demand [gpm]	Future Peak Hour Demand [gpm]
Phase 1								
300	Green Island Vineyard	107	0.039		0.096	0.241	519	
507	AC Treatment Plant	71		0.047	0.064	0.160		118
101	Donaldson Way School	17	0.010		0.015	0.038	78	
102	American Canyon Middle School	11	0.007		0.010	0.025	51	
201	American Canyon Community Park	24	0.014		0.022	0.054	111	
203	Kimberly Park	8	0.005		0.007	0.018	38	
207	Stand Park	1	0.001		0.001	0.002	4	
222	Taper Development Park	5		0.003	0.005	0.011		21
401A	Wetlands Edge Road	11		0.007	0.010	0.025		52
401B	Wetlands Edge Road	5	0.003		0.005	0.011	22	
402A	Right of Way	2		0.001	0.002	0.005		9
402B	Right of Way	8		0.005	0.007	0.018		36
404	The Preserve (north of American Canyon Road)	1	0.001		0.001	0.002	5	
Subtotal		271	0.080	0.063	0.244	0.611	828	236
Phase 2								
103	Future American Canyon High School	11		0.011	0.010	0.025		88
104	Future American Canyon Elementary School	19		0.011	0.017	0.043		88
202	Northampton Park	8	0.005		0.007	0.018	35	
208	Via Bellagio Park	2	0.001		0.002	0.005	11	
209	DB/Park	5	0.003		0.005	0.011	21	
213	Gateway Village	4	0.002		0.004	0.009	17	
215	World Marine Estates	6	0.003		0.005	0.014	26	
218	Canyon Creek	10	0.006		0.009	0.023	45	
224	Future Elementary School Park	17		0.010	0.015	0.038		76
225	Shenandoah Drive Park	27		0.016	0.024	0.061		124
226	Iron Horse Drive Playground	1		0.001	0.001	0.002		4
227	Future High School Park	17		0.010	0.015	0.038		76
402C	Rights of Way	5		0.003	0.005	0.011		23
405	Via Bellagio Medians & Streetscapes	4	0.002		0.004	0.009	19	
407	La Vigne Streetscapes	14	0.009		0.013	0.032	66	
408	Flosden Road Medians	9	0.005		0.008	0.020	41	
500	Safeway Plaza	4	0.002		0.004	0.009	17	
502	Canyon Plaza II	3	0.002		0.003	0.007	15	
505	Canyon Manor Apartments	2	0.001		0.002	0.005	10	
509	Valley Green Apartments	4	0.002		0.004	0.009	16	
Subtotal		172	0.043	0.062	0.155	0.388	339	479
Cummulative Subtotal		443	0.123	0.125	0.399	0.998	1,168	715

Table A-2 -- Recycled Water Demand Summary Phases 3 - 6

User ID	Customer Name	Future Annual Use [AFPY]	Current Minimum Day Demand [mgd]	Future Minimum Day Demand [mgd]	Future Average Day Demand [mgd]	Future Peak Day Demand [mgd]	Current Peak Hour Demand [gpm]	Future Peak Hour Demand [gpm]
Phase 3								
307	Paoli Loop	8	0.003		0.007	0.018	37	
409	Mezzetta Court	4	0.003		0.004	0.009	20	
411	Green Island Industrial Park	2	0.001		0.002	0.005	10	
412	Green Island Road Streetscapes	3	0.002		0.003	0.007	14	
413	Commerce Blvd. and Hanna Drive	12	0.007		0.011	0.027	57	
414	Jim Oswald Way	2	0.001		0.002	0.005	8	
600	Pokka Beverages	6	0.005		0.005	0.014	8	
603	Blazer Rock	3	0.003		0.003	0.007	20	
302	Hess Collection Wineries	71	0.026		0.064	0.160	344	
303	Grgich Hills Cellar	92	0.033		0.083	0.207	131	
308	Gary Clarke Vineyards	38	0.014		0.034	0.086	182	
301	Jeager Vineyards	81	0.030		0.073	0.182	398	
Subtotal		322	0.128	0.000	0.290	0.725	1,229	
Cummulative Subtotal		765	0.251	0.125	0.689	1.724	2,396	715
Phase 4								
426	Village Center Development	3		0.001	0.003	0.007		12
514	Napa Junction Mixed Use Development	41		0.024	0.037	0.092		189
Subtotal		44	0	0.025	0.040	0.099	0	200
Cummulative Subtotal		809	0.251	0.150	0.729	1.823	2,396	915
Phase 5								
304A	Raymond / Azevedo Vineyard	18	0.006		0.016	0.041	87	
425	Devlin Development	3	0.023		0.003	0.007		179
510	Stavinski Development Group	14	0.008		0.013	0.032	64	
601	Cultured Stone	14	0.013		0.013	0.032	20	
602	Hydro Conduit	5	0.005		0.005	0.011	7	
Subtotal		54	0.055	0	0.049	0.122	178	179
Cummulative Subtotal		863	0.306	0.150	0.778	1.944	2,575	1,094
Phase 6								
304 C	Raymond Azevedo Vineyard	37	0.013		0.033	0.083	53	
305	Sutter Home Vineyards	29	0.010		0.026	0.065	41	
Subtotal		66	0.023	0	0.059	0.149	94	-
Cummulative Subtotal		929	0.329	0.150	0.837	2.093	2,669	1,094

The customers and demands that are listed above were taken from the Recycled Water Facilities Plan dated December 2003.

A-3.0 Operational and Seasonal Storage

Operational Storage

Ultimately, the recycled water system will cover two pressure zones. The Low Zone will serve all customers below Elevation 130 feet and a second High Zone will serve all customers above that elevation. A minimum amount of storage is needed in each zone to make up differences in hourly supply and demand, and this volume is typically referred to as operational storage.

Low Zone: The 1-million-gallon tank proposed for Phase 4 should provide the minimum amount of storage necessary to maintain service within the established pressure ranges (40-100 psig).

Water levels in the tank should be expected to vary widely as diurnal fluctuations in demand and supply occur on the peak delivery days.

It should be emphasized, however, that a single 1-million-gallon tank satisfies the *minimum* requirement for operational storage. Sometime in the future it may be desirable to have a second storage tank located at the northern extremity of the Low Zone. Such a tank would provide an increased level of reliability to the system and would enhance operational flexibility. This second tank, however, was not considered in the process of determining the budget for this program's fourth alternative.

During the period before the 1-million-gallon tank is operational, a hydropneumatic tank will be needed at the wastewater treatment plant pump station. The tank (approximately 10,000-12,000 gallons) is needed to stabilize pressures in the Low Zone, and also helps to prevent over-cycling of the pumps. Typically, the hydropneumatic tank should be sized large enough to prevent any single pump from starting more than four times per hour.

High Zone: The vineyard properties located east of the proposed Hess storage ponds are on hilly terrain, above Elevation 130 feet. This area will comprise the system's High Zone and will require separate storage facilities to meet operational needs.

Initially, operational storage may be provided by using a hydropneumatic tank that would be located at or near the proposed booster pump station (constructed during Phase 3). Sizing of the hydropneumatic tank should be determined during the pump station design because it will have a significant impact on how the pumps are selected and controlled.

Additional storage will probably be needed upon completion of the Private Vineyard Project (Phase 6). This storage will be located at or near Elevation 360 feet, and will be used to help stabilize delivery pressures in the High Zone. For purposes of establishing a program budget, a 100,000-gallon steel tank is assumed. However, final tank sizing for the High Zone should be based on a more detailed understanding of the time-varying demands and the pump station design capacity.

Seasonal Storage

Seasonal storage is required to make up for the excess supply of recycled water that is generated during the shoulder month of May. It can also offset the amount of supplemental water that is needed to make up the shortfall in supply that would normally occur later in the irrigation season. To make sure that there is enough storage to handle both scenarios, the amount of storage required is calculated in two ways:

- Volume needed to store excess recycled water during the shoulder month (May)
- Volume needed to eliminate the need for supplemental water

Excess recycled water during the shoulder month is estimated using the following assumptions:

- Average tertiary effluent: 1.875 mgd (average dry weather flow-2003)

- Effluent disposal to constructed wetlands: 1.000 mgd (rated design capacity)
- Available recycled water: 0.875 mgd (1.875 mgd-1.000 mgd)
- One month of recycled water: 26 mgal (0.875 mgd x 30 days)
- Minimum daily recycled water demand: 0.329 mgd
- One month of minimum demand: 10 mgal (0.329 mgd x 30 days)
- Storage required for excess water: 16 mgal (26 mgal-10 mgal)

Thus, the minimum amount of seasonal storage needed during the month of May is 16 million gallons, which is equivalent to 50 acre-feet. This assumes that up to 1 mgd of treated effluent may be discharged to the constructed wetlands during the shoulder months. In contrast, during the month of October the vineyard owners will allow some over-irrigation to get rid of any excess recycled water that cannot be discharged to the Napa River.

Similarly, the storage volume needed to eliminate the need for supplemental water is determined using the following assumptions:

- Peak-day demand: 2.093 mgd
- Estimated peak-month demand: 50 mgal (80% x 2.093 mgd x 30 days)
- Estimated monthly supply (maximum): 56 mgal (1.875 mgd x 30 days)
- Storage required to meet demand: 0 mgal (56 mgal > 50 mgal)
- Average flow to constructed wetlands: 0.20 mgd (6 mgal / 30 days)

Thus, supplemental water should not be required because the monthly supply should always exceed demand.

Based on this analysis, a minimum of 50 acre-feet of storage is needed to eliminate the need for spray fields. In comparison, the storage ponds that are planned for the Hess Vineyard would contain approximately 160 acre-feet of recycled water, which, if filled during the winter, could supply the entire system for over three months.

A-4.0 Real Estate/Right-of-Way Acquisition

Most of the proposed improvements described in this document will be constructed within existing public rights-of-way. Three areas of the system, however, will require easements and/or rights-of-way if the City intends to take on the maintenance responsibilities:

- 1-million-gallon storage reservoir constructed during Phase 4
- Seasonal storage pond and pump station constructed on the Hess property during Phase 3
- Distribution piping and high-zone reservoir constructed during Phase 6

For purposes of estimating the program costs, easements, and right-of-way, expenses were calculated assuming an average land value of \$100,000 per acre. This number should be verified prior to finalizing the program budget, however.

A maximum of 30 acres may be needed for the seasonal storage ponds and high-zone pump station. This is based on preliminary design drawings that were prepared for Hess Vineyards. This area could be reduced significantly if the ponds were downsized to provide only the minimum storage requirement.

Approximately one quarter of an acre would be needed for the high-zone tank constructed during Phase 6.

The pipeline easement for Phase 6 was estimated assuming a width of 15 feet, which works out to \$34 per lineal foot of pipeline. The length of the pipeline easement is assumed to be no longer than 7,000 lineal feet.

The one-million-gallon storage reservoir constructed during Phase 4 will share a site with a 2-million-gallon potable water tank. The total site area is expected to range between 1 and 3 acres, but will ultimately depend on the final location. Assuming the recycled water tank is one third of a 3-acre site, the land required for the recycled tank is one acre. The site will also require an access road, which is assumed to be no longer than 3,000 lineal feet. Assuming a 15-foot-wide easement yields an area of about one acre, the total land acquisition required for Phase 4 is approximately two acres.

A-4.0 Capital Cost Estimates

The costs developed in the Table A-4 (included at the end of this Appendix) were based on the following unit prices for pipelines:

Table A-3 - Pipeline Unit Construction Costs

Pipe Size [in]	Unit Cost [\$/LF]
4	\$ 40
6	\$ 45
8	\$ 75
10	\$ 90
12	\$ 125
16	\$ 175
18	\$ 200
20	\$ 225

These estimated costs are for pipeline installed within public rights-of-way and include the cost of repaving the trench section. A 25% deduct is applied to the pipeline cost where pipeline is proposed in unpaved areas.

Costs for the seasonal storage pond facility were based on an estimate of probable construction costs prepared by the design engineer, Riechers-Spence. The cost estimate was dated May 26, 2004 and is based on conceptual plans that were dated June, 2004. It should be noted that the proposed location for these facilities is next to an existing wetland area, and has not been approved by the regulatory agencies. Costs may increase if the site has to be moved to a different location.

It should also be noted that costs could increase significantly if additional easements and/or rights-of-way are required beyond those specifically listed in this document.

A-6.0 Operating and Maintenance Cost Estimates

Operational and Maintenance Cost include the fixed costs of operating the system, such as staffing, renewal, and replacement budgets; and contingencies and variable costs, such as electrical costs for pumping and chemical costs for disinfection. Table A-5 below outlines the estimates for the City's system.

Table A-5 – Operational Cost Summary

Item	Unit	Unit Cost	Current Program		Full Program	
			Units	Unit Cost	Units	Unit Cost
Annual Fixed Costs						
Replacement and Renewal	LS	1.5% of capital	0	\$0.00		\$129,328.94
Electrical Demand Charge	LS	\$6,000.00	1	\$6,000.00	1	\$6,000.00
FTE Maintenance Worker	EA	\$60,000.00	0	\$0.00	0.5	\$30,000.00
FTE Operations Worker	EA	\$66,000.00	0.125	\$7,500.00	0.5	\$33,000.00
FTE Clerical Worker	EA	\$54,000.00	0	\$0.00	0.5	\$27,000.00
Program Contingency	LS	20% of Annual Fixed	1	\$3,375.00		\$56,332.24
Annual O&M Costs						
Low Zone Energy Costs	AF	\$41.30	107	\$4,419.10	416	\$17,180.80
High Zone Energy Costs	AF	\$82.60	0	\$0.00	442	\$36,509.20
Chlorination	AF	\$20.00	107	\$2,140.00	858	\$17,160.00
Total Estimated Costs				\$23,434		\$352,511

Table A-4 Capital Cost Estimates

Diameter (in)	Phase I - Wetlands Edge		Phase II - American Canyon Rd		Phase III - Green Island Road		Phase IV - New Main St		Phase V - Tower Rd		Private Vineyard Project		Grand Total	
	length (ft)	cost (\$)	length (ft)	cost (\$)	length (ft)	cost (\$)	length (ft)	cost (\$)	length (ft)	cost (\$)	length (ft)	cost (\$)	length (ft)	cost (\$)
6	1076	\$ 36,607			975	\$ 73,125	2584	\$ 116,280			3,660	\$ 154,887		
8	8846	\$ 317,393	2497	\$ 187,275	2820	\$ 253,800					12,318	\$ 577,793		
10					11657	\$ 1,457,125	8657	\$ 1,062,125			2,820	\$ 253,800		
12			719	\$ 125,825							32,899	\$ 4,112,375		
16			3501	\$ 700,200							719	\$ 125,825		
18											3,501	\$ 700,200		
	9,922	\$ 356,000	6,717	\$ 1,013,300	15,452	\$ 1,784,050	8,657	\$ 1,082,125	8,128	\$ 809,280	7,041	\$ 880,125	55,917	\$ 5,924,880
Subtotal Pipeline Costs	11	\$ 66,000	23	\$ 138,000	12	\$ 72,000	2	\$ 12,000	5	\$ 30,000	2	\$ 12,000	55	\$ 330,000
Service Laterals (\$6k ea)					400	\$ 124,000	150	\$ 46,500	250	\$ 77,500	100	\$ 31,000		\$ 356,500
Bore & Jack (\$310/ft)			0%	\$ -	-8%	\$ (142,724)	-25%	\$ (270,531)	-25%	\$ (202,320)	-25%	\$ (220,031)		\$ (835,607)
Deduct for Reduced AC Repair														
Total Pipeline Cost		\$ 422,000		\$ 1,228,800		\$ 1,837,326		\$ 870,094		\$ 714,160		\$ 703,094		\$ 5,775,774
Pump Stations (new or upgrade of existing)		\$ -		\$ -		\$ 235,225		\$ -		\$ -		\$ 100,000		\$ 335,225
Storage		\$ -		\$ 1,000,000		\$ 1,160,931		\$ -		\$ -		\$ 100,000		\$ 2,260,931
Recirculation System for Chlorine Contact Tank		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Spray Fields		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -		\$ -
Subtotal Construction Costs		\$ 422,000		\$ 2,478,800		\$ 3,233,482		\$ 870,094		\$ 714,160		\$ 903,094		\$ 8,821,930
Contingency [20%]		\$ 84,400		\$ 495,760		\$ 646,896		\$ 174,019		\$ 142,892		\$ 180,619		\$ 1,724,386
Engineering / Admin [15%]		\$ 63,300		\$ 371,820		\$ 485,022		\$ 130,514		\$ 107,169		\$ 135,464		\$ 1,293,289
Construction Management [8%]		\$ 33,760		\$ 198,304		\$ 258,679		\$ 69,608		\$ 57,157		\$ 72,248		\$ 689,754
Project Management [5%]		\$ 110,000	23	\$ 230,000	12	\$ 120,000	2	\$ 20,000	5	\$ 50,000	2	\$ 20,000	55	\$ 550,000
Subtotal Project Costs (not incl R/W or escalation)	0	\$ 713,460		\$ 3,774,884	30	\$ 4,743,879	0	\$ 1,264,234		\$ 1,071,678	2,42	\$ 1,311,424	33,42	\$ 12,879,359
right-of-way (\$50k/acre)		\$ -	1	\$ 50,000		\$ 1,500,000		\$ -		\$ -		\$ 121,229		\$ 1,671,229
Subtotal Project Costs (not incl escalation)		\$ 713,460		\$ 3,824,884		\$ 6,243,879		\$ 1,264,234		\$ 1,071,678		\$ 1,432,653		\$ 14,550,589
Subtotal w/ 1%QTR escalation to midpoint of construction [QTR]	0	\$ 713,500	5	\$ 4,020,000	5.5	\$ 6,595,000	5.5	\$ 1,335,000	10.5	\$ 1,190,000	10.5	\$ 1,590,000		\$ 15,443,500

APPENDIX B
CASH FLOW PROJECTIONS BY EXPANSION PHASE

The rates set forward in this implementation plan were developed to allow the Recycled Water System to support its operational costs as it is built out.

Currently, the recycled water rate charged to Green Island Vineyard does cover the power and chemical costs necessary to serve this customer. However, as the system expands, operational staff will be needed to maintain the expanded system, provide the appropriate level oversight for the City's program, and perform the inspections and reporting required by the RWQCB.

Because system phasing is dependent upon the construction of recycled water storage facilities, either the Phase 1 and 2 system or the Phase 3, 5, 6 system could come on line and need to function independently.

Table B-1, following, summarizes the operational costs estimated for the various system phases and compares these costs to the operational revenue that can be generated by setting the recycled water rate as a percentage of the potable water rates. The Table illustrates that an average rate of 60% of the potable water rate will support the whole system. However, because the southern system includes mostly urban irrigation users (base potable water rates average \$2.30 to \$2.50/hcf), it generates significantly more revenue than the northern system, which includes mostly agriculture users with base rates generally set at \$1.10/hcf. In order to assure that each part of the system is self supporting, the Implementation Plan proposes a recycled water rate of 50% of the potable water rate for urban irrigation customers and 75% for agriculture customers.

A detailed rate schedule by customer and phase is included as Table B-2.

Table B-1 Cash Flow Projections

Item	Unit	Unit Cost	Current Program Units	Current Program Unit Cost	Full Program Units	Full Program Unit Cost	North System (1) Units	North System (1) Unit Cost	South System (2) Units	South System (2) Unit Cost
Annual Fixed Costs										
Replacement and Renewal	LS	1.5% of capital	0	\$0.00	1	\$129,328.94	1	\$78,166.04	1	\$45,408.66
Electrical Demand Charge	LS	\$6,000.00	1	\$6,000.00	0.5	\$30,000.00	0.25	\$15,000.00	0.25	\$6,000.00
FTE Maintenance Worker	EA	\$60,000.00	0	\$0.00	0.5	\$33,000.00	0.25	\$16,500.00	0.25	\$15,000.00
FTE Operations Worker	EA	\$66,000.00	0.125	\$7,500.00	0.5	\$33,000.00	0.25	\$16,500.00	0.25	\$16,500.00
FTE Clerical Worker	EA	\$54,000.00	0	\$0.00	0.5	\$27,000.00	0.25	\$13,500.00	0.25	\$13,500.00
Program Contingency	LS	20% of Annual Fixed	1	\$3,375.00		\$56,332.24	1	\$32,291.51	1	\$24,102.16
Annual O&M Costs										
Low Zone Energy Costs	AF	\$41.30	107	\$4,419.10	416	\$17,180.80	107	\$4,419.10	372	\$15,363.60
High Zone Energy Costs	AF	\$82.60	0	\$0.00	442	\$36,509.20	442	\$36,509.20	0	\$0.00
Chlorination	AF	\$20.00	107	\$2,140.00	858	\$17,160.00	549	\$10,980.00	372	\$7,440.00
Total Estimated Costs				\$23,434		\$352,511		\$213,366		\$143,314
(1) North System is Green Island Vineyards + Phase 3, 5 and 6										
(2) South System is Green Island Vineyards + Phases 1 and 2										
Current Revenue from Green Island				\$25,635						
Revenue @ 50% of Potable Rates						\$319,796		\$154,072		\$167,401
Revenue @ 60% of Potable Rates						\$378,628		\$179,759		\$195,754
Revenue @ 65% of Potable Rates						\$408,044		\$192,603		\$209,931
Revenue @ 70% of Potable Rates						\$437,460		\$205,446		\$224,107
Revenue @ 75% of Potable Rates						\$466,876		\$218,290		\$238,284
"Average" Rate Needed to Cover Costs per AF				\$219.01		\$410.85		\$388.64		\$385.25
"Average" Rate Needed to Cover Costs per HCF				\$0.50		\$0.94		\$0.89		\$0.88
Revenue at "Proposed Rate Structure"										
50% of Potable for Urban										
75% of Potable for Agriculture										
				\$25,635		\$367,951		\$202,227		\$167,401

Table B-2 Recycled Water Rate Schedule by User and Phase

User NO.	User ID	Customer Name	Annual Use in AFY	Phase Totals	Use in HCF	Phase Totals	In City Limits	Potable Water Rate per HCF	Potable Rate Adjustment per City Direction	Recycled Water Rates & Revenue @ 50% of Potable for Urban and 75% for Agricultural	
										Revenue	Rate
Current	1	300	Green Island Vineyard	107	46,609		NO			\$25,635.06	\$0.55
Phase 1 Wetlands Edge Road											
	2	101	Donaldson Way School	17	7,405		Yes	\$2.30		\$8,515.98	\$1.15
	3	102	American Canyon Middle School	11	4,792		Yes	\$2.30		\$5,510.34	\$1.15
	4	201	American Canyon Community Park	24	10,454		Yes	\$2.50		\$13,068.00	\$1.25
	5	203	Kimberly Park	8	3,485		Yes	\$2.50		\$4,356.00	\$1.25
	6	207	Stand Park	1	436		Yes	\$2.50		\$544.50	\$1.25
	7	222	Taper Development Park	5	2,178		Yes	\$2.50		\$2,722.50	\$1.25
	8	401A	Wetlands Edge Road	11	4,792		Yes	\$2.50		\$5,989.50	\$1.25
	9	401B	Wetlands Edge Road	5	2,178		Yes	\$2.50		\$2,722.50	\$1.25
	10	402A	Right of Way	2	871		Yes	\$2.50		\$1,089.00	\$1.25
	11	402B	Right of Way	8	3,485		Yes	\$2.50		\$4,356.00	\$1.25
	12	404	The Preserve (north of American Canyon Road)	1	436		Yes	\$2.50		\$544.50	\$1.25
			Subtotal	93	200	87,120				\$49,418.82	
Phase 2 American Canyon Road & Tank											
	13	103	Future American Canyon High School	11	4,792		Yes	\$2.30		\$5,510.34	\$1.15
	14	104	Future American Canyon Elementary School	19	8,276		Yes	\$2.30		\$9,517.88	\$1.15
	15	202	Northampton Park	8	3,485		Yes	\$2.50		\$4,356.00	\$1.25
	16	208	Via Bellagio Park	2	871		Yes	\$2.50		\$1,089.00	\$1.25
	17	209	DB/Park	5	2,178		Yes	\$2.50		\$2,722.50	\$1.25
	18	213	Gateway Village	4	1,742		Yes	\$2.50		\$2,178.00	\$1.25
	19	215	World Marine Estates	6	2,614		Yes	\$2.50		\$3,267.00	\$1.25
	20	218	Canyon Creek	10	4,356		Yes	\$2.50		\$5,445.00	\$1.25
	21	224	Future Elementary School Park	17	7,405		Yes	\$2.50		\$9,256.50	\$1.25
	22	225	Shenandoah Drive Park	27	11,761		Yes	\$2.50		\$14,701.50	\$1.25
	23	226	Iron Horse Drive Playground	1	436		Yes	\$2.50		\$544.50	\$1.25
	24	227	Future High School Park	17	7,405		Yes	\$2.50		\$9,256.50	\$1.25
	25	402C	Rights of Way	5	2,178		Yes	\$2.50		\$2,722.50	\$1.25
	25	405	Via Bellagio Medians & Streetscapes	4	1,742		Yes	\$2.50		\$2,178.00	\$1.25
	27	407	La Vigne Streetscapes	14	6,098		Yes	\$2.50		\$7,623.00	\$1.25
	28	408	Floresden Road Medians	9	3,920		Yes	\$2.50		\$4,900.50	\$1.25
	29	500	Safeway Plaza	4	1,742		Yes	\$2.50		\$2,178.00	\$1.25
	30	502	Canyon Plaza II	3	1,307		Yes	\$2.50		\$1,633.50	\$1.25
	31	505	Canyon Manor Apartments	2	871		Yes	\$2.50		\$1,089.00	\$1.25
	32	509	Valley Green Apartments	4	1,742		Yes	\$2.50		\$2,178.00	\$1.25
			Subtotal	172	372	162,043				\$92,347.20	
Phase 3 Green Island Road & Seasonal Storage Pond											
	33	307	Paoli Loop	8	3,485		Yes	\$2.50		\$4,356.00	\$1.25
	34	409	Mezzetta Court	4	1,742		Yes	\$2.50		\$2,178.00	\$1.25
	35	411	Green Island Industrial Park	2	871		Yes	\$2.50		\$1,089.00	\$1.25
	36	412	Green Island Road Streetscapes	3	1,307		Yes	\$2.50		\$1,633.50	\$1.25
	37	413	Commerce Blvd. and Hanna Drive	12	5,227		Yes	\$2.50		\$6,534.00	\$1.25
	38	414	Jim Oswald Way	2	871		Yes	\$2.50		\$1,089.00	\$1.25
	39	600	Pokka Beverages-	6	2,614		Yes	\$1.60	\$2.50	\$3,267.00	\$1.25
	40	603	Blazer Rock	3	1,307		Yes	\$1.80		\$1,176.12	\$0.90
	41	302	Hess Collection Wineries	71	30,928		NO	\$1.10		\$25,515.27	\$0.83
	42	303	Gingrich Hills Cellar	92	40,075		NO	\$1.10		\$33,062.04	\$0.83
	43	308	Gary Clarke Vineyards	38	16,553		NO	\$1.10		\$13,656.06	\$0.83
	44	301	Jeager Vineyards	81	35,284		NO	\$1.10		\$29,108.97	\$0.83
			Subtotal	322	694	302,306				\$122,664.96	
Phase 4 New Main Street Pipeline											
	45	426	Village Center Development	3	1,307		Yes	\$2.50		\$1,633.50	\$1.25
	46	514	Napa Junction Mixed Use Development	41	17,860		Yes	\$2.50		\$22,324.50	\$1.25
			Subtotal	44	738	321,473				\$23,958.00	
Phase 5 Tower Road											
	47	304 A	Raymond Azevado Vineyard	18	7,841		NO	\$1.10		\$6,468.66	\$0.83
	48	425	Devlin Development	3	1,307		Yes	\$2.50		\$1,633.50	\$1.25
	49	510	Stavinski Development Group	14	6,098		NO	\$2.50		\$7,623.00	\$1.25
	50	601	Cultured Stone	14	6,098		NO	\$3.50		\$10,672.20	\$1.75
	51	602	Hydro Conduit	5	2,178		NO	\$3.50		\$3,811.50	\$1.75
			Subtotal	54	792	344,995				\$30,208.86	
Phase 6 Future Vineyard Project											
	52	304 C	Raymond Azevado Vineyard	37	16,117		NO	\$1.10		\$13,296.69	\$0.83
	53	305	Sutter Home Vineyards	29	12,632		NO	\$1.10		\$10,421.73	\$0.83
			Subtotal	66	858	373,745				\$23,718.42	
Total Revenue and Average Rate per HCF										\$367,951.32	\$0.98