THE CITY OF
PLEASANTON

City of Pleasanton

Recycled Water Feasibility Study
Administrative Draft Report

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

INTRODUCTION

The City of Pleasanton shares a joint wastewater treatment plant (WWTP) with Dublin San Ramon Services District (DSRSD). DSRSD owns and operates the WWTP. Approximately 62 percent of the WWTP capacity is committed to the City of Pleasanton by agreement with DSRSD including the first rights to the wastewater for recycling. Wastewater disposal is currently accomplished by pumping secondary treated effluent from the DSRSD and City of Livermore plants to the Hayward area where it joins with effluent from East Bay communities and is discharged into the deep waters of the San Francisco Bay. The wastewater disposal system is owned and operated by the Livermore Amador Valley Water Management Agency (LAVWMA), a joint powers agency whose members are the City of Pleasanton, the City of Livermore and DSRSD. Currently only a very small amount of the wastewater is recycled in the Tri-Valley area, while the majority is discharged to the bay.

DSRSD and the East Bay Municipal Utility District (EBMUD) have formed a joint powers agency (DERWA) for the purpose of serving recycled water to the Dublin, San Ramon and Danville areas. DSRSD began serving recycled water to the Dublin Sports Ground in September 1999 and expects to begin a program to add a significant number of additional recycled water customers in the Spring of 2000.

DSRSD is also involved in another water recycling project entitled the Clean Water Revival Project, which is a reverse osmosis technology based project to treat DSRSD wastewater to a level adequate for groundwater recharge. The project was developed to treat wastewater for year-round reuse in order to supplement DSRSD's wastewater disposal capacity.

The City of Pleasanton views the development and implementation of a recycled water program in the City as a desirable and environmentally beneficial goal. Because wastewater from Pleasanton has been identified as a potential source of recycled water for the other recycled water programs identified above, the City would like to investigate the engineering and economic feasibility of implementing a recycled water program of its own prior to committing wastewater supplies for recycled water programs outside of the City.

PROJECT OBJECTIVES

The Goal of this study was to evaluate the engineering and economic feasibility of implementing a recycled water program in the City of Pleasanton. Specific objectives of the study included:

1) Assess the potential market for recycled water in the City;

2) Evaluate the quantity and quality of recycled water available to the City for a recycled water program;

3) Develop alternative recycled water distribution projects;

4) Identify the engineering facility requirements for each alternative project;

5) Evaluate each of the alternatives on the basis of engineering and economic considerations; and

6) Recommend a recycled water project for implementation and develop a phased implementation program if feasible.

REGULATORY ISSUES

Recycled water projects in California are regulated by the Regional Water Quality Control Board (RWQCB) and the Department of Health Services (DHS). DHS has developed comprehensive water reclamation regulations, commonly referred to as Title 22. The RWQCB issues water reclamation permits that enforce the Title 22 requirements. In addition, Zone 7 is responsible for managing and protecting the groundwater quality in the Livermore-Amador Valley area.

Title 22

Title 22 defines treatment processes, water quality criteria, and treatment reliability requirements for public use of recycled water. In general, the regulations are more stringent for uses with high potential for public contact, and less stringent for uses with low potential for public contact. Since the City's recycled water project could include public school yards and parks, the most stringent requirements would apply. At a minimum, recycled water treated to a disinfected tertiary level would be required.

Permits

The RWQCB issued a Master Water Reuse Permit for several agencies in the Livermore-Amador Valley in 1993 (Order No. 93-159). This permit sets standards for several water reuse programs in the Valley. The City of Pleasanton is not listed as a permittee, but is identified as a potential primary customer. It is likely that the City would be required to apply for a similar permit to distribute recycled water and any City project would be subject to similar standards. A copy of this Order is included as **Appendix A**. This Order also requires that a Salt Management Plan be developed and implemented, which is currently being done by Zone 7.

In addition, the RWQCB issued General Water Reuse Requirements for Municipal Wastewater and Water Agencies in the San Francisco Bay Region in 1996 (Order No. 96-011). This Order authorizes municipal water reuse and establishes prohibitions, quality requirements, water reuse program provisions, and general provisions. A copy of this Order is included as **Appendix B**.

MARKET ASSESSMENT

A market assessment was conducted including a total of approximately 380 existing and potential future (undeveloped) City recycled water customers. Customers were assigned customer numbers and recycled water demands were estimated from water usage records, evapotranspiration rate calculations, or planning data. The customers were grouped and sorted; various customer groupings are presented in **Appendices C** and **D**.

Table ES-1 below presents a summary of recycled water demands for customers identified in the market assessment. *Potential customers* are customers considered likely to connect. *Future potential customers* are customers considered not likely to connect initially, but that may connect in the future.

Table ES-1 • Summary of Recycled Water Demands

Category/Grouping	Average Annual Demand Acre Feet per Year (AFY)
Potential Customers	
< 7 AFY	481
7 – 10 AFY	393
11 – 25 AFY	1,120
26 – 50 AFY	588
> 50 AFY	2,060
Subtotal	**4,642**
Future Potential Customers	910
TOTAL	**5,552**

RECYCLED WATER SUPPLY

The continuous supply of wastewater that will be available to the City for a recycled water project must be sufficient to meet the peak day demands within the system. Peak irrigation demands typically occur in the hot drier months of the summer when wastewater flows are lowest. Pleasanton has estimated that its wastewater production at build-out of the General Plan could range from 8.4 mgd to 10.3 mgd, average dry weather flow, with more recent estimates indicating the flow could be as low as 7.3 mgd. **Table ES-2** summarizes wastewater flows that are projected for the City in the year 2000 and at build-out (based on a wastewater production of 8.4 mgd).

Table ES-2 • Summary of Pleasanton Wastewater Flows

Year	Projected Monthly Wastewater Flows in Acre-Feet												Total (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2000	646	661	670	590	579	583	560	550	561	563	565	593	**7,120**
Build-Out	910	930	943	830	815	821	788	775	789	793	795	835	**10,024**

[a] Projected monthly wastewater flows are distributed based on current variations in monthly flow. Monthly flow is the sum of average dry weather (ADW) flow plus total infiltration and inflow (I/I) for that month.

[b] Reference: San Ramon Valley Recycled Water Program, Facilities Plan, Montgomery Watson, 1996.

[c] Build-out flows are based on an ADW flow of 8.4 mgd (9,408 AFY), plus allowances for I/I. 8.4 mgd is the low end of the range of build-out flows projected in the Pleasanton General Plan.

DEVELOPMENT OF ALTERNATIVE DELIVERY SYSTEMS

As identified above, a market analysis identified a potential demand of 5,552 AFY. Some of these sites were considered to be too far away from other sites to make them economically viable to serve at this time. Therefore, three alternative scenarios for distribution systems were developed for delivering recycled water to selected sites in the City for which it appeared reasonable to serve at this time. Not all of the sites evaluated in the total market analysis (5,552 AFY) were identified in the alternative systems. The three scenarios identify three different alternative distribution systems with varying potential recycled water demands ranging from 1,695 AFY to 3,441 AFY. These scenarios are summarized as follows:

Scenario A

Scenario A is the smallest of the three projects. This system generally includes only the pipelines required to service demand clusters in and adjacent to the Hacienda Business Park. The system would extend south to include the Pleasanton Sports and Recreation Park and the Pleasanton Tennis and Community Park. The system would also extend west across Interstate 680 to service demand clusters in the Stoneridge Mall area. The total annual average recycled water demand included in Scenario A is **1,695 AFY**.

Scenario B

Scenario B is an extension of Scenario A to include the pipelines required to service the two future golf courses in south Pleasanton (Bernal property development and City golf course), with upsizing of some Scenario A facilities to accommodate increased demands. The scenario also includes demands in the vicinity of Koll Center and the Pleasanton Middle School. The backbone pipeline runs through the Bernal property to facilitate connection of the future golf course and minimize pipeline lengths. The total annual average recycled water demand for Scenario B is **2,815 AFY**. Included in the 2,815 AFY is 745 AFY for the Bernal property and the City of Pleasanton's Happy Valley golf

courses. Although no allowance was included for future new irrigation sites, other than the new golf courses, there will be new irrigation sites developed in association with future residential and commercial growth that potentially could be irrigated with recycled water. The Bernal property, in particular, will have some park land and common landscaped areas that could be served by the proposed recycled water system.

As of the date of preparation of this report, the Bernal property development is planning to proceed with irrigation of the golf course with groundwater from existing wells that have been used for many years for agricultural irrigation of the property. To the extent that groundwater is used for irrigation in lieu of a recycled water system, funding for the recycled water system capital cost will be impacted since connection fees from this area that could otherwise have been used to fund a recycled water project may not be available. Thus, the economics of the recycled water system presented herein will be impacted if groundwater is used for the golf course irrigation.

Scenario C

Scenario C is the most comprehensive recycled water system. This system includes the areas covered in Scenario B, plus the facilities necessary to supply recycled water to the Ruby Hills area (including the golf course), with upsizing of some Scenario B facilities to accommodate increased demands. The backbone pipeline to the Ruby Hills area runs along Valley Avenue, Santa Rita Road, and Vineyard Avenue. The alignment also includes demands near Harvest School, Amador Valley Community Park, and Amador Valley High School. Many smaller demands in the Vintage Hills area were not included because they would require fairly extensive piping to reach a relatively small amount of recycled water demand. The total average annual recycled water demand for Scenario C is **3,441 AFY**.

EVALUATION OF ALTERNATIVE SCENARIOS

Engineering Evaluation

An engineering evaluation of each scenario was conducted using computerized hydraulic models of each scenario. Night and day demands were estimated for each customer. Pipeline lengths and diameters were estimated. Facility requirements for pump stations and reservoirs were developed and pump stations and reservoirs were sized. The facility requirements for each scenario are summarized in **Table ES-3**.

Table ES-3 • Facility Requirements

Facility	Quantity/Size		
	Scenario A	Scenario B	Scenario C
Pump Stations			
WWTP Pump Station	450 HP	660 HP	660 HP
Valley Pump Station	(none)	(none)	100 HP
Vineyard Pump Station	(none)	(none)	30 HP
Storage Tanks			
WWTP Tank	2.5 MG	4 MG	4 MG
Sycamore Tank	(none)	(none)	1 MG
Pipelines			
6-inch	21,600 ft	27,000 ft	30,400 ft
8-inch	14,800 ft	14,800 ft	41,800 ft
10-inch	6,900 ft	11,000 ft	11,700 ft
12-inch	3,300 ft	6,600 ft	4,500 ft
16-inch	6,100 ft	13,200 ft	24,400 ft
20-inch	(none)	5,500 ft	5,500 ft
24-inch	900 ft	900 ft	900 ft
Total	**53,600 ft**	**78,900 ft**	**119,100 ft**

Economic Evaluation

Economic analyses were conducted on all three scenarios. These analyses included estimation of capital construction costs for pipelines, pump stations, reservoirs, treatment facilities, and user retrofits. Annual costs were estimated using amortized capital costs, O&M costs, and salt mitigation costs. Capital, annual, and unit delivery costs are summarized in **Table ES-4.**

Table ES-4 • Cost Analyses Summary

Scenario	Recycled Water Delivery (AFY)	Capital Cost ($M)	Annual Cost ($M/Yr)[a]	Unit Delivery Cost ($/AF)[a]
A	1,695	17.16	1.50 to 1.66	886 to 979
B	2,815	27.26	2.33 to 2.58	826 to 915
C	3,441	34.95	3.02 to 3.35	878 to 975

[a] Annual and Unit Delivery Costs vary with salt mitigation costs assumed. These costs include salt mitigation for 250 mg/l.

RECYCLED WATER IMPLEMENTATION

Recycled Water Supply and Demand

There are three potential sources of recycled water for a recycled water project in the City of Pleasanton. These include wastewater from the City, wastewater from Dublin San Ramon Services District (DSRSD) to the joint wastewater treatment plant and some additional water which could potentially be made available through a seasonal aquifer storage and recovery (ASR) program as evaluated by DERWA. The supply of wastewater from the City at build-out is projected to range from a low of 8.4 mgd to a high of 10.3 mgd during the average summer months (average dry weather flow-ADWF). Although DSRSD has projected that its wastewater disposal capacity requirements from LAVWMA at build-out will be 10.4 mgd, the available wastewater supply during the dry summer months would be in the order of 9.4 mgd. **Table ES-5** summarizes the potential supply of wastewater that could be available to the City and DSRSD for recycled water projects based on projected wastewater flow of 8.4 mgd for the Pleasanton, and 9.4 mgd for DSRSD. Projections included in **Table ES-5** identify increased wastewater flow during the winter months.

Table ES-5 • Summary of Potential Wastewater Supply at Build-Out[a]

Source	Projected Monthly Wastewater Flows in Acre-Feet[b]												Total (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Pleasanton[c]	910	930	943	830	815	821	788	775	789	793	795	835	10,024
DSRSD	1,031	1,054	1,069	941	924	930	893	878	894	898	901	946	11,359
ASR	0	0	0	149	222	298	331	284	216	0	0	0	1,500
Total	1,941	1,984	2,012	1,920	1,961	2,049	2,012	1,937	1,899	1,691	1,696	1,781	22,883

[a] Reference: San Ramon Valley Recycled Water Program, Facilities Plan, Montgomery Watson, 1996.
[b] Projected monthly wastewater flows are distributed based on current variations in monthly flow. Monthly flow is the sum of average dry weather (ADW) flow plus total infiltration and inflow (I/I) for that month.
[c] Build-out flows are based on an ADW flow of 8.4 mgd (9,408 AFY), plus allowances for I/I. 8.4 mgd is the low end of the range of build-out flows projected in the Pleasanton General Plan. The 8.4 estimate also includes approximately 0.2 mgd of wastewater generated from the Ruby Hill development even though wastewater from Ruby Hill flows to the Livermore wastewater treatment plant for treatment and disposal.

Figures 9-4, 9-5 and **9-6** graphically depict the demands for each of the three Pleasanton project scenarios in combination with the DERWA project, as well as the wastewater supply projections, at builtout. DERWA projected demands were based on the DERWA Facilities Plan prepared in 1996. As the DERWA project procedes, the actual demands are likely to change from those estimated in 1996. Reference to these figures may provide a better understanding of the relationships of demand and supplies at build-out and the following discussion.

At build-out, the City should be able to provide sufficient wastewater (based on a projection of 8.4 mgd) to meet the peak summer demands of any of the three recycled water scenarios developed in this study without any additional recycled water from DERWA. In fact, even with Scenario C, Pleasanton should have a small amount of wastewater during the summer that could be made available to DERWA. However, the combined demands of any of the City's three recycled water scenarios with the ultimate demands of the DERWA Project would exceed the total available supply of wastewater from the DSRSD wastewater treatment plant.

If ASR is available, then the DERWA and Pleasanton Scenario A demands could be accommodated throughout the peak summer irrigation period. However, when Scenarios B and C are combined with the DERWA Project demands, there would be inadequate summer supplies to meet peak demands even with the ASR component. DSRSD staff has recently indicated that it is unlikely that the ASR wells will be constructed. Therefore, potential shortfalls in wastewater supply during the summer would result if the DERWA Project and a City recycled water project both proceed. In this respect, the Pleasanton and DERWA Projects would compete for the available wastewater supplies. Joint Pleasanton/DSRSD/DERWA coordination of recycled water projects and possible short-term seasonal supplementation of the recycled water systems with potable water supplies could potentially manage this shortfall in supply.

Economic Issues

Two potential cost benefits typically associated with the implementation of recycled water projects are the avoided costs of developing new water supplies and the avoided costs of wastewater disposal. The City's projected increase in demand for treated water by the year 2020 is estimated at approximately 6,000 AFY. Historically, water use in the Pleasanton area has been split approximately 60% for residential, 12% for commercial and 28% for irrigation customers. Assuming that this mixture will be similar in the future, the future additional demand of 6,000 AFY would be split approximately 3,600 AFY for residential, 720 AFY for commercial and 1,680 AFY for irrigation customers. The potential demand for recycled water ranges from approximately 1,700 AFY to 3,450 AFY. Based on the projections above, Scenario A would meet the projected future water supply needs for irrigation of 1680 AFY, or 28% of the total future water supply requirements for Pleasanton. Similarly, Scenario C could meet up to approximately 75% of Pleasanton's projected future water total water supply requirements with recycled water. If the total recycled water market demand of 5,552 AFY evaluated in this report were implemented, then over 90% of Pleasanton's future water supply requirement of 6,000 AFY could be met with recycled water.

The total delivery cost of potable water to new customers in the City is estimated at $835/AF for all customers and $879 per AF for irrigation customers, not including any amortization of connection fees. Included in these costs are utility billing, debt service and accrual of funds for replacement. Recycled water system cost estimates included in this report do not provide estimates for these items, therefore, the potable water costs have been adjusted to $659/AF for all customers and $694/AF for irrigation customers to make costs comparable. The cost estimates for operation and maintenance of a new

recycled water system range from $259/AF to $286/AF. With an allowance for salt mitigation to an equivalent quality as potable, these recycled water operational costs would increase to a range between $348/AF and $382/AF, which is approximately 50 to 55% of potable water costs.

Connection fees are charged to new customers to pay for the cost of acquiring water supplies and to build necessary capital improvements to deliver potable water to customers. Therefore, for this analysis, connection fees are used as an estimate for the capital costs associated with providing new potable water facilities. Potable water system connection fees are currently $6,220 for a 5/8" meter, the size required for most residential customers. Discussion with Zone 7 staff indicates that connection fees are likely to increase in the year 2000 from 5% to 20%. For purposes of this report an increase of 10% has been used, or a new rate of $6,712 for a 5/8" meter. Recycled water system capital costs by comparison ranged from $4,800 to $5,100 per equivalent 5/8" meter, or approximately 72 to 75% of potable water connection fees.

A common comparison is to determine the total cost for construction and operation of a recycled water system and compare the cost per AF to only the average annual cost to a potable customer. This approach neglects to consider the connection fees which paid for construction of the potable water system. Recognizing that this is not an equal comparison, if recycled water costs for construction and O&M are included and compared <u>only</u> with potable water O&M charges, then recycled water costs for the three scenarios are higher. With salt mitigation, recycled water system capital and O&M costs ranged from $915 to $979/AF as compared to current O&M costs of $694/AF for potable water irrigation customers. However, this comparison neglects the capital costs associated with providing new potable water facilities.

Therefore, when recycled water O&M costs are compared to the O&M costs for potable water, recycled water is less costly. Further, when recycled water system capital costs are compared to connection fees, recycled water is less costly. Therefore, when all costs (O&M and capital) are considered, recycled water is economically competitive, and actually less costly than potable water. In addition, for each AF of water recycled within Pleasanton, there are savings that result from not pumping the wastewater to the San Francisco Bay for disposal. That avoided disposal cost through LAVWMA is estimated to be approximately $50/AF.

Based on the above analysis, recycled water system O&M and capital costs are lower than comparable potable water costs. However, the major challenge is funding the capital costs to build the recycled water treatment and distribution system. Since most of the customers identified in this report are existing customers of the potable water system, they have already paid potable water connection fees. Assessing another connection fee to existing customers to connect to a recycled water system (to pay capital costs for construction) would be infeasible and inappropriate. Therefore alternative funding approaches were explored and are presented below.

FUNDING ALTERNATIVES

In order to implement a recycled water program, the project must also be financially viable. Five conceptual funding alternative concepts were evaluated for the recycled water system scenarios evaluated in this report:

Alternative 1: All Recycled Water System Customers Pay Equally (all costs built into the recycled water commodity charges)

Under this alternative, all capital costs would be amortized and combined with O&M costs and included in the commodity charge to all existing and new irrigation customers participate in the development of the recycled water system capital costs. The costs for the three distribution system alternatives range from $915 to $979/AF. Therefore, all three scenarios would result in a bimonthly rate higher than the current potable user charges for irrigation water of $694/AF. Therefore, if the capital costs of the recycled water system is amortized and included in the recycled water commodity charge, the existing customers would have paid for capital costs in both systems. Further, existing customers would pay a higher commodity charge than for potable water and would not experience any financial advantage from the change.

Alternative 2: Use New Recycled Water Irrigation Customer Connection Fees to Pay all Recycled Water Capital Costs

Alternative 2 uses an opposite approach to assure that existing customers pay capital costs in only one water system. Under this approach, the capital costs for the recycled water system are allocated to new recycled water customers only. The commodity charges for recycled water delivered to the customer would then be only as necessary to cover O&M costs. However since there are very few new recycled water system customers anticipated, the recycled water system connection fees would be approximately eight to ten times current potable water connection fees. If additional new recycled water system customers could be included, these costs would be reduced, however it would take approximately eight to ten times the amount of new customers to bring the costs down to existing connection fee levels. This amount of new customers was not identified in the market assessment. Allocation of cost in this manner would keep the bimonthly cost for recycled water at approximately 40% of the current potable system irrigation rate (ranges from $260 to $290/AF when compared to the existing potable rate of $694/AF). Bimonthly water bills would be very low, however a very high connection fee for new recycled water customers would likely make this alternative for funding capital cost infeasible.

Alternative 3: Use Future Potable Water System Irrigation Customer Connection Fees to Pay Recycled Water Capital Costs

Alternative 3 is somewhat of a hybrid of Alternatives 1 and 2. The concept would be to use connection fees from "future potable water irrigation customers" for the recycled water system capital costs. In other words, the connection fees from the 1,680 AFY (portion of the projected 6,000 AFY of additional water supplies that is collected from

future irrigation customers) would be used to fund a portion of the recycled water system capital costs. The remaining capital costs would be amortized and added to the O&M costs and included in the recycled water commodity charge. The water rates necessary under this alternative would range from $669/AF to $849. The existing potable water commodity charges range from $659 to $694 per AF. Scenario A costs would be very close to the cost of potable water rates, while Scenarios B and C would still be higher. While closer to becoming attractive to existing customers, there is still no financial incentive under this funding approach for existing or new irrigation customers to use recycled water.

Alternative 4: Price Recycled Water at 90% of Potable and Use a Portion of Potable Water System Connection Fees for Recycled Water System Capital Cost Funding

In order to meet Pleasanton's projected additional water demand of approximately 6,000 AFY, Zone 7 will need to acquire additional water supplies and build facilities necessary to distribute the water to Pleasanton. If the irrigation customers identified in this study connect to a recycled water system, the new potable water supply needs could be reduced by up to 3,441 AF per year (Scenario C). This approach could be viewed as a switch in demands from the potable water system to recycled water. This "potable demand switch" concept would reduce the demands for future potable supplies. Thus, connection fees for new potable water supplies and infrastructure could conceivably be transferred to fund the recycled water system capital costs.

For Scenarios A, B, and C, the equivalent number of residential units that could be served from potable water made available through a "transfer" of supplies would be approximately 3,390 units, 5,630 units and 6,882 units respectively.

If the recycled water commodity charge is set at 90% of the current potable rate, the recycled water system capital costs could be funded with approximately $1,700 to $2,100 of the current $6,220 connection fee per residential unit. Another perspective of this analysis is that a complete irrigation system can be developed for a connection fee that ranges from $1,700 to $2,100 per single family equivalent, as compared with the current potable water connection fee of $6,220. In other words, implementation of a recycled water system could be less expensive than expansion of the potable water system to serve irrigation customers.

Since the new potable water system customers would likely cause a need for improvements to the existing potable water system, some portion of the existing connection fee would also probably be required by the City of Pleasanton and Zone 7 to provide adequate service. Using this approach, approximately $4,100 to $4,500 of the current connection fee would be available for these costs. However, the portion of the existing connection fee associated with obtaining new water supplies could be transferred to pay for a portion of the recycled water system capital costs.

Alternative 5: Use Future Residential Potable Water Connection Fees to Pay for Recycled Water System Capital Costs to Minimize the Recycled Water Commodity Charges

Switching existing customers to recycled water would free potable water to serve residential and commercial uses. Similar to the analysis for Alternative 4, this approach evaluates how much of the recycled water system capital costs could be supported by connection fees from future residential customers. As previously identified the equivalent number of residential units that could be served from potable water made available through a "transfer" of supplies would be 3,390 units, 5,630 units and 6,882 units for Scenarios A, B, and C respectively.

Based on this funding approach, connection fees from future residential development could support more than the capital costs for the recycled water system. Thus, the recycled water commodity charge could be reduced to the O&M costs plus salt mitigation, which is less than $300/AF for all scenarios. Further, based on the projected connection fees of $6,712 per residential unit expected in January 2000, there would still be $1,600 to $1,900 of the $6,712 connection fee revenue remaining after funding all of the recycled water system capital costs. Similarly to Alternative 4, the new potable water system customers would likely cause a need for improvements to the existing potable water system, this portion of the existing connection fee could be used by the City of Pleasanton and Zone 7 for potable water system improvements.

In summary, analysis of these funding alternatives indicates that recycled water commodity charges will not be competitive with potable water without some method to pay a portion of the capital costs for construction. Funding Alternatives 1, 2 and 3 are not currently considered feasible because either the estimated recycled water commodity charges or the connection fees necessary to fund the system would be too high. However, under Funding Alternatives 4 and 5 using a "potable demand switch" concept, the recycled water commodity charges and the recycled water connection fees would be competitive with potable water costs. Depending on the desired RW pricing policy the commodity charges could range from 37% to 90% of potable water charges. In order to keep commodity charges low enough to make RW attractive to users, the portion of the potable water system connection fee needed could range from 25% to 80% to pay for enough of the RW system capital costs to make recycled water financially feasible. Either of funding Alternatives 4 or 5 requires a cooperative approach between Pleasanton and Zone 7 regarding a transfer of a portion of the potable water connection fees toward recycled water system capital costs.

NON-MONETARY BENEFITS

In addition to the avoided costs of wastewater disposal, there are a number of non-monetary benefits, or benefits which cannot be quantified, that result from the use of recycled water including but not limited to the following:

- ✓ Avoided higher level regulatory compliance for discharge of wastewater into the San Francisco Bay (more stringent wastewater quality standards).

- ✓ Local control of water supply and independence for additional water supplies from agencies outside the Tri-Valley.
- ✓ Reliability of supply and reduced impacts of future droughts (i.e. cutbacks in water use, plant stress due to reduced irrigation and potential drought surcharges).
- ✓ Assurance that adequate landscape can be supported to enhance the aesthetic environment in Pleasanton, even during droughts.

PROJECT ALTERNATIVES

Alternatives to Pleasanton constructing a recycled water system are:

- ✓ Joint project with DERWA.
- ✓ Joint project with DSRSD.
- ✓ Sell Pleasanton's wastewater to DERWA or DSRSD.
- ✓ Sell Pleasanton's wastewater to Zone 7 for non-potable use in the Tri-Valley area.

RECOMMENDATIONS

As a result of this study, a number of recommendations are made to the City of Pleasanton regarding further consideration of implementation of a recycled water system. These recommendations are predicated on reaching a positive decision at each of the steps in the process before proceeding. Pleasanton should consider the following actions:

- ✓ Present the results of this study to the City Council. It is suggested that a workshop be scheduled with the Council to facilitate fully discussing the implications of proceeding further.
- ✓ Begin discussion with Zone 7 regarding the potential of connection fee contributions to pay for recycled water system capital costs.
- ✓ Reinitiate discussion with the San Francisco Water Department regarding installation of a dual distribution system (potable and recycled) within the Bernal property and for service to the City's Happy Valley golf course project.
- ✓ Begin discussion with DSRSD and/or DERWA regarding either construction of treatment facilities or costs to deliver treated water to meet Pleasanton's needs. Also enter into discussion with DSRSD and/or DERWA to consider the benefits of sharing some facilities such as pump stations and reservoirs. Alternatively, Pleasanton may consider entering into discussions with DSRSD/DERWA to explore their interest in providing recycled water service in the Pleasanton area.
- ✓ Initiate or continue discussion with Zone 7 regarding possible use of Pleasanton recycled water to serve large projected agricultural water demand increases.
- ✓ Prepare detailed water projections to confirm the potential future demands for residential, commercial and irrigation uses. Staff is in the process of preparation of an Urban Water Master Plan and an update of the Water Distribution System Master Plan. Upon completion of this work, a review of the water connection fees will be undertaken.
- ✓ Begin a community outreach program that will gain an understanding of the support for a recycled water system and provide a method to communicate with the citizens as the program progresses. A possible forum to begin this community outreach would be the formation of a recycled water program advisory committee.

- ✓ Begin discussion with the Pleasanton Unified School District, the Hacienda Business Park Owners Association and other potential users to develop a better estimate of firm water demands.
- ✓ Begin discussions with the San Francisco Bay Regional Water Quality Control Board, and the California Department of Health Services for a permit to distribute recycled water.
- ✓ Apply for a facilities planning grant from the State Water Resources Control Board. Staff should also explore construction cost financing options such as low interest loans from the WateReuse Association of California, the Office of Water Recycling or the State Revolving Fund.
- ✓ Development of a pricing policy and recycled water use ordinance.
- ✓ Prepare an Environmental Impact Report for the project.

IMPLEMENTATION

In order to implement recycled water use in Pleasanton, there must be a firm commitment by the community, its leaders and the staff of Pleasanton that recycled water is a valuable resource and is appropriate for Pleasanton. In addition, there must also be regulatory agency support, as well as support from Zone 7 to bring water recycling from a noble concept to reality. A significant amount of additional discussion and an appropriate decision making process must be undertaken in order to provide the level of confidence that water recycling makes sense at this time and stage of Pleasanton's community development. That discussion and analysis should include but not limited to the following: additional analysis of the available supplies (i.e. Pleasanton's wastewater production), engineering facilities planning for the recycled water system, economic and financial feasibility evaluation, discussion on pricing policies, environmental documentation, and community outreach necessary to achieve that commitment. The issues and discussion presented herein are not intended to be all inclusive and fully developed, but rather provide a framework for discussions on whether Pleasanton should continue to consider recycled water use and a general guide to the steps necessary for implementation.

SECTION 1 • INTRODUCTION

SECTION 1 • INTRODUCTION

PROJECT BACKGROUND

Water has become an increasingly scarce resource in the State of California. As the State's climate has oscillated between dry and wet years, the availability of water has also varied greatly. Many public agencies charged with providing this water to their customers are actively seeking new reliable sources of water. One alternative source that has received considerable attention is recycled water. Recycled water is wastewater that has been treated and disinfected to a sufficiently high level to make it suitable for many non-potable applications such as irrigation.

The City of Pleasanton shares a joint wastewater treatment plant (WWTP) with Dublin San Ramon Services District (DSRSD). The WWTP is located in the City of Pleasanton. DSRSD owns and operates the WWTP and by agreement with Pleasanton commits approximately 62 percent of this WWTP's treatment capacity to the City of Pleasanton. DSRSD will soon begin actively recycling water at the WWTP for two significant projects. These include:

> **DSRSD-EBMUD Recycled Water Authority (DERWA) Project.** After studying joint and individual recycled water projects since 1990, DSRSD and EBMUD formed a Joint Powers Authority (JPA) in June 1995 to implement a joint recycled water project. The project will obtain wastewater from the DSRSD WWTP and other potential sources, recycle it, and distribute it to irrigation customers in and adjacent to the water service areas of EBMUD and DSRSD. These customers will be located in the communities of Dublin, San Ramon, Danville, and Blackhawk in Alameda and Contra Costa counties.
>
> **DSRSD Clean Water Revival Project.** DSRSD currently disposes of its wastewater from the Pleasanton WWTP through an export pipeline managed by the Livermore-Amador Valley Wastewater Management Agency (LAVWMA). LAVWMA contracts with the East Bay Dischargers Authority (EBDA) for capacity in EBDA's outfall pipeline into San Francisco Bay. DSRSD's wet season discharges to the outfall is rapidly approaching its discharge limit. DSRSD proposes to increase its wastewater disposal capacity by recycling wastewater from the WWTP using advanced treatment process and injecting this water into local Valley groundwater basins.

The City of Pleasanton views the development and implementation of a recycled water program in the City as a desirable and environmentally beneficial goal. Because wastewater from Pleasanton has been identified as a potential source of recycled water for the other recycled water programs identified above, the City would like to investigate the engineering and economic feasibility of implementing a recycled water program of its

own in the City prior to committing wastewater supplies for recycled water programs outside of the City.

PROJECT OBJECTIVES

The Goal of this study was to evaluate the engineering and economic feasibility of implementing a recycled water program in the City of Pleasanton. Specific objectives of the study included:

1) Assess the potential market for recycled water in the City;

2) Evaluate the quantity and quality of recycled water available to the City for a recycled water program;

3) Develop alternative recycled water distribution projects;

4) Identify the engineering facility requirements for each alternative project;

5) Evaluate each of the alternatives on the basis of engineering and economic considerations; and

6) Recommend a recycled water project for implementation and develop a phased implementation program if feasible.

SECTION 2 • DESCRIPTION OF STUDY AREA

SECTION 2 • DESCRIPTION OF STUDY AREA

STUDY AREA BOUNDARIES

The general study area falls within the sphere of influence of the City of Pleasanton, as defined in the City of Pleasanton General Plan (General Plan, August 6, 1996). This includes areas inside and outside of the city limits. Interstate 580 and Interstate 680 generally bound the area on the north and west. The southern edge of the study area includes the Castlewood area, the Bernal property, and the site of the future city golf course in South Pleasanton. On the east side, the study area extends to the new Ruby Hills development. **Figure 2-1** illustrates the study area.

HYDROGEOLOGY/WATER QUALITY

The Livermore-Amador Valley is a closed groundwater basin within the Alameda Creek Watershed with multiple groundwater subbasins based largely upon faults, which form local impediments to groundwater flow. There are thirteen subbasins grouped into two general basin categories generally referred to as the Main Basin and the Fringe Subbasin. The portion of the Main Basin underlying Livermore and Pleasanton has the highest quality water. The Main Basin supplies most of the municipal wells in the area, and is also used to store imported water. The basin boundaries are shown on **Figure 5-1**, which also shows the locations of potential recycled water customers identified in **Section 5**.

A major issue associated with recycled water irrigation in the study area will be salt loading. Because the Livermore-Amador Valley groundwater basin is a closed basin, there has been a steady buildup of salts in groundwater. A major source of salts is irrigation water that percolates through the plant root zone into the groundwater basin. TDS levels in the Main Basin currently range from approximately 400 to 450 mg/L. The Fringe Subbasins are generally characterized by comparatively poor water quality. TDS levels in the Fringe Subbasins range from approximately 340 mg/L to over 900 mg/L.

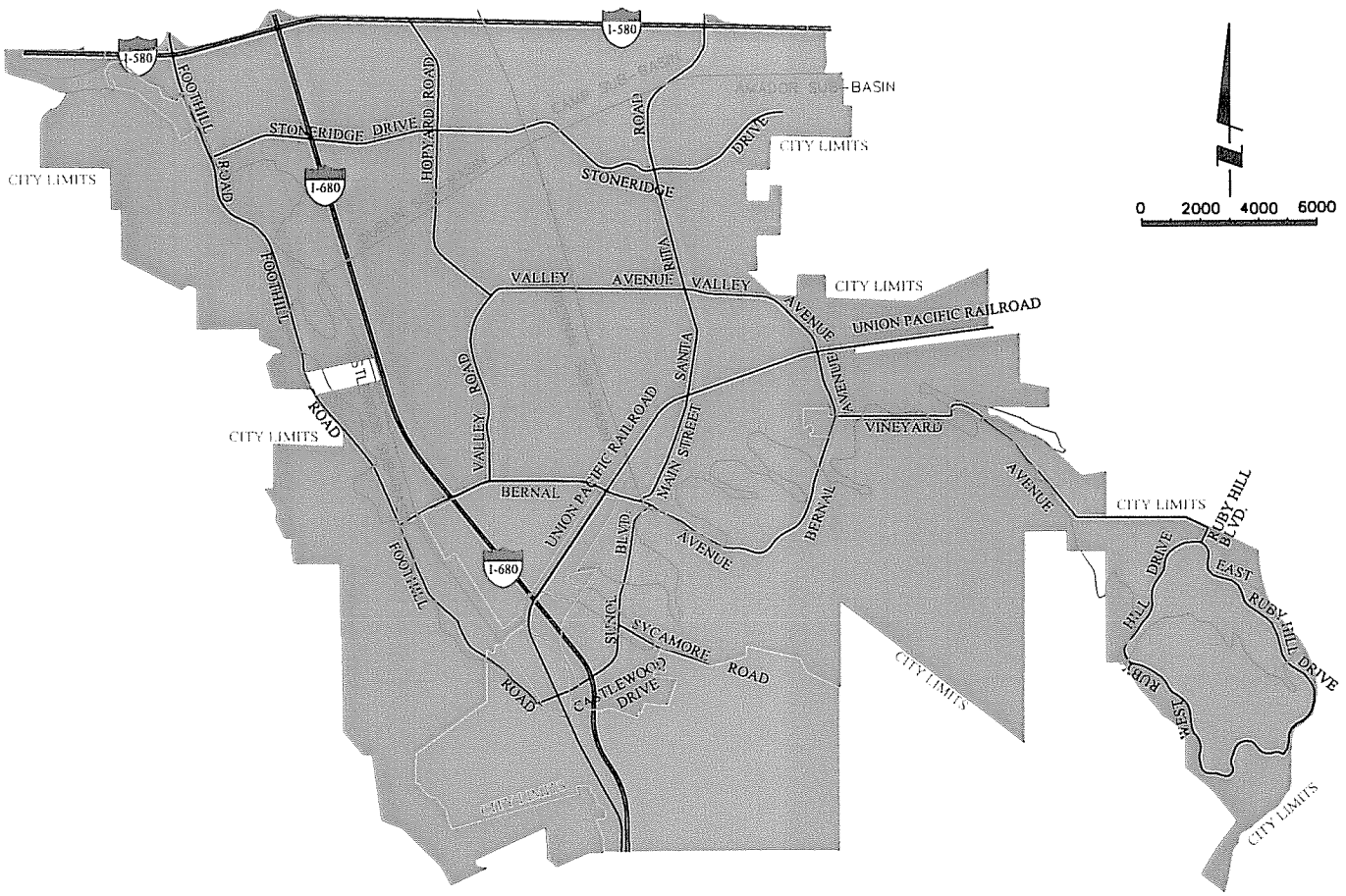
The Zone 7 Water Agency is the water wholesaler for the Livermore-Amador Valley and is responsible for overall management of the Valley's surface water and groundwater resources. Zone 7 uses imported surface water from the State Water Project, local runoff stored in Lake Del Valle and groundwater to meet the demands of the water retailers. Raw (untreated) water is either used to recharge local groundwater basins or treated for distribution to retailers. Zone 7 has developed a Salt Management Plan that will assist the Zone in developing policies, identifying capital improvements, and developing operational objectives to:

1) Offset the current 2,200 tons per year increase of imported salts into the groundwater basin;

2) Develop approaches to eliminate future additional salt loading with the long-term goal to reduce the salt loading to the groundwater basin;

3) Maintain and improve, if possible, the delivered water quality to Zone 7 retailers;

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



LEGEND

- Study Area, Within City Limits
- Study Area, Outside City Limits
- Groundwater Main-basin Boundary
- Groundwater Sub-basin Boundary
- Pleasanton City Limits
- Interstate Freeways
- City Streets
- Union Pacific Rail Road

FIGURE 2-1
STUDY AREA
NOVEMBER 1999

HydroScience Engineers, Inc.

4) Provide comparable delivered water quality to all Zone 7 retailers (Pleasanton, Livermore, California Water Service Company, and DSRSD);

5) Minimize program costs.

The groundwater delivered by Pleasanton and Zone 7 wells in the Pleasanton area average approximately 400 mg/l of TDS during 1998 while surface water deliveries averaged approximately 215 mg/l. It is anticipated that TDS levels in recycled water originating from the DSRSD WWTP will average approximately 600 mg/L (see **Section 6**).

One of the major goals of the Salt Management Plan undertaken by Zone 7 was to address and develop salt mitigation measures and policies related to salts resulting from water recycling. Although the Salt Management Plan has provided significant additional understanding of the issues and management tools available, the policies that address how salt management costs will be shared by the retailers, and ultimately the customers, have not yet been finalized. The allocation of cost for salt management of irrigation with non-demineralized recycled water will be a significant consideration in implementing a recycled water program in the City of Pleasanton.

REGIONAL WATER RECYCLING

CALFED Bay-Delta Program[1]

The CALFED Bay-Delta Program is a cooperative effort among state and federal agencies and California's environmental, urban and agricultural communities. It was initiated in 1995 to address environmental and water management problems associated with the Bay-Delta system, an intricate web of waterways created at the junction of the San Francisco Bay and the Sacramento and San Joaquin rivers and the watershed that feeds them.

The CALFED Bay-Delta Program is divided into three phases.

Phase I During Phase I, the CALFED Program concentrated on identifying and defining the problems confronting the Bay-Delta system. During Phase I a mission statement and guiding principles were developed, along with Program objectives and an array of potential actions to meet them. Three preliminary alternatives were identified for further analyses in Phase II. Phase I was completed in September 1996.

Phase II During Phase II, currently underway, the Program is developing a preferred program alternative and conducting a comprehensive programmatic environmental review process. Because the CALFED solution area is so large, and because it is approaching its task in an integrated, comprehensive way, environmental review must be

[1] Excerpted from CALFED Bay Delta Program Fact Sheet Spring 1999 – Program Overview

conducted on a very broad level. Phase II will conclude with the Final Programmatic Environmental Impact Statement/Environmental Impact Report (EIS/EIR). Final decision on the program plan is expected by June 2000.

Phase III Program implementation will begin in Phase III, following completion of the final Programmatic EIS/EIR. The CALFED solution plan is expected to take 25 to 30 years to complete. Implementation is roughly divided into three stages, with Stage 1 lasting seven years.

Working with the state's urban and agricultural water users, environmental organizations and others, the CALFED Program has examined differing ways, or alternatives, to meet program goals, and identified a preferred alternative to solve Bay-Delta system problems. Actions will comprehensively address four inter-related problem areas: ecosystem restoration, water quality improvements, enhanced Delta levee system integrity, and increased water supply reliability.

The preferred program alternative will consist of a set of broadly described programmatic actions that set the long-term, overall direction of the CALFED Program. It is made up of several program elements identified earlier in the process: Levee System Integrity Program, Water Quality Program, Ecosystem Restoration Program, Water Use Efficiency Program, Water Transfers Program, Watershed Program, and Storage and Delta Conveyance.

The CALFED Bay-Delta Program has recognized and included water recycling as part of the solution for improving the Bay-Delta ecosystem.

Bay Area Regional Water Recycling Program[2]

The Bay Area Regional Water Recycling Program (BARWRP) was established in 1993 by a consortium of local, state, and federal water and wastewater agencies. The mission of BARWRP is to develop a regional partnership to maximize Bay Area recycling. The first phase of the program was the preparation of a feasibility study, which was completed in April 1996. The first step in the process explored the possibility of exporting recycled water from the Bay Area to Central California for agricultural irrigation. That phase of the study process concluded significant recycling could be achieved in the Bay Area with greater environmental benefits while enhancing the Bay Area's awareness of water conservation and the need for recycled water. It also concluded that costs are competitive with other future new water supplies.

BARWRP is nearing completion of its second phase of evaluation with the preparation of a draft Regional Master Plan. The completion of the master plan will complete the second step of a three step Feasibility Assessment process. Step 3 will address questions regarding institutional constraints and public acceptance for near-term projects.

[2] Excerpted from the BARWRP Draft Water Recycling Master Plan.

The BARWRP Master Plan estimated that the average costs for near-term (2010) projects to be approximately $460/Af of delivered recycled water. This cost is less than many other recycling projects due to economics of scale, and due to the fact that existing facilities are utilized to the greatest extent possible. Although this may appear to be higher than other new water supply costs, those do not reflect the full cost of treatment and delivery to the customer and do not provide the benefits of dry year reliability, Bay-Delta water quality enhancements, etc.

The major recommendations of the Regional Master Plan are as follows:

- ✓ Water recycling should be pursued from a regional perspective with agencies sharing costs proportional to benefit, including water supply, wastewater discharge and environmental benefits.
- ✓ The initial phases of all recycled water projects currently planned by local agencies are a high priority for implementation and should be incorporated into the near-term regional system by 2010.
- ✓ Near-term recycled water facilities located in identified regional service corridors should be sized for mid-term demands projected for 2025.
- ✓ The near-term regional system should include recycled water uses that improve the environment by stream augmentation or wetlands enhancement.
- ✓ The implementation of recycled water projects in the Bay Area should be phased to supply 125,000 acre feet per year by 2010 and about 240,000 acre feet per year by 2025.
- ✓ The current feasibility assessment work should continue upon completion of the Regional Master Plan to answer specific questions regarding institutional constraints and public acceptance for some near-term projects.
- ✓ For near-term projects where implementation issues have been resolved, permitting design and construction should begin at the completion of the Master Plan.
- ✓ That 50% of the design and construction costs be funded by the federal and state governments and that 50% be funded by local agencies.
- ✓ That the BARWRP partnership should be formalized with the creation of a regional organization that can implement water trading/banking strategies, discharge trading strategies and regional sharing of costs.
- ✓ That a comprehensive public education program to convey facts that recycled water provides a safe, drought-proof source of water, and that using recycled water improves the water supply reliability of the Bay Area and California and contributes to the long-term restoration of the Bay-Delta environment.

South Bay Water Recycling Program[3]

In 1989, the Regional Water Quality Control Board determined that the discharge from the San Jose/Santa Clara Water Pollution Control Plant had lowered the salinity levels in the receiving water to a level that it posed a threat to impacted two endangered species, the Salt Marsh Harvest mouse and the California Clapper Rail. As a result, the RWQCB

[3] Information taken from various SBWRP publications and presentation at the Northern California WateReuse Association meeting on August 13, 1999.

required the South Bay Dischargers to implement an action plan to reduce discharges and the South Bay Water Recycling Program was undertaken. The purpose of South Bay Water Recycling is to deliver recycled water to these cities for non-drinking purposes, such as irrigating golf courses, parks, and agricultural land. Recycled water also will be used for industrial purposes. South Bay Water Recycling is a joint effort by the cities of San Jose, Milpitas, Santa Clara, the San Jose Water Company, Santa Clara Valley Water District, and U.S. Bureau of Reclamation. Phase 1 of the program included construction of 60 miles of recycled water pipelines and supporting infrastructure in portions of San Jose, Santa Clara, and Milpitas. The projected demand of customers upon build-out of this phase of the project is about 15 mgd.

Even though the SBWRP has completed a significant amount of infrastructure and are now serving approximately 200 customers totaling between 8.5 to 9 mgd during the peak of July 1999, with continued growth in the Santa Clara Valley the water recycling program must be expanded. SBWRP is nearing completion of a Phase 2 Master Plan that has a goal of a summer diversion of 100 mgd. During the development of this Master Plan, the South Bay program has looked at alternatives to meet goals including but not limited to:

- ✓ **Irrigation Expansion** Extension of the distribution system that would include construction of pipeline segments originally included in Phase 1 that were not completed; connection of additional customers within the current service area; and construction of a 15-mile extension to reach additional customers in the Coyote Valley. Estimated flow reduction/ diversion: 15 mgd.
- ✓ **Indoor Water Conservation** Major emphasis will be placed on residential ultra low-flush toilet (ULFT) rebate programs and will be supported by public water conservation and education, particularly in South Bay schools. Additionally, ULFT programs will be instituted for commercial, industrial and public institutions. Estimated flow reduction/diversion: 5-8 mgd.
- ✓ **Industrial Water Recycling/Reuse** This option addresses the reuse of a company's own discharge and/or use of recycled water in manufacturing processes, heating, venting and air conditioning systems, and irrigation at industrial facilities. Estimated flow reduction/diversion: 2-4 mgd.
- ✓ **Inflow/Infiltration Reduction & Sewer Rehabilitation** This option includes locating inflow and infiltration sources, that increase wastewater flow to the plant, developing cost-benefit analyses to prioritize locations, and performing sewer rehabilitation work. Estimated flow reduction: 8 mgd.
- ✓ **Environmental Enhancements** Augmenting South Bay streams with recycled water and wetland creation are being considered and may be implemented separately or in combination. The main objectives of this project are to enhance habitat and improve water quality. Estimated flow reduction/diversion: 8-10 mgd.
- ✓ **Wetlands Rehabilitation** Purchasing and creating wetlands enhance habitats and add aesthetic value. Wetlands add landscape and botanical variety to the ecosystem, and provide new habitat for aquatic plants and animals. Estimated flow reduction/ diversion: 8 mgd.

Among alternatives considered is the possible export of up to 15 mgd into the Livermore Valley to meet the projected irrigation demands of vineyard expansion in the Valley. However, preliminary indications are that the Tri-Valley area is not expected to be a primary market for expansion.

Preliminary estimates for SBWRP Phase 2 construction is approximately $200M.
The completed Master plan is expected to be available for review during the fall of 1999.

SECTION 3 • REGULATORY REQUIREMENTS

SECTION 3 • REGULATORY REQUIREMENTS

The California Regional Water Quality Control Board (RWQCB) and the State Department of Health Services (DOHS) have primary responsibility for implementing recycled water projects in the State of California. This Section presents the potential regulatory requirements for implementing a recycled water program in the City of Pleasanton.

TITLE 22

The DOHS was given authority under the Porter-Cologne Act to establish criteria for recycled water production, distribution, and use wherever special protection of public health is required. DOHS has developed comprehensive water reclamation regulations that define treatment processes, water quality criteria, and treatment reliability requirements for public use of recycled water. These regulations are contained in Title 22, Division 4, Chapter 3 of the California Administrative Code, or more commonly referred to as "Title 22." New draft Title 22 regulations and guidelines have been established and are currently undergoing review. The schedule for final publication of the regulations has changed numerous times in recent years. However, the Regional Water Quality Control Board is currently using the September 1998 Draft Proposed Amendments to Title 22 Water Reclamation Criteria as a guide for developing reclamation permits. In this draft, recycled water criteria are divided into several categories based upon the extent of public access or risk of exposure. In general, Title 22 regulations are more stringent for uses with high public contact potential and less stringent for uses with low public contact potential. The following four levels of treatment are established for recycled water by Title 22:

Undisinfected Secondary

This category of recycled water includes wastewater that has been treated to a secondary level of treatment and is commonly referred to as secondary effluent. Secondary effluent is wastewater that contains dissolved oxygen and has undergone an oxidation process in which the organic matter content of the water has been stabilized and made nonputrescible.

Disinfected Secondary – 23

This category of recycled water includes secondary effluent that has been disinfected to a level that the median number of Coliform bacteria in the water does not exceed 23 per 100 mL. Disinfection is the process whereby pathogenic bacteria and virus are inactivated by chemical, physical, or biological means.

Disinfected Secondary – 2.2

This category of recycled water includes secondary effluent that has been disinfected to a level that the median number of Coliform bacteria in the water does not exceed 2.2 per 100 mL.

Disinfected Tertiary

This category of recycled water includes secondary effluent that has undergone a tertiary treatment process and has been disinfected to a level that the median number of Coliform bacteria in the water does not exceed 2.2 per 100 mL. Title 22 defines the "tertiary" treatment process as wastewater which has been oxidized, coagulated, clarified and filtered. The recycled water turbidity should not exceed two turbidity units on average, should not exceed 5 turbidity units more than five percent of the time during any 24-hour period, and should never exceed 10 turbidity units.

MASTER WATER REUSE PERMIT (ORDER NO. 93 – 159)

Zone 7 has projected a need for an additional 20,000 to 25,000 AFY of water supply in the next 10 to 15 years. The various water and wastewater agencies of the Livermore-Amador Valley have studied water recycling as an alternative to the import of new water supplies and export of wastewater for many years. Water recycling in the Valley is consistent with the RWQCB's policy on reclamation, which states in part that disposal of wastewater to inland, estuarine, or coastal waters is not considered a permanent wastewater disposal solution where the potential exists for conservation and reclamation. The RWQCB supports the use of recycled water to supplement existing surface and groundwater supplies.

In 1992 the Livermore-Amador Valley water and wastewater agencies jointly sponsored the "Livermore-Amador Valley Water Recycling Study," which was a comprehensive investigation of water recycling options. One of the recommendations of the study was that the agencies apply for a master water reuse permit to cover proposed water recycling activities in the valley. This recommendation was adopted by the agencies and the permit was issued by the RWQCB in December 1993 (Order No. 93-159). The permit identifies Alameda County Flood Control and Water Conservation District, Zone 7, City of Livermore, and Dublin San Ramon Services District (DSRSD) as permittees. The permit includes:

1) Prohibitions on the use of recycled water;

2) Recycled water use limitations;

3) Recycled water quality specifications; and

4) Provisions for implementing three groups of recycled water projects.

Any recycled water use within the City of Pleasanton would have to comply with the terms and conditions set forth in the Master Water Reuse Permit. Of particular importance is the fact that the Master Permit requires that a Salt Management Plan be developed and implemented.

Most recycled water customers in the City of Pleasanton are located over groundwater basins which are used for potable water supplies. The concern is that using higher TDS recycled water for irrigation will cause the potable groundwater TDS to increase, thus forcing future costly demineralization of well water for potable supplies. The requirement that a Salt Management Plan be prepared is intended to assure that a plan is implemented to protect groundwater quality from degradation resulting from recycled water use.

It is important to recognize that salt management in the Livermore-Amador Valley involves more than just considering the impact of using recycled water over the groundwater basin. TDS levels in the potable groundwater basin have been gradually increasing as the result of potable water irrigation associated with increased development. A portion of the water applied to irrigated areas is used by the plants through evapotranspiration and the remaining portion percolates down until it reaches the groundwater aquifer carrying the majority of the salts. Thus, the TDS increases have been, and will continue to be, an issue even with potable water use for irrigation. With higher level TDS concentrations in recycled water, the TDS increases in the groundwater would be exacerbated. Thus, salt management will continue to be a significant issue to the Livermore-Amador Valley water agencies even without implementation of significant recycled water use.

Although a formal Salt Management Plan report has not been adopted by Zone 7 to date, but the majority of the technical work has been completed and significant amount of policy discussion has begun. Although no formal report has yet been adopted, Zone 7 is beginning to implement some of the management tools identified during the planning process. Thus, it can be assumed that any recycled water project implemented by the City of Pleasanton would have to comply with the plan. Additional discussion on salt mitigation is included in **Sections 4** and **9**. A copy of Order No. 93-159 is included in **Appendix A** for reference.

GENERAL WATER REUSE REQUIREMENTS (ORDER NO. 96 – 011)

The RWQCB issued General Water Reuse Requirements for Municipal Wastewater and Water Agencies in the San Francisco Bay Region in 1996. Order No. 96-011 serves as a General Water Reuse Order authorizing municipal wastewater reuse by producers, distributors and users of recycled water throughout the Bay Area, including this project study area. This order establishes prohibitions, recycled water quality requirements and limitations, water reuse program provisions, and general provisions for recycled water programs in the San Francisco Bay Region. **Table 3-1** summarizes suitable uses for various recycled water treatment levels as established in Order No. 96-011. It is anticipated that any recycled water program implemented by the City of Pleasanton will have to comply with these general water reuse requirements. A copy of order No. 96-011 is included in **Appendix B**.

Table 3-1 • Suitable Uses* Of Recycled Water

Use of Recycled Water	Treatment Level		
	Tertiary Recycled Water	Secondary-2.2 Recycled Water	Secondary-23 Recycled Water
Irrigation of:			
Food crops - contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
Parks and playgrounds	Allowed	Not Allowed	Not Allowed
School yards	Allowed	Not Allowed	Not Allowed
Residential landscaping	Allowed	Not Allowed	Not Allowed
Unrestricted access golf courses	Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohib. by other prov. of CCR	Allowed	Not Allowed	Not Allowed
Food crops - edible portion above ground/ not in contact w/ reclaimed. water	Allowed	Allowed	Not Allowed
Cemeteries	Allowed	Allowed	Allowed
Freeway landscaping	Allowed	Allowed	Allowed
Restricted access golf courses	Allowed	Allowed	Allowed
Ornamental nursery stock and sod farms	Allowed	Allowed	Allowed
Pasture for milk animals	Allowed	Allowed	Allowed
Any nonedible vegetation with access control to prevent use as if it were a park, playground or schoolyard.	Allowed	Allowed	Allowed
Orchards w/ no contact between edible portion and reclaimed water.	Allowed	Allowed	Allowed
Vineyards w/ no contact between edible portion and reclaimed water	Allowed	Allowed	Allowed
Non food bearing trees not irrigated <14 days of harvest	Allowed	Allowed	Allowed
Fodder crops (e.g. alfalfa) and fiber crops (e.g. cotton)	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed
Food crops that undergo commercial pathogen-destroying processing before human consumption (e.g. sugar beets)	Allowed	Allowed	Allowed
Supply for impoundments:			
Nonrestricted rec. impound., w/ suppl. monitoring for path. organisms.	Allowed**	Not Allowed	Not Allowed
Restricted impoundment and fish hatcheries	Allowed	Allowed	Not Allowed
Landscape impoundment. w/o decorative fountains	Allowed	Allowed	Allowed
Supply for cooling or air conditioning:			
Ind. or comm. Cooling or air cond. w/ cooling tower, evaporative condenser, or a spraying that creates a mist	Allowed***	Not Allowed	Not Allowed
Ind. or comm. Cooling or air cond. w/ cooling tower, evaporative condenser, or a spraying that creates a mist	Allowed	Allowed	Allowed
Other uses:			
Flushing toilets and urinals	Allowed	Not Allowed	Not Allowed
Priming drain tap	Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	Allowed	Not Allowed	Not Allowed
Structural fire fighting	Allowed	Not Allowed	Not Allowed
Decorative fountains	Allowed	Not Allowed	Not Allowed
Commercial laundries	Allowed	Not Allowed	Not Allowed
Consolidation Of backfill material around potable water pipelines	Allowed	Not Allowed	Not Allowed
Artificial snow making for commercial outdoor uses	Allowed	Not Allowed	Not Allowed
Industrial boiler feed	Allowed	Allowed	Allowed
Nonstructural fire fighting	Allowed	Allowed	Allowed
Backfill consolidation around nonpotable piping	Allowed	Allowed	Allowed
Soil compaction	Allowed	Allowed	Allowed
Mixing concrete	Allowed	Allowed	Allowed
Dust control on roads and streets	Allowed	Allowed	Allowed
Cleaning roads, sidewalks, and outdoor work areas	Allowed	Allowed	Allowed
Flushing sanitary sewers	Allowed	Allowed	Allowed

* Refer to the full text of the latest version of Title 22
** With "conventional tertiary treatment" additional monitoring may be necessary
*** Drift eliminators and/or biocides are required if public or employees can be exposed to mist.

SECTION 4 • PLANNING CRITERIA

SECTION 4 • PLANNING CRITERIA

In this section, engineering and cost planning criteria are developed for the study. Engineering criteria are developed for two purposes:

- Estimating average, peak day and peak delivery recycled water demands,
- Sizing of pipelines, reservoirs, and pump stations for hydraulic modeling.

Cost criteria are presented in this section for estimating capital implementation costs as well as amortized capital and O&M costs, including salt mitigation costs.

ENGINEERING CRITERIA

The engineering criteria developed for this feasibility study are described below.

Landscape Irrigation

Many of the potential recycled water customers in the study area are existing irrigation users with readily available water usage records. For these customers, irrigation demands are estimated directly from 1997 water meter data, as described further in **Section 5**.

For a few potential customers, average landscape irrigation demands were estimated using estimated irrigated acreage and typical evapotranspiration and precipitation rates for southern Contra Costa County and northern Alameda County (San Ramon). Reference crop evapotranspiration rates were obtained from California DWR Bulletin 113-3. Major landscape irrigation uses typically include parks, schools, golf courses, commercial property landscaping, cemeteries, and road medians/parkways. Typical monthly irrigation demands are summarized in **Table 4-1** and were calculated using the following formula:

$$Irrigation\ Demand\ (in) = \frac{[k_c(ET_0) - (P \times 0.75)]LR}{IE}$$

where,

k_C = Crop Coefficient = 0.8 for warm-weather grasses. This assumes that evapotranspiration rates for turf grasses typically irrigated in the study area are 80 percent of the Et_O.

ET_0 = Reference Crop Evapotranspiration. A standardized evapotranspiration rate for plants in general.

P = Precipitation. 75 percent precipitation irrigation efficiency is assumed. This assumes that 25 percent of the precipitation will be lost.

LR = 1.1. This assumes that approximately 10 percent of the applied irrigation water will pass through the irrigated grass root zone and be lost.

IE = 0.8 (80 percent irrigation efficiency). This assumes that 20 percent of the applied irrigation water will be lost to run-off and inefficient irrigation.

The estimated average annual landscape irrigation demand for the study area shown in **Table 4-1** is 42.1 inches. A peak monthly irrigation demand of 8.7 inches is projected for July. An eight-month irrigation season is assumed. No landscape irrigation demands are projected for November through February when it is anticipated that local precipitation will satisfy landscape irrigation requirements.

Table 4-1 • Typical Study Area Irrigation Demands

Month	ET_0[a]	ET[b]	P[c]	Irrigation Demand (inches)
January	1.1	0.9	4.8	0.0
February	1.8	1.4	3.8	0.0
March	3.0	2.4	2.7	0.5
April	4.4	3.5	1.1	3.6
May	5.8	4.6	0.6	5.7
June	7.3	5.8	0.1	7.8
July	7.9	6.3	0.0	8.7
August	6.7	5.4	0.0	7.4
September	5.2	4.2	0.3	5.5
October	3.4	2.7	0.8	2.9
November	1.6	1.3	2.2	0.0
December	1.0	0.8	3.9	0.0
Total	**49.2**	**39.4**	**20.4**	**42.1**

[a] Reference Crop Evapotranspiration, California DWR Bulletin 113-3.

[b] Warm-weather grass evapotranspiration ($k_c = 0.8$).

[c] Average precipitation, San Ramon, U.S. Department of Agriculture Soil Survey.

Peaking Factors

Based on the data presented in **Table 4-1**, the average monthly irrigation demand is 3.5 inches. The peak monthly irrigation demand occurs in July and is 8.7 inches. Using this data, a peak month irrigation demand factor of 2.5 (8.7/3.5) is calculated. It is assumed that peak day irrigation demand is essentially the same as peak month demand for facility planning purposes. This is reasonable because not all customers will be irrigating on the same day. It is further assumed that "true" peak day irrigation demand conditions (all customers irrigating on the same day) occur so rarely that the cost of providing facilities to meet these demands is not justified. A peak day irrigation demand factor of 2.5 times average day demand is therefore assumed.

Peak delivery demands for irrigation systems are a function of the length of daily irrigation periods. On the basis of experience with implemented recycled water programs, a peak delivery factor of 2.4 times peak day demand is used to estimate peak delivery demands, assuming a 10-hour-per-day irrigation cycle (24 hours/10 hours = 2.4). This peaking factor assumes that irrigation demands are uniform over the 10-hour daily irrigation period. Actual peaking requirements can be minimized during program implementation by emphasizing water management and staggering irrigation periods between customers. A summary of peaking factors assumed for landscape irrigation in this study is provided below:

Peak Day Demand	=	2.5 × Average Day Demand
Peak Delivery Demand	=	2.4 × Peak Day Demand
	=	6.0 × Average Day Demand

Pipelines

The pipelines evaluated in this study consist of both major backbone transmission pipelines and distribution pipelines. Transmissions pipelines are intended primarily for conveyance of recycled water from the source to a reservoir. These pipelines are sized to meet *peak day demands*. Distribution pipelines convey recycled water directly to customer areas and are sized for *peak delivery demands*. General pipeline design criteria used in the analyses are summarized below:

- Service Pressure at Meter:

  Maximum = 125 psi (under standard operations)
  Maximum static = 125 psi
  Minimum dynamic = 50 psi

- Pipelines:

  Minimum diameter = 6 inches
  Materials: < 16-inch diameter, PVC pressure

> 16-inch diameter, Steel cylinder (lined and coated) or ductile iron (lined and wrapped)-

- System Hydraulics:

  Hazen-Williams "C" value = 130
  Desirable velocity = 3-5 ft/sec
  Maximum velocity = 10 ft/sec
  Minimum velocity = 1 ft/sec

Pump Stations

Pump station design capacity is assumed to be dependent upon the type of system into which the station is pumping. These systems can be open, closed, or a combination of the two. An open system includes one or more storage tanks that assist the pump station in meeting peak delivery demands when necessary, usually at night. Pump stations serving open systems are sized to meet peak day demands. A closed system is defined as one where the pump station must meet all demands. Pump stations are sized to meet peak delivery demands in closed systems. For combination systems, the pump station must meet some of the peak delivery demands, with assistance from one or more reservoirs.

Each pump station is assumed to contain at least one standby pump to allow the pump station to meet peak demands with one pump out of operation. This level of redundancy may not be required in actual project implementation because unlike potable water, recycled water will not be required for emergency uses such as fire suppression. To ensure flexibility and reliability, each pump stations is assumed to contain at least three pumps. No allowance is made for emergency standby power. Pump station criteria assumed in this study are summarized below:

- General:

  Sized to meet peak day demands for zones with storage
  Sized to meet peak delivery demands for zones without storage

- Design

  Minimum Number of Pumps = 3
  Minimum Number of Standby Pumps = 1
  Standby Power = None

Storage Reservoirs

Operational storage will be provided to supplement treatment plant production. It is assumed that a reservoir of sufficient capacity can be located at the WWTP to provide a steady supply of recycled water to the WWTP Pump Station. It is assumed that the reservoir at the pump station will be filled directly from the WWTP pumping facilities. As a result, the fill/draw cycle of the WWTP reservoir is not modeled in this study.

Storage reservoir criteria are summarized below:

- General:

  Minimum storage capacity to meet 100 percent of peak day demand
  Operational capacity to supplement peak delivery flows for a 10-hour irrigation period.

- Design:

  Aboveground steel tanks

ECONOMIC PLANNING CRITERIA

Planning level economic analyses were conducted on the various project alternatives analyzed in this study. Capital and annual costs including amortized capital and O&M costs were estimated for each alternative. Annual salt mitigation costs were estimated for compliance with the Salt Management Plan to estimate total annual costs. Total annual costs were then used to estimate unit delivery costs for comparison purposes.

CAPITAL FACILITY COSTS

Capital costs are estimated on a unit cost basis using curves derived from historical costs of similar facilities. A 20 percent contingency was assumed for capital costs. This contingency could include additional items such as small laterals not included in the modeled scenarios (see **Section 7**). All costs are planning level costs for budgetary planning purposes only. Capital cost assumptions are summarized in **Table 4-2**.

Table 4-2 • Capital Cost Assumptions

Item	Assumption
ENR CCI	6800
Property Acquisition Allowance	None
Construction Period	24 months (1999 – 2001)
Escalation to Mid-Point of Construction	2.5%
Engineering and Administrative Costs	12% of Capital Cost
Construction Management Costs	15% of Capital Cost

Treatment Costs

The DSRSD wastewater treatment plant currently produces secondary effluent. This effluent will have to be further treated to comply with tertiary recycled water quality standards as discussed in **Section 3**. The cost for treatment are dependent on the level of treatment provided. The costs for treatment to meet Title 22 requirements will be significantly less than the costs if demineralization is required for salt mitigation.

DSRSD, in conjunction with DERWA, has prepared a Treatment Facilities Master Plan to identify the treatment processes needed and evaluate the location of the facilities to meet the Title 22 requirements for the San Ramon Valley Recycled Water Program (DERWA project). The Master Plan has recently been completed and the costs from the plan are used as a basis for estimating tertiary treatment costs for the Pleasanton recycled water system. The master plan considered four filtration alternatives and four disinfection alternatives as follows:

Filtration:
- ✓ Rehabilitation of the existing dual media filters at the plant,
- ✓ Continuous backwash filters (DynaSand)
- ✓ Synthetic Medium Filters (Fuzzy Filter)
- ✓ Microfiltration

Disinfection:
- ✓ Hypochlorite
- ✓ Low-pressure, low-intensity, Ultraviolet
- ✓ Medium-pressure, high-intensity, Ultraviolet
- ✓ Low-pressure, high-intensity, Ultraviolet

The DSRSD Master Plan recommends use of DynaSand Filters with either hypochlorite or medium-pressure UV for disinfection. Costs for the 16.5 mgd facility (maximum daily flow) are expected to be in the order of $13 M not including the pump station, or approximately $800,000 per mgd of capacity. Operational costs are expected to be $400,000 to $500,000 per year, or $24,000 to $30,000 per year per mgd of capacity. For purposes of this study, values of $800,000 and $30,000 per mgd of capacity are used for capital costs and O&M expenses, respectively.

Pipelines

Table 4-3 summarizes the capital cost assumptions for pipeline construction. These are typical costs for pipe construction in the Bay Area. It is assumed that pipelines would be constructed in existing streets and include paving and traffic control. Pipeline costs also include trenching, placing and jointing of pipe, installing valves and fittings, and using native material for subsequent backfill. Imported backfill is frequently used in Pleasanton for subsequent backfill and could increase the cost for pipeline installation. The increment for imported material is not expected to substantially change the unit costs to the point where the project feasibility is impacted and would most likely be accommodated by contingencies added to project costs.

Table 4-3 • Pipeline Construction Unit Costs

Pipe Size (in)	Material	Unit Cost ($/ft)
4	PVC	45
6	PVC	50
8	PVC	60
10	PVC	72
12	PVC	90
16	DIP	100
20	DIP	120
24	DIP	140

Pump Stations

Table 4-4 summarizes the capital cost assumptions for pump stations. Capital construction costs for pump stations are assumed to be a direct function of connected horsepower. Cost curve data for a large number of pumps were used to develop this data. The unit costs presented below include typical costs for construction of pump stations, including site grading, structures, equipment, piping, electrical and instrumentation, and sound insulation. There are no cost allowances for emergency stand-by power generators and engines, landscaping, or land acquisition.

Table 4-4 • Pump Station Construction Unit Costs

Installed Horsepower	Unit Cost ($/h.p.)
100	4,800
200	3,750
300	3,500
400	2,850
500	2,375
600	2,100
700	1,930
800	1,850
900	1,790
1000	1,750

Storage Tanks

The assumed capital construction cost for storage tanks is $0.60/gal storage. These costs assume construction of aboveground steel storage tanks and are based upon our experience with recent recycled water storage tank construction costs in California.

User Retrofits

User retrofit construction costs can be expressed as a function of the amount of recycled water delivered to the individual user. This is because the cost of backflow preventers, valves, meters, and other fittings required for retrofitting a user are dependent upon the size of the connection, which is a function of the recycled water demand. These retrofit construction cost assumptions are summarized in **Table 4-5** and are based upon experience with recycled water user retrofits. For retrofit engineering, a fixed cost of $10,000 per retrofit is also assumed. Retrofit engineering costs are relatively independent of the size of the connection.

Table 4-5 • User Retrofit Costs

User Demands (AFY)	Unit Cost ($/User)
Less than 20 AFY	10,000
20 AFY to 50 AFY	25,000
Greater than 50 AFY	100,000

ANNUAL COSTS

Annual costs were estimated including amortized capital costs, O&M costs, and annual salt mitigation costs. A 25 percent contingency was assumed for annual costs. The basis for the cost assumptions is explained in detail below.

Amortized Capital Costs

The fixed costs of borrowing and repaying capital invested in a project, comprised of interest and repayment of principal, are termed the amortized capital costs. Cost assumptions used in amortized capital costs are as follows:

1) Pipeline and reservoir capital costs are amortized over 50 years. All other capital costs are amortized over 30 years.

2) All capital costs are amortized at 6 percent annual interest.

O&M Costs

It was assumed that all pump stations and reservoirs would be designed for unattended operation. Pipeline and reservoir O&M costs are assumed at 0.2 percent of capital costs.

Pump station O&M costs are assumed at 2 percent of capital cost plus $20,000 per year labor and a $0.095/KW-Hr pumping power cost. O&M costs do not include any allowance for meter reading and billing (typically 2% to 3% of total annual O&M costs) or accrual of funds for system replacement, which typically is approximately 2% of total capital costs annually.

Salt Mitigation and Costs

During the preparation of the Salt Management Plan, Zone 7 has evaluated a whole series of salt management methods to address the increasing salt loading in the Valley. These methods include:

- ✓ Well-head demineralization to remove and export salt through the Livermore Amador Valley Water Management Agency (LAVWMA) wastewater effluent export pipeline.
- ✓ Increased groundwater pumping (conjunctive use) to promote more salt export through the LAVWMA pipeline. Increased pumping coupled with importing and recharging lower TDS water reduces the groundwater TDS over time.
- ✓ Pumping high TDS concentration groundwater during winter months into the arroyos for export to the San Francisco Bay.
- ✓ Groundwater recharge with demineralized recycled water.
- ✓ Various combinations of the above methods.

Based on evaluation of the above alternatives, Zone 7 estimates that salt mitigation cost will be approximately $400 per ton of salt applied to the main basin for operating costs only, not including any capital costs for wellhead demineralization. This estimate is based upon the composite projected unit cost ($/ton of salt removed) to increased groundwater pumping (conjunctive use), remove salt via wellhead demineralization, and use of demineralized recycled water. While a salt mitigation fee structure has not yet been finalized, as part of its Salt Management Plan, Zone 7 has considered various alternatives to recover the costs for implementation of salt management. Zone 7 staff has indicated that if Pleasanton were to implement non-demineralized recycled water use over the main groundwater basin, that additional capital facilities, in addition to those already planned, may be needed in order mitigate the impact of additional salt from recycled water.[4]

One alternative being considered is that Zone 7 would integrate the costs for implementing a salt management program into the treated water price to the four Tri-Valley water retailers. Under this approach existing and future potable water customers would pay all salt mitigation costs, including any associated with recycled water use. No special salt mitigation fee would be assessed to recycled water customers or to the agencies. This alternative would be the least restrictive and would tend to encourage agencies and users to implement recycled water use.

Another alternative would assess some salt mitigation fee for the incremental salt loading added to the groundwater basin above the amount contributed by potable water. For

[4] Personal communication with Zone 7 staff.

example, if the potable water currently being used to irrigate a park in the City has a TDS level of 350 mg/L, and the recycled water that will replace it has a TDS level of 600 mg/L, the salt mitigation assessment will be based upon the *increment of* 250 mg/L in the recycled above the potable water TDS (e.g. 600 mg/L – 350 mg/L = 250 mg/L). *(At 250 mg/l, there are 0.34 tons of salt in every AF of water. The cost to remove 0.34 tons of salt at $400 per ton would be $136 per AF.)*

A third alternative would assess a salt mitigation fee for the all salt loading added to the groundwater basin. For example, if the recycled water has a TDS level of 600 mg/L, the salt mitigation assessment will be based upon the *total* 600 mg/L in the recycled water. *(At 600 mg/l, there are 0.816 tons of salt in every AF of water. The cost to remove 0.816 tons of salt at $400 per ton would be $326 per AF.)* The basis for this approach is that although the potable water would no longer be used for irrigation at the recycled water customer site, it would be used for the irrigation of new development elsewhere over the basin where it would continue to impact the local basin salt loading. Zone 7, the City of Pleasanton and other valley water retailers are currently discussing this concept in efforts to develop the most appropriate approach to salt mitigation.

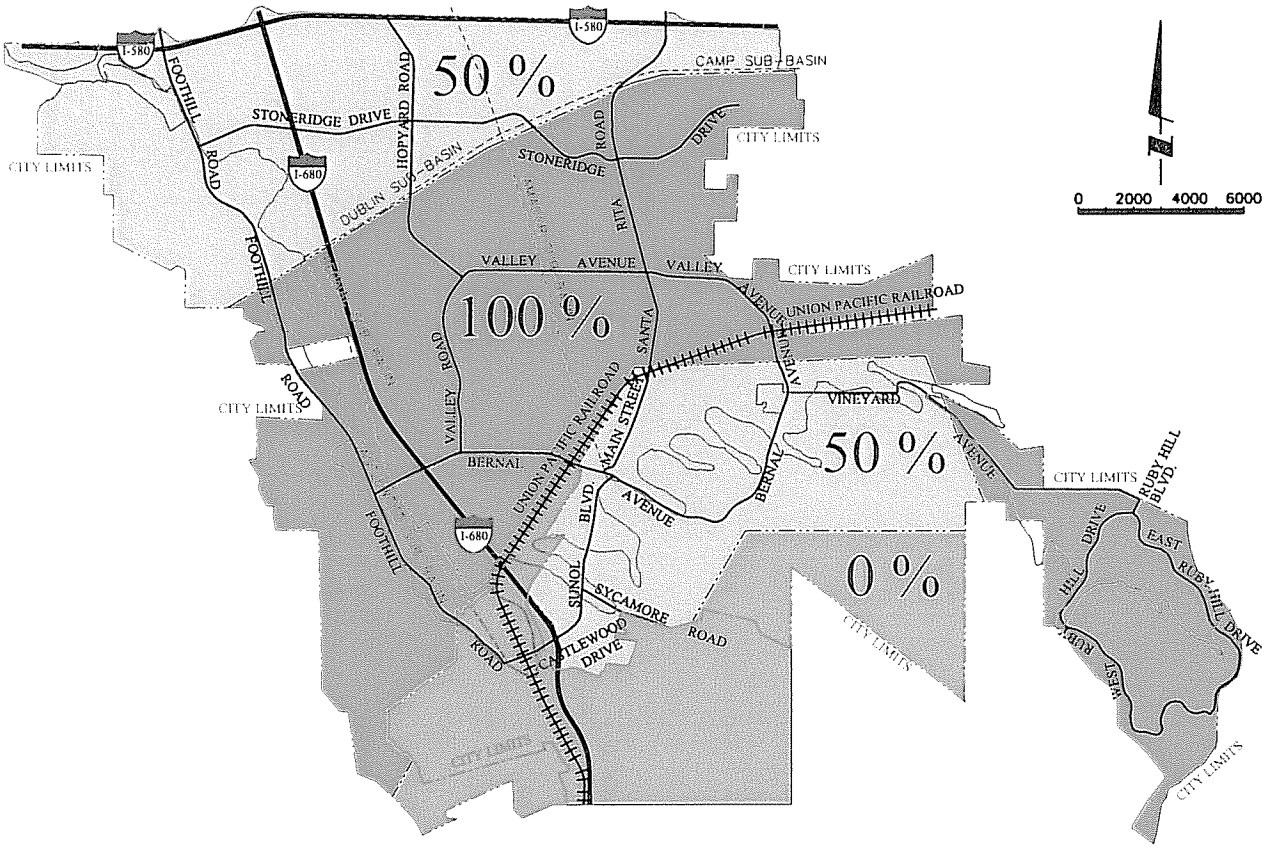
Based upon local groundwater hydrogeology and the movement of water within local basins, it is recognized by Zone 7 that salt-loading impacts may vary significantly from one point in the study area to another. On this basis, Zone 7 has indicated its intent to designate salt mitigation zones within the project study area. For purposes of this study, potential salt mitigation zones were developed in preliminary discussions with Zone 7. These potential zones are intended to delineate the relative impacts to the main basin of irrigation water salt loading within each zone, on an order of magnitude basis. Zones have been identified by Zone 7 which could require 100 percent mitigation (e.g. the City would be assessed $400/ton for 100 percent of the salt in recycled water applied by users in this zone). The basis for these zones is the assumption that 100 percent of the applied salt would eventually migrate into the main basin groundwater. Potential salt mitigation zones were also classified as 50 percent and 0 percent zones, where the City would be assessed $400/ton for 50 percent and 0 percent of the applied salt in the irrigation water, respectively. The approximate boundaries of these potential salt mitigation zones are shown in **Figure 4-1**.

The total amount of recycled water that would be applied annually by users in each of the individual salt mitigation zones was calculated for each alternative distribution system. An annual salt mitigation fee of $400/ton was assumed for the total amount of salt applied by users in each of the individual salt mitigation zones after adjustment for zone classification. A total TDS level of 600 mg/L was assumed for the applied recycled water based upon water quality analyses conducted at the DSRSD wastewater treatment plant (see **Section 6**).

Clean Water Revival Costs for Salt Mitigation

The DSRSD Clean Water Revival Project will demineralize tertiary treated recycled water. The CWR Project was planned and constructed for the purpose of expanding the wastewater disposal capacity for DSRSD. Pleasanton has the option to participate in the

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



LEGEND

- 0 % Salt Mitigation Zone
- 50 % Salt Mitigation Zone
- 100 % Salt Mitigation Zone
- Groundwater Main-basin Boundary
- Groundwater Sub-basin Boundary
- Pleasanton City Limits
- Interstate Freeways
- City Streets
- Union Pacific Rail Road

* ZONE 7 WATER AGENCY

FIGURE 4-1
SALT MITIGATION ZONES*
NOVEMBER 1999

HydroScience Engineers, Inc.

CWR Project by agreeing to fund its portion with capital from the Regional Treatment Facilities Expansion Fund. If funded in this manner, additional capital costs would not be incurred for water recycling since the facilities would be paid with the purpose of expanding wastewater disposal capacity. Based on discussion with DSRSD staff[5], the O&M cost of for the CWR Project is estimated to be $375 per AF while operating at full capacity of 2.5 mgd and reducing the TDS from 600 mg/l to 40 mg/l. At a rate of $375/AF, the CWR water will cost approximately $500/ton to remove salts. If Pleasanton chooses not to fund a portion of the CWR Project with expansion funds the additional amortized capital costs would increase the costs of CWR water to approximately $750/AF, which would increase the cost for salt removal to approximately $1,000/ton.

For the purposes of this study, a salt mitigation cost of $400/ton will be used based on the costs estimated by the Zone 7 salt management planning process.

[5] Discussion with Dave Requa on April 22, 1999.

SECTION 5 • MARKET ASSESSMENT

SECTION 5 • MARKET ASSESSMENT

In the Market Assessment, potential recycled water customers were identified and specific data was collected for each customer. This data was then stored in a database constructed specifically for recycled water customers. Next, the data was sorted and assessed to develop a picture of likely and realistic recycled water systems. Maps were developed to illustrate this step.

METHODOLOGY

The methodology used to identify and assess the customer market is summarized below.

IDENTIFICATION OF IRRIGATION CUSTOMERS

The City of Pleasanton currently serves potable water to most irrigation customers within the City limits. Meters identified as irrigation meters serve most of these customers. As a result, most of the potential customers were identifiable through irrigation meter records. City staff performed a database search to identify all irrigation meter accounts with a demand of 2 acre-feet per year (AFY) and larger. These customers were located on a city map based on meter address.

A handful of potential customers are not yet constructed or do not obtain irrigation water from the City. These customers were identified primarily through discussions with City staff. In addition, the City General Plan and the Bernal Property Specific Plan were reviewed to collect data on these potential customers. An aerial photograph of the City was also obtained and reviewed as a check to make sure that significant "green spots" were not missed in the efforts described above.

CUSTOMER DEMANDS

Since most of the potential customers were identified through meter records, actual water usage data was available. For these customers, recycled water demands were calculated directly from meter records for 1997. Since these meters were identified as irrigation meters, it was assumed that 100 percent of the usage would be available as potential recycled water demand for most of the customers. However, for some customers, the City indicated that a portion of the demand could also serve potable uses. For these customers, it was assumed that only 80 percent of the identified usage would be available as recycled water demand.

Several of the largest potential recycled water customers in the study area are either not yet constructed or are not supplied water by the City. These potential customers include:

- The Castlewood Country Club golf courses,
- The future golf course and development on the Bernal property,
- The future Pleasanton golf course in south Pleasanton, and

- The Ruby Hills golf course.

In the Draft Environmental Impact Report for the Bernal property (May 1997), the recycled water demand for the golf course was estimated as 395 AFY (preferred alternative). This demand was used in this study for planning purposes. For the other potential customers listed above, recycled water demand was estimated using estimated acreage and the unit irrigation demand developed in **Section 4**. Although not included in the market assessment, the new residential and commercial/office/industrial (COI) development within the Bernal property could also be served by a recycled water system. Estimates prepared by the Pleasanton Planning Department indicate that approximately 50 acres of park lands are included as part of the Bernal property development. This would represent approximately 150 AFY demand in addition to the golf course. Additional landscaped medians could also be served by a recycled water system, depending on their proximity to the golf course and any parks being served.

The potential for additional irrigation customers associated with new residential and COI development has not been included in this study although there would likely be additional irrigation demands. More discussion is provided in Section 9 regarding Pleasanton's future water demands.

A typical 18-hole golf course has a total acreage of approximately 200 acres. However, depending on the landscaping scheme, as little as 50 percent of the acreage may be irrigated. For purposes of this feasibility study, it was assumed that 100 acres of turf would be irrigated at each 18-hole golf course. The unit irrigation demand developed in **Section 4** is 42.1 inches per year, or 3.5 feet per year. Thus, typical golf course irrigation demand was calculated as follows:

100 acres x 3.5 feet = 350 acre-feet/year.

For purposes of this study, it was assumed that the recycled water demand would be 350 AFY for the Castlewood Country Club golf courses (upper and lower), the Ruby Hills golf course, and the future City of Pleasanton golf course.

CUSTOMER DATABASE

The customer information was entered into a computer database for storage and manipulation. Initially, only account numbers, account addresses, and water usage data were available. These data were entered into the database and a unique *ID number* was assigned to each meter account. Later, account names were provided for the account numbers. After this data was entered, a database query was performed to match the account names with the account. The account names generally reflect the owner or operator of the facility. By comparing meter locations to City maps, it was possible to develop more specific customer names. Where possible, the account names were replaced by the more specific customer names. For instance, an account name such as *City of Pleasanton - Parks Department* was replaced by a customer name such as *Harvest Park*. This raw data is presented in **Appendix C**, sorted by customer name.

After the account names were matched with account numbers, it became apparent that many potential customers have multiple meters. For example, a typical business park might have separate landscape irrigation meters for each tenant. In order to facilitate the development of a map that shows all potential customers, the customers with multiple meters were grouped together, under the lowest ID number in the group. The recycled water demands were also totaled for all of the meters grouped under one ID number. This list of customers is presented in **Appendix D**. To distinguish this list from the raw data in **Appendix C**, the ID numbers are referred to as *Customer Numbers* in **Appendix D**. The gaps between customer numbers are ID numbers that have been grouped and no longer appear as separate entries.

Customers were grouped in two general categories depending on likelihood to connect to a recycled water system. Customers considered likely to connect were listed as *Potential Customers*. Generally, these were customers that were already connected to the City's potable water distribution system. The future City of Pleasanton golf course was also included in this category, as the City would promote the use of recycled water at its golf course. The future golf course on the Bernal property was also included in this category. Even though this facility would be outside the city limits, the Specific Plan for the project indicates that recycled water would be used for the golf course if available.

Customers considered not likely to connect initially but that may connect in the future were listed as *Future Potential Customers*. This category generally includes customers that currently have an alternate source of water. The Castlewood Country Club golf courses and the county fairgrounds fall into this category. They were included in the customer list because they could become customers should the availability of their alternate sources of water change in the future.

SUMMARY OF RECYCLED WATER DEMANDS

Customers were further grouped according to size within the Potential Customer category. The groupings are illustrated in **Table 5-1**, which summarizes the recycled water demands in each category and grouping listed above.

Table 5-1 • Summary of Recycled Water Demands

Category/Grouping	Average Annual Demand (AFY)
Potential Customers	
< 7 AFY	481
7 – 10 AFY	393
11 – 25 AFY	1,120
26 – 50 AFY	588
> 50 AFY	2,060
Subtotal	**4,642**
Potential Future Customers	910
TOTAL	**5,552**

Figure 5-1 shows all potential and future potential irrigation customers with a demand of 7 AFY or more. The customers are color coded by size.

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY

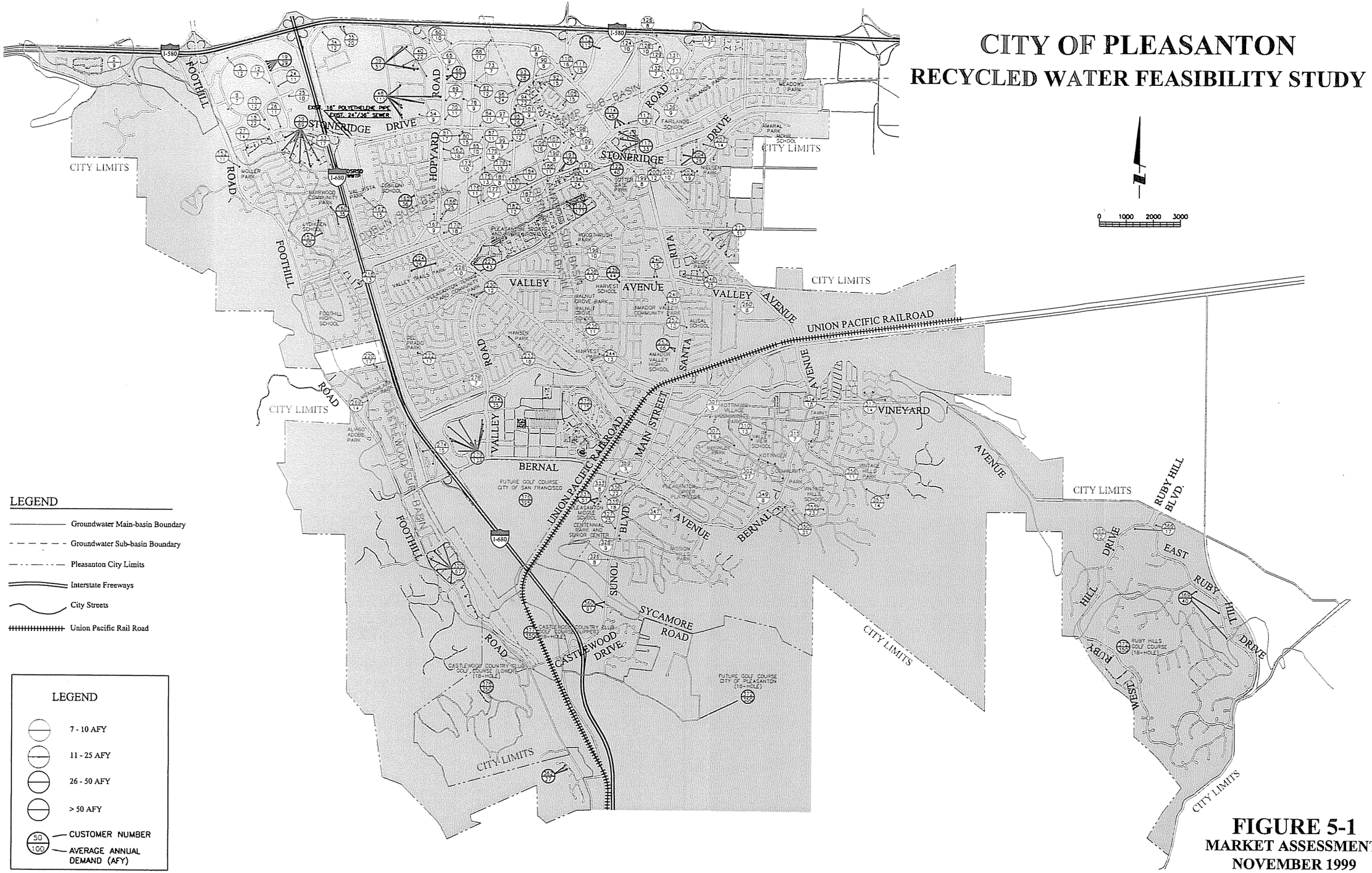


FIGURE 5-1
MARKET ASSESSMENT
NOVEMBER 1999

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SECTION 6 • RECYCLED WATER SUPPLY

SECTION 6 • RECYCLED WATER SUPPLY

All of the recycled water supply for a recycled water project in the City of Pleasanton would originate at the DSRSD WWTP in Pleasanton. The DSRSD WWTP currently has a capacity of 11.5 mgd and effluent is discharged through the Livermore-Amador Valley Water Management Agency (LAVWMA) outfall to Hayward where it is pumped into the East Bay Discharger's Authority (EBDA) pipeline for disposal to the San Francisco Bay. The current average wastewater flow from Pleasanton to the DSRSD WWTP is approximately 5.5 mgd, and the City has an ultimate capacity of approximately 7.1 mgd at the WWTP.

WASTEWATER FLOWS

The continuous supply of wastewater that would be available to the City for a recycled water project must be sufficient to meet the peak day demands within the system. Peak irrigation demands typically occur in the hot drier months of the summer when wastewater flows are lowest. Operational storage and pumping would be designed to accommodate peak delivery demands that occur over the course of a day. **Table 6-1** summarizes projected wastewater flows from Pleasanton to the DSRSD WWTP in the year 2000 and at build-out.

Table 6-1 • Summary of Pleasanton Wastewater Flows

Year	Projected Monthly Wastewater Flows in Acre-Feet[a]												Total (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2000[b]	646	661	670	590	579	583	560	550	561	563	565	593	**7,120**
Build-Out[c]	910	930	943	830	815	821	788	775	789	793	795	835	**10,024**

[a] Projected monthly wastewater flows are distributed based on current variations in monthly flow. Monthly flow is the sum of average dry weather (ADW) flow plus total infiltration and inflow (I/I) for that month.

[b] Reference: San Ramon Valley Recycled Water Program, Facilities Plan, Montgomery Watson, 1996.

[c] Build-out flows are based on an ADW flow of 8.4 mgd (9,408 AFY), plus allowances for I/I. 8.4 mgd is the low end of the range of build-out flows projected in the Pleasanton General Plan.

RECYCLED WATER QUALITY

Table 6-2 summarizes recent secondary effluent quality from the DSRSD WWTP. **Table 6-3** compares the quality of this effluent with established quality criteria for various use restrictions.

Table 6-2 • Summary of DSRSD WWTP Secondary Effluent Water Quality

Constituent	Units	Data From DSRSD				Other Data Source[b]
		Average[a]	Minimum[b]	Maximum[b]	Notes	
Total Dissolved Solids (TDS)	mg/l	571	493	681	(c)	678
Alkalinity as CaCO3	mg/l					264
Aluminum	µg/l					30
Ammonia Nitrogen	mg/l as N	25.1	16.3	34.0	(c)	35
Antimony	µg/l	<0.0017	<0.001	<0.005		0.85
Arsenic	mg/l				(c)	1.1
Barium	µg/l					50
Beryllium	µg/l					5
Bicarbonate Alkalinity	mg/l	260	220	300	(c)	
BOD (5-day)	mg/l	9.3	5.7	13.9	(c)	
Boron	mg/l	0.7	Na	Na	(f)	0.6-0.7
Cadmium	mg/l	<0.0005	<0.0002	<0.0009	(c)	0.6
Calcium	mg/l	89	64	127	(c)	30
Chloride	mg/l	109	82	140	(d)	110
Chromium	mg/l	<0.0058	<0.001	<0.0023	(c)	5.3
Conductivity (EC)	mmhos/cm = dS/m	0.89	0.77	1.06	(d)	
Copper	mg/l	<0.02	<0.01	0.088	(c)	30
Cyanide	mg/l	<0.0097	<0.0061	<0.01	(c)	<10
Dissolved Oxygen	mg/l	6.4	5.8	6.8	(c)	
Fluoride	mg/l					0.5
Hardness	mg/l as CO3	158	120	210	(d)	116
Iron	mg/l	0.19	Na	Na	(d)	190
Lead	mg/l	<0.002	<0.002	<0.002	(c)	<10
Magnesium	mg/l	15.7	14	18	(d)	15
Manganese	mg/l	0.029	0.021	0.042	(d)	30
Mercury	mg/l	<0.0001	<0.0001	<0.0002	(c)	0.1
Molybdenum	mg/l	<0.01	Na	Na	(c)	
Nickel	mg/l	<0.004	<0.001	<0.004	(c)	4.5
Nitrate as NO3	mg/l as N	3	<0.5	5.1	(d)	
Nitrite	mg/l as N	2.2	0.92	4.4	(d)	3
Organic Nitrogen	mg/l as N	34	Na	Na	(d)	
pH	-----	7.7	7.5	7.7	(c)	7.7
Phosphate (PO4)	mg/l as P	10.4	8.2	12	(d)	
Potassium (K)	mg/l	14.5	11	26	(d)	13
Selenium	mg/l	<0.001	<0.001	<0.005	(c)	<1
Silica (SiO3)	mg/l	19	17	21	(d)	20
Silver	mg/l	<0.001	<0.0002	0.0078	(c)	1.8
Sodium	mg/l	127	110	150	(d)	
Sodium Adsorption Ratio (SAR)	---	4.7	4.2	5.3	(e)	140
Specific Conductance	µmho/cm					no data
Sulfate (SO4)	mg/l	105	84	130	(d)	105
Temperature	Degrees C	21	17	26	(c)	
Thallium	µg/l					<0.1
Total Coliform	MPN/ 100 ml					no data
Total Coliform Bacteria	MPN/ 100 ml	<2	<2	2	(c)	
Total Organic Carbon	mg/l					no data
Total Phosphorus	mg/l as P	4.2	3.5	4.7	(d)	
Total Trihalomethanes	µg/l					4-6
Tritium	pCi/l					non-detect
Turbidity	NTU					4-6
Zinc	mg/l	0.043	0.023	0.071	(c)	27

Notes:

a. Average value based on monthly average data, when available. A single value is used when no additional data is available.
b. Minimum and maximum values based on monthly average data.
c. Data based on 1995 monthly averages of a secondary effluent from DSRSD.
d. Data from secondary effluent samples collected on 10/7/93, 1/12/94, 7/5/95 and 10/4/95.
e. SAR = [Na] / (([Ca]+[Mg])/2)$^{0.5}$, ion concentrations expressed as meq/L.
f. From average value of secondary effluent samples collected on 1/29/96, 1/30/96, and 1/31/96.
g. na = not available or not applicable.
h. The average of three quarterly samples taken on October 7, 1993, January 12, 1994, and April 4, 1994 by DSRSD staff for a feasibility study performed by Separation Processes, Inc.

Table 6-3 • Summary of DSRSD Recycled Water Quality for Irrigation of Landcapes, Turfgrasses, and Golf Courses[d]

Irrigation Water Key Quality Parameter	Units	Established Criteria Degree of Use Restriction[b]			DSRSD Recycled Water[a]	
		None	Slight to Moderate	Severe	Value	Relative Degree of Restriction on Use
Salinity EC TDS	DS/m mg/l	<0.7 <450	0.7-3.0 450-2000	>3.0 >2000	EC=0.89 TDS=571	No restrictions for tolerant plants. Slight to moderate restrictions for sensitive plants and caution on very sensitive plants.
Permeability[c] SAR = 3-6		EC>1.2	EC=1.2-0.3	EC<0.3	SAR=4.7 EC=0.89	None to slight restrictions.
Sodium Root Absorption Foliar Absorption	SAR mg/l	<3 <70	3-9 >70	>9	SAR=4.7 Na=127	Root uptake slight to moderate. Foliar uptake by sprinkler irrigation should be minimized during periods of low humidity (<30%).
Chloride Root Absorption Foliar Absorption	 mg/l mg/l	 <70 <100	 70-355 >100	>355	Cl=109	Slight to moderate restrictions for sprinkler irrigation.
Boron	mg/l	<1.0	1.0-2.0	>2.0	B=0.7	No restrictions.
Bicarbonate	mg/l	<90	90-500	>500	Bicar = 260	Slight to moderate restrictions for sprinkler irrigation. May increase soil pH.
pH			6.5-8.4		pH=7.7	No restrictions.
Trace Elements	mg/l		Variable by Element		<Stds	No restrictions.

Notes:

a. Method and Timing of Irrigation: Assume normal surface and sprinkler irrigation methods are used. Water is applied as needed, and the plants utilize a considerable portion of the available stored soil water (50% or more) befc the next irrigation. At least 15% of the applied water percolates below the root zone (leaching fraction [LF] > 15%). Site conditions: Assume soil texture ranges from sandy loam to clay with good internal drainage with uncontrolled shallow water table present.

b. Definitions of "The Degree of Use Restriction terms:
   - **None** = Recycled water can be used similarly to the best available irrigation water.
   - **Slight** = Some additional management required above that with potable irrigation water, e.g., leaching salts from root zone and/or choice of plants.
   - **Moderate** = Increased level of management required and choice of plants limited to those which are intolerant of the specific parameters.
   - **Severe** = Typically cannot be used to limitations imposed by the specific parameter.

c. Permeability is evaluated on the basis of sodium adsorption ratio (SAR) and electrical conductivity (EC) in combination.

d. From Haravendi, M.A., Wastewater Reuse for Golf Course Irrigation, Lewis Publishers, Chelsea, MA, 1994.

SECTION 7 • DEVELOPMENT OF ALTERNATIVE DELIVERY SYSTEMS

SECTION 7 • DEVELOPMENT OF ALTERNATIVE DELIVERY SYSTEMS

METHODOLOGY

During the market assessment, potential recycled water customers were identified. All potential customers with a demand greater than 7 AFY are shown on **Figure 5-1** (approximately 283 customers). The total recycled water demand for all customers shown on **Figure 5-1** is **5,071 AFY**. This is approximately 90 percent of the total recycled water demand identified, as shown in **Table 5-1**. Since some allowance must be made for a percentage of customers that will not connect to the system, not including customers smaller than 7 AFY can be considered as this allowance. The resulting assumption is that approximately 90 percent of potential demand for any alternative will ultimately connect to the system.

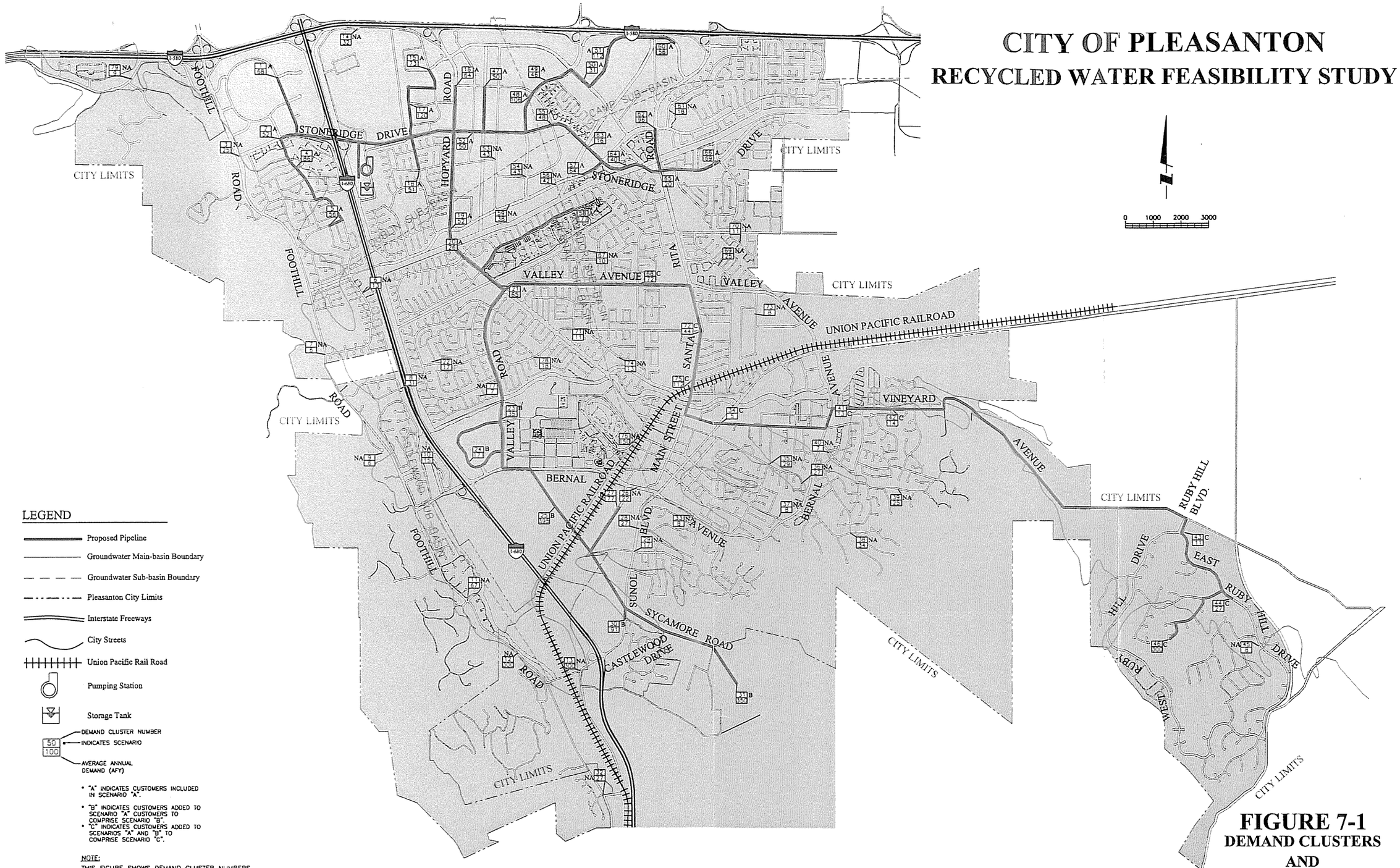
In order to facilitate the development of alternative delivery systems, the map of potential customers shown in **Figure 5-1** had to be simplified. This was done by grouping adjacent customers into *demand clusters*. Generally, customers that could be serviced by the same distribution lateral were grouped together. A list of the resulting demand clusters, the customers included in each cluster, and the grouped recycled water demands is included in **Appendix E**. The demand clusters are illustrated in **Figure 7-1**, along with the potential pipeline alignments to reach these customers. Three different potential project scenarios are identified in the following sections. Scenario A is the smallest alternative to serve potential customers in North Pleasanton; Scenario B adds customers in the south portion of Pleasanton; and Scenario C is the largest project alternative which considers irrigation sites added in southeast Pleasanton. Figure 7-1 presents all of the potential recycled water irrigation sites evaluated. Scenario A is comprised of the sites identified with an "A", Scenario B includes sites "A" and "B", while Scenario C is sites "A", "B" and "C".

BACKBONE DISTRIBUTION PIPING ALTERNATIVES

Once the customers were grouped into demand clusters, potential pipeline alignments and distribution system components could be conceptualized. Two comprehensive pipeline network alternatives that would service all of the demand clusters were sketched. Though these backbone alternatives included piping to reach demand clusters, additional smaller diameter laterals would be required to reach each individual customer within the clusters. For comparison between alternatives, these small laterals were neglected. Both alternatives described below utilize the existing 16-inch diameter polyethylene pipeline in Stoneridge Drive, between Johnson Drive and Hopyard Road.

In **Alternative 1**, the backbone transmission main would be located in Hopyard Road and Valley Avenue. This route was chosen because it would be the most direct route in City streets to the South Pleasanton area, which includes two future golf courses. In addition, a number of demand clusters are located adjacent to Hopyard and Valley. Easy access is available from this backbone to extend distribution laterals to demand clusters in other

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



LEGEND

- Proposed Pipeline
- Groundwater Main-basin Boundary
- Groundwater Sub-basin Boundary
- Pleasanton City Limits
- Interstate Freeways
- City Streets
- Union Pacific Rail Road
- Pumping Station
- Storage Tank
- DEMAND CLUSTER NUMBER
- 50 / 100 — INDICATES SCENARIO
- AVERAGE ANNUAL DEMAND (AFY)

- "A" INDICATES CUSTOMERS INCLUDED IN SCENARIO "A".
- "B" INDICATES CUSTOMERS ADDED TO SCENARIO "A" CUSTOMERS TO COMPRISE SCENARIO "B".
- "C" INDICATES CUSTOMERS ADDED TO SCENARIOS "A" AND "B" TO COMPRISE SCENARIO "C".

NOTE:
THIS FIGURE SHOWS DEMAND CLUSTER NUMBERS. FOR H_2ONET NODE NUMBERS USED IN MODELING, SEE FIGURE 8-1.

FIGURE 7-1
DEMAND CLUSTERS AND POTENTIAL PIPELINE ALIGNMENTS
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areas of the City. In **Alternative 2**, the backbone distribution main would be constructed in the Alamo Canal access road. In this alternative, distribution laterals would also extend to service all of the demand clusters.

It was thought that construction might be less costly in Alternative 2 because the canal access roads are unimproved and traffic control would not be required. Zone 7 Water Agency was contacted regarding the possibility of locating recycled water distribution pipelines in the canal access roads. Zone 7 indicated that they strongly discourage the use of the canal banks for utilities. In general, they will not allow use of their canal banks unless there are no alternatives. Zone 7 also indicated that if the canal access roads were used for pipeline alignments, they would likely require that the City provide an improved road surface. In addition, Zone 7 is concerned about slope stability on the canal banks. As a result, they would probably require the City to assess the slope stability and perform any stabilization indicated during construction of the pipelines. These additional requirements would significantly increase the cost of construction in the canal banks.

DSRSD was also contacted, as the canal banks were considered for the Clean Water Revival Project pipelines. Due to similar constraints, DSRSD abandoned any alternatives that included alignments in the canal banks. After discussion with City staff, it was decided not to consider Alternative 2 any further in this feasibility study. As a result, the distinction between *Alternative 1* and *Alternative 2* was dropped in any subsequent development of pipeline alignments. In addition, subsequent alignments are referred to as *scenarios* for this project, to distinguish between the alternatives described above.

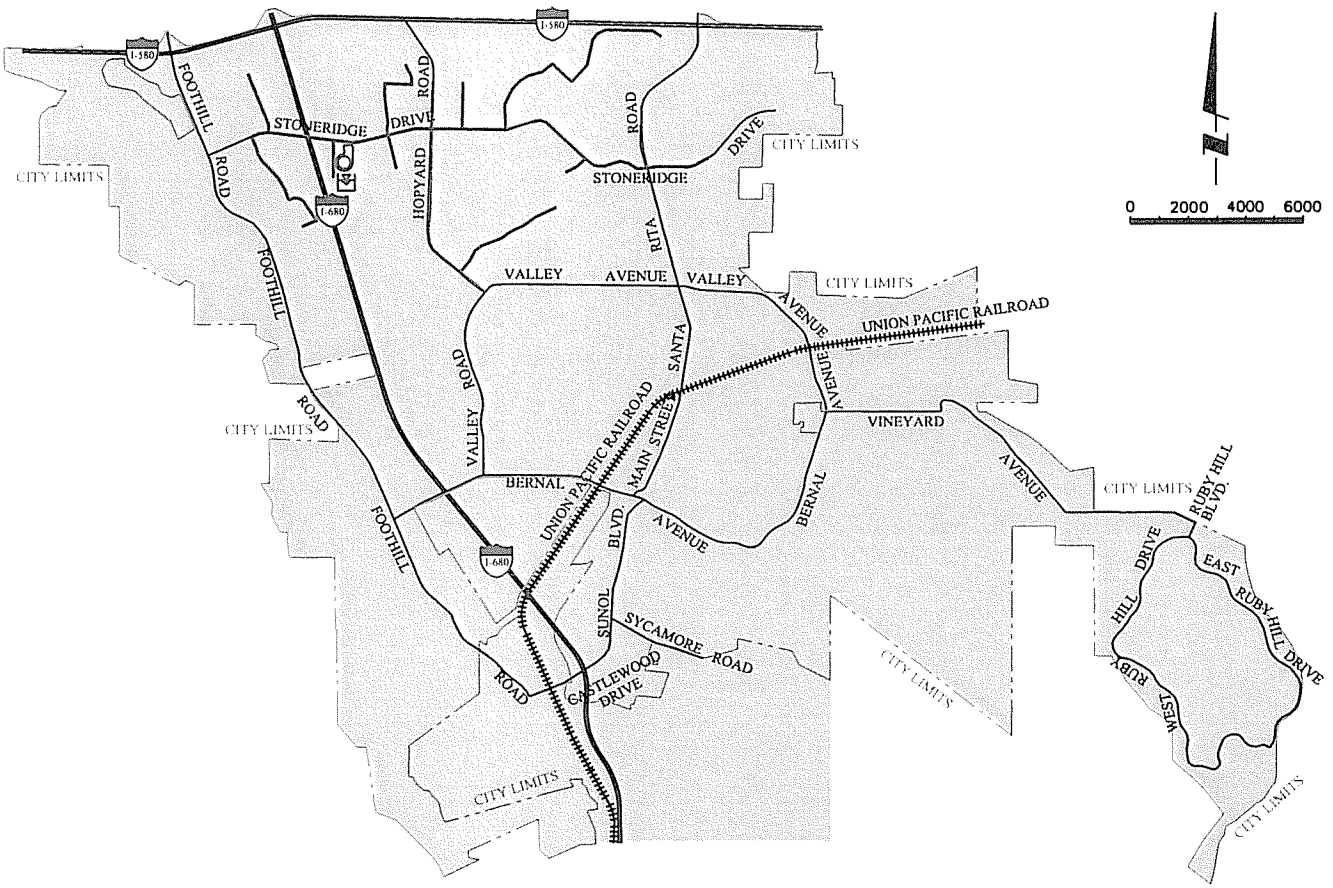
DESCRIPTION OF SCENARIOS

The comprehensive alternative developed above was streamlined by eliminating long laterals of distribution pipeline that service demand clusters smaller than 50 AFY. In addition, laterals to customers classified as *future potential customers* were eliminated because these customers are not likely to connect unless their current water supply situation changes dramatically. This streamlining process resulted in a more realistic system that could be modeled hydraulically and economically. The total annual average recycled water demand resulting from this streamlined system is **3,441 AFY**. This system was then broken into three scenarios. These scenarios are described below.

Scenario A

Scenario A is the smallest of the three projects. This system generally includes only the pipelines required to service demand clusters in and adjacent to the Hacienda Business Park. The system would extend south to include the Pleasanton Sports and Recreation Park and the Pleasanton Tennis and Community Park. The system would also extend west across Interstate 680 to service demand clusters in the Stoneridge Mall area. However, Scenario A does not include the long run of pipeline required to serve any of the golf courses, future or existing. The total annual average recycled water demand included in Scenario A is **1,695 AFY**. Scenario A is shown in **Figure 7-2**.

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



LEGEND

- Proposed Pipeline
- Pleasanton City Limits
- Interstate Freeways
- City Streets
- Union Pacific Rail Road
- Pumping Station
- Storage Tank

FIGURE 7-2
SCENARIO A
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Scenario B

Scenario B extends Scenario A to include the pipelines required to service the two future golf courses in south Pleasanton (Bernal property development and City golf course). The scenario also includes demand clusters in the vicinity of Koll Center and the Pleasanton Middle School. The backbone pipeline runs through the Bernal property to facilitate connection of the future golf course and minimize pipeline lengths. The total annual average recycled water demand for Scenario B is **2,815 AFY**. Scenario B is illustrated on **Figure 7-3**.

Scenario C

Scenario C is the complete streamlined system described in the beginning of this report section. This system includes the areas covered in Scenario B, plus the facilities necessary to supply recycled water to the Ruby Hills area. The backbone pipeline to the Ruby Hills area runs along Valley Avenue, Santa Rita Road, and Vineyard Avenue. The alignment also includes demand clusters near Harvest School, Amador Valley Community Park, and Amador Valley High School. However, many smaller demand clusters in the Vintage Hills area were not included because they would require fairly extensive piping to reach a relatively small amount of recycled water demand. The total average annual recycled water demand for Scenario C is **3,441 AFY**. **Figure 7-4** is a map of this scenario.

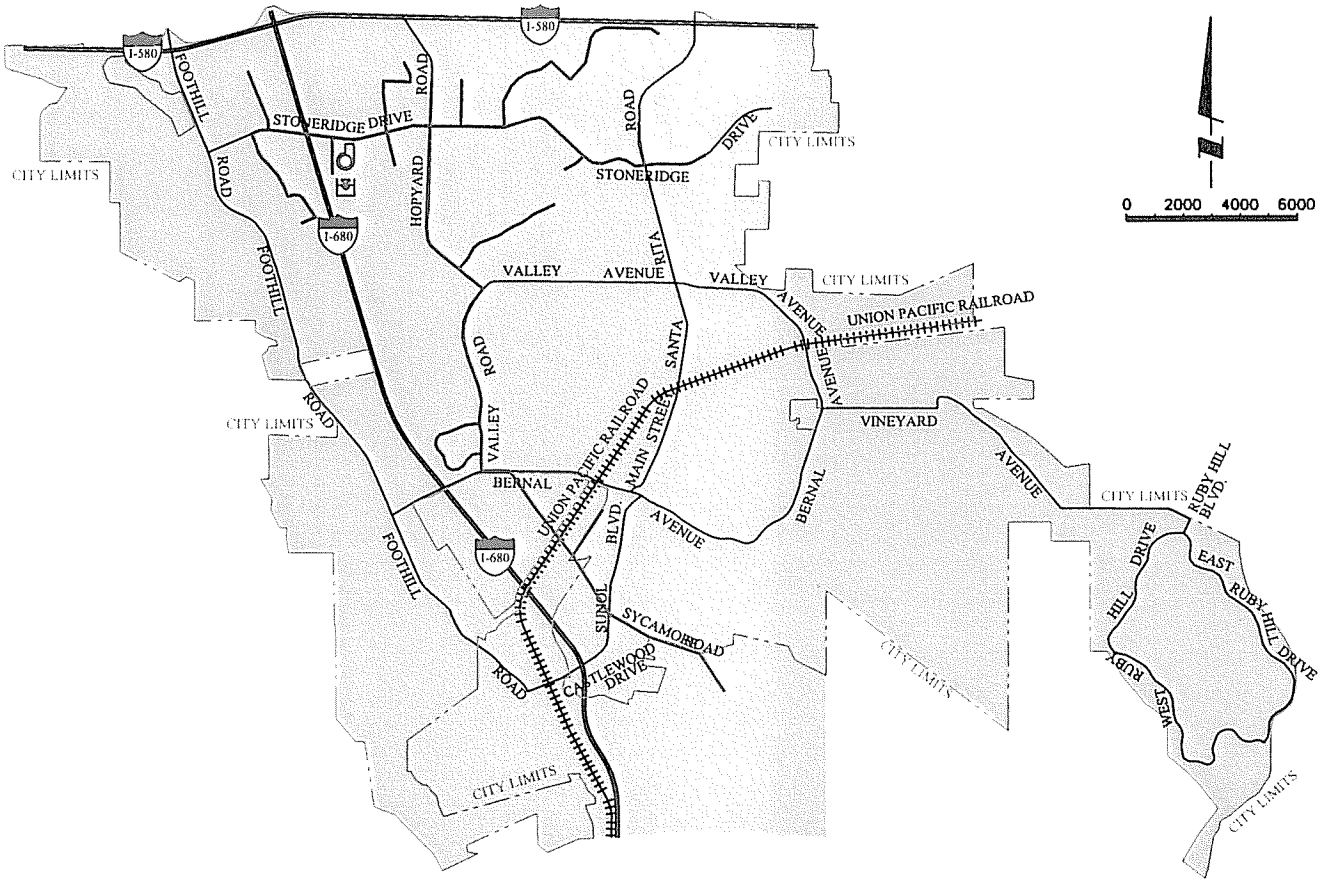
SUMMARY OF DEMANDS

Table 7-1 below shows a summary of the demands described in this section.

Table 7-1 • Summary of Demands for Scenarios

Alternative/Scenario	Demand (AFY)	Comments
Total, > 7 AFY	5,071	Shown on Figure 5-1
Total, streamlined system	3,441	Eliminates laterals to clusters < 7 AFY and customers not expected to connect (same as Scenario C)
Scenario A	1,695	North Pleasanton, Sports Park
Scenario B	2,815	Scenario A plus future golf courses
Scenario C	3,441	Scenario B plus Ruby Hills

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



LEGEND

- Proposed Pipeline
- Pleasanton City Limits
- Interstate Freeways
- City Streets
- Union Pacific Rail Road
- Pumping Station
- Storage Tank

FIGURE 7-3
SCENARIO B
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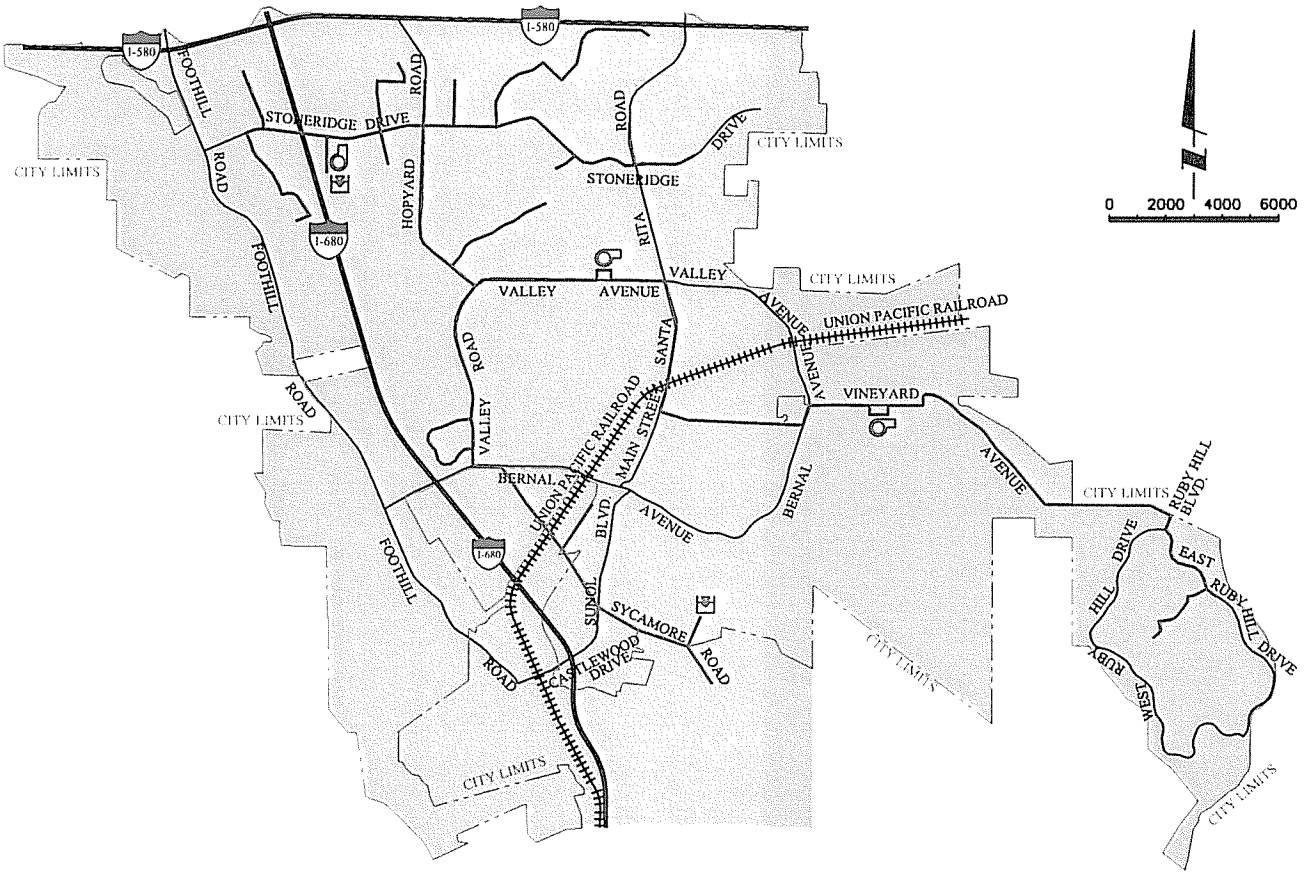
CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



LEGEND

- Proposed Pipeline
- Pleasanton City Limits
- Interstate Freeways
- City Streets
- Union Pacific Rail Road
- Pumping Station
- Storage Tank

FIGURE 7-4
SCENARIO C
NOVEMBER 1999

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SECTION 8 • EVALUATION OF ALTERNATIVE SCENARIOS

SECTION 8 • EVALUATION OF ALTERNATIVE SCENARIOS

ENGINEERING EVALUATION

The engineering evaluation was conducted by modeling each scenario with *H_2ONET*. This modeling software runs as a module to *AutoCAD 14*. In general, the links (pipes) and nodes are drawn in AutoCAD. H_2ONET creates and manages databases to store the input information such as pipe diameters, pipe lengths, loss coefficients, node demands, and other operating parameters. The model was created using the engineering criteria described in **Section 4**. H_20NET uses this input information to generate hydraulic results.

Figure 8-1 illustrates the H_20NET model. All junction node and pipe numbers used in the model for all 3 scenarios are shown on this figure. Junction node numbers are preceded by a "J". For each scenario, the model was run under two demand conditions: *night demands and day demands*. Night delivery demands and day delivery demands for each scenario are itemized in **Appendix F**.

Night Demands

It was assumed that all customers irrigate at night. For most customers, night demands are therefore equivalent to the *peak delivery demands*, as defined in **Section 4**. Peak delivery demands were based on a 10-hour irrigation cycle during the driest, warmest month. Most golf courses have on-site storage from which irrigation water is pumped. For these customers, the recycled water system need only provide the peak day flow rates over a 24-hour period. Therefore, for golf courses only, the night demand is equivalent to the *peak day demands*, as defined in **Section 4**.

Day Demands

Day demands consist of flows required to fill reservoirs and golf course ponds, based on the peak day demands. No other customer demands were included in day demands.

Pipeline Diameters

For each scenario, pipeline diameters were initially set at 8-inches. After analysis, diameters were modified to meet the velocity requirements set forth in the Engineering Criteria in **Section 4**. For long stretches of transmission pipeline, the velocities were kept near the lower end of the velocity range.

Pump Stations

For this planning level, pump stations were modeled by horsepower input and standard pump curves. The horsepower settings for pump stations were adjusted during analysis to meet the pressure criteria set forth in **Section 4**.

A recycled water pump station was sited at the wastewater treatment plant (WWTP Pump Station). This pump station would serve a closed system in Scenarios A and B, and a

combination system in Scenario C. Two additional pump stations would be required for Scenarios B and C. (Valley Pump Station and Vineyard Pump Station). These pump stations were both sized to meet peak delivery demands for the downstream customers.

Storage Tanks

Storage tanks were modeled as infinitely large reservoirs for purposes of draw and fill. Therefore, tank capacities were not important for the hydraulic model, though they must be determined for cost analysis. The primary reservoir for the recycled water system was located at the suction end of the pump station at the WWTP. This reservoir was included in all three scenarios.

The City has an 8-MG potable water tank (Sycamore Tank) located near the future golf course in South Pleasanton. This site is considered to be a good location for a recycled water tank. As a result, a reservoir was located at this site for analysis of Scenarios B and C, which include the future Pleasanton Golf Course as a customer. For purposes of modeling, it was assumed that the reservoir would be at an elevation of 505 feet for filling and 475 feet for draining. It was assumed that the future Pleasanton Golf course would have on-site storage. Based on this assumption, the reservoir elevation would only need to be sufficient to provide recycled water to the golf course at the day delivery demand, and pressures required for operation of sprinklers at the golf course would be provided by on-site pumps.

For purposes of estimating cost of facilities, the required capacity of both reservoirs combined was considered to be 2/3 of the total peak day demand. This is based on the assumption that the reservoir must supply all of the *night delivery demand* during an eight-hour period. Though a ten-hour period was used for modeling purposes and subsequent sizing of pipelines and pump stations, using an eight-hour period for sizing of reservoirs adds a safety factor for inaccuracies in the draw and fill cycles.

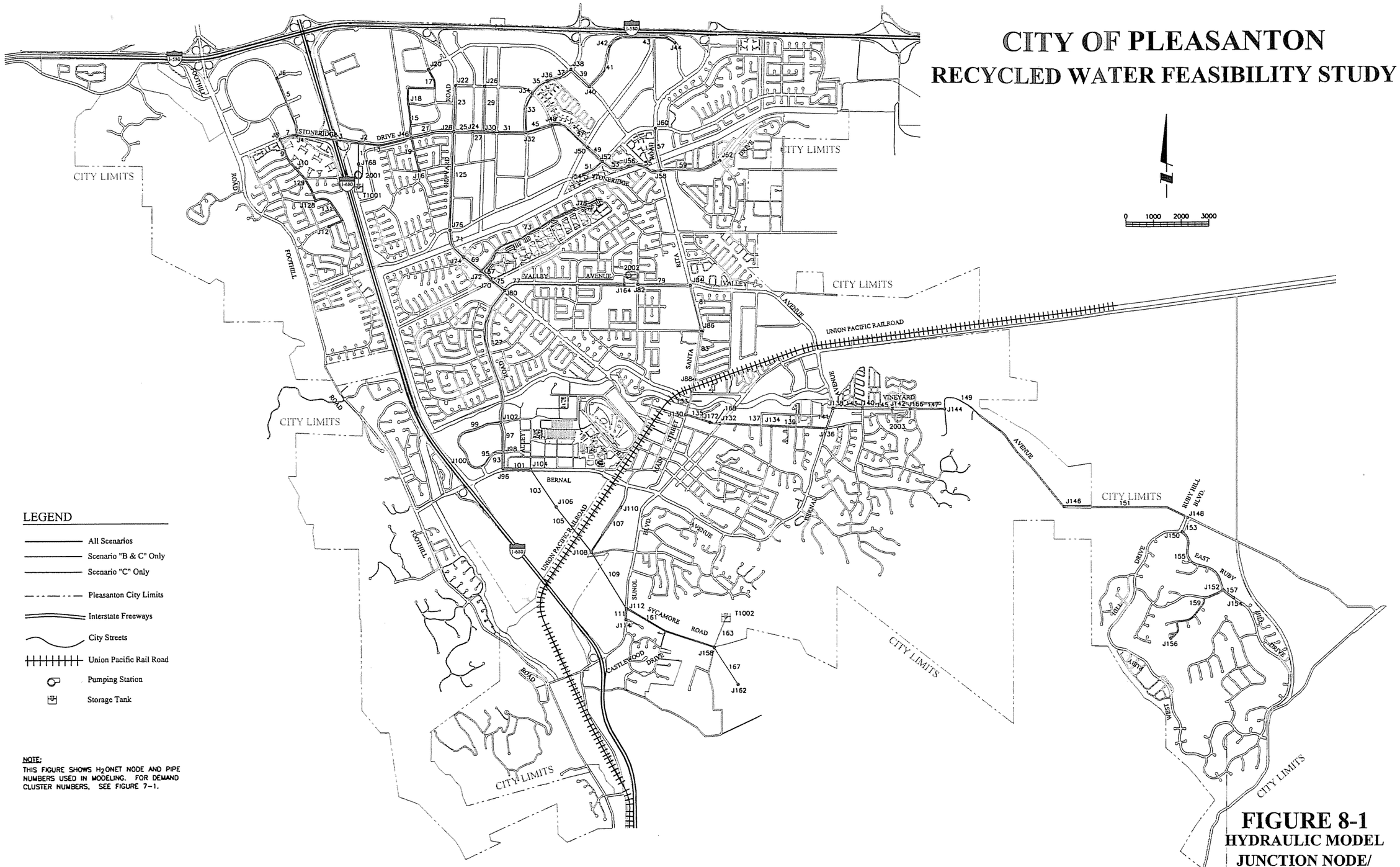
Analysis Sequence

In general, for each scenario, the model was first run at night demand conditions. All pipelines and pump stations were sized to meet the Engineering Criteria at these conditions. Then the model was run at day conditions to make sure that transmission pipelines and pumping facilities were sufficiently sized for filling of storage tanks.

FACILITY REQUIREMENTS

The facility requirements were derived from the system model hydraulic results. The facilities required for each scenario are briefly described below. The sizes and quantities of these facilities are detailed in **Table 8-1**. The hydraulic model results are included in **Appendix G**.

CITY OF PLEASANTON
RECYCLED WATER FEASIBILITY STUDY



NOTE:
THIS FIGURE SHOWS H_2ONET NODE AND PIPE NUMBERS USED IN MODELING. FOR DEMAND CLUSTER NUMBERS, SEE FIGURE 7-1.

FIGURE 8-1
HYDRAULIC MODEL
JUNCTION NODE/
PIPE NUMBERS AND PIPE DIAMETERS
NOVEMBER 1999

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Scenario A

Scenario A includes a reservoir at the WWTP, a pump station at the WWTP, and approximately 54,000 lineal feet of pipe. No other facilities would be required. Scenario A is illustrated in **Figure 7-1**.

Scenario B

Scenario B requires a larger reservoir and a larger pump station at the WWTP than required for Scenario A. In addition, Scenario B includes approximately 79,000 lineal feet of pipeline. Scenario B is illustrated in **Figure 7-2**.

A recycled water storage tank was considered near the current location of the 8 MG Sycamore potable water tank. However, at this elevation, the model showed that the tank could not provide significant flow to the recycled water system without a booster pump station. This was due to the distance of this tank from most of the customers requiring peak flow. As a result, it was determined that it would be more economical to increase the size of the pump station at the WWTP and eliminate the terminal reservoir and booster pump station near the golf course.

It was assumed that the golf courses would peak off of on-site ponds. If these future golf courses do not provide on-site storage, then a tank at the Sycamore site could still be required. In addition, booster pumping could be required for operation of a sprinkler system.

Scenario C

Scenario C requires the same size storage tank and pump station at the WWTP as in Scenario B. However, additional peaking capacity is required, which is provided by a reservoir at the Sycamore site. In addition, two booster pump stations are required along the backbone distribution pipeline to the Ruby Hills area (see **Figure 7-3**). One booster pump station is required on Valley Avenue near Greenwood Road (Valley Pump Station). Another booster pump station is required on Vineyard Avenue, near Sauterne Way (Vineyard Pump Station). Scenario C includes approximately 119,000 lineal feet of pipeline.

Table 8-1 • Facility Requirements

Facility	Quantity/Size		
	Scenario A	**Scenario B**	**Scenario C**
Pump Stations			
WWTP Pump Station	450 HP	660 HP	660 HP
Valley Pump Station	(none)	(none)	100 HP
Vineyard Pump Station	(none)	(none)	30 HP
Storage Tanks			
WWTP Tank	2.5 MG	4 MG	4 MG
Sycamore Tank	(none)	(none)	1 MG
Pipelines			
6-inch	21,600 ft	27,000 ft	30,400 ft
8-inch	14,800 ft	14,800 ft	41,800 ft
10-inch	6,900 ft	11,000 ft	11,700 ft
12-inch	3,300 ft	6,600 ft	4,500 ft
16-inch	6,100 ft	13,200 ft	24,400 ft
20-inch	(none)	5,500 ft	5,500 ft
24-inch	900 ft	900 ft	900 ft
Total	**53,600 ft**	**78,900 ft**	**119,100 ft**

All three scenarios were developed as independent alternatives. If Scenario A or B is implemented as a phase with future expansion provisions, then some facility upsizing will be necessary to function in a phased program.

ECONOMIC EVALUATION

Economic analyses were conducted on all three scenarios. These analyses included estimation of capital construction costs for pipelines, pump stations, reservoirs, treatment facilities, and user retrofits. Annual costs were estimated using amortized capital costs, O&M costs, and salt mitigation costs. Capital, annual, and unit delivery costs are summarized in **Table 8-2**.

Table 8-2 • Cost Analyses Summary

Scenario	Recycled Water Delivery (AFY)	Capital Cost ($M)	Annual Cost ($M/Yr)[a]	Unit Delivery Cost ($/AF)[a]
A	1,695	17.16	1.50 to 1.66	886 to 979
B	2,815	27.26	2.33 to 2.58	826 to 915
C	3,441	34.95	3.02 to 3.35	878 to 975

[a] Annual and Unit Delivery Costs vary with salt mitigation costs assumed. These costs include salt mitigation for 250 mg/l.

Capital Costs

Capital construction cost estimates ranged from $17.16M for Scenario A, to $27.26M for Scenario B, to $34.95M for Scenario C. The increases in capital costs are directly attributable to increases in pipeline and other facility requirements as well as increases in the number of users that must be connected to the system. Cost assumptions for escalation to mid-point of construction, engineering/administrative costs (including City billing costs), construction management costs, and construction contingencies are summarized in **Section 4**. Escalation to midpoint of construction was assumed to be 2.5 percent annually, with a 24-month construction period beginning in 1999 (see **Table 4-1**). Detailed breakdowns of all cost estimates are contained in **Appendix H**.

Annual Costs

Annual costs for Scenario A ranged from $1.50M/Yr to $1.66M/Yr. Annual costs for Scenario B ranged from $2.33M/Yr to $2.58M/Yr. Annual costs for Scenario C ranged from $3.02M/Yr to $3.35M/Yr. The ranges in annual costs resulted from inclusion of salt mitigation cost for 250 mg/l of removal, which increased total annual costs approximately 10 percent for all scenarios. If salt mitigation costs for 600 mg/l are included, the annual costs for scenarios A, B and C would be $1.88M/YR, $2.93M/Yr and $3.82M/Yr, respectively, which would increase total annual costs approximately 25%. Detailed breakdowns of annual costs between amortized capital costs, O&M costs, and salt mitigation costs are contained in **Appendix H** for reference.

Annual costs for delivery of recycled water for the DERWA Project were reviewed for comparison with costs included herein. Annual O&M costs for the distribution system, not including treatment, presented in the DERWA Facilities Plan ranged from $124 to $132 per AF. By comparison annual O&M cost estimates for the distribution of recycled water presented in Appendix H of this report are in the order of $80 to $90 per AF. Therefore there is approximately $50/AF difference between the Pleasanton distribution cost estimates for O&M included herein and those prepared for the DERWA Facilities Plan. This difference likely results from different assumptions used concerning

the level of maintenance required on the various facilities. While the difference may seem significant, it is unlikely to be a major factor in affecting the overall decision regarding the economic feasibility of recycled water.

Annual O&M costs for treatment included in the July 1996 DERWA Facilities Plan have been superceded by cost estimates for the DSRSD/DERWA Treatment Facilities Master Plan. The cost estimates included herein for the treatment plant O&M were obtained from the DSDRSD/DERWA Treatment Facilities Master Plan. Therefore, the cost for the treatment portion of the recycled water system for the Pleasanton study is the same as used for DSRSD/DERWA.

Unit Delivery Costs

Unit delivery costs varied significantly between scenarios and were also greatly influenced by salt mitigation costs. The lowest unit delivery costs were for Scenario B where unit delivery costs ranged from $826/AF to $915/AF. The highest unit delivery costs were for Scenario A. These unit delivery costs ranged from $886/AF to $979/AF. The significant difference in unit delivery costs between Scenario A and B is directly attributable to the significantly greater annual volume of recycled water that is delivered in Scenario B. Although the total number of users only increases from 71 to 78 (approximately 10 percent) between the two scenarios, the total volume of recycled water delivered annually increases from 1,695 AFY to 2,815 AFY (an increase of approximately 66 percent). This is because Scenario B picks up a number of major users including the Koll Center, the future golf course at the Bernal property, and the future City golf course in South Pleasanton. Unit delivery costs for Scenario C ranged from $878/AF to $975/AF. There does not appear to be an economy of scale benefit for Scenario C due to the length of distribution system necessary to reach Ruby Hill development and its golf course.

More discussion and analysis of the economic feasibility is presented in **Section 9.**

SECTION 9 • RECYCLED WATER IMPLEMENTATION

SECTION 9 • RECYCLED WATER IMPLEMENTATION

This section presents additional analysis of the available supplies (i.e. Pleasanton's wastewater production), economic and financial feasibility evaluation, discussion on pricing policies, environmental documentation, community outreach, and other issues and policies, as well as the conclusions of this study and recommendations. The issues and discussion presented herein are not intended to be all inclusive and fully developed, but rather provide a framework for discussions on whether Pleasanton should continue to consider recycled water use and provide a general guide to the steps necessary for implementation. A significant amount of additional discussion, economic analysis and an appropriate decision making process must be undertaken by Pleasanton in order to provide the level of confidence that water recycling makes sense at this time and stage of Pleasanton's community development. Upon conclusion of this process, the City of Pleasanton will be in a position to move forward with a well-informed decision on whether to implement a recycled water program, or alternatively to evaluate possible use of its wastewater for reuse options with DERWA, DSRSD and Zone 7 in other areas of the Tri-Valley.

RECYCLED WATER SUPPLY AND DEMAND

Table 6-1 presented projected wastewater flows for the City of Pleasanton in the year 2000 and at build-out. The wastewater flow estimates presented in **Table 6-1** are also included in **Tables 9-1 and 9-2** along with DSRSD projections and potential supplies that could conceivably be available through a seasonal aquifer storage and recovery (ASR) program.[6] The flows presented in **Tables 9-1 and 9-2** represent the supply of wastewater that could be available to the City for recycling purposes. The wastewater projection for Pleasanton included in **Table 9-2** below is based on an average dry weather flow (ADWF) of 8.4 mgd. This projection is the low end of estimates developed for Pleasanton, which ranged from 8.4 to 10.3 mgd, that were evaluated for the LAVWMA export pipeline expansion project approved by the voters of Pleasanton in November 1998. Pleasanton staff has since estimated that the total wastewater production at build-out could be closer to 7.3 mgd ADWF.[7] An initiative has recently qualified for the ballot in Pleasanton that would require voter approval of proposed developments of more than 10 residential units that could further limit the projected wastewater production in Pleasanton. If this initiative passes, wastewater flows (recycled water supply) within Pleasanton could decrease further. However, due to the uncertainty of these possible reductions in estimates, for purposes of this report, the lower range of the LAVWMA projection of 8.4 mgd has been used for evaluation of recycled water supply from Pleasanton.

The ASR Program proposes utilizing the Dublin and Bishop fringe basins for seasonal storage of recycled water. The ASR Program would require construction of injection/extraction well facilities. The monthly ASR estimates for the 1,500 AFY

[6] San Ramon Valley Recycled Water Program, Facilities Plan for DERWA prepared by Montgomery Watson, July 1996.
[7] Personal communication with Steve Cusenza, August 12, 1999.

included in **Tables 9-1 and 9-2** were derived by pro-rating the monthly estimates for 3,500 AFY from the Montgomery Watson Master Plan. Recent discussion with the DSRSD staff also indicates that it is unlikely that the ASR wells will be constructed.[8] However, the additional supply that would be available with implementation of ASR is included in **Tables 9-1 and 9-2** in order to represent all of the potential supplies of wastewater for a recycled water project in Pleasanton.

Table 9-1 • Summary of Potential Wastewater Supply in the Year 2000[a]

Source	Projected Monthly Wastewater Flows in Acre-Feet[b]												Total (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Pleasanton[c]	646	661	670	590	579	583	560	550	561	563	565	593	7,121
DSRSD	494	505	512	451	443	446	428	421	429	430	432	454	5,445
ASR	0	0	0	149	222	298	331	284	216	0	0	0	1,500
Total	1,140	1,166	1,182	1,190	1,244	1,327	1,319	1,255	1,206	993	997	1,047	14,066

[a] Reference: San Ramon Valley Recycled Water Program, Facilities Plan, Montgomery Watson, 1996.
[b] Projected monthly wastewater flows are distributed based on current variations in monthly flow. Monthly flow is the sum of average dry weather (ADW) flow plus total infiltration and inflow (I/I) for that month.
c Pleasanton estimates include approximately 0.2 mgd of wastewater generated from the Ruby Hill development even though wastewater from Ruby Hill flows to the Livermore wastewater treatment plant for treatment and disposal through an agreement with the City of Livermore.

Table 9-2 • Summary of Potential Wastewater Supply at Build-Out[a]

Source	Projected Monthly Wastewater Flows in Acre-Feet[b]												Total (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Pleasanton[c]	910	930	943	830	815	821	788	775	789	793	795	835	10,024
DSRSD	1,031	1,054	1,069	941	924	930	893	878	894	898	901	946	11,359
ASR	0	0	0	149	222	298	331	284	216	0	0	0	1,500
Total	1,941	1,984	2,012	1,920	1,961	2,049	2,012	1,937	1,899	1,691	1,696	1,781	22,883

[a] Reference: San Ramon Valley Recycled Water Program, Facilities Plan, Montgomery Watson, 1996.
[b] Projected monthly wastewater flows are distributed based on current variations in monthly flow. Monthly flow is the sum of average dry weather (ADW) flow plus total infiltration and inflow (I/I) for that month.
[c] Build-out flows are based on an ADW flow of 8.4 mgd (9,408 AFY), plus allowances for I/I. 8.4 mgd is the low end of the range of build-out flows projected in the Pleasanton General Plan. The 8.4 estimate also includes approximately 0.2 mgd of wastewater generated from the Ruby Hill development even though wastewater from Ruby Hill flows to the Livermore wastewater treatment plant for treatment and disposal.

[8] Personal Communication with Dave Requa, August 12, 1999.

The DSRSD-EBMUD Recycled Water Authority (DERWA) Project discussed in **Section 1** could provide a potential competing demand for wastewater supplies. **Figures 9-1** through **9-3** illustrate the projected relationship between wastewater supply at **year 2000** and the demands associated with the City's three recycled water scenarios. In addition, these figures also illustrate the combined demands of the City's three recycled water scenarios and the ultimate demands of the DERWA Project. DERWA projected demands were based on the DERWA Facilities Plan prepared in 1996. As the DERWA project proceeds, the actual demands are likely to change from those estimated in 1996.

It appears the City would have sufficient internal wastewater supply at this time (year 2000) to meet the ultimate demands of Scenario A and Scenario B. However, it appears the City would require supplemental wastewater supplies from sources outside of the City at this time to support the total estimated demands of Scenario C. The combined demands of any of the City's three recycled water scenarios with the ultimate demands of the DERWA Project would significantly exceed the currently available supply of wastewater at the WWTP even if ASR water were available.

Figures 9-4 through **9-6** illustrate the projected relationship between wastewater supply at **build-out** and the demands associated with the City's three recycled water scenarios. In addition, these figures also illustrate the combined demands of the City's three recycled water scenarios and the ultimate demands of the DERWA project. For Pleasanton, wastewater supply is based on an average dry weather flow of 8.4 mgd per the City General Plan. This value corresponds to the low end of the range of flows projected in the General Plan. The high end of range of projected average dry weather flow at build-out is 10.3 mgd, which is also the influent limit for Pleasanton for the LAVWMA project expansion. (**Appendix I** includes similar Figures I-1, I-2 and I-3 for projected wastewater supply projections of 10.3 mgd.) At build-out, using an ADW flow of 8.4 mgd as a basis, it appears that there would be sufficient wastewater supply from the City to meet the demands of any of three proposed recycled water scenarios, including Scenario C. It appears the City would not require any supplemental supplies of wastewater to implement any of the three proposed recycled water projects, if wastewater supplies approach 10.3 mgd. In addition, it appears that the City would have surplus wastewater if any of the three recycled water scenarios were implemented.

Figure 9-1
Year 2000 Wastewater Flows
Pleasanton Recycled Water Scenario A

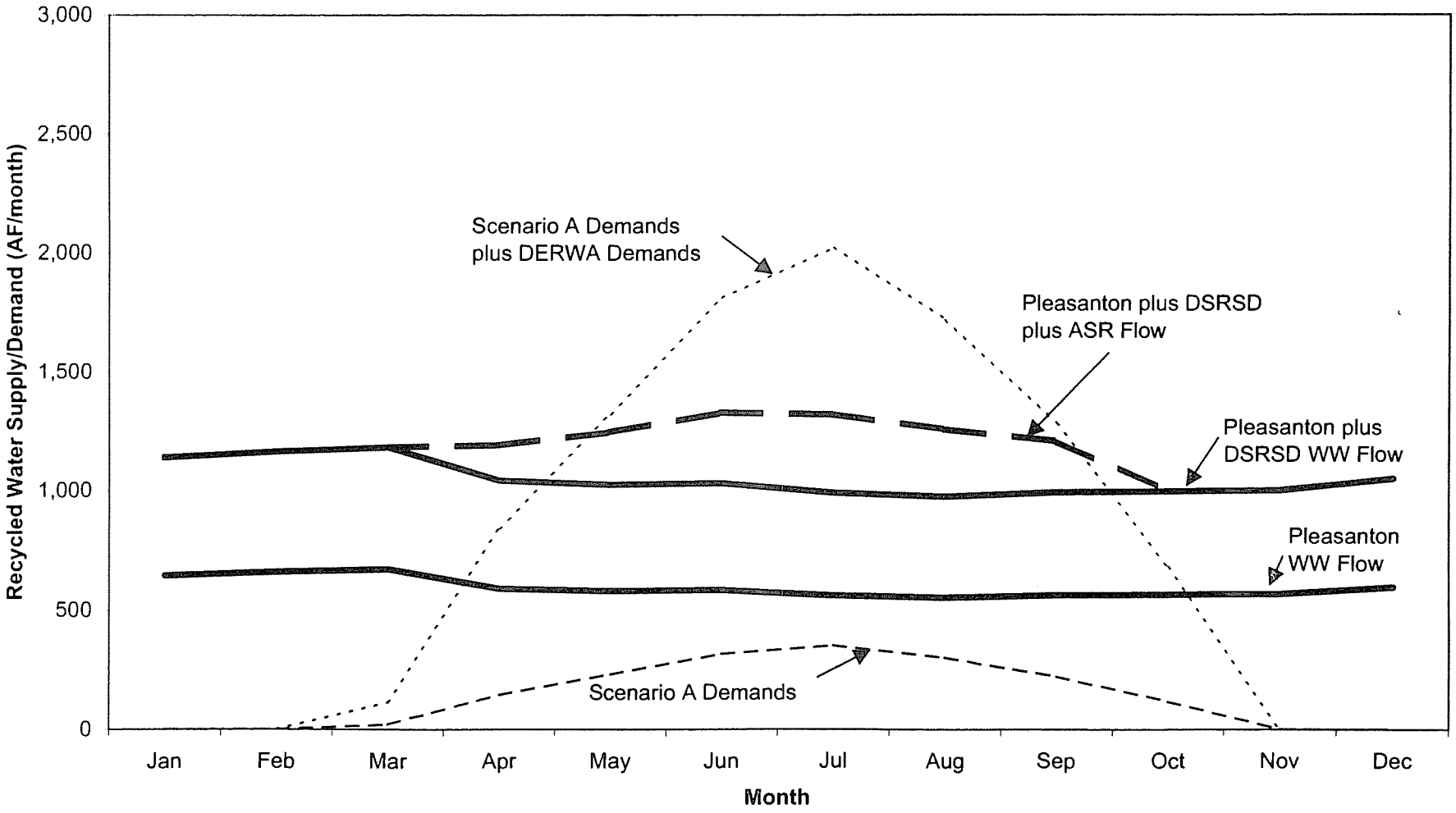


Figure 9-2
Year 2000 Wastewater Flows
Pleasanton Recycled Water Scenario B

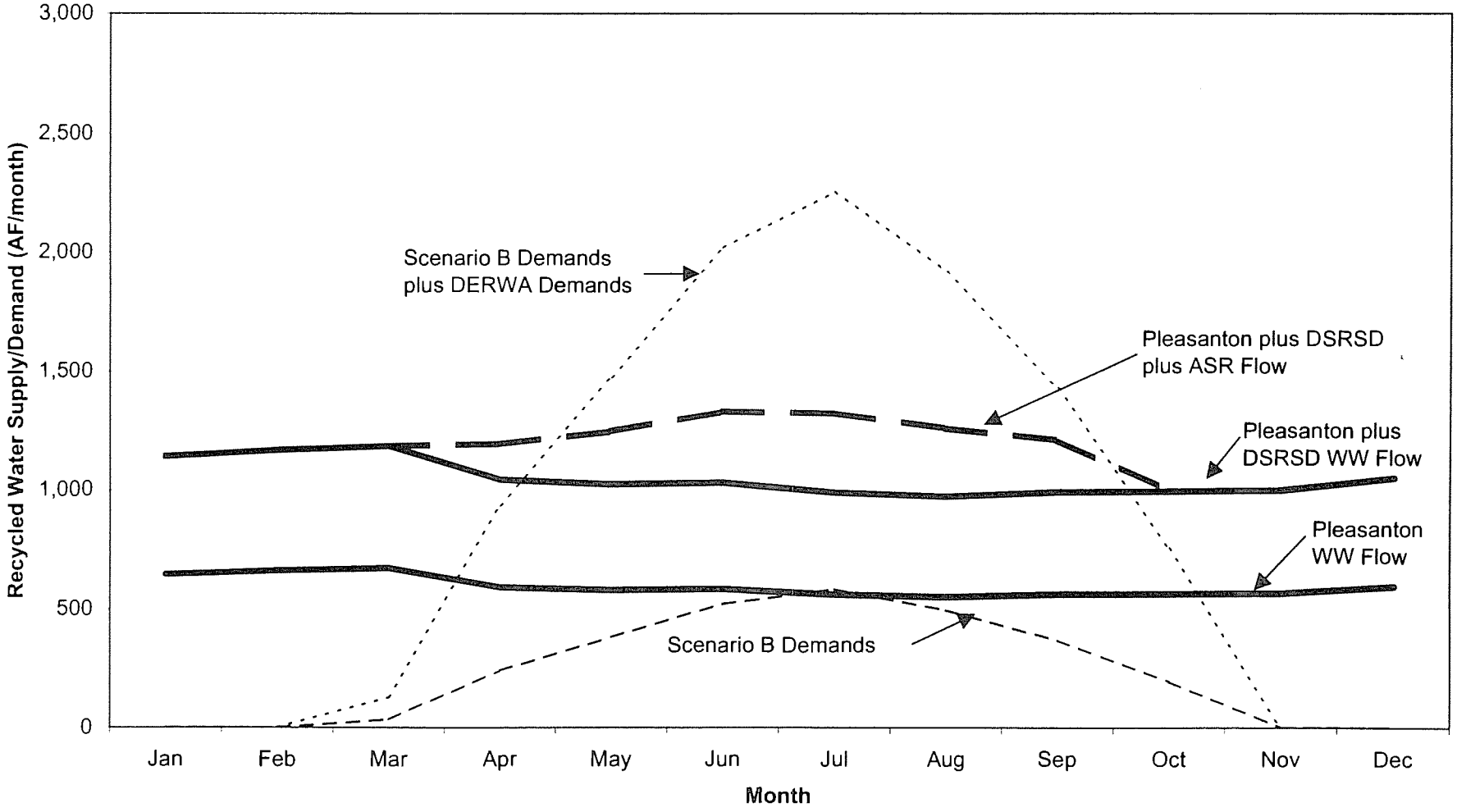


Figure 9-3
Year 2000 Wastewater Flows
Pleasanton Recycled Water Scenario C

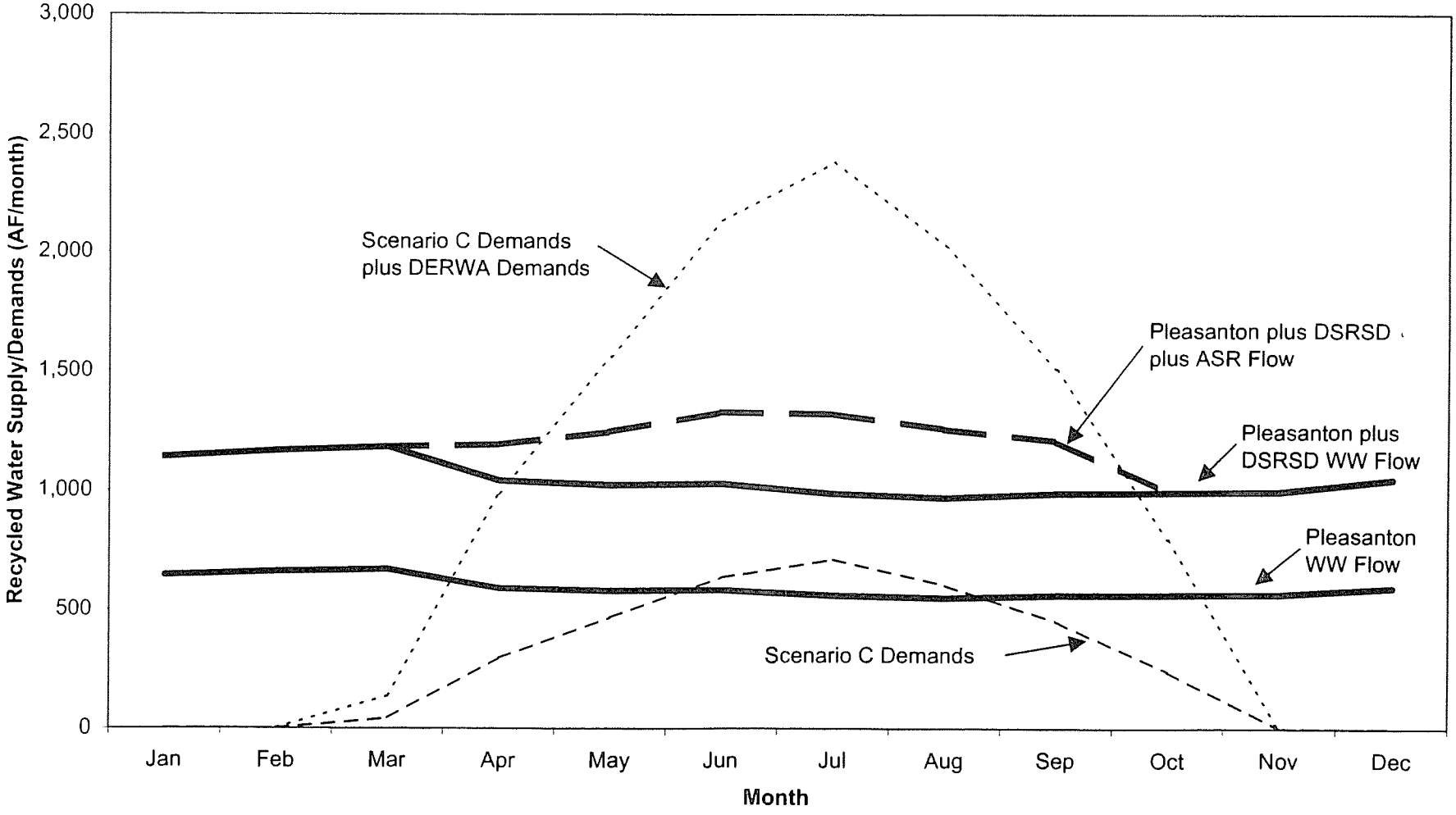


Figure 9-4
Build-Out Wastewater Flows
Pleasanton Recycled Water Scenario A
(@ 8.4 mgd)

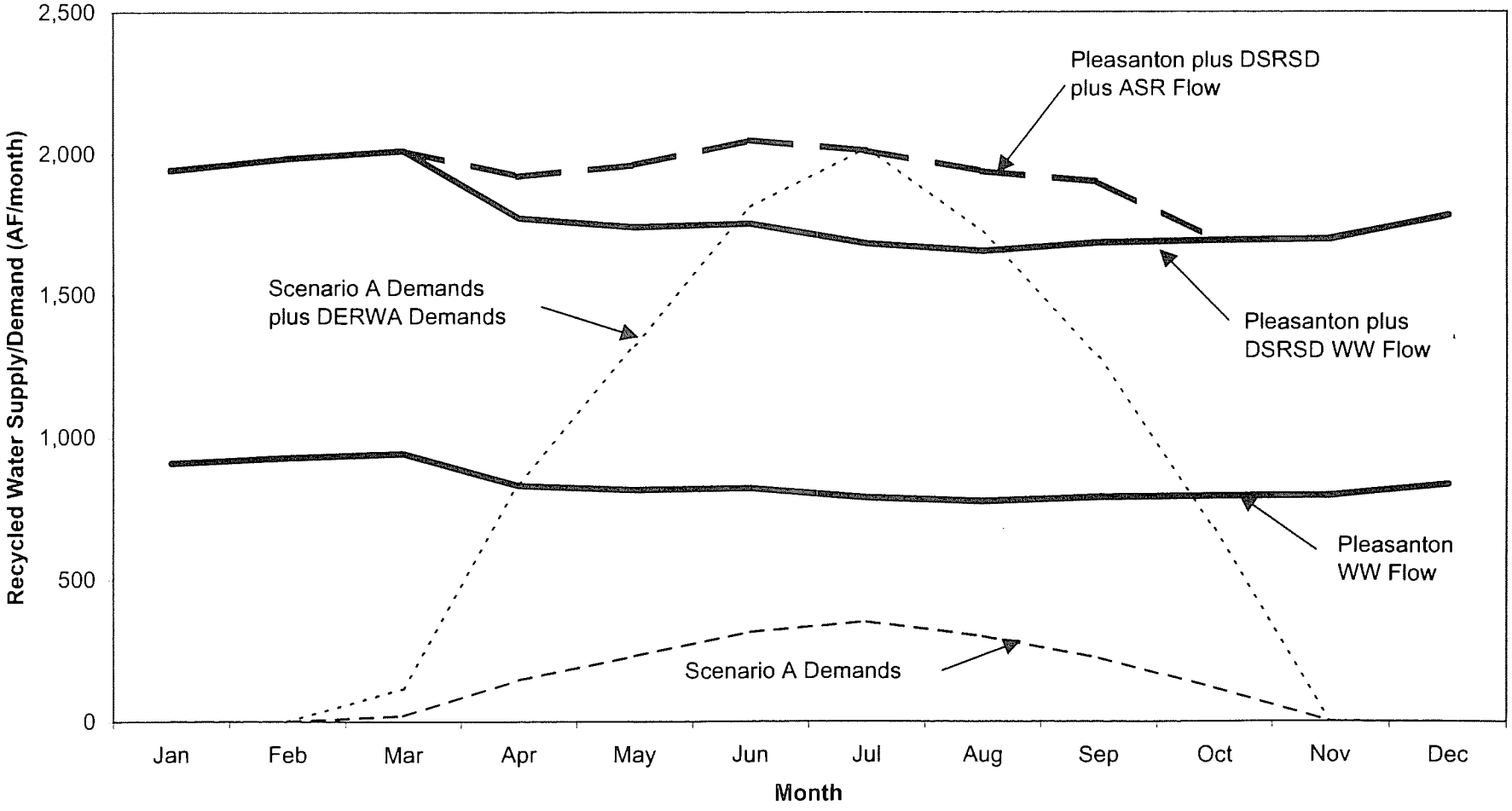


Figure 9-5
Build-Out Wastewater Flows
Pleasanton Recycled Water Scenario B
(@ 8.4 mgd)

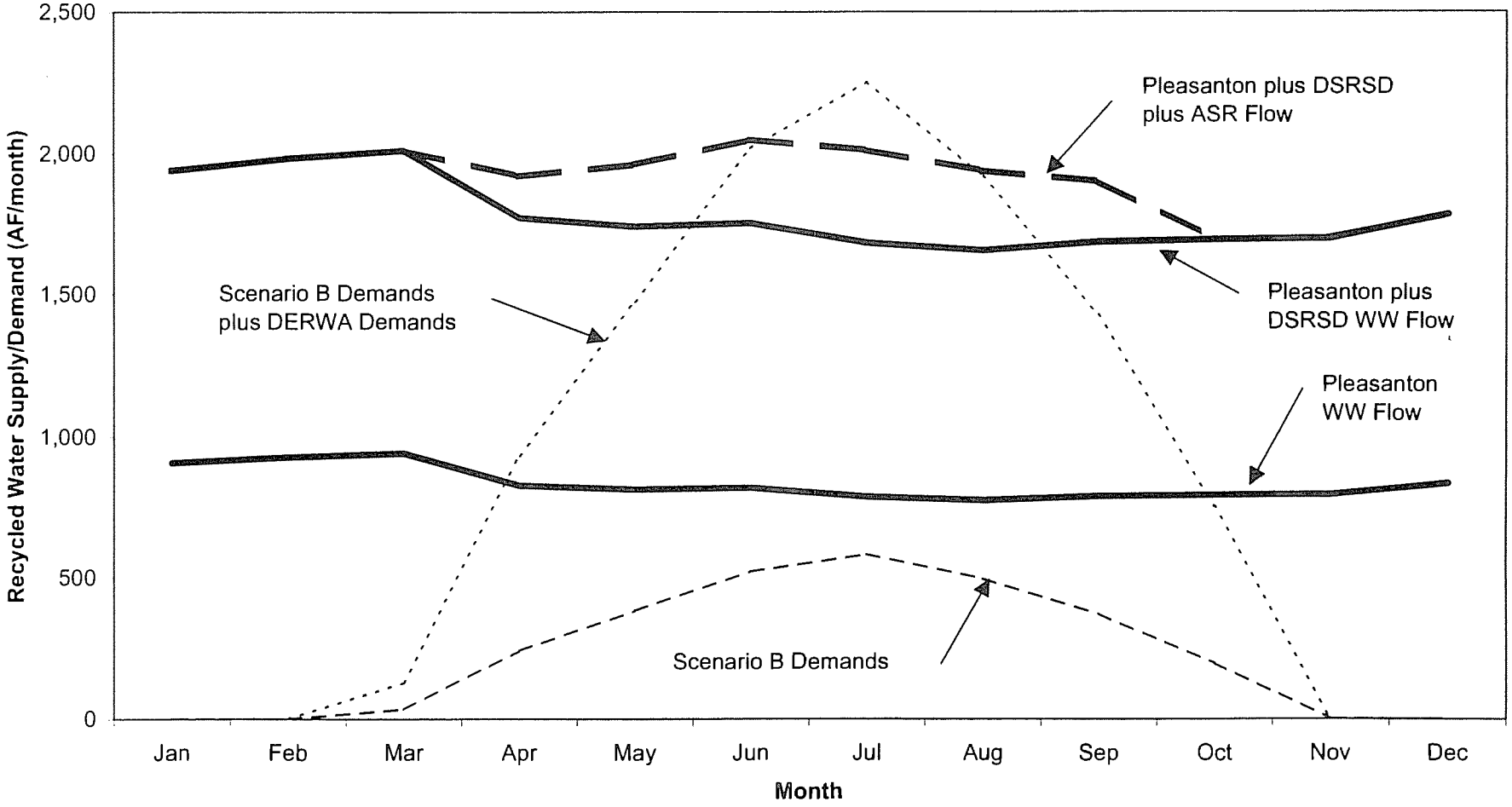
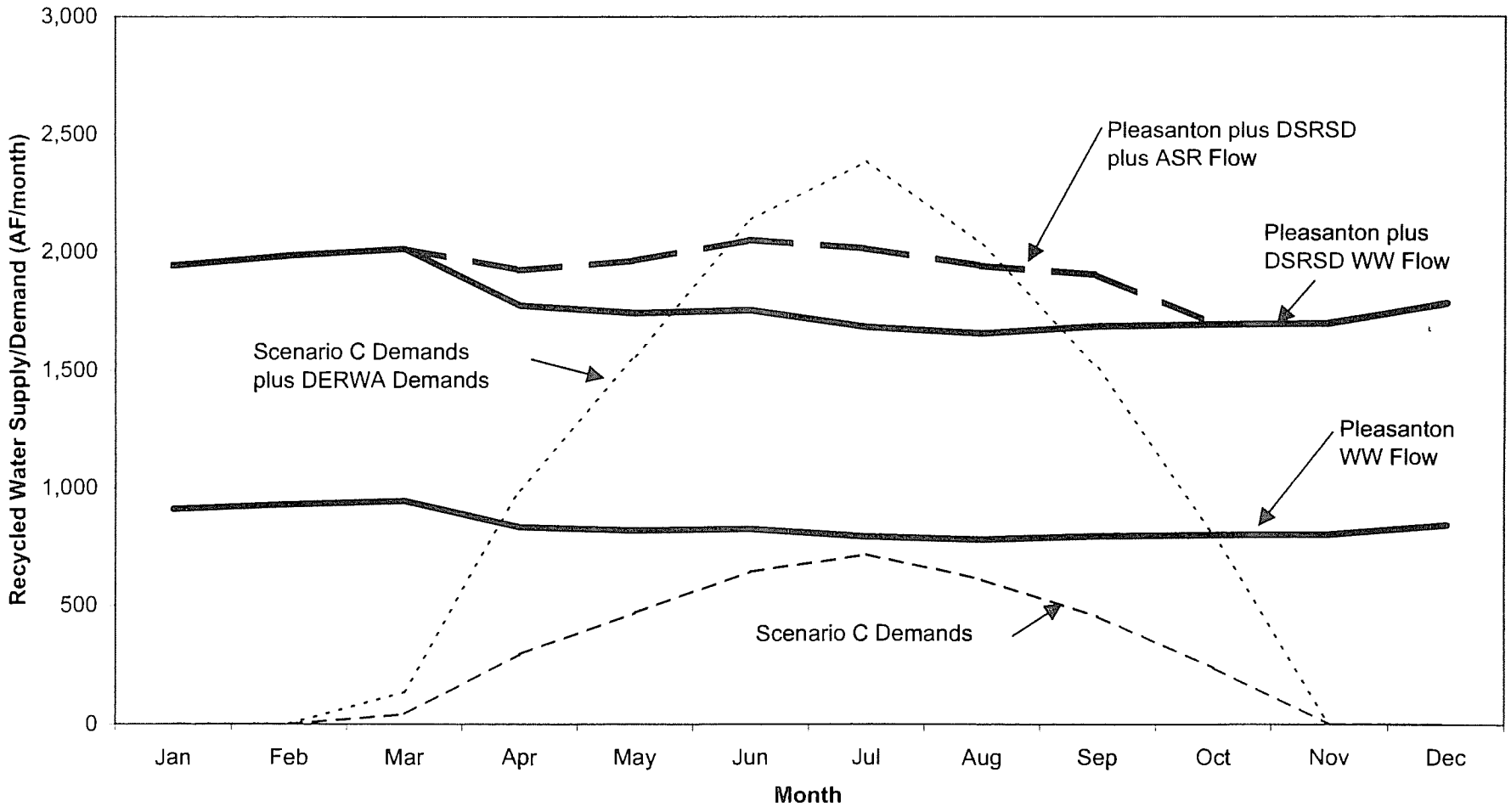


Figure 9-6
Build-Out Wastewater Flows
Pleasanton Recycled Water Scenario C
(@ 8.4 mgd)



At build-out there also appears to be sufficient wastewater supply to meet the combined demands of Pleasanton Project Scenario A and the DERWA Project without ASR water, except during the peak month in July (see **Figure 9-4**). During this month, approximately 250 AF of water from other sources would be required to meet the peak demands for both projects. For Scenarios B or C in combination with the DERWA Project, supplemental supplies of water from other sources would be required throughout the summer to meet peak demands. If ASR water is not available, then there may be the potential for shortfalls in wastewater supply during the summer if DSRSD proceeds with the DERWA Project and the City also proceeds with a recycled water project. Joint coordination of recycled water projects and possible short-term seasonal supplementation of the recycled water systems with potable water supplies could potentially manage this shortfall in supply.

Should build-out supplies of wastewater exceed 8.4 mgd (ADW flow), then more wastewater would be available for both a project for Pleasanton and the DERWA Project. Should build-out supplies of wastewater reach the high-end level of 10.3 mgd (ADW flow), then Scenario A and the DERWA Project could both be implemented without ASR and only minimal seasonal water management for the month of July, (see **Appendix I, Figure I-1**). Scenarios B and C would require more seasonal water management if an ASR project is not developed. (See **Appendix I, Figures I-2 and I-3**)

ECONOMIC ISSUES

Future Water Supply Needs

The City's projected total demand for water supplies (residential, commercial and irrigation) is projected to increase from approximately 18,000 AFY in the year 2000 to over 24,000 AFY in the year 2020, an increase of 6,000 AFY. Historically, water use in the Pleasanton area has been split approximately 60% for residential, 12% for commercial and 28% for irrigation customers. Assuming that this mixture will be similar in the future, the future additional demand of 6,000 AFY would be split approximately 3,600 AFY for residential, 720 AFY for commercial and 1,680 AFY for irrigation customers.

The recycled water scenarios developed in this study range from 1,700 AFY to 3,400 AFY of potential recycled water demand associated with them and are primarily supply existing irrigation customers. Scenarios B and C include an estimated total of 745 AFY for the new golf courses that are planned for the Bernal Property and the course planned by the City in the Happy Valley area of Pleasanton. In addition to these new demands, there will likely be other irrigation uses associated with new development. As previously noted, the Bernal Property has been estimated to generate on the order of an additional 150 AFY of irrigation demand from park, schools and other common landscaped areas.

Implementation of water recycling could potentially directly offset the need to develop new treated water supplies needed for the City of Pleasanton from Zone 7. Scenario C identifies a potential of 3,441 AFY of irrigation demand, 745 of which is future demand. Thus, approximately 2,700 AFY (3,441-745) of existing potable demand could be made

potentially available to meet future demands, if Scenario C were constructed. This 2,700 AFY represents approximately 45% of the future 6,000 AFY of potable demand. With the 745 AFY of new irrigation demand identified in this report, the total could be increased to 57% of the 6,000 AFY. Recognizing that construction of a recycled water system will likely pass close to some additional customers, not yet identified, to possibly permit even more recycled water use. These additional customers could come from extension of any of the three system scenarios either to new developing areas such as the Bernal project or possible some sites that become more economically viable over time. Some additional cost for further extension would be required that are not included in this report. Thus, it appears conceivably that Pleasanton could possibly meet as much as 60 - 65 percent of its future potable demand from recycled water.

More discussion and economic analysis is provided in the following sections describing how a system of "water transfers" resulting from a switch of existing potable system irrigation customers to recycled water use would release water supplies for future potable demands.

As of the date of preparation of this report, the Bernal property development is planning to proceed with irrigation of the golf course using groundwater from existing wells owned by the San Francisco Water Department. Groundwater from these wells has been used for agricultural irrigation on the Bernal property and has historically been approximately 350AFY. In one respect, use of the groundwater for irrigation of the Bernal property golf course will achieve the same goal as recycled water use by reducing additional future supply requirements from Zone 7. However, even though the groundwater is of marginal quality for potable purposes, it is conceivable that it could be used for potable purposes whereas the recycled water could not. If added to Pleasanton's independent quota, it would allow Pleasanton additional flexibility in meeting peak potable water demands and could be used to help meet the 6,000 AFY additional potable supply needed as described above. To the extent that groundwater is used for irrigation in lieu of a recycled water system, funding for the recycled water system capital cost will be impacted since connection fees from this area that could otherwise have been used may not be available. Thus, the economics of the recycled water system will be impacted if groundwater is used for the golf course irrigation.

The Bernal property is the largest remaining piece of land to be developed within the City of Pleasanton and would be a major user of recycled water. If the Bernal property golf course is eliminated from the analysis, demands for Scenarios B and C would be reduced to 2,420 AFY and 3,046 AFY respectively. This 10% to 15% reduction in demands is likely to result in the same percentage of increase in the delivered cost of water. Further, as a general rule, recycled water system economics are significantly less when dual water systems are installed during initial property development rather than through retrofitting. It is recommended that the Bernal property golf course and common landscape irrigation areas irrigation systems be designed using standards for recycled water use to facilitate potential future conversion.

Updated Water Supply Projections

The City of Pleasanton will be performing water and wastewater planning studies in the in the near future including:

- ✓ Sanitary Sewer Master Plan
- ✓ Urban Water Management Plan
- ✓ Water Distribution Master Plan

The estimates of recycled water supply (wastewater production) and potential recycled water demand included herein may change as the result of this work. It is recommended that the recycled water supply and demand estimates included in this report be updated upon completion of these studies.

Potable Water System Costs

Bimonthly User Charges

Pleasanton adjusted its water rates in March of 1999 for the Calendar Year based on a projected total operating budget of $12.6 M and projected customer sales of 6,574,000 billing units (one billing unit = 100 cubic feet {hcf}). Thus, the average cost for delivery of water to customers in Pleasanton is $1.92 per hcf, or $835 per AF. Included in the $12.6 M was approximately $0.58 M per year for debt service, $0.34 M for meter reading and utility billing, and $1.78 M for system replacement accrual. The recycled water system cost estimates included in this report do not include any estimates for debt service, meter reading, utility billing or replacement accrual. Therefore, to make valid comparisons between the recycled water system estimates, adjustments to the potable water costs are necessary. If these costs were adjusted, the comparable potable water cost would be approximately $659 per AF.

Pleasanton's water rate is different for irrigation customers and is established based on the cost to provide service. For 1999, the irrigation water rates were calculated from projected cost to serve irrigation customers and set at an average cost of $1.61 per hcf, or $703/AF, not including fixed meter charges. Bimonthly meter charges are generally about 25% of the unit commodity charge, which when added, would bring the total to $878/AF. Adjusting for utility billing, debt service and replacement accrual (approximately 21%) would bring the unit irrigation water cost back down to approximately $694/AF for comparison with the recycled water costs included in this report.

Connection Fees

In addition to bimonthly user charges, new customers pay a connection fee to offset the cost of treating and delivering new water supplies. **Table 9-3** summarizes current connection fees for new water customers in the City of Pleasanton.

Table 9-3 • City of Pleasanton Water Connection Fees

Meter Size (in.)	Flow Rate (gpm)	Pleasanton's Connection Fee (including meter)	Zone 7's Connection Fee	Total Connection Fee ($)
5/8	20	$1,305	$4,915	$6,220
3/4	30	$1,940	$7,375	$9,315
1	50	$3,180	$12,290	$15,470
1 1/2	100	$6,515	$24,575	$31,090
2	160	$10,220	$39,320	$49,540
3	350	$21,890	$86,013*	$107,903
4	1,000	$61,595	$245,750*	$307,345
6	2,000	$123,565	$491,500*	$615,065
* Estimated Zone 7 fees based on probable meter flow rates				

Zone 7 has recently authorized the preparation of an Integrated Supply and Conveyance Plan. The purpose of this plan is to review and incorporate the results of a number of important water planning efforts that have been completed over the last several years. This plan is expected to lead to the development of some additional policies that will be relevant to water supply and recycled water system planning for the Tri-Valley area. Among those policies expected to come out of this plan is the development of an agricultural connection fee for non-potable water customers. The evaluation and establishment of an agricultural connection fee is expected to be complete by approximately November or December of 1999.

Following the establishment of an agricultural connection fee, Zone 7 staff plans to review the treated water connection fees. Discussion with Zone 7 staff indicates that potable water connection fees are likely to increase in the range of 5% to 20% and will probably be implemented in approximately January or February 2000[9]. For purposes of comparison with the recycled water system costs in this report, Zone 7 water connection fees have been increased 10% from the current fee of $4,915 to $5,407 per single family unit (5/8" meter).

Total Potable Water Costs

Connection fees can be used to estimate the capital costs and water supply acquisition costs associated with new potable water supply. This capital cost can then be added to the operating costs estimated from bimonthly user charges. A typical connection in

[9] Telephone conference with Jim Horen of Zone 7 on July 27, 1999.

Pleasanton uses a 5/8" meter. If the $6,712 connection fee ($5,407 estimated for Zone 7 connection fees plus $1,305 for Pleasanton) is annualized over a 30-year facility life cycle at an interest rate of 6 percent, the annual cost is approximately $490 per 5/8" meter connection. In Pleasanton, the average annual water demand per household is approximately 0.5 AFY. Thus, the estimated annualized capital facility cost is approximately $980/AF of water delivered. The total delivery cost for potable water to new customers in Pleasanton can therefore be estimated at approximately $1,639 per AF ($659 operating cost +$980 facility cost).

The City of Pleasanton has approximately 850 irrigation meter customers. During the development of this report, irrigation water consumption for 376 of those customers was compiled. The meter sizes for each of the 376 potential sites were obtained and the connection fees estimated based on current rates, plus a 10% Zone 7 increase (Appendix C). A comparison of potable water connection fees for irrigation customers was developed based on the potential recycled water system customer meters. The total connection fees were then prorated for the potential demand for Scenarios A, B, and C. The results of this analysis found that the connection fees for irrigation meters averaged approximately $4,900 per AF of annual water use. At an interest rate of 6 percent and a 30-year facility life cycle, the annual cost for the connection fees would be approximately $360/AF. The total delivery cost for potable water to new irrigation customers in Pleasanton can therefore be estimated at approximately $1,054/AF ($694 operating cost + $330 facility cost).

The above comparison reveals an apparent difference in total delivered water costs between residential and irrigation customers due to connection fees. Connection fees are established based on the peak rate at which the various meter sizes are able to deliver water, but are the same for all types of customers for a given meter size. For example, the cost for a 5/8" meter is the same for both residential and commercial customers. The apparent difference in the delivered water rate results from irrigation customers as a group using the peak capacity of the meter for longer periods than do residential customers resulting in more annual water consumption. When the total connection fee is amortized to an annual cost and compared with average annual consumption, the cost per acre-foot for irrigation customers is less. In other words, during design of irrigation systems, the meter size is carefully selected to efficiently match the peak irrigation demand to maximize the capacity of the meter. By comparison, residential customers use the peak capacity of the meter for shorter periods of time that results in less annual water consumption.

The inflation rate on the cost of Zone 7 water is currently estimated at 3 to 5 percent annually. However once recycled water treatment and distribution facilities are constructed, the inflation rate on the cost of recycled water can be expected to be less than that on treated water supplies. The supply of wastewater for recycling purposes will be less susceptible to drought conditions and other environmental and regulatory supply constraints than raw water supplies. The competition for future supplies of recycled water will probably be less significant than the competition for other water resources.

Wastewater Disposal Avoided Costs

For each AF of recycled water that is kept in the Tri-Valley area, there are savings in not pumping that wastewater over the Dublin Grade for disposal into the San Francisco Bay. The cost to pump wastewater effluent from the DSRSD WWTP through the Livermore-Amador Valley Wastewater Management Agency (LAVWMA) outfall for disposal is estimated at approximately $50/AF. The combined avoided cost of delivering new irrigation water supplies and avoided cost of disposing of wastewater is therefore estimated to range from approximately $1,104/AF to $1,689/AF ($1,054/AF to $1,639/AF for delivery cost plus $50/AF disposal cost).

SALT MITIGATION COSTS

Section 4 presented information regarding Zone 7's Salt Management Plan and alternative approaches for allocation of the costs for salt management. **Table 9-4** below presents a summary of the salt mitigation costs per acre foot that must be added for each of the distribution system scenarios (presented in Section 7) and the alternative salt mitigation cost allocation methods described above using $400 per ton.

Table 9-4 Salt Mitigation Costs

Distribution Alternatives	Estimated Recycled Water Use	If Included in Treated Water Rates	Salt Mitigation based on Incremental Salt Above Potable (250 mg/l)	Salt Mitigation Based on 600 mg/l Salt Load from Recycled Water	Salt Mitigation Cost for Additional 350 mg/L
Scenario A	1,695	0	$93	$223	$130
Scenario B	2,815	0	$89	$214	$125
Scenario C	3,441	0	$97	$233	$136

As shown **Table 9-4** above, if salt mitigation for all 600 mg/L is used, then the unit cost for recycled water for all scenarios would increase by approximately an additional $130/AF.

RECYCLED WATER SYSTEM FEASIBILITY

Comparison To Total Potable Water System Costs

A simple comparison of recycled water costs to potable water costs can be made by dividing the total cost to design, build and operate a recycled water system by the quantity of recycled water served and comparing it with the unit cost for potable water. Since salt mitigation is currently under development and the final approach to allocation of cost is unknown, the following analysis includes an allowance for salt mitigation for the increment above the average delivered potable water quality (600 mg/L – 350 mg/L = 250 mg/L). **Table 9-5** provides a summary of the system costs for Scenarios A, B, and C.

Table 9-5 Unit Costs for Recycled Water Systems

	Estimated System Demand (AFY)	Total Capital Costs ($M)	Annual Capital Costs ($M)	Annual O&M Costs ($M)	Total Annual Costs ($M)	Unit Cost for Recycled Water per AF	Salt Mitigation Costs per AF (based on 250 mg/L increment)	Total Unit Cost for Recycled Water per AF
Scenario A	1,695	17.16	1.17	0.33	1.50	$886	$93	$979
Scenario B	2,815	27.26	1.85	0.48	2.33	$826	$89	$915
Scenario C	3,441	34.95	2.37	0.65	3.02	$878	$97	$975

Based on the analysis and assumptions included in **Table 9-5** above, the cost for the recycled water system ranges from $915/AF to $979/AF. If this is compared with only the bimonthly water user charges ($659/AF) for potable water, then recycled water, is not currently economically competitive for existing City irrigation customers. When connection fees are included (which are designed to recover the cost of acquisition of water supplies and construction of delivery systems), the total cost to deliver potable water to residential customers is $1,639/AF, while total cost to deliver potable water to irrigation customers is estimated to be $1,054. It is clear from the above comparison that all three recycled water system scenarios are competitive with the costs to deliver irrigation water and significantly less costly than the cost to deliver potable water to residential customers. More discussion is included in the following sections and tables to compare the capital costs of the recycled water system with potable water connection fees and O&M costs to potable water bimonthly user charges.

Recycled Water Capital Costs vs. Potable Water Connection fees

Table 9-6 below presents a comparison of the recycled water system capital costs with the connection fees. If connection fees were charged to new recycled water system customers in a similar fee structure as for potable water, then recycled water connection fees would be approximately 25% less than current potable connection fees. Clearly, the costs to build the infrastructure to deliver recycled water are competitive with potable water based on the recycled system build-out scenarios identified in this report.

Table 9-6 Recycled Water Capital Cost Comparison with Potable Connection Fees

	Annual Volume of Water (AFY)	Equivalent Number of 5/8" Connections	Recycled Water System Capital Cost	Recycled Water System Capital Cost Per Single Family Residential Equivalent	Water System Connection Fees
Scenario A	1,695	3,390	$17,164,042	$5,063	$6,712
Scenario B	2,815	5,630	$27,256,536	$4,841	$6,712
Scenario C	3,441	6,882	$34,948,317	$5,078	$6,712

Recycled Water O&M Costs vs. Potable Water O&M Cost

The price that customers pay for their bimonthly potable water service reflects the cost for annual operation and maintenance expenses. Therefore, a comparison of the O&M

cost of the recycled water system with potable water bimonthly charges reflects a comparison of possible water rates. The annual cost of operation and maintenance is compared with the bimonthly water costs to the users in **Table 9-7** below. Two different potable water system O&M costs are presented in **Table 9-7** above for comparison with the recycled water system O&M costs. The $659/AF value is derived from the average costs to provide service to all customers in the City of Pleasanton, while the value of $694/AF is based on the cost to provide service to irrigation customers. When the capital costs for the RW system is separated, the commodity charges necessary to pay for the recycled water O&M costs would be approximately 60% less than current irrigation charges.

Table 9-7 Recycled Water System O&M Cost Comparison with Potable System O&M

	Annual Volume of Water (AFY)	Recycled Water System O&M Costs	Recycled Water System O&M Costs per AF[1]	Potable Water System O&M Costs per AF	Potable Water System Cost for Irrigation per AF
Scenario A	1,695	$327,898	$286	$659	$694
Scenario B	2,815	$477,968	$259	$659	$694
Scenario C	3,441	$647,717	$285	$659	$694
[1] Includes salt mitigation costs for 250 mg/l (see Table 9-4).					

As can be seen from **Tables 9-6** and **9-7** above, when capital and O&M costs for the recycled water system scenarios are separated and compared to the connection fees and bimonthly user charges for the potable water system, the recycled water system is competitive with potable water system costs. It is also clear from the analysis above, that funding of the recycled water system capital costs has a significant impact on the economic feasibility. More discussion of possible recycled water system funding alternatives is included in the following sections.

Funding Alternatives

The above analysis demonstrates that recycled water is economically competitive with potable water when capital/connection fees are included. However, in order to implement a recycled water program, the project must also be financially viable from a funding mechanism perspective. Therefore the following sections will address conceptual alternative approaches to fund the RW system costs. As shown in **Tables 9-6 and 9-7**, the source of funding for the capital costs represents the biggest challenge to implementation of a recycled water project in Pleasanton. The following are five conceptual funding alternatives that have been developed for recycled water system scenarios evaluated in this report:

Alternative 1: All Recycled Water System Customers Pay Equally (all costs built into the recycled water commodity charges)

Alternative 2: Use New Recycled Water Irrigation Customer Connection Fees to Pay all Recycled Water Capital Costs

Alternative 3: Use Future Potable Water System Irrigation Customer Connection Fees to Pay Recycled Water Capital Costs

Alternative 4: Price Recycled Water at 90% of Potable and Use a Portion of Potable Water System Connection Fees for Recycled Water System Capital Cost Funding

Alternative 5: Use Future Residential Potable Water Connection Fees to Pay for Recycled Water System Capital Costs to Minimize the Recycled Water Commodity Charges

The following sections provide a description and cost comparisons of the five funding alternatives.

Alternative 1: All Recycled Water System Customers Pay Equally (all costs built into the recycled water commodity charges)

The limitation with the economic comparison above is that almost all of the potential recycled water customers in Pleasanton are existing customers. **Table 9-8** below summarizes the existing and new potential recycled water system annual use for Scenarios A, B and C.

Table 9-8 Existing and New Recycled Water System Use

	Potential Recycled Water System Annual Use (AFY)	Existing Customer Use from Potable Water System (AFY)	New Potential Recycled Water Customer Use (AFY)
Scenario A	1,695	1,695	0
Scenario B	2,815	2,070	745
Scenario C	3,441	2,696	745

Therefore, existing customers that were evaluated for potential recycled water use have already paid connection fees and are practically no longer a source of funding. However, if all existing and new irrigation customers participate in the development of the recycled water system capital costs (included in the delivered price of water), then the costs would range from $915 to $979/AF, as shown in **Table 9-5**. All three scenarios would result in a bimonthly rate higher than the current potable user charges for irrigation water of $694/AF. The existing customers that would be switched from the potable water system to the recycled water system have already paid capital costs for the potable system through connection fees. Therefore, if the capital costs of the recycled water system is amortized and included in the recycled water commodity charge, the existing customers would have paid for capital costs in both systems. Thus, customers that currently are connected to existing potable system and convert to recycled water would not experience any financial advantage from that change.

Alternative 2: Use New Recycled Water Irrigation Customer Connection Fees to Pay Recycled Water Capital Costs

As discussed above, most of the potential recycled water customers are existing potable water customers that have no further obligation or need to pay for water supply development and delivery system construction. For Scenarios A, B, and C, the potential new customers demands are 0, 745 AF, and 745 AF respectively. If the capital costs are allocated to these customers only, then the connection fee would be approximately $36,000/AF ($27M ÷ 745 AF) for Scenario B and $47,000/AF ($35M ÷ 745 AF) for Scenario C. These costs are an order of magnitude higher than the current average of $4,900/AF for irrigation customers (see previous discussion and Appendix C for explanation and development of these costs). If additional new recycled water system customers could be identified, these costs would be reduced, however it would take approximately eight to ten times the amount of new customers to bring the costs down to existing connection fee levels. This amount of new customers was not in the Market Assessment. Allocation of cost in this manner would keep the bimonthly cost for recycled water at approximately 40% of the current potable system irrigation rate (ranges from $260 to $290/AF when compared to the existing potable rate of $694/AF). Bimonthly water bills would be very low, however a connection fee for new recycled water customers in the range of $36,000 to $47,000 would make this alternative for funding capital cost infeasible.

This study has included a minimum of new development irrigation demands based on serving the proposed new golf courses. In new development areas, there will be other potential sites for recycled water. For example, the Bernal property is expected to have parks, school irrigation, median landscaping, and common area irrigation at some of the residential development. Therefore, the capital costs could be spread over a larger number of customers and the connection fee range identified above is a conservative estimate and in all likelihood would be less, but not significantly enough to make this alternative feasible.

Alternative 3: Use Future Potable Water System Irrigation Customer Connection Fees to Pay Recycled Water Capital Costs

Neither of the above approaches appears to be financially viable, however a hybrid is presented in **Tables 9-9** and **9-10** as an example of a possible approach to fund the capital costs partially through connection fees and partially through recycled water rates. **Table 9-9** presents estimates of the amount of funds that may be available and applicable if "future potable water irrigation customer" fees are used toward capital costs. In other words, the connection fees from the 1,680 AFY (portion of the projected 6,000 AFY of additional water supplies that is collected from future irrigation customers) would be used to fund a portion of the recycled water system capital costs. The revenue generated from connection fees at the current potable water rate for irrigation customers (based on an average of $4,900/AF of annual demand, see earlier discussion in this chapter), would generate approximately $8.2M. Remaining capital costs that would need to be recovered through recycled water rates is presented in **Table 9-9** below.

Table 9-9 Capital Costs Remaining After Connection Fees (Alternative 3)

	Annual Volume of Water (AFY)	New Potable Irrigation Water Customer Demands	Funds from New Customer Connection Fees @ $4,900/AF	Capital Costs	Remaining Capital Costs
Scenario A	1,695	1,680	$8,232,000	$17,164,042	$8,932,042
Scenario B	2,815	1,680	$8,232,000	$27,256,536	$19,024,536
Scenario C	3,441	1,680	$8,232,000	$34,948,317	$26,716,317

The water rates necessary to recover the remaining capital costs after connection fees as well as the O&M costs are presented in **Table 9-10** below.

Table 9-10 Recycled Water Costs (Alternative 3)

	Remaining Capital Costs	Remaining Annual Capital Costs*	Recycled Water System O&M Costs	Annual Capital Cost to be Recovered Through Water Rates per AF	O&M Increment to be Recovered Through Water Rates per AF	Total Cost per AF
Scenario A	$8,932,042	$648,903	$327,898	$383	$286	$669
Scenario B	$19,024,536	$1,382,112	$477,968	$491	$259	$750
Scenario C	$26,716,317	$1,940,911	$647,717	$564	$285	$849
* Amortized annual cost based on 6% for 30 years.						

As presented in **Table 9-10** above, the resulting water rates range from $669/AF to $849. When compared to the existing potable water rates of $659 to $694 previously discussed, there is no financial incentive under this funding approach for existing or new irrigation customers to use recycled water. Scenario A costs would be very close to the cost of potable water rates, while Scenarios B and C would still be higher. All scenarios compare more favorably with potable water rates than previous funding alternatives.

Alternative 4: Price Recycled Water at 90% of Potable and Use a Portion of Potable Water System Connection Fees for Recycled Water System Capital Cost Funding

Projections for the City of Pleasanton indicate that an additional water demand of approximately 6,000 AF per year will be needed to accommodate General Plan build-out. In order to meet that demand, Zone 7 will need to acquire additional water supplies and build facilities necessary to distribute the water to Pleasanton. If the irrigation customers identified in this study connect to a recycled water system, the new potable water supply needs could be reduced by up to 3,441 AF per year (Scenario C). This approach could be viewed as a switch in demands from the potable water system to recycled water. This "potable demand switch" concept would reduce the demands for future potable supplies. Thus, connection fees that for new potable water supplies and infrastructure could

conceivably be transferred to fund the recycled water system capital costs. Thus, if Pleasanton and Zone 7 were to agree to use a portion of the connection fees for the recycled water system capital costs, the recycled water system water rate could be reduced dramatically, thus providing incentive to potential customers to use recycled water. The following analysis estimates the amount revenue that would be available from the sale of recycled water that could be used for capital costs and the amount of connection fees that would be necessary to support the remaining capital costs.

Recycled water rates in other communities that have implemented programs range from a low of approximately 50% of potable rates to a high of 100% of potable rates. DSRSD has established a recycled water commodity rate of 90% of the potable rates. Due to the local precedent and for purposes of this analysis, a recycled water rate of 90% of the potable rate (90% of $694/AF = $625/AF) has been assumed. Switching existing customers to recycled water would free up potable water to serve residential and commercial uses. Each AF of potable water will serve approximately two residential units for one year. Therefore, for Scenarios A, B, and C, the equivalent number of residential units that could be served from potable water made available through a "transfer" of supplies would be 3,390 units, 5,630 units and 6,882 units respectively. The required connection fee that would be necessary to support the remaining capital cost from the above number of residential units is calculated and presented in **Tables 9-11** and **9-12** below.

Table 9-11 Capital Costs Remaining After Use of Portion of User Fees for Capital Costs (Alternative 4)

	Annual Volume of Water (AFY)	Annual Revenue from Recycled Water Sales	O&M Costs	Remaining Annual Revenue That Can be used for Annual Capital Costs	Total Annual Capital Costs	Remaining Annual Capital Costs to be Funded Through Connection Fees
Scenario A	1,695	$1,059,375	$327,898	$731,477	$1,246,949	$515,472
Scenario B	2,815	$1,759,375	$477,968	$1,281,407	$1,980,158	$698,751
Scenario C	3,441	$2,150,625	$647,717	$1,502,908	$2,538,957	$1,036,049

Table 9-12 Portion of Connection Fees Required to Fund Remaining Capital Costs (Alternative 4)

	Remaining Annual Capital Costs to be Funded Through Connection Fees	Present Value of the Remaining Annual Cost*	Equivalent No. of 5/8" Potable Connections Served by the RW System	Portion of Connection Fee Required to Fund Remaining Capital Cost
Scenario A	$515,472	$7,095,392	3,390	$2,093
Scenario B	$698,751	$9,618,186	5,630	$1,708
Scenario C	$1,036,049	$14,261,040	6,882	$2,072
* Present Value based on 6% for 30 years.				

Based on the above analysis, use of approximately $1,700 to $2,100 of the current $6,220 connection fee per residential unit and a recycled water rate of $625/AF would support implementation of the recycled water system. Another perspective of this analysis is that a complete irrigation system can be developed for a connection fee that ranges from $1,700 to $2,100 per single family equivalent as compared with the current potable water connection fee of $6,220. In other words, implementation of a recycled water system could be less expensive than expansion of the potable water system to serve irrigation customers.

Since the new potable water system customers would likely cause a need for improvements to the existing potable water system, some portion of the existing connection fee would also probably be required by the City of Pleasanton and Zone 7 to provide adequate service. Using this approach, approximately $4,100 to $4,500 of the current connection fee would be available for these costs. However, the portion of the existing connection fee associated with obtaining new water supplies could be transferred to pay for a portion of the recycled water system capital costs.

Alternative 5: Use Future Residential Potable Water Connection Fees to Pay for Recycled Water System Capital Costs to Minimize the Recycled Water Commodity Charges

Switching existing customers to recycled water would free up potable water to serve residential and commercial uses. Similar to the analysis for Alternative 4, this approach evaluates how much of the recycled water system capital costs could be supported by connection fees from future residential customers. As previously identified the equivalent number of residential units that could be served from potable water made available through a "transfer" of supplies would be 3,390 units, 5,630 units and 6,882 units for Scenarios A, B, and C respectively.

Tables 9-13 and **9-14** below present the amount of revenue that would be generated by residential connection fees by the number of units that could be served from a transfer of water and the resulting recycled water commodity charge.

Table 9-13 Capital Costs Remaining After Use of Connection Fees for Capital Costs (Alternative 5)

	Equivalent No. of 5/8" Potable Connections Served by the RW System	Revenue from Future Residential Customers	Recycled Water System Capital Costs	Remaining Capital Costs
Scenario A	3,390	$22,753,680	$17,164,042	$0
Scenario B	5,630	$37,788,560	$27,256,536	$0
Scenario C	6,882	$46,191,984	$34,948,317	$0

Table 9-14 Recycled Water Commodity (Alternative 5)

	Annual Volume of Recycled Water (AFY)	Annual O&M Costs	Recycled Water Commodity Charge (per AF)	Salt Mitigation Costs (per AF)	Total Recycled Water Commodity Charge (per AF)
Scenario A	1,695	$327,898	$193	$93	$286
Scenario B	2,815	$477,968	$170	$89	$259
Scenario C	3,441	$647,717	$188	$97	$285

Based on the above analysis, connection fees from future residential development could support more than the capital costs for the recycled water system. Thus, the recycled water commodity charge could be reduced to the O&M costs plus salt mitigation, which is less than $300/AF for all scenarios. Further, based on the projected connection fees of $6,712 per residential unit expected in January 2000, there would be funds remaining after allocation of the recycled water system capital costs. **Table 9-15** below identifies how much of the $6,712 connection would remain after payment of the recycled water capital costs.

Table 9-15 Capital Costs Remaining After Use of Connection Fees for Capital Costs (Alternative 5)

	Connection Fee Revenue from Future Residential Customers	Recycled Water System Capital Costs	Remaining Revenues from Connection Fees	Equivalent No. of 5/8" Potable Connections Served by the RW System	Connection Fees Remaining Per Residential Unit
Scenario A	$22,753,680	$17,164,042	$5,589,638	3,390	$1,649
Scenario B	$37,788,560	$27,256,536	$10,532,024	5,630	$1,871
Scenario C	$46,191,984	$34,948,317	$11,243,667	6,882	$1,634

Based on the analysis presented in **Table 9-15** above, there would still be $1,600 to $1,900 of the $6,712 connection fee revenue remaining after funding all of the recycled water system capital costs.

Similarly to Alternative 4, the new potable water system customers would likely cause a need for improvements to the existing potable water system, this portion of the existing connection fee could be used by the City of Pleasanton and Zone 7 for potable water system improvements.

Funding Alternatives 4 or 5 would require the commitment of the City of Pleasanton and Zone 7 to use a major portion of the connection fees to fund a portion of the recycled water system capital costs. It is recommended that the City of Pleasanton begin some preliminary discussion with Zone 7 to explore the use of connection fees from potable water customers to fund the capital cost for the recycled water system.

IMPLEMENTATION ISSUES AND POLICIES

There are several other implementation issues which must be considered and policies developed by the City prior to implementing a recycled water program. Some of these key issues are discussed in the following paragraphs.

Zone 7 Salt Mitigation Cost Policy

Unit delivery costs for recycled water and reclamation economics presented in this study, may be significantly impacted by Zone 7 groundwater salt mitigation costs. Implementation of salt management policy that includes the costs in the treated and untreated water rates would encourage agencies to implement water recycling. On the opposite end of the spectrum, requiring each recycled water project to mitigate the full impact of all salt (i.e. 600 mg/l of TDS), would add over $200/AF to the price of recycled water. **Table 9-4** illustrates the wide range of potential unit delivery costs for recycled water in the City for each of the scenarios developed in this study. Much of this variability is attributable to the uncertainty associated with future Zone 7 salt mitigation costs. The City should work closely with Zone 7 to clearly define their future salt mitigation cost policy.

Mandatory or Voluntary Connection Policy

The City will need to consider what type of recycled water connection policy would be most appropriate – whether connection will be mandatory or voluntary. Based on the recycled water system master planning and its proposed distribution system, DSRSD has established a mandatory policy for new customers in pre-established "water reuse zones." Other new irrigation systems not in reuse zones are being required to install dual piping (within the project, not outside the project area) in anticipation of possible future recycled water availability, at which time they will be required to connect. Existing irrigation customers not in a reuse zone will be connected on a voluntary basis when recycled water is available. Additional engineering and financial planning work would be necessary to develop the background of information that would allow Pleasanton to establish a similar approach for a connection policy.

East Bay MUD has established a mandatory policy for connection when recycled water is available. The District pays the retrofit costs.

Pricing Policy

The City should develop a pricing policy for the sale of recycled water. The cost of recycled water will impact its marketability and City revenue from its sale. Other communities have typically established pricing policies for recycled water ranging from 50% to 100% of the rate of potable water in the same service area. Examples of recycled water pricing policies for other major programs in California are presented in **Table 9-16** below with more detailed descriptions included in Appendix J.

Table 9-16 Water Pricing Policies

Agency	RW Commodity Charge (% of Potable Water Rate)	Agency Pays Retrofit Costs
East Bay MUD	100%	Yes, if connection req'd by EBMUD No, if connection requested by user
DSRSD	90%	Policy not yet finalized
West Basin Municipal Water District (LA County)	53%	N/A
West Basin Municipal Water District - Retailers	40% to 80%	West Basin MWD finances retrofit cost and recovers costs in RW commodity charges
City of San Diego	90%	Yes
City of Escondido (San Diego County)	80%	City finances retro fit costs and recovers costs in RW commodity charges
Moulton Niguel Water District (Orange County)	80%	District provides loans to finance retrofit costs.

Funding Assistance

Facilities Planning Grant

The California State Water Resources Control Board (SWRCB) Office of Water Recycling is administering the Water Recycling Facilities Planning Grant Program (FPGP). This grant program will provide communities with up to $75,000 of matching fund grants for preparation of recycled water facilities plans. The purpose of the FPGP is to assist local agencies in the preparation of facilities planning studies for recycling using treated municipal wastewater. In addition to encouraging new recycling planning studies, the SWRCB intends that these funds be used to supplement local funds to enhance the quality of local planning efforts and to produce documents needed by the SWRCB to evaluate applications for design and construction loans if a cost-effective project is identified. Grants will be provided for facilities plans to determine the feasibility of using recycled water that will offset new freshwater development and augment the State's local water supply. Pollution control studies, in which water recycling is an alternative, will not be eligible for a grant.

Following the facilities planning phase, low interest loans from the Office of Water Recycling and the State Revolving Fund through the SWRCB may be available for design and construction, however funding is uncertain due to competition between projects.

WateReuse Association of California Loan Program[10]

The WateReuse Association of California, whose mission is "to increase the amount of water reclamation and recycling in California," has established the WateReuse Financing Authority. The Foundation developed a low interest loan program to assist agencies with the implementation of RW systems. The program enables WateReuse Members to access low cost, variable rate debt, while achieving significant savings in costs and ease of implementation. The program makes funding available for water and wastewater capital projects ranging between $1 million and $100 million. Current variable rate costs range between 3.5% and 4.25%. Loans can be made for the full useful life of the project up to 30 years. The loans may be retired without premium at any time through the use of SRF or other grant proceeds or cash. Loans may also be refunded with long term debt.

The bonds carry a AAA rating from the bond insurance provider and have a highly rated bank liquidity facility. This ensures the bonds trade at the best possible rate in the market. Interest rates on variable rate bonds are reset every seven days and have averaged 3.582% since 1990. Interest rate risk exposure can be managed through the program using an interest rate cap, asset/liability management or an interest rate swap. The time required to secure the loan can be as little as 60 days.

The analysis included in this report was developed without any grants and based on an interest rate of 6% for 30 years. If some grant money can be obtained and a substantially lower interest rate can be secured, the funding analysis may be more attractive than presented herein.

State and Federal Grants

Although no state and federal grant program currently exists to help pay for the capital costs of RW systems (other than facilities planning grants identified above), there is discussion beginning and recommendations for such assistance. The Bay Area Regional Water Recycling Program (discussed in a previous Section 2 of this report) recommends that grants of 50% of the capital costs be provided to local agencies from federal and state funds to assist implementation of RW systems.

Funding for the DERWA Project was included in the recently passed Water Resources Development Act that will provide $15 M in for construction of the DERWA facilities.

Community Outreach

The City will need to develop a strategy for marketing recycled water to customers in the City. This strategy should incorporate the City's pricing policy for recycled water, but may include other financial incentives such as assisting customers with the cost of retrofitting existing potable water irrigation systems to comply with current regulatory requirements for recycled water irrigation.

[10] Excerpted from the WateReuse Association website www.watereuse.org.

Development of an extensive community outreach program implemented very early in the planning of a recycled water system is extremely important to garner public support. The public will want to know that they are being informed of the project and that any issues are addressed, as well as keeping the public informed on regulatory and environmental issues, well before decisions are made to go forward. Therefore, upon determination that a recycled water system is worthy of further consideration, the City should be prepared to initiate an outreach program that will provide information early and often to the public, as well as numerous opportunities to provide comments during the decision making process.

Permitting

The City of Pleasanton is identified as a primary customer in the RWQCB's Master Water Reuse Permit Order No. 93-159 (See Appendix A). However, since Pleasanton is not specifically identified as a permittee, the City will likely have to negotiate a new recycled water permit with the RWQCB for any recycled water distribution project initiated in the City. This permit will probably have to be approved by the Department of Health Services as well as Zone 7. As discussed in Section 3 of this report, it can be assumed that any recycled water project implemented by the City will have to comply with comparable requirements to the Master Water Reuse Permit Order No. 93-159. The City could potentially obtain a joint permit with the DERWA Project. This permit would identify the agency responsible for producing and distributing recycled water in the City. An Engineer's Report would have to be developed in support of this application for a permit.

Environmental Documentation

Environmental documentation complying with the requirements of the California Environmental Quality Act (CEQA) will be required prior to construction and permitting of any recycled water project in the City. The City will need to select a project scenario for implementation prior to circulating the environmental documentation for public review. A detailed project description and facilities plan will also be required in support of the environmental documentation.

CONCLUSIONS

Based on the analysis included in this section, recycled water use in Pleasanton is economically competitive with potable water when all costs are included. Scenario B is the least costly alternative. Scenarios A and C have approximately the same costs per AF of delivered water.

Water recycling is not currently competitive with potable water, if compared with <u>only</u> the bimonthly bills paid by customers. Including capital costs in the recycled water system, the cost of providing recycled water is approximately 30% to 40% more than irrigation customers currently pay bimonthly, based on salt mitigation costs for 250 mg/l. If inflationary pressure on the potable water system costs were 3% to 5% higher than for

a recycled water system, it would take approximately 10 years before the costs would be equal.

If the capital cost of the recycled water system is separated from the O&M costs so that a comparison can be made with bimonthly potable water rates, then the recycled water cost is approximately 40% of the potable water cost(see **Table 9-7**) i.e. $286/AF vs. $694/AF. Similarly, if connection fees were used to fund all of the capital costs of the recycled water system, the recycled water connection fees would be approximately 75% of potable connection fees in the year 2000. This is based on Alternative 5 and approximately $1,700 (see **Table 9-15**) left of the $6,712 in connection fees after funding the recycled water system capital costs. Therefore, based on the above comparison, the capital and operating costs of a recycled water system is competitive with potable water.

Since Pleasanton has a limited amount of additional future growth and new irrigation customers that could pay connection fees, the ability to pay for capital costs to build a new distribution system from this source alone is limited. The financial feasibility is therefore dependent upon finding another source of funding. Several funding alternatives were presented to evaluate the feasibility for implementation of recycled water use. **Table 9-17** below presents a summary of the funding alternatives and pertinent issues for each.

Table 9-17 Funding Alternatives

Funding Alternative	Exist. Irrig. Customers pay only O&M Costs of RW System	RW Connection Fee Required	RW Costs (% of Potable Water Commodity Charge)[1]	Utilizes Transfer of Potable Water Connection Fees	% of Potable Water Connection Fees Req'd to Support Capital Costs[2]
1	No	No	130%	No	None
2	Yes	Yes(8X)[3]	37%	No	None
3	No (portion)[4]	Yes[5]	108%	No	None
4	No (portion)[4]	No[6]	90%	Yes	25%
5	yes	No[6]	37%	Yes	80%

[1] Based on $694/AF estimate of potable water system irrigation customer commodity charges and RW system Scenario B (least unit cost).
[2] Based on $6,712/single family unit and RW system Scenario B.
[3] Requires RW system connection fee to future RW customers of approximately 8 times the potable water connection fee.
[4] A portion of the capital costs are included in RW commodity charge estimates.
[5] Same as potable water connection fees.
[6] Even though this funding alternative did not include revenue estimates from RW customers, they would likely be charged connection fees equal to potable water.

As shown in **Table 9-16** above, Funding Alternatives 1 and 3 provide no incentive to potential RW customers to new and existing customers to switch to RW because bimonthly rates would be higher than current charges. Funding Alternative 3 would provide lower commodity charges to existing customer, but the cost to future RW customers in connection fees would make this alternative unreasonable.

In contrast, the "potable demand switch" concept whereby a portion of the potable water connection fees are used to fund a portion of the recycled water system capital costs would make the project financially feasible (Alternatives 4 and 5) and provide an incentive for lower bimonthly water bills. Depending on the desired RW pricing policy, the commodity charges could range from 37% to 90%. In order to keep commodity charges low enough to makes RW attractive to users, a portion of the potable water system connection fees is needed and could range from 25% to 80% to pay for enough of the RW system capital costs to make recycled water financially feasible. Either of these approaches requires a cooperative approach between Pleasanton and Zone 7 regarding a transfer of a portion of the potable water connection fees toward recycled water system capital costs.

A number of water agencies that have implemented water recycling, or are currently planning systems, have taken the position that all water system costs should be funded from the water enterprise fund. The rationale to include water recycling as part of the water enterprise fund is based on the following:

- ✓ The staff of the water departments are the most appropriate to provide the operations, maintenance and management services needed for a recycled water system.
- ✓ That recycled water, although it may be different in quality and appropriate uses, it is still water and can supply a vital need of a community. In other words **all water** should be funded from the water enterprise fund.
- ✓ New development customers needing potable water should participate in the costs of the recycled water system to assure that adequate potable water is available.
- ✓ Furthers the philosophic concept that everyone in the community benefits from having adequate water resources providing assurance that adequate landscape can be supported to enhance the aesthetic environment within the City.

Other Non-Monetary Benefits

In addition to the avoided costs of wastewater disposal, there are a number of non-monetary benefits, or benefits which cannot be quantified, that result from the use of recycled water including but not limited to the following:

- ✓ Avoided higher level regulatory compliance for discharge of wastewater into the San Francisco Bay (more stringent wastewater quality standards).
- ✓ Local control of water supply and independence for additional water supplies from agencies outside the Tri-Valley.
- ✓ Reliability of supply and reduced impacts of future droughts (i.e. cutbacks in water use, plant stress due to reduced irrigation and potential drought surcharges).
- ✓ Assurance that adequate landscape can be supported to enhance the aesthetic environment in Pleasanton, even during droughts.

Joint Project with DERWA

As discussed in Section 1, EBMUD and DSRSD are planning a joint recycled water project (DERWA Project) using wastewater originating at the DSRSD WWTP in

Pleasanton. This would be the same source of wastewater for any recycled water project in the City. If the City elects to proceed with a recycled water project, then the City may want to consider implementation of a joint project with DERWA. Some savings may be realized because of the economies of scale associated with jointly constructing tertiary treatment facilities as well as storage reservoirs and pumping facilities. This joint planning approach may allow the DERWA Project to recycle surplus wastewater from the City of Pleasanton while allowing the City to utilize surplus treatment capacity in the DERWA facilities. By jointly managing their wastewater resources, Pleasanton, DSRSD, and EBMUD may be able to optimize the efficiency and cost effectiveness of their respective recycled water projects. Alternatively, Pleasanton may want to consider entering discussions regarding purchasing recycled water from DERWA at the tertiary treatment facilities.

Joint Project with DSRSD

If EBMUD were to decide not to implement a recycled water system within its service area of DERWA, then Pleasanton may want to consider a joint recycled water project with DSRSD similar to the concept developed for DERWA. Some savings may be realized because of the economies of scale associated with jointly constructing tertiary treatment facilities as well as storage reservoirs and pumping facilities. One of the advantages of this approach is that the water use area would more closely match the service area that generates the wastewater and in general, the same customers would benefit from recycled water use. Further, Pleasanton and DSRSD have a sewer service agreement for wastewater treatment and disposal that contains provisions for use of recycled water. Alternatively, Pleasanton may want to consider entering discussions regarding purchasing recycled water from DSRSD at the tertiary treatment facilities.

Water Reuse Alternatives for Pleasanton

As an alternative to construction of a dual water distribution system to serve recycled water, Pleasanton may prefer to work with DERWA, DSRSD and/or Zone 7 toward water reuse in other areas of the Tri-Valley area as described below.

Sell Recycled Water to DERWA or DSRSD

Pleasanton could decide not to proceed with its own water reuse system but to sell its wastewater, of which Pleasanton has retained ownership, to DERWA through a long-term water supply agreement.

Zone 7 Non-Potable Water System

Zone 7 has recently begun evaluation of a non-potable water system that would deliver water to the expanding vineyards in the Livermore area. Currently, the non-potable system is envisioned to include untreated imported water, non-demineralized recycled water and possibly demineralized recycled water. Pleasanton may want to enter discussions with Zone 7 regarding acquisition of the City's wastewater for purposes of reused in this non-potable system.

RECOMMENDATIONS

As a result of this study, a number of recommendations are made to the City of Pleasanton regarding further consideration of implementation of a recycled water system and are predicated on reaching a positive decision at each of the steps in the process before proceeding. Pleasanton should consider the following actions:

- ✓ Present the results of this study to the City Council. It is suggested that a workshop be scheduled with the Council to facilitate fully discussing the implications of proceeding further.
- ✓ Begin discussion with Zone 7 regarding the potential of connection fee contributions to pay for recycled water system capital costs.
- ✓ Reinitiate discussion with the San Francisco Water Department regarding installation of a dual distribution system (potable and recycled) within the Bernal property and for service to the City's Happy Valley golf course project.
- ✓ Begin discussion with DSRSD and/or DERWA regarding either construction of treatment facilities or costs to deliver treated water to meet Pleasanton's needs. Also enter into discussion with DSRSD and/or DERWA to consider the benefits of sharing some facilities such as pump stations and reservoirs. Alternatively, Pleasanton may consider entering into discussions with DSRSD/DERWA to explore their interest in providing recycled water service in the Pleasanton area.
- ✓ Initiate or continue discussion with Zone 7 regarding possible use of Pleasanton recycled water to serve large projected agricultural water demand increases.
- ✓ Prepare detailed water projections to confirm the potential future demands for residential, commercial and irrigation uses. Staff is in the process of preparation of an Urban Water Master Plan and an update of the Water Distribution System Master Plan. Upon completion of this work, a review of the water connection fees will be undertaken.
- ✓ Begin a community outreach program that will gain an understanding of the support for a recycled water system and provide a method to communicate with the citizens as the program progresses. A possible forum to begin this community outreach would be the formation of a recycled water program advisory committee.
- ✓ Begin discussion with the Pleasanton Unified School District, the Hacienda Business Park Owners Association and other potential users to develop a better estimate of firm water demands.
- ✓ Begin discussions with the San Francisco Bay Regional Water Quality Control Board, and the California Department of Health Services for a permit to distribute recycled water.
- ✓ Apply for a facilities planning grant from the State Water Resources Control Board. Staff should also explore construction cost financing options such as low interest loans from the WateReuse Association of California, the Office of Water Recycling or the State Revolving Fund.
- ✓ Development of a pricing policy and recycled water use ordinance.
- ✓ Prepare an Environmental Impact Report for the project.

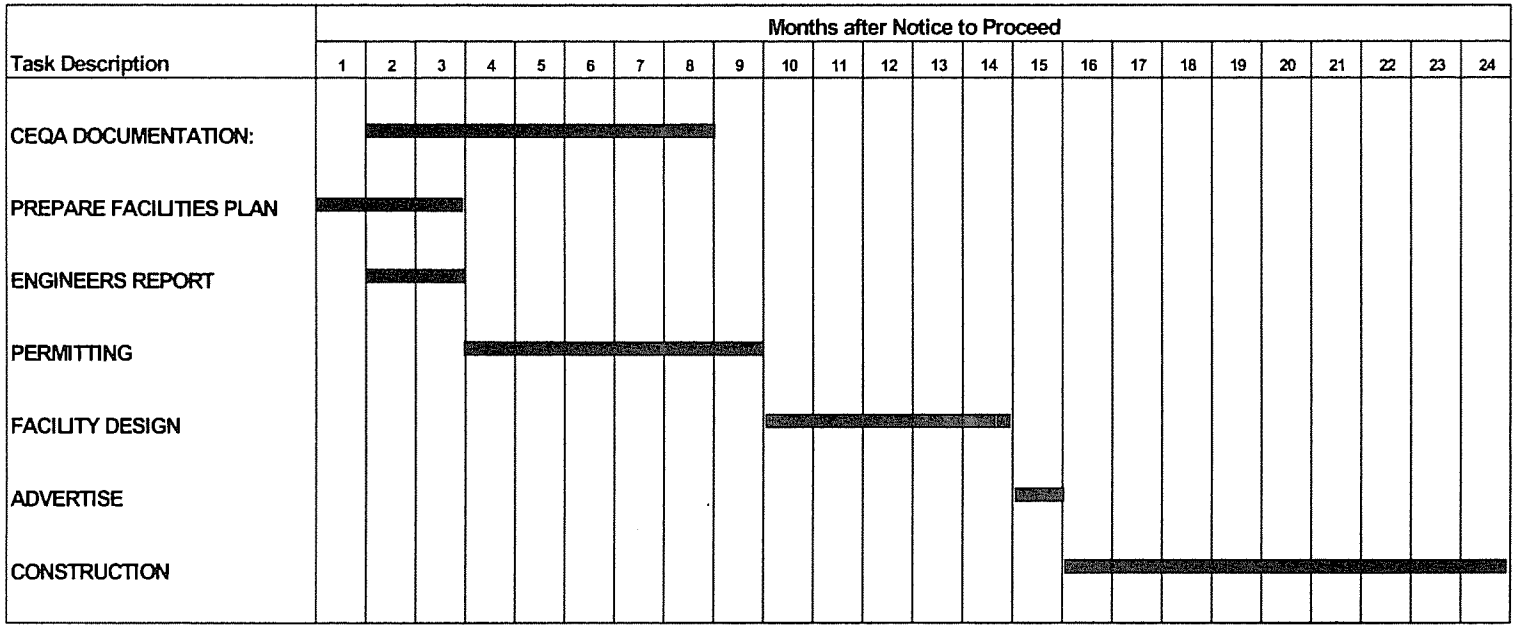
IMPLEMENTATION

In order to implement recycled water use in Pleasanton, there must be a firm commitment by the community, its leaders and the staff of Pleasanton that recycled water is a valuable resource and is appropriate for Pleasanton. In addition, there must also be regulatory agency support, as well as support from Zone 7 to bring water recycling from a noble concept to reality. This section presented additional analysis of the available supplies (i.e. Pleasanton's wastewater production), economic and financial feasibility evaluation, discussion on pricing policies, environmental documentation and community outreach necessary to achieve that commitment. A significant amount of additional discussion and an appropriate decision making process must be undertaken in order to provide the level of confidence that water recycling makes sense at this time and stage of Pleasanton's community development. The issues and discussion presented herein are not intended to be all inclusive and fully developed, but rather provide a framework for discussions on whether Pleasanton should continue to consider recycled water use and a general guide to the steps necessary for implementation.

All three scenarios were developed as independent alternatives. If Scenario A or B is implemented as a phase with future expansion provisions, then some facility upsizing will be necessary to function in a phased program. As a part of future discussion and analysis it may be appropriate to consider development of Scenario A as the first phase of a water recycling for Pleasanton and since the majority of the irrigation sites are not located over the main groundwater basin.

Should the City of Pleasanton decide to move forward with implementation of a RW program, **Figure 9-12** is an example of a typical implementation schedule for a recycled water project. Policy discussion is not included since the time required to reach decisions on policy issues varies from agency to agency. Typical implementation tasks and the duration for each of these tasks are shown in **Figure 9-12**.

Figure 9-7
City of Pleasanton
Recycled Water Program Implementation Schedule



APPENDIX A • MASTER WATER REUSE PERMIT ORDER NUMBER 93-159

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER 93 - 159

WATER REUSE REQUIREMENTS FOR:

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, ZONE 7 ("Zone 7")
CITY OF LIVERMORE ("Livermore")
DUBLIN SAN RAMON SERVICES DISTRICT ("DSRSD")
(together, hereinafter called "permittees")

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. The permittees submitted a Report of Waste Discharge, dated December 1,1993, and a technical engineering report titled *Livermore-Amador Valley Water Recycling Study* (May 1992) in support of their permit application for issuance of water reuse requirements.

2. These master water reuse requirements authorize the permittees to produce and distribute recycled water of specified quality to customers throughout the Livermore-Amador Valley (Valley) in accordance with a Salt Management Program for protecting, improving and enhancing Valley groundwater quality. Institutional arrangements for distributing recycled water within, and where feasible outside the Valley, will be determined by the affected permittees and customers.

   This permit identifies two phases and three categories of water recycling projects for specific and defined purposes and requires the development and submittal of technical reports for Executive Officer approval before reuse under each category will be authorized. These categories include:

   a. Phase I small-scale irrigation projects.

   b. Phase I small-scale groundwater recharge demonstration projects.

   c. Phase II valley-wide irrigation projects, other nonpotable reuse projects, and additional groundwater recharge projects using well injection or surface spreading.

3. Water Code section 13510 states that the people of the state have a primary interest in the development of facilities to reclaim water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the state.

   Section 13511 states that a substantial portion of the future water requirements of this state may be economically met by beneficial use of recycled water. Use of recycled water constitutes the development of "new basic water supplies".

   Section 13512 states that the state should undertake all possible steps to encourage development of water reclamation facilities.

   Section 13550 states that the use of potable domestic water for nonpotable uses, including, but not limited to, cemeteries, golf courses, parks, highway landscaped areas, and industrial and irrigation uses, is a waste or an unreasonable use of the water, if recycled water of adequate quality is available at reasonable cost.

   Section 13551 states that a person or public agency shall not use water from any source of quality suitable for potable domestic use for nonpotable uses, including cemeteries, golf

courses, parks, highway landscaped areas, and industrial and irrigation uses, if suitable recycled water is available as provided in Section 13550.

Section 13576(e) states that the use of recycled water has proven to be safe from a public health standpoint and that the State Department of Health Services (DHS) is updating regulations for the use of recycled water.

4. The Basin Plan (Finding 16) supports reclamation and further states that the disposal of wastewater to inland, estuarine or coastal waters is not considered a permanent wastewater disposal solution where the potential exists for conservation and reclamation.

5. Projects subject to federal NPDES requirements are not authorized under this permit. This permit solely identifies the technical reports necessary to support a future NPDES permit application. Groundwater recharge or conveyance via ephemeral streams or waters of the S[illegible] is an essential component of the proposed valley-wide, year-round water recycling and groundwater quality management program. The Board will consider issuing a separate NPD[illegible] permit to the permittees for the above purposes following receipt of a complete NPDES application.

6. Zone 7 serves as the overall water quality management planning agency for the Alameda C[illegible] Watershed above Niles and is responsible for the management of the Valley's surface water groundwater resources. Zone 7 will serve as the lead agency for administering the permit a[illegible] ensuring that water recycling projects are implemented and managed in accordance with permit conditions and an approved Salt Management Program.

Livermore and DSRSD provide water supply and wastewater treatment services within their service areas and will be the recycled water producers. Decisions regarding new treatment [illegible] distribution facility construction, operation, funding, cost-sharing and related aspects will [illegible] under the purview of the permittees and affected customers.

Zone 7 wholesales groundwater and surface water (primarily State Water Project water) to t[illegible] Cities of Livermore and Pleasanton, DSRSD, the California Water Services Company (Cal Water), Camp Parks, Alameda County's Santa Rita facility, and the Veterans Administration Hospital. Lawrence Livermore National Laboratory, Castlewood and the Sunol area are serv[illegible] by the San Francisco Water Department (SFWD).

The principal retail water service agencies (primary customers) who therefore also have authority under the provisions set forth in this Order to purvey recycled water within their respective jurisdictions include Cal Water, City of Pleasanton, City of Livermore, and DSR[illegible] Future projects may include deliveries to EBMUD, SFWD, and other purveyors and customers within their respective service areas.

Wastewater in the sewered eastern portion of the Livermore-Amador Valley is currently trea[illegible] at the 8.5 mgd design capacity Livermore Water Reclamation Plant subject to NPDES permi[illegible] CA0038008 (Order No. 89-100). Wastewater in the sewered western portion of the valley [illegible] treated at the 11.5 mgd design capacity Dublin San Ramon Services District (DSRSD) Wastewater Treatment Plant subject to NPDES permit No. CA0037613 (Order No. 89-99).

Both the Livermore and DSRSD treatment plants produce high-quality secondary effluent an[illegible] have documented long-term records of reliably meeting discharge standards. Both treatmen[illegible] plants have active industrial source control programs that meet the requirements of 40 CFR 433 and effectively control the discharge of potentially toxic substances by local industri[illegible].

7. Livermore has irrigated or supplied recycled water for irrigation in the vicinity of the Livermore Water Reclamation Plant since 1967. Under Regional Board Order No. 90-102, Livermore presently recycles approximately 450 AFY filtered effluent to irrigate approximate[illegible] 200 acres at the Las Positas Golf Course, 2.5 acres at the Livermore Municipal Airport and 6 [illegible] acres at the treatment plant. Existing, but currently unused, piping exists to supply recycle[illegible] water to CALTRANS for irrigation of highway medians and shoulders.

Livermore mitigates the salt loading resulting from recycled water use by diverting flows high in TDS from an unnamed tributary to Altamont Creek to its collection system. Livermore continues to investigate other options for mitigating TDS loading.

8. DSRSD currently delivers approximately 10 AFY to the City of Pleasanton for irrigation of the I-680/Stoneridge Drive interchange under Regional Board Blanket Order No. 91-042. Approximately 2.5 acres of landscaping at the DSRSD wastewater treatment plant site has been irrigated with recycled water since about 1961. DSRSD is actively pursuing expansion of its water recycling activities, including additional highway irrigation along I-580 (sponsored by the North Pleasanton Improvement District (NPID)). As mitigation for salt loading from this additional recycling, NPID has made funds available to Zone 7 to assist in development of a Salt Management Program.

9. Board Order No. 91-042 provided "blanket" authorization for tanker-truck distribution of recycled water and the expansion of existing fixed-irrigation-system projects already subject to water reuse requirements. Prohibition A.6 of Order No. 91-042 requires Executive Officer approval for use of recycled water in areas overlying Livermore-Amador Valley groundwater basins. Both Livermore and DSRSD have obtained this approval and provide recycled water to local contractors for tanker-truck distribution.

10. Livermore and DSRSD are member agencies of the Livermore-Amador Valley Water Management Agency (LAVWMA). Since 1980, wastewater has been exported from the valley via LAVWMA operated facilities that connect to an East Bay Dischargers Authority (EBDA) interceptor in San Leandro and discharge via the EBDA outfall to Lower San Francisco Bay west of the Oakland Airport. The LAVWMA discharge through the EBDA system is regulated under the EBDA/LAVWMA permit, NPDES No. CA0037869 (Order No. 89-098).

    The LAVWMA pump station can export up to 21.0 mgd of treated wastewater, or 1.3 mgd more than its permanent and firm contracted capacity of 19.7 mgd in the EBDA system. LAVWMA is allowed to discharge up to 1.3 mgd of treated wastewater to San Lorenzo Creek during peak wet weather periods when EBDA capacity is exceeded pursuant to NPDES Permit No. 0038769 (Order No. 90-125).

11. LAVWMA, EBMUD and Caltrans were issued Order No. 93-070 on July 21, 1993, allowing the reuse of Valley exported treated wastewater for irrigation of median and shoulder areas of Interstate 580, Interstate 880 and State Route 238.

12. The Board, as stated in the Basin Plan (Finding 16), has been concerned for decades over the need for an overall water-wastewater management plan for the Valley. The 1982 Zone 7 Wastewater Management Plan (incorporated into 1986 Basin Plan) provided a portion of such a plan for unincorporated areas of the Valley. The 1992 *Livermore-Amador Valley Water Recycling Study* identified the framework for a more comprehensive Valley-wide water recycling plan.

13. The *Livermore-Amador Valley Water Recycling Study (Study)* documented the hydrogeology of the Valley groundwater basin and current water supply and wastewater disposal practices, impacts, and constraints. The report described how water recycling projects; would be incrementally implemented throughout the valley, would comply with Basin Plan requirements and Zone 7 policies, and would maintain and enhance overall groundwater quality in accordance with a basin-wide Salt Management Program (SMP) (Provision D.1.c.ii).

14 Among the conclusions of the *Study* are the following:

- Well-established technologies and procedures exist for reusing and recharging between 19,000 and 38,000 acre-feet per year (AFY) of recycled water within the Livermore-Amador Valley without impairing public health or water quality.

- Zone 7 has identified a need for 20,000-25,000 AFY of additional water supply within the next 10-15 years. The recommended water recycling projects could provide a large

portion of this supply depending on the combination of water recycling projects implemented.

- Valley wastewater export disposal capacity is limited to 21 mgd and is projected to be exceeded within the next 10-15 years. Wet weather disposal capacity may be exceeded sooner. Some viable groundwater recharge water recycling projects could also provide additional year-round wastewater disposal capacity.

- Water recycling projects including reverse osmosis demineralization and export of brine could significantly improve groundwater quality and the import-export balance for dissolved salts in the valley's groundwater resources.

- A combination of projects using both demineralized and non-demineralized recycled water for irrigation, groundwater recharge and other beneficial uses is the most cost-effective approach to obtaining the benefits of water recycling.

15. Water recycling is an essential part of an overall program to manage the Livermore-Amador Valley's water resources. The permittees' governing bodies have adopted resolutions establishing their intent to proceed with the planning, permitting, and implementation of valley-wide water recycling projects. These projects would provide important multiple water quality, water supply, and wastewater disposal benefits for Valley residents including:

    - augmentation and improved reliability of the Valley water supply.
    - reduction of the mass of pollutants discharged to San Francisco Bay.
    - reduction in size or deferral of the need for additional wastewater export facilities.

16. The Livermore-Amador Valley is a closed groundwater basin within the Alameda Creek watershed with multiple groundwater subbasins of variable water quality. The main portion of the Central Basin (that portion underlying Livermore and Pleasanton) has the highest quality, supplies most of the municipal wells in the area, and is used to store and distribute high quality imported water.

    The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) in September 16, 1992. The beneficial uses of the Valley groundwater basin are as identified in the Basin Plan are:

    - Industrial Service and Process Supply
    - Municipal and Domestic Supply
    - Agricultural Supply

    Alameda Creek and its tributaries are used for recharge of the Livermore-Amador Valley groundwater basin as well as a channel for conveyance of South Bay Aqueduct (SBA) release water to the Niles Cone ground water basin for recharge. During dry weather, creek flow primarily consists of SBA release water. The beneficial uses of Alameda Creek identified in the Basin Plan are:

    - Agricultural Supply
    - Groundwater Recharge
    - Water Contact Recreation
    - Non-Contact Water Recreation
    - Warm Fresh Water Habitat
    - Cold Fresh Water Habitat
    - Wildlife Habitat
    - Fish Migration
    - Fish Spawning

    Water Code Section 13240 requires the Board to formulate, adopt, and periodically review Basin Plans which identify beneficial uses of all ground and surface waters of the Region and establish water quality objectives that ensure reasonable protection of the beneficial uses.

Section 13241 states that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses. Factors that the Board must consider when establishing or amending water quality objectives include, but are not limited to:

(a) Past, present, and probable future beneficial uses of water.
(b) Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.
(c) Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
(d) Economic considerations.
(e) The need for developing housing within the region.
(f) The need to develop and use recycled water.

17. Basin Plan Table III-3 lists surface water and groundwater quality objectives for the Alameda Creek Watershed above Niles. The current surface water objectives for Alameda Creek and its tributaries, adopted in 1975, were set primarily to prevent degradation of released South Bay Aqueduct water by wastewater discharges (during SBA water transmission and recharge in the Valley and the Niles cone) and also thereby protect groundwater quality. The surface water objectives, based on a several year average of SBA water quality are as follows:

Surface Water Quality Objectives (Alameda Creek and Tributaries):

TDS:	250 mg/l 90-day arithmetic mean
	360 mg/l 90-day 90th percentile
	500 mg/l daily maximum
Chlorides:	60 mg/l 90-day arithmetic mean
	100 mg/l 90-day 90th percentile
	250 mg/l daily maximum

18. Water quality objectives for the groundwater basins were developed by Zone 7 in its 1982 Wastewater Management Plan and incorporated into Basin Plan Table III-3 as follows:

Groundwater Quality Objectives
(not to be exceeded more than 10% of the time during one year)

Central Basin

TDS:	Ambient or 500 mg/l, whichever is lower
Nitrate:	45 mg/l (10 mg/l NO_3-N)

Fringe Subbasins

TDS:	Ambient or 1000 mg/l, whichever is lower
Nitrate:	45 mg/l (10 mg/l NO_3-N)

Upland and Highland Areas

California Administrative Code, Title 22, and county standards

19. The Basin Plan states the Board's intent to use Zone 7's 1982 Wastewater Management Plan general policy and policy for community wastewater systems as guidance in developing waste discharge requirements for dischargers in the Valley. These polices were incorporated verbatim into the 1986 Basin Plan and are contained in the current (September 1992) Basin Plan Implementation Plan.

Attachment 1 to this permit, excerpted from the *Study*, (Finding 13) documents how the Valley-wide water recycling program will comply with each policy. Applicable portions of the Basin Plan and Zone 7 policies include:

"The quality of the ground water in the Central Ground Water Basin should not be allowed to be degraded by controllable factors. All wastewater treatment and disp facilities shall be planned, located, scheduled for construction and operated so as to maximize the export of salt and to minimize salt and other pollutant loadings in the Central Basin.

"To the extent possible and reasonable wastewater should be treated and disposed through the existing systems with export of effluent.

"If additional export is not feasible, limited land application may be an alternativ Land application will be considered only after a feasibility study by Zone 7, or ano entity, finds export not feasible.

"However, wastewater treatment (which may include demineralization) with land application may be permitted if one of the following conditions is met:

a. The percolate (at the groundwater table) meets the ground water quality objectives and does not cause poor quality rising ground water to violate any water quality objectives.

b. The applied wastewater effluent has less than 250 mg/l TDS, does not cause an significant local problems, and does not cause rising ground water to create w quality problems in the Central Basin and Niles Cone areas.

c. The application point is in the fringe subbasin or upland and highland area, it can be shown that the project, because of its size and location, together wi other possible projects in the area, will not cause adverse water quality effec either locally or in the Central Basin or Niles Cone areas. The site-specific st will have to demonstrate that the percolate cannot reasonably be expected o time to move, either directly or indirectly, into the Central Basin or Niles Co and degrade or pollute the groundwater. All other State and Federal standard must be met.

"Policies b and c above allow some degradation only when beneficial reuse of wastewater is proposed, as permitted in the State nondegradation policy. Land application will be discouraged in the Central Basin where salts, trace organics an viruses may cause problems."

The Zone 7 policies define land application to include direct disposal to land or ponds, the use of effluent for irrigation or ground water recharge. The policies have generally bee interpreted to require 250 mg/L recycled water (demineralization) for irrigation above th Central Basin, in large part given the uncertainties involved in measuring percolate qual the groundwater table.

Imported surface water and groundwater can at times exceed the Zone 7 and Basin Plan 25 mg/L surface water and land application water quality objective. Under current conditio and with minimal water recycling, there is a net salt loading to the Central Basin of approximately 5,000 tons per year. Net salt loading occurs in non-drought as well as dro years. In 1991, averages (and ranges) for Valley Total Dissolved Solids (TDS) concentratio were:

• imported SBA surface water	350 mg/L (213-447 mg/L)
• groundwater	640 mg/L (425-983 mg/L)
• DSRSD final effluent	730 mg/L
• Livermore final effluent	800 mg/L

20. Chapter 6 of the *Study* (Finding 13), titled Compliance with Regulatory Constraints, documented how the proposed water recycling program would be conducted to comply with each of the Zone 7 policies in Finding 19 and other Basin Plan policies, prohibitions, and non-degradation requirements. A table from that report documents compliance in a point-by-point format and is made Attachment 1 to this Order.

21. The Basin Plan states that "wastewater discharges that cause the surface water limits in Table III-3 to be exceeded may be allowed if they are part of an overall water-wastewater resource operational program developed by the agencies affected and approved by the Board."

22. Implementation of a Basin Plan specified Valley-wide "water-wastewater resource operational program" incorporating demineralized and non-demineralized recycled water projects (as well as other groundwater-quality management strategies) provides the opportunity and means to actively manage and improve groundwater quality and supply.

23. The permittees propose to develop and implement a Salt Management Program (SMP) to regulate water recycling projects in compliance with the Basin Plan condition cited in Finding . The Program will detail how demineralized water recycling and other projects will be coordinated to fully mitigate increases in salt loading to the overall Central Basin due to recycled water use and to comply with the State Board Anti-Degradation Policy (Resolution 68-16).

24. The *Study* (Finding 13) reviewed Title 22 requirements and potential constituents of concern such as organics, viruses, and salts and documented how well-established treatment technologies are available and would be provided to fully comply with all requirements and to prevent adverse public health and environmental impacts.

25. Multiple examples of successful groundwater recharge and other potable reuse projects exist around the country. The long-operating Orange County Water District Water Factory 21 (WF-21) project has served as a model for many existing and proposed facilities. Other advanced treatment facilities in San Diego and Denver have demonstrated through extensive multiple year studies that recycled water can be produced which has equivalent or lower health risks than potable water.

    WF-21 injects blended recycled water into a seawater intrusion barrier and groundwater recharge system. The nearest WF-21 public water supply well has been receiving nearly 100 percent injection water, more than half of which is recycled water from WF-21. The well is 1800 feet from the injection wells and the travel time is calculated to be between 2 and 4 years.

    Extensive water quality monitoring by WF-21 for the past 18 years indicates no degradation of groundwater quality by chemicals or microorganisms of public health concern.

    The Department of Health Services (DHS) found that the capability of the WF-21 treatment process to adequately reduce viruses in the recycled water before injection has been demonstrated sufficiently. Frequent monitoring and proper operation according to an operating plan are necessary to assure removal of such non-routinely measured constituents as pathogens (including viruses and giardia).

    WF-21 was authorized in 1992 by the Santa Ana Regional Board and the DHS to inject up to 100 percent recycled water as an on-going research and demonstration project.

26. The DHS considers Total Organic Carbon (TOC) to be a reasonable surrogate measure of the trace organics present in wastewater after treatment. A Scientific Advisory Panel (SAP) assembled by the State of California to evaluate the recharge of groundwater with recycled water indicated in its 1987 report that reducing TOC to one mg/L or less would minimize concern about the presence of individual chemicals that could pose a threat to health. Proposed Title 22 groundwater recharge regulations limit TOC of wastewater origin to one mg/L in extracted groundwater.

27. Zone 7's near-term need for additional water supply, increasing demands on statewide sup and the recent lengthy drought illustrate an urgent need to implement viable and environmentally sound recycled water groundwater recharge and irrigation projects.

28. Small-scale projects, when accompanied by rigorous monitoring, data collection, and management programs, are a safe and prudent first step toward implementing water recyclin in the valley on a larger scale. Small-scale irrigation projects operated by the permittees anc selected customers would provide each with the experience needed to effectively impleme larger scale projects.

29. Small-scale demonstration groundwater recharge projects of up to one mgd average flow, producing water quality meeting proposed Title 22 and Basin Plan objectives, would provic valuable local experience and public involvement, allow collection of applicable data documenting predicted groundwater basin travel times and mixing characteristics, and facilitate future large-scale water recycling.

    Livermore has completed a feasibility study and preliminary design of a 0.75 mgd demonstration Advanced Water Reclamation Plant (AWRP) modeled after the intensely studied Orange County Water District Water Factory 21 (WF-21) reverse osmosis facilities, which began operation in 1976.

    Livermore has applied for State Revolving Loan Funding for the project which would be located at the existing treatment plant site. The project is eligible for funding under Cla (projects necessary to comply with waste discharge requirements). Zone 7 has offered to p Livermore for demineralized recycled water produced by the AWRP suitable for groundwater recharge.

30. Implementation of small-scale recycled water irrigation and groundwater recharge project a phased manner, concurrent with development of a Valley-Wide Salt Management Program (SMP), will enable a more rapid realization of the water-quality benefits promised by full-scale water recycling projects. Once the Valley-Wide SMP has been completed by the permittees and accepted by the Executive Officer, Phase I small-scale projects would beco part of the Phase II valley-wide water recycling program and subject to the requirements c Program.

31. To progressively implement water recycling in the Livermore-Amador Valley, potential projects have been divided into the following three groups:

    GROUP A: *Phase I small-scale irrigation projects.* Some of the projects that have been identified to date are listed below. As the valley-wide program develops, other similar projects may be identified and implemented, subject to Executive Officer notification an approval:

    City of Livermore (Las Positas Golf Course, Livermore Municipal Airport Livermore Water Reclamation Plant) (currently active)
    City of Livermore (Springtown Golf Course)
    Triad Business Park, Livermore
    Las Positas Community College, Livermore
    Dublin San Ramon Services District (Wastewater Plant) (currently active)
    CALTRANS interchanges and median areas:
        I-680/Stoneridge (currently active)
        I-580/Hopyard
        I-580/Hacienda
        I-580/Santa Rita
        I-580/Airway
        I-580/Portola
        I-580/N. Livermore Avenue
        I-580/Springtown

GROUP B: *Phase I small-scale demonstration groundwater recharge projects.* This group currently includes the project listed below. As the valley-wide program develops, other similar projects may be identified and implemented, subject to Executive Officer notification and approval:

Groundwater recharge, through spreading or injection wells, of recycled water produced by the Livermore Demonstration Advanced Water Reclamation Plant.

GROUP C: *Phase II valley-wide projects.* This group includes any uses allowed under DHS Title 22 requirements, including commercial, industrial, or residential irrigation use, groundwater recharge through spreading basins or injection wells, or other uses, except drinking or food preparation. Projects involving discharge to surface waters of the State require a separate NPDES permit and are not authorized under this permit.

32. The proposed uses of recycled water will maintain and enhance natural resources, and thus enactment of this Order is categorically exempt from the provisions of the California Environmental Quality Act in accordance with Title 14, California Administrative Code, Chapter 3, Section 15307.

33. Section 13523 of the California Water Code provides that a Regional Board, after consultation with and receipt of recommendations from the California DHS and if it determines such action to be necessary to protect the public health, safety and welfare, shall prescribe water recycling requirements for water which is used or proposed to be used as recycled water. The use of recycled water for the purposes identified in Finding 31 could affect public health safety or welfare and requirements for those uses are therefore necessary in accordance with the California Water Code.

34. This Order's requirements conform with and implement the wastewater reclamation criteria of the California DHS (Title 22, Division 4, Section 60301-60355 of the California Code of Regulations) to protect the public health, safety and welfare.

35. The Board has notified the Permittees and interested agencies and persons of its intent to prescribe water reuse requirements.

36. The Board, in a public meeting, heard and considered all comments pertaining to this matter.

IT IS HEREBY ORDERED, that the Alameda County Flood Control and Water Conservation District – Zone 7, City of Livermore and Dublin San Ramon Service District shall comply with the following:

A. Prohibitions

1. The treatment, distribution or reuse of recycled water shall not create a nuisance as defined in Section 13050 (m) of the California Water Code.

2. No new water recycling projects shall be initiated prior to submittal of the technical reports specified in the respective provisions below, and approval by the Executive Officer, and where specified, the Department of Health Services.

3. Water recycling projects shall not include the discharge of treated wastewater to surface waters of the State. If the permittees seek to apply for future approval to implement such projects, they shall initiate the process by providing the NPDES documentation described in Provision 2.

B. Recycled Water Use Limitations

1. Use of recycled water shall be part of an "overall water-wastewater resource operational program" (as provided in the Basin Plan) designed to prevent degradation of groundwater resources within the basin.

2. The "overall water-wastewater resource operational program" for preventing degrad... of groundwater resources shall include implementation of a Salt Management Prog to be prepared and submitted in accordance with Provision D.1.c.ii.

3. At least 30 days prior to the initial use of recycled water at each new site, the permittees and customer(s) shall jointly submit documentation acceptable to the Executive Officer that the proposed use, system design, and operation comply wit Order.

4. The use of recycled water shall not cause rising groundwater discharging to surface waters to impair surface water quality objectives or beneficial uses.

5. The use of recycled water shall be in accordance with the Salt Management Program approved by the Executive Officer to maintain or enhance ambient groundwater qu and shall not cause ground waters to exceed the following specific water quality objectives more than 10% of the time during one calendar year:

Central Basin

TDS:	Ambient or 500 mg/l, whichever is lower
Nitrate:	45 mg/l (10 mg/l NO_3-N)

Fringe Subbasins

TDS:	Ambient or 1000 mg/l, whichever is lower
Nitrate:	45 mg/l (10 mg/l NO_3-N)

Upland and Highland Areas

California Administrative Code, Title 22, and county standards

Ambient water quality conditions at a proposed project area will be determined by Zone 7 at the time the project is proposed. Ambient conditions apply to the water bearing zone with the highest quality water.

6. All water recycling must be under the direct control of the permittees or their authorized customers. The permittees shall establish permitting, tracking, record keeping, monitoring and inspection procedures, subject to Executive Officer appro These procedures shall clearly identify the responsibilities of each party as they re... to compliance with this Order.

7. Once DHS has approved revised regulations or guidelines for water recycling, the Executive Officer may authorize changes to the restricted and unrestricted water use. consistent with those regulations or guidelines.

8. Recycled water shall be applied in a manner which will minimize public contact or exposure to the water in compliance with the California DHS *Guidelines for the Use of Recycled Water.*

9. Irrigated areas, including recycled water impoundments and all equipment used in conjunction with recycled water use, shall be clearly identified with posted notices the public.

10. Irrigation projects should be managed to conform with the California DHS *Guidelin Use of Recycled Water for Irrigation and Impoundments* and *Guidelines for Worker Protection at Water Reclamation Use Areas* and the American Water Works Associatio California-Nevada Section's *Guidelines for the Distribution of Non-potable Water.*

C. Recycled Water Quality Specifications:

1. Restricted Quality Recycled Water (Disinfected Secondary 23 MPN).

Recycled water shall be at all times an adequately oxidized, disinfected wastewater that meets the following quality limits prior to use:

a.	CBOD (5-day, 20 C)	40 mg/l daily maximum 25 mg/l monthly average
b.	Dissolved Oxygen	1.0 mg/l minimum
c.	Dissolved Sulfide	0.1 mg/l maximum
d.	Total coliform bacteria	At any point downstream of the disinfection facilities after adequate contact with disinfectant the median number of total coliform organisms shall not exceed 23 MPN/100mL as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms shall not exceed 240 MPN/100ml in any sample.
e.	Total Dissolved Solids	In compliance with the Salt Management Plan approved by the Executive Officer.

2. Unrestricted Quality Recycled Water (Disinfected Tertiary).

Recycled water shall be an adequately oxidized, coagulated, clarified, filtered and disinfected water (as defined in latest version of Title 22 Section 60031-603335, California Administrative Code) that meets the following quality limits at all times:

a.	CBOD (5-day, 20 C)	40 mg/l daily maximum 25 mg/l monthly average
b.	Dissolved Oxygen	1.0 mg/l minimum
c.	Dissolved Sulfide	0.1 mg/l maximum
d.	Turbidity	2 NTU daily average filtered water turbidity and not exceeding 5 NTU at any time
e.	Total coliform bacteria	At any point downstream of the disinfection facilities after adequate contact with disinfectant the median number of total coliform organisms shall not exceed 2.2 MPN/100 Ml as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms shall not exceed 23 MPN/100ml in any sample.
f.	Total Dissolved Solids	In compliance with the Salt Management Plan approved by the Executive Officer.

3. Groundwater Recharge Projects - Interim Limits.

The permittees shall assure that recycled water used for groundwater recharge shall be an adequately oxidized, filtered and disinfected water in compliance with the following proposed Title 22, Division 4, Chapter 3, Articles 1 and 5.1 limits at all times. The limits listed below shall be considered Interim Limits, pending final State approval of

the proposed Title 22 limits. In the event the proposed limits are modified during final State adoption, or due to future amendments, the most recent State approved limits shall apply and shall supersede the Interim Limits contained in this permit:

a. CBOD (5-day, 20 C) — 25 mg/l monthly average

b. Total Organic Carbon — 20 mg/l (90-day average), or as required by the following table if the recycled water contribution exceeds 20% of total recharge per project.

MAXIMUM ALLOWABLE TOC AFTER ORGANICS REMOVAL INTERIM LIMITS		
	Maximum TOC (mg/L)	
Recycled Water Contribution	Surface Spreading (Category I)	Direct Injection (Category IV)
0-20%	20	5
21-25%	16	4
26-30%	12	3
31-35%	10	3
36-45%	8	2
46-50%	6	2

c. Total Suspended Solids — 30 mg/l monthly average

d. Turbidity — 2 NTU average daily filtered water turbidity and not exceeding 5 NTU at any time

e. Total coliform bacteria — At any point downstream of the disinfection facility after adequate contact with disinfectant the median number of total coliform organisms shall not exceed [illegible] MPN/100 mL as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms shall not exceed 23 MPN/100ml in any sample.

f. Total Dissolved Solids — In compliance with the Salt Management Plan approved by the Executive Officer.

g. Total Nitrogen — 10 mg/l as nitrogen (annual average) unless the permittee demonstrates, to the satisfaction of the Executive Officer, that the standard can be consistently met prior to reaching the groundwater table.

h. Other Constituents — The level of general physical characteristics, radioactivity and the concentration of inorganic and organic compounds shall not exceed the maximum contaminant levels specified in Title 22, Chapter 15 Sections 64435, 64443, 64444.5 and 64473.

resources. The program will contain monitoring, management and mitigation elements necessary to achieve salt management goals defined in Zone 7 policies and in the Basin Plan. At the permittee's option, the SMP may be incorporated into the Engineering Report or other regulatory documentation.

The SMP shall include a comprehensive groundwater monitoring program. Gathering of data under the monitoring program shall serve three objectives: (1) evaluation of effects of each project on local groundwater and (2) evaluating overall trends in groundwater quality throughout the basin and monitoring any effects of water recycling programs on basin-wide groundwater quality and (3) enhancing understanding of the hydrogeology of the basin.

The Salt Management Program shall fulfill the specific requirements listed in Attachment 3.

2. Potential future projects which may involve the use of ephemeral or year-round streams or other waters of the State for recycled water conveyance or groundwater recharge are not authorized under this permit. The permittees are directed to apply for an NPDES permit if they desire to implement such projects in the future.

   Application for an NPDES permit will need to be supported by technical reports covering, at a minimum, the following issues:

   a. Compliance with the California *Inland Surface Waters Plan* and USEPA policies regarding effluent-dominated ecosystems.

   b. Title 22 requirements for an engineering report and monitoring plan.

   c. Engineering and operating plans for watercourses and impoundments.

   d. CEQA compliance.

   e. NPDES permit application.

3. Development of water recycling plans and facilities must comply with CEQA. Any of the above reports may be combined with CEQA documentation when a united document would facilitate regulatory review.

4. Following Executive Officer approval of the Salt Management Program (SMP) required to be developed in Provision D.1.c.ii. of this Order, the requirements prescribed by this Order will supersede the requirements prescribed by Order No. 90-102 (Livermore and Caltrans Water Reclamation Requirements) and applicable requirements of Order No. 91-042 (Region 2 Water Reuse Requirements). In the interim, recycled water irrigation may continue at the Las Positas Golf Course, Livermore Municipal Airport and Livermore Water Reclamation Plant subject to the requirements of Order No. 90-102 and at existing sites operating subject to Order No. 91-042.

5. Following acceptance by the Executive Officer of the SMP, all existing and Phase I projects will be considered part of the Phase II valley-wide water recycling scenario, and subject to all requirements of the SMP.

6. The permittees and customers shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with the water reuse requirements.

7. The permittees shall discontinue delivery of recycled water to customers during any period in which it has reason to believe that the limits for that use as specified in this section of the Order are not being met. The delivery of recycled

water shall not be resumed until all conditions which caused the limits to be violated have been corrected.

8. The permittees shall comply with the Self-Monitoring Program as adopted by the Board and as may be amended by the Executive Officer. Customers are responsible for submitting on-site observation reports to the permittees, who will compile and file self-monitoring reports with the Regional Board.

9. The permittees and customers shall permit the Regional Board or its authorized representative in accordance with California Water Code Section 13267(c):

   a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order.

   b. Access to and copy of, at reasonable times, any records that must be kept the conditions of this Order.

   c. Inspection at reasonable times of any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order.

   d. To photograph, sample, and monitor at reasonable times for the purpose of assuring compliance with this Order.

10. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

   a. Violation of any term or condition contained in this Order.

   b. Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts.

   c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized reuse.

   d. Endangerment to public health or environment that can only be regulated to acceptable levels by Order modification or termination.

11. The Board will review this Order periodically and may revise the requirements when necessary.

I, Steven R. Ritchie, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Francisco Bay Region, on December 15, 1993.

Steven R. Ritchie
Executive Officer

Attachments:

1. Water Recycling Program Compliance with Basin Plan and Zone 7 Policies
2. Implementation Schedule
3. Technical Report Workplans
4. Self-Monitoring Program

Recycling Program Compliance Summary for Zone 7 Policies and Basin Plan

Policy, Regulations, or Guidelines	Response
c. The application point is in the fringe sub-basin or upland and highland area, and it can be shown that the project, because of its size and location, together with other possible projects in the area, will not cause adverse water quality effects either locally or in the Central Basin or Niles Cone areas. The site specific study will have to demonstrate that the percolate cannot reasonably be expected over time to move, either directly or indirectly, into the Central Basin or Niles Cone and degrade or pollutant ground water. All other State and Federal standards must be met.	As discussed in response to Policy A3b, appropriate recycled water TDS limits would be developed on a base-by-case basis as part of the overall recycling program and salt management plan. An approved monitoring and management plan would be developed for each project allowing potential problems to be promptly detected and corrective actions taken. A technical report covering all the topics identified in the last sentence of Policy A5 will have to be prepared, submitted, and approved by the RWQCB prior to issuance to Waste Discharge Requirements for nonpotable recycling. A detailed engineering report and monitoring program are required by DHS as part of the review and approval process for groundwater recharge projects.
Policies b and c above allow some degradation only when beneficial reuse of wastewater is proposed, as permitted in State Board Resolution No. 68-16 "Statement of Policy With Respect to Maintaining High Quality Waters in California". Land application will be discouraged in the Central Basin where salts, trace organics, and viruses may cause problems.	Only beneficial reuse of wastewater is being proposed. Proposed recycling projects can be managed to comply with the state non-degradation policy (Resolution 68-16) and maintain full beneficial uses of the groundwater. Trace organics and viruses will be reduced to below levels of concern by definition through compliance with Title 22 recharge requirements. Overall TDS loading to the central basin can be managed with a goal of no net increase in salt loading through control of the relative qualities, quantities, types, and locations of recycling practiced in the Valley and/or through control of natural salt loading sources.
Policy A4. If demineralization is proposed the effluent should, is physically, financially and institutionally feasible, be used to replace poor quality wastewater being used for irrigation.	The Livermore Las Positas golf course irrigation is the only significant existing use of recycled water for irrigation. It is arguable whether this is "poor" quality wastewater or not. It does exceed the 250 mg/L TDS objective and contains approximately 20 mg/L NO3-N. Cost-effectiveness and groundwater quality management criteria would be developed to evaluate on a case by case basis the appropriateness of irrigating with demineralized water. Higher quality water could wind up being used for irrigation than being provided to consumers (through recharge).

Source: Livermore-Amador Valley Water Recycling Study (1992)

Recycling Program Compliance Summary for Zone 7 Policies and Basin Plan

Policy, Regulations, or Guidelines	Response
Policy A5. Each proposed community system will be considered on a case-by-case basis considering the overall wastewater disposal needs within the watershed as determined by planning studies under the direction of Zone 7. Proliferation of small inefficient plants should avoided. Adding wastewater to the groundwater in a manner that would force poor quality water into the streams must be avoided. For projects proposing land application site-specific studies of the soils, geohydrology, groundwater, and of the impacts on groundwater must be completed and disposal method approved by Zone 7 and other appropriate agencies.	A technical report covering all the topics identified in the last sentence of A5 will have to be prepared, submitted, and approved by the RWQCB prior to issuance of Waste Discharge Requirements for nonpotable recycling. A detailed engineering report and monitoring program are required by DHS as part of the review and the groundwater in a manner that would force poor quality water into the streams must avoided. For projects proposing land application site-specific studies of the soils, geohydrology, groundwater, and of the impacts on groundwater must be completed, and disposal method approved by Zone 7 and other appropriate agencies.

Source: Livermore-Amador Valley Water Recycling Study (1992)

Recycling Program Compliance Summary for Zone 7 Policies and Basin Plan

Policy, Regulation, Prohibition or Guideline	Response
BASIN PLAN	
Prohibition 1. Any wastewater which has particular characteristics of concern to beneficial uses at any point at which the wastewater does not receive a minimum initial dilution of at least 10:1, or into any nontidal water, dead-end slough, similar confined waters, or any immediate tributaries thereof.	
Waste discharges will contain some levels of pollutants regardless of treatment. This prohibition will require that these pollutants, when of concern to beneficial uses, be discharged away from areas of minimal assimilative capacity such as nontidal waters and dead-end sloughs. This prohibition will accomplish the following:	
a. Provide an added degree of protection from the continuous effects of waste discharge.	Discharges would comply with receiving water quality objectives.
b. Provide a buffer against the effects of abnormal discharges caused by temporary plant upsets or malfunctions.	Complied with through plant reliability and redundancy features.
c. Minimize public contact with undiluted wastes.	Tertiary effluent meets Tale 22 requirements for full body contact recreation.
d. Reduce the visual (aesthetic) impact of waste discharges.	Tertiary effluent appears the same as potable water.
Exceptions to Basin Plan Prohibition above will be considered for discharges where:	
a. An inordinate burden would be placed on the discharger relative to beneficial uses protected and an equivalent level of environmental protection can be achieved by alternate means, such as alternative discharge site, a higher level of treatment, and/or improved treatment reliability.	This exception is more appropriate for stream discharge projects such as to San Ramon Creek than for stream recharge or conveyance projects. A cost effectiveness evaluation of stream discharge versus export would show the extent of inordinate burden imposed. If no recharge is involved, tertiary 2.2 MPN effluent may be a high enough level of treatment depending on nutrient and ISWP requirements.
b. A discharge is approved as part of a reclamation project.	Discharges would be part of an approved reclamation project.

Source: Livermore-Amador Valley Water Recycling Study (1992)

Recycling Program Compliance Summary for Zone 7 Policies and Basin Plan

Policy, Regulation, Prohibition or Guideline	Response
e. It can be demonstrated that net a environmental benefits will be derived as a result of the discharge	Discharge quality and quantity would be designed to provide net environmental benefits by providing flow to otherwise dry creeks, increasing riparian habitat, and possibly providing recreational and aquatic habitat benefits.
Significant factors to be considered by the Regional Board in reviewing requests for exceptions will be the reliability of the discharger's system in preventing inadequately treated wastewater from being discharged to the receiving water and the environmental consequences of such discharges.	A very high level of performance reliability can be readily designed into the treatment facilities. Environmental consequences will be minimal because of the remote chance of the type of catastrophic failure of multiple systems necessary to cause such a discharge.
Prohibition 4. Any wastewater which has particular characteristics of concern to beneficial uses to Alameda Creek when no natural flow occurs.	Any recycled water released to Alameda Creek that could percolate into the groundwaters of the Livermore-Amador Valley and Niles cones would be treated and recharged in compliance with Title 22 recharge requirements and all other relevant requirements. Water recharged in compliance with Title 22 requirements has by definition reduced characteristics of concern below levels required for protection of municipal potable beneficial uses. It will be necessary to show that extraction wells along the creek meet the minimum separation detention time requirements from the points of recharge. The prohibition leaves open the possibility of discharging a lower quality recycled water during times of natural flow.

Source: Livermore-Amador Valley Water Recycling Study (1992)

ATTACHMENT 2

IMPLEMENTATION SCHEDULE

No Group A, B, or C projects are authorized to commence operation until receiving Executive Officer approval of the respective Provision D.1 technical reports summarized below. Group A reports shall be submitted a minimum of 90 days before the first proposed Group A project start-up date. Group B and C reports shall be submitted no later than two and three years, respectively, following startup of the first Group A project. Salt Management Program implementation shall begin no later than five years after startup of the first Group A project.

As noted in Provision D.4 of this Order, recycled water irrigation of areas permitted under Order No. 90-102 and Order No. 91-042 may continue on an interim basis under the terms of those Orders. Those Orders will be superseded by the conditions of this Order following submittal and Executive Officer approval of the Provision D.1.c.ii Salt Management Program.

TIME SCHEDULE

Finding 31 Recycled Water Project Group	Provision D.1 Technical Report Submittal Requirements for Project Group Approval	Submittal Dates Following Start-up of First Group A Project
GROUP A - Phase I Small-Scale Irrigation Projects	DHS Engineering Report; Interim Groundwater Monitoring and Management Program; CEQA documentation	(90 days prior to first proposed Group A project start-up)
GROUP B - Phase I Small-Scale Demonstration Groundwater Recharge or Other Salt Management Projects	DHS Groundwater Recharge or other Salt Management Project Engineering Report; CEQA documentation	Two years
GROUP C - Phase II Valley-wide Water Recycling Projects	Salt Management Program; DHS Engineering Report; CEQA documentation	Three years
	Implement Salt Management Program to achieve 100% mitigation of impacts on groundwater quality from water recycling	Five years

ATTACHMENT 3

TECHNICAL REPORT WORKPLANS

A. ENGINEERING REPORTS

1. General

Engineering Reports shall be in accordance with the State Department of Health Services *Guideline for the Preparation of an Engineering Report on the Production, Distribution and Use of Recycled Water*, and shall cover the following topics, as applicable:

a. Treatment processes, quality of water to be used, applicable use criteria

b. Raw wastewater sources, quality, industrial component

c. Industrial source control programs

d. Schematic of treatment train

e. Treatment design & performance criteria

f. Filtration performance data

g. Reliability features

h. Effluent Monitoring Program

i. Contingency Plan

j. Transmission and Distribution Facility Schematic Design

k. Measures for Compliance with DHS Title 17, *Guidelines for the Distribution of Recycled Water* and California-Nevada Section of the American Water Works Association, *Guidelines for the Distribution of Non-potable Water*

l. Maps and general descriptions of Use Areas

m. Identification of on-site Responsible Parties

n. Irrigation types, methods and drainage

o. Use of Impoundments, including provisions for overflow and drainage

p. Site Monitoring and Inspection Program

2. REQUIREMENTS FOR PHASE I SMALL-SCALE IRRIGATION PROJECT ENGINEERING REPORTS (GROUP A PROJECTS)

In addition to the elements listed above, engineering reports for irrigation projects shall include the following information:

a. Known local groundwater hydrology

b. Known groundwater quality data

c. Current land uses and irrigation practices

d. An estimate of additional salt loading due to irrigation with recycled water

e. Site-specific groundwater monitoring plan.

3. REQUIREMENTS FOR PHASE I SMALL-SCALE GROUNDWATER RECHARGE PROJECT ENGINEERING REPORTS (GROUP B PROJECTS)

Engineering reports shall consist of a thorough investigation and evaluation of the groundwater recharge project, and shall assess impacts on the existing and potential uses of the affected groundwater basin. The reports shall identify proposed means for achieving compliance with requirements regarding source control, treatment performance standards, recharged water quality, maximum recycled water contribution, minimum depth-to-groundwater, minimum retention time underground, horizontal separation, recharge-water monitoring and groundwater monitoring. The reports shall include:

a. An engineering plan of the reclamation plant, transmission facilities, spreading basins and monitoring wells.

b. A detailed description of the proposed facilities.

c. Hydrogeologic data. For a demonstration-scale surface-spreading recharge projects of one MGD or less, the report shall identify groundwater quantity, quality and flow patterns for the immediate area of recharge and for one mile down gradient. The study shall identify the zones within the receiving aquifer where the maximum allowed recycled water contribution is not met and in which the provided organics removal is not sufficient for the recycled water contribution to the groundwater.

d. Identification of all wells that will be affected by the proposed project. The study shall specify which wells are subject to the highest recycled water contribution and shortest recycled water retention time.

e. Quantitative descriptions of the soil, soil layers, infiltration rates, aquifer transmissivity, groundwater movement, historic depth-to-groundwater for the recharge area.

f. A description of the operational and management personnel, their qualifications, experience and responsibilities.

g. A description of how the project will be operated to comply with the recharge site requirements of maximum recycled water contribution, minimum depth-to-groundwater, horizontal separation and minimum retention time underground.

h. Identification of the mechanism for preventing the use of groundwater for drinking water within the area required to meet the minimum retention time and minimum horizontal separation.

i. A contingency plan for redirection of recycled water when treatment performance standards or depth-to-groundwater requirements are not met.

j. Methods of determination and results for initial percolative capacity, maximum recycled water contribution, minimum retention time underground and horizontal separation.

k. A water quality monitoring plan for recharge water and groundwater.

l. A description of how data from the demonstration project will be used to plan and design full-scale projects.

4. ENGINEERING REPORT REQUIREMENTS FOR PHASE II VALLEY-WIDE WATER RECYCLING PROJECTS (GROUP C PROJECTS)

The report shall include all elements listed in Section A and shall also include the following additional elements:

a. Comprehensive Description of Basin-Wide Hydrogeology

b. Hydrogeology of Proposed Project Sites

c. Basin-wide Inventory of Water-Supply Uses

d. Predicted Hydrogeological Effects of Proposed Groundwater Recharge

e. Groundwater Recharge Site Conceptual Designs and Operational Plans

f. Basin-wide Balance of Flow Planned Inputs, Outputs and Storage

g. Concepts and Schematics for Transmission Systems

h. Project Phasing and Interim Impacts

i. Effects of Brine Disposal on Discharge to San Francisco Bay.

6. SALT MANAGEMENT PROGRAM

Prior to implementation of Phase II valley-wide water recycling projects, the permittees shall submit a Salt Management Plan (SMP) for approval by the Executive Officer. The SMP will insure that water recycling projects implemented under the valley-wide water recycling program will not degrade the Livermore-Amador Valley's groundwater resource or surface waters.

The SMP will be based on the concept that the effect of each individual project on the Central Basin groundwater resource is best assessed in the context of the cumulative effects of all such projects, as well as groundwater management policies and natural conditions. The relative geological homogeneity of the Central Basin lends itself to a mass-balance approach for assessing cumulative impacts.

For a planning horizon of 10 years, the SMP will define a project or set of projects which will:

a. fully mitigate the effects of salt loading due to water recycling on the Central Basin groundwater resource and

b. minimize the current trend toward increasing Central Basin groundwater salinity due to subsurface groundwater inflow, natural recharge, water imports and water recycling.

The SMP will also provide a technical basis for estimating and allocating salt loading or removal among existing sources and new projects. Accordingly, the SMP must include development of a basin-wide model of salt sources and sinks. Numerical factors, representing (for example) connectivity between groundwater basins and effects of filtering through the soil mantle, will be estimated using the preparer's best professional judgement.

The SMP will also provide information needed to support the DHS engineering report for full-scale groundwater recharge projects.

The SMP will include the following tasks:

1. Define Basin Characteristics

   a. Review existing information (including DWR studies)

   b. Evaluate connectivity between the fringe subbasins and the Central Basin.

   c. Characterize mixing in the Central Basin

   d. Obtain site-specific hydrogeologic information to evaluate local impacts and provide data for design. Needed information includes stratigraphy, horizontal flow barriers (e.g. faults) and hydraulic conductivity.

e. Re-evaluate total Central Basin groundwater volume, ambient TDS concentration and natural salt loadings from surface and subsurface inflow.

2. Refine Salt Balance Calculations

a. Select appropriate factors needed to assess impacts of specific projects

b. Develop a model or set of equations to assess cumulative effects and predict trends.

3. Set Long-Term Water-Quality Objectives

a. Identify target concentrations for TDS, nitrogen and other constituents f specific locations within the groundwater basin.

4. Select Program Elements

a. Evaluate relative impacts of alternative water recycling projects

b. Consider other elements such as wellhead demineralization or diversion saline inflows

c. Assess relative costs and benefits

d. Select a cost-effective set of programs to meet SMP goals

5. Identify a Schedule for Implementation

a. Set deadlines for initiation of projects.

b. Balance the timing of mitigation projects against projects with negative impacts.

c. Demonstrate that the impacts of water recycling are fully mitigated when considered over the full planning horizon.

6. Detailed Monitoring Program

a. Identify the monitoring requirements to accurately assess the impacts of mitigation projects not identified in the Engineering Report for Valley-Wi Recycling.

b. Specify additional monitoring to refine and verify assumptions concermin basin characteristics and existing conditions.

c. Integrate monitoring for salt management with other required project monitoring to allow a periodic comprehensive evaluation of the status and trends of groundwater quality throughout the basin.

ATTACHMENT 4

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR

Alameda County Flood Control
and Water Conservation District, Zone 7
City of Livermore
Dublin San Ramon Services District

("Permittees")

Order No. 93-159

A. GENERAL

Reporting responsibilities of waste dischargers are specified in Sections 13255(a), 13267(b), 13268, 13383, and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16.

The principal purposes of a monitoring program by a waste discharger, also referred to as self-monitoring program, are:

1) To document compliance with waste discharge requirements and prohibitions established by this Regional Board; and

2) To facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from wastewater reclamation.

B. RECYCLED WATER AND GROUNDWATER SAMPLING AND ANALYSIS

1. Following Executive Officer approval of the Salt Management Program, existing effluent and groundwater quality monitoring requirements for the Las Positas Golf Course, Livermore Municipal Airport and Livermore Water Reclamation Plant under Order No. 90-102, and for irrigation projects operating under Order No. 91-42, shall be superseded by the monitoring requirements of this Order.

2. The Executive Officer shall modify this Self-Monitoring Program, as needed, to include additional site specific monitoring requirements for new Group A, B, and C projects. The need for, and scope of, additional monitoring will be developed following review of recommendations in the Provision D.1 Engineering Reports and other technical reports to be submitted by the permittees.

A. MONITORING OF REUSE SITES

1. This self-monitoring program is applicable during periods when wastewater is being recycled.

2. Each recycled water site shall, during periods when recycled water is used, have the use area inspected weekly for the following:

   a. Evidence of recycled water escaping any irrigation site through surface runoff or airborne spray. (Show affected area on a sketch.)

   b. Presence or absence, characterization, source, and distance of travel of odors of recycled water origin.

   c. Evidence of prolonged ponding of recycled water in the irrigation site as a result of excessive spray.

   d. Adequate posting of warning signs or notices to inform public of the use of recycled water for irrigation.

   e. Maintenance of the required buffer distance from areas to be protected.

   f. Evidence of direct spraying of recycled water on streams, passing vehicle, buildings, domestic water facilities, or food handling facilities.

3. The Permittees shall conduct periodic random inspections of selected Customers to insure compliance with the water recycling specifications. Inspections shall be performed when recycled water is being used.

D. REPORTS TO BE FILED WITH THE REGIONAL BOARD

Reports shall be accompanied by a letter of transmittal. The letter shall include a discussion of water recycling related violations found during the reporting period and actions taken for correcting violations. The letter shall contain a statement by the reporting official, under penalty of perjury, that to the best of the signer's knowledge the report is true and correct.

1. Monthly Self-Monitoring Reports

Written reports shall be prepared for each month and shall be received by the Regional Board by the fifteenth day of the following month. The reports shall be comprised of the following:

a. Tabulation of SMR recycled water analyses.

b. A list of new authorized recycled water Customers, including the name of customers, application, source and gallons per day authorized.

c. A summary of recycled water use by each Customer during the month, including the source of recycled water used.

d. Tabulation of inspections and observations and reuse sites, including Customer's inspections and random inspections by the Permittees.

e. A summary of effluent violations related to recycled water use, violations found during inspection of reuse sites, corrective actions taken and any changes to, or revoking of Customer authorizations.

f. For the monthly reports for March, June, September and December, a tabular summary of groundwater monitoring data for the previous quarter.

g. An update regarding development of the water recycling program, including planning, design and construction of facilities, preparation of required reports and technical documents and progress toward regulatory approvals.

2. Annual Report

An annual report for each calender year shall be submitted to the Board by January 30 of the following year. The report should include:

a. A summary of information in the monthly reports.

b. A comprehensive discussion of the progress and results of the valley-wide water recycling program and the Salt Management Program. The discussion shall include the following components:

i. Analysis of trends in groundwater monitoring data.

ii. Calculation of the impact of each project on the basin-wide salt balance, and a summary of estimated salt sources and sinks for the year.

iii. Status of current and future projects identified in the May 1992 Water Recycling Study, the Engineering Report for full-scale valley-wide recycling and the Salt Management Plan.

iv. Evaluation of progress toward meeting the long-term water-quality objectives set by the Salt Management Plan.

I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing Self-Monitoring Program is effective on the date shown below and may be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the Permittees, and revisions will be ordered by the Executive Officer.

STEVEN R. RITCHIE
Executive Officer

December 15, 1993

APPENDIX B • GENERAL WATER REUSE PERMIT ORDER NUMBER 96-011

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER 96–011

GENERAL WATER REUSE REQUIREMENTS FOR:

MUNICIPAL WASTEWATER AND WATER AGENCIES

The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter called the Board) finds that:

PURPOSE and APPLICABILITY

1. This Order serves as a *General Water Reuse Order* authorizing municipal wastewater reuse by producers, distributors and users of non-potable recycled wastewater throughout the region. The intent of this Order is to streamline the permitting process and delegate the responsiblity of administrating water reuse programs to local agencies to the fullest extent possible.

2. This Order is intended to serve as a region-wide general permit for publicly owned wastewater and water agencies that recycle treated municipal wastewater. It is intended to replace individual reuse Orders and applies to the following suppliers of recycled water:

   a. Producers of secondary and tertiary recycled water that meets CCR Title 22 water reuse criteria and is reused for a direct beneficial use or a controlled use that would not otherwise occur.

   b. A Distributor of recycled water – who receives wastewater from a municipal wastewater facility, may or may not give it additional treatment to meet CCR Title 22 water reuse criteria for its intended use(s) and distributes it to users. In some cases, a written agreemen (e.g., Joint Powers Agreement or equivalent contractual agreement) between a Producer and a Distributor may be preferable to issuing this Order to the Distributor.

   c. Although the statewide criteria specified in Title 22 apply only to use of recycled water and not to the *disposal* of wastewater to land (e.g., to meet NPDES restrictions for receiving water discharge) those discharges to land may pose an identical degree of public exposure and risk.

      Therefore, wastewater agencies that apply wastewater to land through irrigation for the primary pupose of disposal, but operate in accordance with these requirements, may also apply to be regulated under this Order.

   d. It should be noted that a project that is very complex in nature (long-term, multi-phased projects, e.g., Zone 7/Livermore water reuse program) may best be served by an individual order.

3. A separate NPDES permit must be obtained from the Regional Board for projects involving the use of ephemeral or year-round streams or other waters of the State for recycled water conveyance or direct or indirect groundwater recharge.

4. Water reuse is an essential part of an overall program to manage local and regional water resources. Many local governing bodies have adopted resolutions establishing

their intent to proceed with the planning, permitting, and implementation of water reuse projects. These projects would provide important multiple water quality, water supply, and wastewater disposal benefits for communities including:

- augmentation and improved reliability of local water supplies.
- reduction of the mass of pollutants discharged to State waters
- reduction in size or deferral of the need for additional wastewater export facilities.

REUSE FACILITIES AND THEIR RESPONSIBILITIES

5. Most of the publicly owned wastewater treatment plants (POTWs) in the Region, hereinafter referred to as the Producers, produce treated wastewater of sufficient quality to allow its reuse for certain applications as prescribed in this Order. Water service agencies also have authority under the provisions set forth in this Order to distribute recycled water within their respective jurisdictions.

6. POTWs provide at least secondary treatment to Distributors or Users under written agreements with the participating Producers/Distributors respectively. The recycled water meets the quality criteria established by California Department of Health Services (DHS) and this Order. Additional treatment by the Producer, Distributor or User may be necessary to meet the intended use. The Producer or Distributor is responsible for insuring that water reuse is adequately monitored through an approved program.

7. Decisions regarding new treatment and distribution facility construction, operation, funding, cost-sharing and related aspects are the responsibility of the Producer, Distributor and affected Users.

STATE RECLAMATION POLICIES AND REGULATIONS

8. In July 1992 Section 13523.1 was added to the California Water Code, authorizing regional boards to issue master reclamation permits to a producer and/or distributor of recycled water in lieu of prescribing individual water reuse requirements for a user of recycled water. Section 13523.1 also removes the requirement, except upon written request of a regional board, that Users file a report with a regional board to use recycled water from a producer/distributor for whom a master reuse Order has been issued. Similarly, it exempts any such user of recycled water from the requirement to file a report with a regional board related to any material change in the character of the recycled water or its use.

   For further discussion of State Policies and Regulations see Attachment G.

State Health Regulations

9. Section 13523 of the California Water Code provides that a Regional Board, after consultation with and upon receipt of recommendations from DHS, and if it determines such action to be necessary to protect the public health, safety, or welfare, shall prescribe water reuse requirements for water which is used or proposed to be used as recycled water.

10. This Order's requirements conform with and implement the Department of Health Services's water reuse criteria as set forth in Title 22, Division 4, Sections 60301 through 60355 of the California Code of Regulations (herein referred to as the DHS reuse criteria). Revisions to Title 22 shall become part of this Order automatically upon final adoption of those revisions by DHS.

REGIONAL BOARD BASIN PLAN

11. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986 prescribing water quality objectives for ground and surface waters throughout the region. The Board amended its Basin Plan on June 21, 1995, and the State Water Resources Control Board (State Board) approved it on July 20, 1995, with approval from the State Office of Administrative Law on November 13, 1995. The Basin Plan supports water reclamation and further states that the disposal of wastewater to inland, estuarine, or coastal waters is not considered a permanent wastewater disposal solution where the potential exists for conservation and reclamation. The water quality goals to be used in regulating water quality factors as set forth in the Basin Plan include maximum feasible reuse of municipal, industrial, and agricultural wastewaters.

    Beneficial Uses

    The Basin Plan identifies existing and potential beneficial uses of the region's underlying groundwaters as:

    - Industrial service and Process supply
    - Municipal and domestic supply
    - Agricultural supply

    The Basin Plan identifies beneficial uses of all surface waters of San Francisco Bay Region, including San Francisco Bay system and its tributaries, Tomales Bay and its tributaries, coastal waters and tributaries and all inland waters. The Basin Plan identifies beneficial uses of specified surface waters as:

    - Municipal and Domestic Water Supply
    - Water Contact Recreation
    - Non-Contact Water Recreation
    - Warm Fresh Water Habitat
    - Cold Fresh Water Habitat
    - Wildlife Habitat
    - Fish Migration
    - Fish Spawning

REGIONAL BOARD's LIMITED RECYCLING ORDER

12. Board Order No. 91-042 provides "blanket" authorization for tanker-truck distribution of recycled water and the expansion of existing fixed irrigation system projects already subject to water reuse requirements. Order 91-042 will be superseded by this Order for those agencies being regulated by this Order.

CEQA AND PUBLIC NOTICE

13. The proposed uses of reclaimed water will maintain and enhance natural resources, and thus this Order is categorically exempt from the provisions of the California Environmental Quality Act in accordance with Title 14, California Administrative Code, Chapter 3, Section 15307.

14. The Board has notified the Producers, Distributors and interested agencies and persons of its intent to prescribe water reuse requirements and has provided them the opportunity for a public hearing and to submit their written views and recommendations.

15. The Board, in a public meeting, heard and considered all comments pertaining to this matter.

IT IS HEREBY ORDERED, that all agencies that file a Notice of Intent (NOI) indicating their intention to be regulated under the provisions of this general order and receive program authorization from this Board shall comply with the following:

A. PROHIBITIONS

1. The treatment, storage, distribution, or reuse of recycled water shall not create a nuisance as defined in Section 13050(m) of the California Water Code.

2. No recycled water shall be applied to irrigation areas during periods when soils are saturated.

3. Recycled water shall not be allowed to escape from the designated use area(s) as surface flow that would either pond and/or enter waters of the state.

   Recycled secondary treated water as described under Section B shall not be allowed to escape from the designated use area(s) as an airborne spray that would visibly wet vegetation or any other surface.

4. Spray or runoff shall not enter a dwelling or food handling facility, and shall not contact any drinking water fountain, unless specifically protected with a shielding device. If the recycled water is of restricted quality as described under Section B, then spray or runoff shall not enter any place where the public may be present during irrigation.

5. Secondary recycled water shall not be applied so as to cause runoff or degradation of any water body or wetland.

6. Recycled water shall not be applied in groundwater recharge and wellhead protection areas (so designated by local agencies).

7. The use of recycled water shall not cause rising groundwater discharging to surface waters to impair surface water quality objectives or beneficial uses.

8. The incidental discharge of recycled water to waters of the State shall not unreasonably affect present and anticipated beneficial uses of water, and not result in water quality less than that prescribed in water quality control plans or policies.

9. No recycled water shall be discharged from treatment facilities, irrigation holding tanks, storage ponds, or other containment, other than for permitted reuse in accordance with this Order, other Board issued Waste Discharge Requirements or NPDES permits, contingency plan in an approved Water Reuse Program (NOI repo..) or for discharge to a municipal sewage treatment system.

10. Recycled water shall not be used as a domestic or animal water supply.

11. There shall be no cross-connection between potable water supply and piping containing recycled water. All users of recycled water shall provide for appropriate backflow protection for potable water supplies as specified in Title 17, Section 7604 of the California Code of Regulations or as specified by DHS.

B. REUSE WATER QUALITY REQUIREMENTS AND LIMITATIONS:

1. Reuse Water Quality Requirements and Limitations of this Order shall meet the most current CCR Title 22 regulations.

2. The Producer/Distributor shall discontinue delivery of recycled water for intended reuse projects during any period in which it has reason to believe that the limits for that use as specified below or the requirements of the DHS reuse criteria insofar as they relate to the quality of the recycled water, are not being met. The delivery of recycled water intended uses shall not be resumed until all conditions which caused the violations have been corrected.

3. Minimum Recycled Water Quality

Water to be recycled for reuse shall at a minimum be adequately oxidized and disinfected water that receives at least secondary level treatment and meets, at a minimum, the following limits:

a. Dissolved Oxygen 1.0 mg/l minimum

b. Dissolved Sulfide 0.1 mg/l maximum

c. Total Coliform

All water recycled for reuse authorized under this permit must meet the total coliform limits specified below (at either the Producer's wastewater treatment plant or, if necessary, after additional treatment at a Distributor's plant.

4. Secondary - 23 Recycled Water (Restricted Use)

Secondary-23 recycled water shall meet the following total coliform limit prior to delivery for reuse purposes:

a. Total coliform

After adequate contact with disinfectant the number of total coliform organisms shall not exceed: (a) a median value of 23 MPN/100ml as determined from the bacteriological results of the last seven days for which sample analyses have been completed, and (b) a maximum value of 240 MPN/100ml in more than one sample in any 30 day period.

b. Reuse Applications:

Secondary recycled water may be used where the public has restricted access or exposure. See Attachment A for a list of reuse applications.

5. Secondary-2.2 Recycled Water

Secondary-2.2 recycled water shall meet the following total coliform limit prior to delivery for reuse purposes:

a. Total coliform

After adequate contact with disinfectant the number of total coliform organisms shall not exceed (a) a median value of 2.2 MPN/100ml as

determined from the bacteriological results of the last seven days for which sample analyses have been completed, and (b) a maximum value of 23 MPN/100ml in more than one sample in any 30 day period.

b. **Reuse Applications:**

See Attachment A for reuse applications.

6. **Tertiary Recycled Water**

Tertiary recycled water shall be coagulated (except as identified in Part C below), and filtered, and meet the following total coliform, disinfection process and turbidity limits prior to delivery for reuse purposes:

a. **Total coliform**

After adequate contact with disinfectant the number of total coliform organisms shall not exceed: (1) a median value of 2.2 MPN/100ml as determined from the bacteriological results of the last seven days for which sample analyses have been completed, and (2) a maximum value of 23 MPN/100ml in more than one sample in any 30 day period. No sample shall exceed a total colform value of 240 MPN/100 ml.

b. **Disinfection Process**

1) A chlorine disinfection process that provides a CT (chlorine concentration times modal contact time) value of not less than 300 milligram-minutes per liter at all times with a *modal contact time* of at least 90 minutes, based on peak daily design flow (or an equivalent combination of chlorine concentration and contact time subject to Executive Officer approval); or

2) A disinfection process that, when combined with the filtration process, has been demonstrated to reduce the concentration of plaque-forming units of F-specific bacteriophage MS-2, or polio virus, per unit volume of water in the wastewater to one hundred thousandths (1/100,000) of the initial concentration in the filter influent throughout the range of qualities of wastewater that will occur during the recycled water treatment process. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration. The above demonstration must be approved by the DHS and the Executive Officer.

c. **Turbidity**

The turbidity of filtered recycled water shall not exceed any of the following:

1) 2 NTU daily average, 5 NTU more than 5 percent of the time, or 10 NTU at any time.

Coagulation need not be used as part of the treatment process provided the turbidity of the influent to the filters does not exceed 5 NTU more than 5 percent of the time.

d. Reuse Applications:

See Attachment A for reuse applications.

7. Recycled Water Storage Limitations

a. Any storage facility containing recycled water for reuse applications shall be managed in a manner to control odor or nuisance conditions. Should such problems develop, a management plan shall be devised and implemented to monitor, correct, and control future occurrences.

b. All wastewater storage ponds shall be adequately protected from erosion, washout and flooding from a 24-hour rainfall event having a predicted frequency of once in 100 years.

C. REUSE PROGRAM PROVISIONS

Producer Responsibilities

1. Producers wishing to be covered under this General Water Reuse Order shall submit a Notice of Intent (NOI) in accordance with Attachment B. Producers who are currently covered by an individual order, and do not submit an NOI, will continue to be covered by their individual orders and Order 91-042.

   Producer responsibilities in this section may be required of or undertaken by the Distributor as appropriate. In such cases the Distributor shall submit the NOI or the Producer shall show evidence of an agreement with the Distributor to undertake the responsibilities. In any cases respective responsibilities shall be spelled out in the joint agreement.

2. This Order becomes effective upon written approval of the NOI report by the Executive Officer and supersedes any current Water Reuse Requirements. The Regional Board will coordinate with DHS to obtain their concurrence of NOI reports prior to approval by the Executive Officer.

3. Under this Order a Producer may authorize specific reuse projects on a case-by-case basis in accordance with a Producer designed permit-based program for Users of recycled water. The Producer shall develop administrative procedures specifying how the permit based system for regulating users will be implemented and how compliance with the DHS reuse criteria will be assured. Upon Board approval of the Producer's program, which shall accompany the NOI, the Producer may authorize specific reuse projects on a case-by-case basis once the administrative elements of the water reuse program are in place.

4. The Producer shall establish and enforce rules and regulations for recycled water uses governing the design and construction of reclaimed water use facilities and the use of recycled water in accordance with DHS reuse criteria.

5. The Producer or Distributor (as appropriate) shall submit to DHS for review and approval documentation of the proper installation of Title 22 mandated backflow prevention devices and the absence of cross connections prior to commencing use of recycled water at sites meeting any of the following criteria:

a. Where the proposed use is a new use that is not covered in the DHS reuse cr

b. Dual plumbed systems (per Title 22 definition – within building plumbing and residential irrigation).

c. Large, high volume usage, or otherwise complex sites as defined in the Producer's Water Reuse Program (pursuant to Provision C.3.).

6. The Producer will be responsible for ensuring that recycled water meets the quality standards of this Order and for the operation and maintenance of major transport facilities and associated appurtenances. The Producer shall hold the Users responsible for the application and use of recycled water on their designated use areas and associated operations and maintence in accordance with all applicable DHS reuse criteria requirements.

7. The Producer shall conduct periodic inspections of the User's facilities and operations to monitor and assure compliance with conditions of the Producer's permit and this Order. The Producer shall take whatever actions are necessary, including the termination of delivery of recycled water to the User, to correct any User violations.

8. The Producer shall comply with all applicable items of the attached Standard Provisions and Reporting Requirements, or any amendments thereafter.

9. When additional site specific requirements and/or Provisions are applied to a reuse project as a condition of adoption of this Order, they shall be identified in the NOI and appended to this Order as Attachment E.

Joint Responsibilities

10. Each User shall demonstrate to the Producer the means by which all applicable use area requirements, as specified in DHS reuse criteria, will be complied with.

11. If someone other than the User (User's Agent) is responsible for applying the recycled water, e.g. a truck hauler, then the User shall inform them of these requirements in a written permit or other suitable manner. A User's Agent shall

    fill out a Recycled Water Release Form or equivalent traking documentation when receiving recycled water from the Producer.

12. A copy of the Water Use Permit must be provided to the Users by the Producer. The Users must have these available at all times for inspection by Regional Board staff, the Producer, or State/County Health Officers.

13. The Producer shall comply with the self–monitoring program as adopted by the Board and as may be amended by the Executive Officer. The Producer is responsible for collecting reports from Users. Users are responsible for submitting on–site observation reports and use data to the Producer, who will compile and file an annual report with the Regional Board. The Producer, at its discretion, may assume the User's responsibility for on–site observation reports and use data.

14. The Producer shall assure that cross-connections between potable water and nonpotable water systems have not been created and that backflow prevention devices are in proper working order by conducting or requiring User testing, in

accordance with DHS reuse criteria and CCR Title 22 Section 7605. Reports of testing and maintence shall be maintained by the Producer.

15. The Producer and Users shall maintain in good working order and operate as efficiently as possible any facility or control system installed by the Producer or Users, respectively, to achieve compliance with the water reuse requirements.

16. The Producer, Distributor and Users should receive appropriate employee training to assure proper operation of recycling facilities, worker protection, and compliance with this Order. In accordance with CCR Title 17, Section 7586, each Producer, Distributor and User shall designate a Recycled Water Supervisor responsible for compliance with a Producer's permit conditions.

17. The Producer and Users shall assure that all above ground equipment, including pumps, piping, storage reservoir, and valves, etc. which may at any time contain recycled water shall be adequately and clearly identified with appropriate warning signs. The Producer and Users shall make all necessary provisions to inform the public that the liquid being distributed is recycled water and is unfit for human consumption.

D. GENERAL PROVISIONS

1. The Producer will document compliance with all conditions of this Order and of water reuse criteria in Title 17 and Title 22 of the California Code of Regulations.

2. Current Water Reclamation Reuse Requirements that are superseded by this Order pursuant to Provisions C. 1 and 2, will be rescinded under a separate Order(s).

3. This Order provides authorization for tanker-truck distribution of recycled water, and supercedes Order No. 91-042 for those Producers pursuant to C.2. Order 91-042 stays in effect for those not under the General Order.

4. Each Producer should strive to investigate, as resources permit, all possible potential reuse strategies such as groundwater recharge, surface water augmentation, and dual water supply for new construction, in order to move towards achieving a goal of reusing the maximum possible amount of recycled water.

5. When directed by the Regional Board, in groundwater basins that are a significant source of drinking water where there is a likely potential for groundwater degradation from salt buildup from extensive water recycling irrigation, a Producer shall prepare and submit a Salt Management Program, acceptable to the Executive Officer, to insure that the overall impact of permitted water recycling projects does not degrade groundwater resources.

6. If any condition or criteria set forth in this Order conflicts or is inconsistent with any requirement set forth in any State regulation, the more stringent condition or criterion shall apply.

7. Regional Board staff will conduct an annual inspection/audit of each Producer's water reuse program and conduct periodic spot field inspections on reuse projects.

8. The Producer, User/Distributor shall permit the Board or its authorized representatives, in accordance with Section 13267(c) of the California Water Code:

a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order;

b. Access to and copy of, at reasonable times, any records that must be kept under the conditions of this Order;

c. Inspection, at reasonable times, of any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order; and

d. To sample or monitor, at reasonable times, for the purpose of assuring compliance with this Order.

9. After notice and opportunity for a hearing, this Order may be terminated or modified for cause, including, but not limited to:

a. Violation of any term or condition contained in this Order;

b. Obtaining this Order by misrepresentation, or failure to disclose fully all relevant facts;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized reuse;

d. Endangerment to public health or environment that can only be regulated to acceptable levels by Order modification or termination.

10. The Executive Officer may add additional Producers at any time, pursuant to conditions specified in Provisions C. 1 and C. 2.

11. The Executive Officer upon a finding of non-compliance with this Order, may revoke a Producer's authority to issue Water Reuse Permits.

12. The Board will review this Order periodically and may revise the requirements as deemed necessary.

I, Loretta K. Barsamian, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region on January 17, 1996.

Loretta K. Barsamian
Executive Office

Attachments:
A. Summary Chart of Recycled Water Use
B. Notice of Intent (NOI) – General Instructions
C. Self-Monitoring Program
D. Standard Provisions & Reporting Requirements for Water Reuse Orders
E. Additional Site Specific Requirements
F. Definition of Terms
G. Summary State Water Reuse Policies & Regs
H. Regulatory Agency Contacts

[Originator/RJC] [Reviewers BDA/RHW/TCW]
File No.: 2107.00

ATTACHMENT A

SUMMARY CHART OF RECYCLED WATER USE

Suitable Uses* of Recycled Water

Use of Recycled Water	Treatment Level		
	Tertiary Recycled Water	Secondary-2.2 Recycled Water	Secondary-23 Recycled Wate.
Irrigation of:			
Food crops–contact with edible portion of crop	Allowed	Not Allowed	Not Allowed
Parks and playgrounds	Allowed	Not Allowed	Not Allowed
School yards	Allowed	Not Allowed	Not Allowed
Residential landscaping	Allowed	Not Allowed	Not Allowed
Unrestricted access golf courses	Allowed	Not Allowed	Not Allowed
Any other irrigation uses not prohib. by other prov. of CCR	Allowed	Not Allowed	Not Allowed
Food crops–edible portion above gd/not in contact w/ recl. Water	Allowed	Allowed	Not Allowed
Cemetaries	Allowed	Allowed	Allowed
Freeway landscaping	Allowed	Allowed	Allowed
Restricted access golf courses	Allowed	Allowed	Allowed
Ornamental nursery stock and sod farms	Allowed	Allowed	Allowed
Pasture for milk animals	Allowed	Allowed	Allowed
Any nonedible vegetation with access control to prevent use as if it were a park, playground or school yard.	Allowed	Allowed	Allowed
Orchards w/ no contact between edible portion and recl. water.	Allowed	Allowed	Allowed
Vineyards w/ no contact between edible portion and recl. water	Allowed	Allowed	Allowed
Non food-bearing trees not irrigated <14 days of harvest	Allowed	Allowed	Allowed
Fodder crops (e.g. alfalfa) and fiber crops (e.g. cotton)	Allowed	Allowed	Allowed
Seed crops not eaten by humans	Allowed	Allowed	Allowed
Food crops that undergo commercial pathogen-destroying processing before human consumption (e.g. sugar beets)	Allowed	Allowed	Allowed
Supply for impoundments:			
Nonrestricted rec. impound., w/ suppl. monit. for path. org.	Allowed**	Not Allowed	Not Allowed
Restricted rec. impound. and fish hatcheries	Allowed	Allowed	Not Allowed
Landscape impound. w/o decorative fountains	Allowed	Allowed	Allowed
Supply for cooling or air cond.:			
Ind. or comm. cooling or air cond. with cooling tower, evaporative condenser, or spraying that creates a mist	Allowed***	Not Allowed	Not Allowed
Ind. or comm. cooling or air cond. w/o cooling tower, evaporative condenser, or spraying that creates a mist	Allowed	Allowed	Allowed
Other uses:			
Flushing toilets and urinals	Allowed	Not Allowed	Not Allowed
Priming drain traps	Allowed	Not Allowed	Not Allowed
Industrial process water that may contact workers	Allowed	Not Allowed	Not Allowed
Structural fire fighting	Allowed	Not Allowed	Not Allowed
Decorative fountains	Allowed	Not Allowed	Not Allowed
Commercial laundries	Allowed	Not Allowed	Not Allowed
Consol. of backfill material around potable water pipelines	Allowed	Not Allowed	Not Allowed
Artificial snow making for commercial outdoor uses	Allowed	Not Allowed	Not Allowed
Industrial boiler feed	Allowed	Allowed	Allowed
Nonstructural fire fighting	Allowed	Allowed	Allowed
Backfill consol. around nonpotable piping	Allowed	Allowed	Allowed
Soil compaction	Allowed	Allowed	Allowed
Mixing concrete	Allowed	Allowed	Allowed
Dust control on roads and streets	Allowed	Allowed	Allowed
Cleaning roads, sidewalks and outdoor work areas	Allowed	Allowed	Allowed
Flushing sanitary sewers	Allowed	Allowed	Allowed

* Refer to the full text of the latest version of Title-22

** With "conventional tertiary treatment" additional monitoring may be necessary

*** Drift eliminators and/or biocides are required if public or employees can be exposed to mist

ATTACHMENT B

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCICO BAY REGION

WATER REUSE

NOTICE OF INTENT (NOI) — GENERAL INSTRUCTIONS

Who May Apply

This Order is intended to serve as a regional-wide general permit for publicly owned wastewater agencies that recycle wastewater. It is intended to replace individual reuse Orders and applies to the following:

a. Producers of secondary and tertiary recycled water that meets Title 22 criteria and is reused for a direct beneficial use or a controlled use that would not otherwise occur.

b. A major Distributor of recycled water: one who receives wastewater from a municipal facility, further treats it to meet Title 22 criteria for its intended use(s) and distributes it to users. In some cases, a written agreement (i.e. Joint Powers Agreement) between a Producer and a Distributor may be used in lieu of issuing this Order to the Distributor.

c. Wastewater agencies that do not fall into categories a. and b. above but apply wastewater to land through irrigation for the primary pupose of disposal – to meet NPDES restrictions for receiving water discharge – but operate in accordance with these requirements, may also apply to be regulated under this Order.

Producers that havereceived an individual Order and previously submitted information equivalent to that required in the Water Reuse Program Report below, may submit a letter as a Notice of Intent without duplicating the material.

Where to Apply

The NOI should be mailed to the Regional Water Quality Control Board at the following address:

Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Ste 500
Oakland, CA 94612
Attn: Watershed Protection Division

A copy of the NOI shall also be mailed to the California Department of Health at the following address:

California Department of Health Services
Drinking Water Field Operations Branch
North Coastal Region
2151 Berkeley Way
Berkeley, CA 94704

When to Apply

An applicant should file the NOI within 120 days of the adoption of this Order for existing projects and/or NEW projects to start within 180 days. For subsequent projects, a supplemental or initial NOI (if not filed before) should be filed 60 days prior to project start.

What to File

The NOI shall include a Water Reuse Progam technical report, containing the following as a minimum:

SECTION I – FACILITY /WASTE TREATMENT INFORMATION

Description of existing and/or proposed treatment, storage and transmission facilities for water reuse (much of this may be from current Orders/reports, but should be updated). This should include the type and level of wastewater treatment for reuse applications and estimated seasonal flows of recycled water.

SECTION II – REUSE APPLICATIONS

Describe the types of applications recycled water will be used for. This should include:

a) Agency owned/controlled uses (e.g. irrigation type/acreage/locations)

b) Contracted User applications

   1) List of Users receiving or proposing to receive recycled water (including a list of uses of recycled water for each user)

   2) The estimated amount of recycled water flows to each User.

   3) Descriptions/maps of designated use areas.

SECTION III – DESCRIPTION OF WATER REUSE PERMIT PROGRAM

The Agency's water reuse program should be fully described as follows:

a) Copy of agency's authority and proposed rules and/or regulations
b) Design and implementation of program
c) Cross connection testing responsibilities and procedures
d) Self-monitoring program
e) User Inspection Program
f) O&M program
g) Compliance program
h) Employee (user) Training
i) Emergency procedures & notification

SECTION IV – ADDITIONAL SITE SPECIFIC CONDITIONS

If existing Orders have additional site specific conditions and/or restrictions not covered in th General Order, they should be described here.

SECTION V – REUSE PROGRAM ADMINISTRATION

Describe organization and responsibilities of pertinent personnel involved in the water reuse program. Provide the name(s), title(s) and phone number(s) of contact person(s) who are charged with operation/oversight of the water reuse program.

ATTACHMENT C

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR

Order No. 96–011

A. GENERAL

Reporting responsibilities of water recycling agencies are specified in Sections 13255(a), 13267(b), 13268, 13383, and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16.

The principal purposes of a monitoring program by water recyclers, also referred to as the self-monitoring program, are:

1) To document compliance with water quality requirements and prohibitions established by this Regional Board; and

2) To facilitate self-policing by the water recyclers.

B. RECYCLED WATER MONITORING

A Producer shall develop and implement a water reuse monitoring program. When the User(s) is other than the Producer, delegation of responsibilities must be clearly spelled out and included in the Producer's Water Use Permits.

Recycled Water Effluent Quality - Producer Program

The Producer's self-monitoring program is applicable during periods when recycled water is in use. The SMP program shall include the observations, sampling, measurements, and analyses prescribed in Table 1.

Description of Sampling and Observation Stations

a. Recycled Water

Station	Description
E-001	Location at the wastewater treatment plant where a representative sample of treated effluent being diverted for reuse can be obtained and total diverted flow can be measured.

Monitoring of Recycled Water Users - Producer/User Program

Self-Monitoring Program

The Producer will set individual user monitoring requirements based on the size, volume used, complexity, etc. of each use area. Producer conducted monitoring, or user self-monitoring if approved by the Producer, shall be conducted at least annually.

All recycled use areas, while recycled water is being used, shall beinspected at a frequency, specified by the Producer's Water Reuse Permit , for the following deficiencies or violations of use:

1. Standard Observations

   a. Evidence of runoff of recycled water from the site (show affected area on a sketch, estimate volume).

   b. Odor of wastewater origin from irrigation site. If present, indicate apparent source, characterization,and direction of travel.

c. Evidence of ponding of recycled water, and evidence of mosquitoes breeding within the irrigation area due to ponded water.

d. Warning signs properly posted to inform public that irrigation or water use is recycled water which is not safe for drinking.

e. Evidence of leaks or breaks in the irrigation system pipelines or tubing.

f. Evidence of broken, or otherwise faulty drip irrigation system emitters or spray irrigation sprinklers.

g. Evidence of overflows, leaks, erosion of dikes, etc. of storage pond(s) or impoundment(s).

All violations shall be followed by a discussion of when and how deficiences were corrected.

2. Description of Sampling and Observation Stations

a. Land Observation Stations

Station	Description
L-1 to L-n	Locations at a sufficient number of points at reuse areas in order to ensure compliance with water reuse requirements.

b. Impoundment Stations

Station	Description
P-1 to P-n	Locations at points along the periphery of each storage, ornamental, golf course, or other pond or impoundment.

Inspection Program

A Producer shall also conduct periodic random inspections of Users to ensure compliance with DHS reuse criteria and the Water Reuse Permit. Inspections shall be performed when recycled water is being used. Any significant repairs or modifications made to the system involving compliance with this Order shall be described in the Annual Report.

C. REPORTING REQUIREMENTS

1. Significant Violation Reporting

Violations of the DHS reuse criteria that impact or threaten to impact public health or water quality shall be reported to the Board by phone within 24 hours, followed by a written report within 15 days describing corrective actions taken.

2. Annual Report to the Regional Board

An annual report for each calender year shall be submitted to the Board by the Producer by March 15 of each year. The report shall contain a statement by the reporting official, under penalty of perjury, that to the best of the signer's knowledge the report is true and correct.

The report shall include:

a. Tabulation of SMP recycled water analyses (see Table 1).

b. A tabular summary of recycled water use by billing period by each User.

c. A list of new authorized recycled water Users, including the name of customers, application, source and projected annual flow to be delivered.

d. A summary of the total daily recycled water delivered by the Producer.

e. Tabulation of User site inspections conducted by the Producer.

f. A summary of effluent violations related to recycled water use, violations found during inspection of reuse sites, corrective actions taken and any changes to, or revoking of User authorizations by the Producer.

In addition there shall be a comprehensive discussion of the progress and results of the water recycling program. The discussion shall also include:

g. An update regarding current and future development of the water recycling program, including planning, design and construction of facilities, preparation of required reports and technical documents and progress toward regulatory approvals.

h. Progress and evaluation of any special studies or projects being undertaken related to the program.

I, Loretta Barsamian, Executive Officer, do hereby certify that the foregoing Self-Monitoring Program is effective on the date shown below and may be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the Producers. Revisions to the SMP will be authorized in writing by the Executive Officer.

Loretta K. Barsamian
Executive Officer

Attachment:
Table 1 – Producer Schedule for Sampling, Measurements, and Analyses

File No. 2107.00

January 17, 1996

Table 1: Producer's Schedule Sampling & Analyses

	E-001		All L	All P
TYPE OF SAMPLE	Grab	Cont.	Obs.	Obs.
Flow Rate (gallons/day)		D	D*	D*
Total Coliform (MPN/100ml)	D**/#			
Turbidity (NTU)		D**/#		
Dissolved Oxygen (mg/l)	3/W**			
Dis. Sulfides (mg/l) (if DO <1mg/l)	3/W**			
Appl. Stand. Observations			A***	A***

LEGEND FOR TABLE 1

Type of Sample

Grab = Instantaneous grab sample
Cont. = Continuous monitoring (recorder)
Obs. = Observation

Sampling Frequency

D = Daily
3/W = Three times per week
A = Annually

* Records of recycled water use at each site may be compiled from billing period readings (divided by number of days to obtain daily flow) and submitted with the annual report.

** Equivalent routine effluent (NPDES/WDR) monitoring data collected on days and during times (grab samples) recycled water is being produced can be submitted in fulfillment of these requirements.

*** User sites to be inspected a minimum of annually for "Applicable Standard Observations" based on the size and complexity of each site in accordance with the Producer's Water Reuse Program.

\# Unless current NPDES or WDR sampling frequency is less. Turbidity would apply to tertiary water only and is based on a 24-hour composite sample.

ATTACHMENT D

STANDARD PROVISIONS
&
REPORTING REQUIREMENTS

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

January 1996

STANDARD PROVISIONS AND REPORTING REQUIREMENTS

for

WATER REUSE ORDERS

A. GENERAL PROVISIONS

1. Duty to Comply

   a. A water recycler must comply with all of the conditions of this Order. Any Order noncompliance constitutes a violation of the Porter-Cologne Water Quality Control Act and/or Basin Plan and is subject to enforcement action.

   b. The filing of a request by the Producer for an Order modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition.

2. Duty to Mitigate

   The Producer shall take all reasonable steps to minimize or prevent any discharge in violation of this Order which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation.

3. Property Rights

   This Order does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws.

4. Duty to Provide Information

   The Producer shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the Order. The Producer shall also furnish to the Board, upon request, copies of records required to be kept by its Order.

5. Availability

   A copy of this Order shall be maintained at Producer and distributor facilities and be available at all times to operating personnel.

B. TREATMENT RELIABILITY

1. The Producer shall, at all times, properly operate and maintain all facilities and systems of treatment disposal and control (and related appurtenances) which are installed or used by the Producer to achieve compliance with this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. All of these procedures shall be described in an Operation and Maintenance Manual. The Producer shall keep in a state of readiness all systems necessary to achieve compliance with the conditions of this Order. All systems, both those in service and reserve, shall be inspected and maintained on a regular basis. Records shall be kept of the tests and made available to the Board.

2. Recycled water treatment facilities subject to this Order shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 4, Chapter 14, Title 23 of the California Code of Regulations. (See Definition E. 4)

C. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

a. All reports required by the order and Order and other information requested by the Board shall be signed by a principal owner or operator, or by a duly authorized representative of that person.

Duly authorized representative is one whose:

1) Authorization specifies either an individual or a position having responsibililty for the overall operation of the regulated facility or activity such as general manager in a partnership, manager, operator of a well or a well field, superintendent, positon of equivalent responsibility, or an individual or positon having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named positon.), and

2) Written authorization is submitted to the Board. If an authorization becomes no longer accurate because a different individual or positon has responsibililty for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board prior to or together with any reports, information, or applications to be signed by an authorized representative.

b. Certification

All reports signed by a duly authorized representative under Provision C.1.a. shall contain the following certification:

"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

ATTACHMENT F

DEFINITION OF TERMS

Coagulated Wastewater: Oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated upstream from a filter by the addition of suitable floc-forming chemicals.

Conventional Tertiary Treatment: A treatment chain that utilizes a sedimentation unit process between the coagulation and filtration processes and produces an effluent that meets the definition for disinfected tertiary recycled water.

Disinfected Secondary-23: Adequately disinfected, oxidized wastewater in which the median number of coliform organisms in the effluent does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 milliliters in more than one sample in any 30 day period.

Disinfected Secondary-2.3: Adequately disinfected, oxidized wastewater in which the median number of coliform organisms in the effluent does not exceed 2.3 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample in any 30 day period.

Disinfected Tertiary Adequately disinfected, oxidized, coagulated, clarified, filtered wastewater in which meets the following criteria:

(a) A filtered wastewater which has been disinfected by either:

(1) A chlorine disinfection process that provides a CT (chorine concentration times modal contact time) value of not less than 300 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak daily design flow (or an equivalent combination of chlorine residual concentration and contact time subject to Executive Officer approval); or

2) A disinfection process that, when combined with the filtration process, has been demonstrated to reduce the concentration of plaque-forming units of F-specific bacteriophage MS-2, or polio virus, per unit volume of water in the wastewater to one hundred thousandths (1/100,000) of the initial concentration in the filter influent throughout the range of qualities of wastewater that will occur during the reuse process. A virus that is at least a resistant to disinfection as polio virus may be used fopurposes of the demonstration.

(b) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed maximum an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

capacity to conserve and reclaim water to supplement existing water supplies, meet future water requirements, and restore the region's watersheds and estuary system. Disposal of wastewater to inland, estuarine or coastal waters is not considered a permanent solution where the potential exists for conservation and reclamation.

California Water Code states that the State Water Resources Control Board shall take all appropriate proceedings or actions to prevent waste, unreasonable use, or unreasonable methods of use. ....Section 13225(i) mandates that the Regional Board encourage regional planning and action for water quality control.

Source Quality Control

The quality of influent to a reclamation plant affects the quality of effluent production, particularly in those communities that import high-quality surface water from the Sierra Nevada. Reclamation treatment and costs are directly dependent on the quality of influent into the plant. The quality of this influent depends on the quality of the water supply and the quality of the waste discharges to the reclamation plant. Reclamation requires that industrial pretreatment and pollution prevention programs be sufficient to remove toxic constituents. Reclamation also requires adequate monitoring and enforcement. Additionally, maximum recycling and separate treatment of waste by industries should be encouraged where feasible.

Government Coordination

Implementation of reclamation projects requires the involvement, approval, and support of a number of agencies, including state and local health departments, the Regional Board, local POTWs and water districts, and land use planning agencies. Interagency coordination must be a priority of all parties involved in reclamation. Failure to coordinate activities can result in the inability to carry out reclamation projects in a timely, consistent, and cost-effective manner. The Regional Board seeks cooperation and participation of professionals from the water reclamation industry and the water, health, and regulatory agencies to ensure the development of criteria that are both attainable and appropriate.

Regional Water Quality Control Board – Water Reuse Permits

If a Regional Water Quality Control Board (Regional Board) determines that it is necessary to protect public health, safety, or welfare, it may prescribe water reclamation *(reuse)* requirements where reclaimed water is used or proposed to be used (Water Code Section 13523). Where regulatory reclamation criteria has been adopted by the Department of Health Services, no person may either reclaim water or use reclaimed water until the Regional Board has either issued reclamationrequirements or waived the necessity for such requirements (Water Code Section 13524). In the process of issuing reclamation requirements, the Regional Board must consult with and consider recommendations of the Department (Water Code Section 13523). Any reclamation requirements which are issued by the Regional Board, whether applicable to the reclaimer or to the user of reclaimed water, must include or be in conformance with any regulatory reclamation criteria adopted by the Department.

Department of Health Services – Title 22 Wastewater Reclamation Criteria

To assure protection of public health where water use is involved, the California Department of Health Services (Department) has been statutorily directed to establish statewide reclamation criteria for the various uses of reclaimed water (Water Code Section 13521). The Department has promulgated regulatory criteria, which are currently set forth in the California Code of Regulations, Title 22, Division 4, Section 60301 et seq. The Department's regulatory criteria include numerical limitations and requirements, treatment method requirements, and provisions and requirements related to sampling and analysis, engineering reports, design, operation, maintenance and reliability of facilities. The Department's regulations also permit the granting of exceptions to reclaimed water quality requirements in some cases, call for a case-by-case review of groundwater recharge projects, and allow use of alternative methods of treatment so long as the alternative methods used are determined by the Department to assure equivalent treatment and reliability. Many of the regulatory requirements related to sampling, analysis, engineering reports, personnel, operation and design are narrative in nature and leave room for discretionary decisions based on the individual situation in each case.

ATTACHMENT H

REGULATORY CONTACTS

REGIONAL WATER QUALITY CONTROL BOARD

Surface Water Protection Division
2101 Webster Street, Ste 500
Oakland, CA 94612
Fax (510) 286–1380 or (510) 286–1495

General Water Reuse Order Coordinator

Questions/suggestions regarding this Order:

Richard J. Condit
Senior Environmental Specialist
Watershed Division
(510) 286–0456

General information/policy for waste discharge requirement:

Division Chief:
Surface Water Management Division
Dr. Teng-chung Wu
(510) 286–0899

Water Reuse Facility Contacts – Site Specific Contacts

Refer to staff Permit/ County Area Engineer responsible for your NPDES/WDR facility

Section Managers (Supervise permit engineers)

North Bay Section (Marin, Sonoma,Napa, Solano & Contra Costa)
Section Leader:
Greg Walker
(510) 286-4213

South Bay Section (Alameda, Santa Clara, San Mateo, San Francisco)
Section Leader
John Wolfenden
(510) 286-0689

CALIFORNIA DEPARTMENT OF HEALTH SERVICES (Title 22/Title 17)

Drinking Water Field Operations Branch
North Coast Region
2151 Berkeley Way
Berkeley, CA 94704
(510) 540-2158

APPENDIX C • CUSTOMER LIST (UNGROUPED METERS)

Appendix C
Customer List (Ungrouped Meters)

ID	Customer Name	Address	Account	Demand (HCF)	Demand (AFY)	Meter Size	Current Connection Fees		
							Zone 7	Pleasanton	Total
1	(CLOSED)		139578	1348	3	3	$94,614	$21,890	$116,504
2	HOLIDAY INN	11950 DUBLIN CANYON RD	105198	3712	9	1.5	$27,033	$6,515	$33,548
3	CITY OF PLEASANTON	H-33 DUBLIN CANYON WAY	141167	2412	6	2	$43,252	$10,220	$53,472
4	SAFEWAY INC (VEN #036535)	5900 STONERIDGE MALL	139971	1541	4	2	$43,252	$10,220	$53,472
5	WYNDHAM HOTELS & RESORTS	5990 STONERIDGE MALL	139504	5098	12	1.5	$27,033	$6,515	$33,548
6	ARNOLDS HOME FURNITURE	5858 STONERIDGE MALL	136500	1500	3	1	$13,629	$3,180	$16,809
7	AMERICA SAVINGS BANK	5800 STONERIDGE MALL	105119	1204	3	1.5	$27,033	$6,515	$33,548
8	SPECTRUM INTERESTS	5776 STONERIDGE MALL	105126	3019	7	2	$43,252	$10,220	$53,472
9	SHELL RIDGE MGMT CO	5720 STONERIDGE MALL	105125	1167	3	2	$43,252	$10,220	$53,472
10	J K L CORP	5700 STONERIDGE MALL RD	105149	1980	5	1.5	$27,033	$6,515	$33,548
11	NORDSTROM'S	1600 STONERIDGE MALL	105157	1310	3	2	$43,252	$10,220	$53,472
12	J C PENNEYS	1500 STONERIDGE MALL	105142	2862	7	2	$43,252	$10,220	$53,472
13	MACY'S WEST, INC	1400 STONERIDGE MALL	105132	1390	3	2	$43,252	$10,220	$53,472
14	TAUBMAN	12 STONERIDGE MALL	105137	1484	3	2	$43,252	$10,220	$53,472
15	SEARS # 1019	1700 STONERIDGE MALL	141205	2569	6	2	$43,252	$10,220	$53,472
16	MACY'S ACCTG DEPT	1300 STONERIDGE MALL	105135	2335	5	2	$43,252	$10,220	$53,472
17	ACF PROPERTY MGMT	5532 SPRINGDALE AVE	105114	5362	12	2	$43,252	$10,220	$53,472
18	THE PERMANENTE MED GROUP, INC	STONERIDGE DR	105129	9576	22	2	$43,252	$10,220	$53,472
19	P C A STONERIDGE ASSOC L.P.	6150 STONERIDGE MALL	105188	2049	5	2	$43,252	$10,220	$53,472
20	P C A STONERIDGE ASSOC L.P.	6150 STONERIDGE MALL	105191	2159	5	2	$43,252	$10,220	$53,472
21	P C A STONERIDGE ASSOC L.P.	6140 STONERIDGE MALL	105194	2276	5	2	$43,252	$10,220	$53,472
22	P C A STONERIDGE ASSOC L.P.	6150 STONERIDGE MALL	105195	3603	8	2	$43,252	$10,220	$53,472
23	P C A STONERIDGE ASSOC L.P.	6140 STONERIDGE MALL	105190	2457	6	1.5	$27,033	$6,515	$33,548
24	WELLS FARGO #9832-98	6172 STONERIDGE MALL	105205	4944	11	1.5	$27,033	$6,515	$33,548
25	STONERIDGE APTS	FABIAN CT	105110	4340	10	2	$43,252	$10,220	$53,472
26	I & G STONERIDGE INC	7901 STONERIDGE RD	143082	4859	11	3	$94,614	$21,890	$116,504
27	GOLD CREEK HOA	BALDWIN WAY	105368	2743	6	2	$43,252	$10,220	$53,472
28	GOLD CREEK HOA	CAMBO CT	105265	3500	8	2	$43,252	$10,220	$53,472
29	STONERIDGE HOA INC	ROSEDALE CT	105370	3012	7	2	$43,252	$10,220	$53,472
30	STONERIDGE HOA INC	HOMEWOOD CT	105319	3028	7	2	$43,252	$10,220	$53,472
31	STONERIDGE HOA INC	BROOKSIDE CT	105369	7703	18	2	$43,252	$10,220	$53,472
32	STONERIDGE HOA INC	STONEDALE DR	105357	2003	5	2	$43,252	$10,220	$53,472
33	THE GABLES HOA	STONEDALE DR	105374	7475	17	2	$43,252	$10,220	$53,472
34	CLUBSPORT OF PLEASANTON	7090 JOHNSON DR	104589	5068	12	2	$43,252	$10,220	$53,472
35	PLEASANTON HILTON	7050 JOHNSON DR	140764	4898	11	2	$43,252	$10,220	$53,472
36	PLEASANTON HILTON	7050 JOHNSON DR	140767	3905	9	2	$43,252	$10,220	$53,472
37	CITY OF PLEASANTON	H-24 JOHNSON DR	141158	1997	5		$0	$0	$0
38	DELTA PROPERTIES	5775 JOHNSON DR	144889	1656	4	1.5	$27,033	$6,515	$33,548
39	REYNOLDS & BROWN	OWENS DR	104491	7638	18	2	$43,252	$10,220	$53,472
40	PLSTN PARK ASSOC	6685 OWENS CT	104490	1077	2	2	$43,252	$10,220	$53,472
41	REYNOLDS & BROWN	6679 OWENS DR	104526	1477	3	1.5	$27,033	$6,515	$33,548
42	PLSNT PARK ASSOC	6621 OWENS DR	104546	1733	4	1.5	$27,033	$6,515	$33,548
43	PLSTN PARK ASSOC	6601 OWENS CT	104603	3308	8	1.5	$27,033	$6,515	$33,548
44	REYNOLDS & BROWN	JOHNSON @ OWENS DR	104492	4804	11	1.5	$27,033	$6,515	$33,548
45	REYNOLDS & BROWN	JOHNSON DR	104493	8303	19	1.5	$27,033	$6,515	$33,548
46	PLSTN PARK ASSOC	5111 JOHNSON DR	104604	3517	8	1.5	$27,033	$6,515	$33,548
47	ULTRA DATA CORP	5000 FRANKLIN DR	143578	1066	2	2	$43,252	$10,220	$53,472
48	MEYERS ASSOC	FRANKLIN DR	104508	6225	14	1.5	$27,033	$6,515	$33,548
49	MEYERS ASSOC	FRANKLIN DR	104512	4563	10	10	$540,650	$123,565	$664,215
50	MEYERS ASSOC	JOHNSON DR	104513	6053	14	1.5	$27,033	$6,515	$33,548
51	MEYERS ASSOC	JOHNSON DR	104517	12675	29	1.5	$27,033	$6,515	$33,548
52	MEYERS ASSOC	FRANKLIN DR	104516	5721	13	1.5	$27,033	$6,515	$33,548
53	MEYERS ASSOC	FRANKLIN DR	104514	3961	9	1.5	$27,033	$6,515	$33,548
54	PROVIDIAN BANCORP	4940 JOHNSON DR	136368	4071	9	1.5	$27,033	$6,515	$33,548
55	HOME DEPOT #629	6000 JOHNSON DR	104613	2110	5	1.5	$27,033	$6,515	$33,548
56	HOME DEPOT #629	6000 JOHNSON DR	104616	751	2	1.5	$27,033	$6,515	$33,548
57	EDWARD PIKE CO	6101 STONERIDGE DR IRR	144820	1157	3	1.5	$27,033	$6,515	$33,548
58	THORATEC LABORATORIES	6035 STONERIDGE DR IRR	146054	1217	3	1.5	$27,033	$6,515	$33,548
59	SPIEKER PARTNERS	6000 STONERIDGE DR	105122	2297	5	1.5	$27,033	$6,515	$33,548
60	HACIENDA MOTOR LTD	5885 OWENS DR	102158	4190	10	1	$13,629	$3,180	$16,809
61	PLEASANTON PROPERTY	5877 OWENS DR	102298	1747	4	1	$13,629	$3,180	$16,809
62	HACIENDA OWN ASSOCIATION	OWENS DR	102272	2736	6	1.5	$27,033	$6,515	$33,548
63	HACIENDA OWN ASSOCIATION	CHABOT & OWEN	102308	1087	2	1	$13,629	$3,180	$16,809
64	HOPYARD SHELL	5251 HOPYARD RD	138845	898	2	1	$13,629	$3,180	$16,809
65	HACIENDA OWN ASSOCIATION	HOPYARD RD	102160	4133	9	1.5	$27,033	$6,515	$33,548
66	R F S INCORP (FOUR POINTS HOTEL)	5115 HOPYARD RD	144178	10055	23	2	$43,252	$10,220	$53,472
67	R F S INCORP (FOUR POINTS HOTEL)	5115 HOPYARD RD	144179	1823	4	2	$43,252	$10,220	$53,472
68	MEYERS ASSOC	MORSE @ HOPYD	104506	9045	21	1.5	$27,033	$6,515	$33,548

Appendix C
Customer List (Ungrouped Meters)

ID	Customer Name	Address	Account	Demand (HCF)	Demand (AFY)		Meter Size	Zone 7	Pleasanton	Total
69	MARRIOT	5059 HOPYARD RD	102242	3084	7		2	$43,252	$10,220	$53,472
70	HACIENDA OWN ASSOCIATION	HOPYARD RD	102159	4645	11		1.5	$27,033	$6,515	$33,548
71	GIBSON SPENO MANAGEMENT COMPANY	4555 HOPYARD RD	102289	2097	5		2	$43,252	$10,220	$53,472
72	HERALD ACCTS PAYABLE	4770 WILLOW RD	102342	949	2		1.5	$27,033	$6,515	$33,548
73	HACIENDA OWN ASSOCIATION	GIBRALTAR DR	102168	3131	7		1.5	$27,033	$6,515	$33,548
74	HACIENDA VENTURE	4457 WILLOW RD	104669	2420	6		2	$43,252	$10,220	$53,472
75	U S POST OFFICE	4682 CHABOT DR	102226	980	2		0.625	$5,407	$1,305	$6,712
76	PARK PLAZA ASSOC.	4683 CHABOT DR	143559	3907	9		2	$43,252	$10,220	$53,472
77	EARLY LEARNING INST	4671 CHABOT DR	102244	1210	3		1.5	$27,033	$6,515	$33,548
78			104662	885	2		1.5	$27,033	$6,515	$33,548
79	CALIF PROPT O B ONE CORP	4637 CHABOT DR	145483	2136	5		1.5	$27,033	$6,515	$33,548
80	DUTRA REALTY ENTERPRISES	5950 STONERIDGE DR	102322	6339	15		1.5	$27,033	$6,515	$33,548
81	GIBSON SPENO MANAGEMENT COMPANY	4767 & 5980 STONERIDGE DR	102324	7534	17		1.5	$27,033	$6,515	$33,548
82	HACIENDA PARK ASSOC	5934 GIBRALTAR DR	102218	5405	12		1.5	$27,033	$6,515	$33,548
83	HACIENDA OWN ASSOCIATION	WILLOW/GIBRALTAR	102178	1348	3		1.5	$27,033	$6,515	$33,548
84	PACIFIC BELL MOBILE SERICES	4626 WILLOW RD	143272	4654	11		1.5	$27,033	$6,515	$33,548
85	GOLDEN GRAIN CO	4576 WILLOW RD	102216	4509	10		1.5	$27,033	$6,515	$33,548
86	BRITANNIA HACIENDA	5870 STONERIDGE DR	102239	2496	6		2	$43,252	$10,220	$53,472
87	BRITANNIA HACIENDA	4511 WILLOW RD	102347	4879	11		2	$43,252	$10,220	$53,472
88	B A R T	BART STATION	144557	4584	11		2	$43,252	$10,220	$53,472
89	POSITIVE COMMUNICATIONS	5645 GIBRALTAR DR	135847	2238	5		1.5	$27,033	$6,515	$33,548
90	HACIENDA VENTURE		104670	3545	8		2	$43,252	$10,220	$53,472
91	SIGNATURE PROPERTIES	INGLEWD @ CHABT C	145604	3364	8		2	$43,252	$10,220	$53,472
92	SIENA H O A	0000 TRIESTE WAY	138789	6601	15		2	$43,252	$10,220	$53,472
93	UNISOURCE	4225 HACIENDA DR	138686	12287	28		2	$43,252	$10,220	$53,472
94	THE VOIT COMPANIES	4309 HACIENDA DR	139956	9420	22		1.5	$27,033	$6,515	$33,548
95	THE VOIT COMPANIES	4309 HACIENDA DR	139957	11284	26		1.5	$27,033	$6,515	$33,548
96	CALIF PROPT O B ONE CORP	4256 HACIENDA DR	145490	10405	24		2	$43,252	$10,220	$53,472
97	BOERINGER MANNHEIM	4300 HACIENDA DR	144296	2892	7		2	$43,252	$10,220	$53,472
98	REMEDY CORPORATION	5924 STONERIDGE DR	144839	2339	5		1.5	$27,033	$6,515	$33,548
99	NELLCOR	4280 HACIENDA DR	102189	3984	9		2	$43,252	$10,220	$53,472
100	BRITANNIA HACIENDA	5700 STONERIDGE DR IRR	143835	2194	5		2	$43,252	$10,220	$53,472
101	HACIENDA OWN ASSOCIATION	STONERIDGE DR	102174	4027	9		1.5	$27,033	$6,515	$33,548
102	HACIENDA OWN ASSOCIATION	GIBRALTAR DR @ STONE	102169	5198	12		1.5	$27,033	$6,515	$33,548
103	SIGNATURE PROPERTIES	000 S/E FLORIAN ST @SAN	144292	2472	6		1.5	$27,033	$6,515	$33,548
104	VALENCIA H O A	0000 APPIAN ST	138790	2268	5		1	$13,629	$3,180	$16,809
105	HACIENDA OWNERS ASSOCIATION	RIGATTI CIR	145246	6391	15		1.5	$27,033	$6,515	$33,548
106	PAINEWEBBER MORTAGE	5696 STONERIDGE DR	102221	7025	16		1.5	$27,033	$6,515	$33,548
107	SUNOL CENTER ASSOCIATES	5675 GIBRALTAR DR	102146	4653	11		1.5	$27,033	$6,515	$33,548
108	COUNTY OF ALAMEDA	5672 STONERIDGE DR	102182	3558	8		1.5	$27,033	$6,515	$33,548
109	BRITANNIA HACIENDA I I I	5720 STONERIDGE DR	141894	3391	8		1.5	$27,033	$6,515	$33,548
110	WAL-MART # 1-2161	4501 ROSEWOOD DR	139906	7009	16		2	$43,252	$10,220	$53,472
111	EXCELL REALTY TRUST INC	4503 ROSEWOOD DR	138704	6371	15		2	$43,252	$10,220	$53,472
112	CARRAMERICA REALTY CORPORATION	4432 ROSEWOOD DR	144207	48794	112		4	$270,325	$61,595	$331,920
113	VALLEY CARE HOSPITAL	5555 W LAS POSITAS B	102309	8058	18		1.5	$27,033	$6,515	$33,548
114	VALLEYCARE HOSPITAL CORP	5565 W LAS POSITAS B	102329	3558	8		1.5	$27,033	$6,515	$33,548
115	VALLEYCARE HOSPITAL CORP	5565 W LAS POSITAS E	102328	11493	26		1.5	$27,033	$6,515	$33,548
116	VALLEYCARE HOSPITAL CORP	5565 W LAS POSITAS A	102325	4588	11		1.5	$27,033	$6,515	$33,548
117	LAS POSITAS GHOA 5	6 SEMINOLE WAY	118648	3682	8		1.5	$27,033	$6,515	$33,548
118	SANTA RITA SQUARE	3150 SANTA RITA RD	133466	1401	3		1.5	$27,033	$6,515	$33,548
119	LAS POSITAS GHOA 8	9 COMANCHE WAY	118652	3598	8		1.5	$27,033	$6,515	$33,548
120	LAS POSITAS GHOA	17 CROW CT	118651	1524	3		1.5	$27,033	$6,515	$33,548
121	LAS POSITAS GHOA	28 TONOPAH #28	118756	3765	9		1.5	$27,033	$6,515	$33,548
122	SPRINGHOUSE APTS	5505 SPRINGHOUSE DR	136736	17400	40		6	$540,650	$123,565	$664,215
123	SPIEKER PARTNERS	ROSEWOOD DR (MEDIAN)	118736	2034	5		1.5	$27,033	$6,515	$33,548
124	SPIEKER PARTNERS	ROSEWOOD DR (E. CRNR)	118735	4262	10		1.5	$27,033	$6,515	$33,548
125	VAL STROUGH	4341 ROSEWOOD DR	118670	964	2		1.5	$27,033	$6,515	$33,548
126	TOKAI CREDIT CORP	4350 ROSEWOOD DR	118800	3491	8		1.5	$27,033	$6,515	$33,548
127	EASTBAY B M W	4355 ROSEWOOD DR	118742	1675	4		1	$13,629	$3,180	$16,809
128	SPIEKER PARTNERS	4275 ROSEWOOD DR	118679	4172	10		1.5	$27,033	$6,515	$33,548
129	SPIEKER PARTNERS	4225 ROSEWOOD DR	118680	3212	7		1.5	$27,033	$6,515	$33,548
130	HACIENDA OWN ASSOC	OLD SANTA RITA RD	118702	2244	5		1.5	$27,033	$6,515	$33,548
131	SPIEKER PARTNERS	4226 ROSEWOOD DR	118750	3231	7		2	$43,252	$10,220	$53,472
132	SPIEKER PARTNERS	3999 SANTA RITA RD	118790	3068	7		2	$43,252	$10,220	$53,472
133	COMMUNITY ASSOCIATION MGMT	FAIRLANDS DR	120169	1661	4		1.5	$27,033	$6,515	$33,548
134	COMMUNITY ASSOCIATION MGMT	FAIRLANDS DR	120220	2471	6		1	$13,629	$3,180	$16,809
135	CITY OF PLEASANTON	D-29 CHURCHILL PARK	141059	1210	3		2	$43,252	$10,220	$53,472
136	PLEASANTON CABANA CLUB	4110 CHURCHILL DR	119465	3840	9		2	$43,252	$10,220	$53,472
137	CAL TRANS - D O 4	SANTA RITA - PIMLICO	118796	2920	7		1.5	$27,033	$6,515	$33,548
138	SANTA RITA SHELL	6750 SANTA RITA RD	118717	1478	3		1.5	$27,033	$6,515	$33,548
139	PIMLICO PLAZA	4040 PIMLICO DR	118708	1068	2		1.5	$27,033	$6,515	$33,548

Appendix C
Customer List (Ungrouped Meters)

ID	Customer Name	Address	Account	Demand (HCF)	Demand (AFY)		Meter Size	Zone 7	Pleasanton	Total
140	MC DONALDS CORP	6800 SANTA RITA RD	118631	2423	6		1	$13,629	$3,180	$16,809
141	FAIRLAND PK ASSOC	PIMLICO DR	119299	2761	6		1.5	$27,033	$6,515	$33,548
142	PLEASANT VILLAGE ASSOC	6700 SNATA RITA RD	118767	993	2		1	$13,629	$3,180	$16,809
143	FAIRLANDS PARK HOA	MARLBORO WAY	118862	2405	6		1.5	$27,033	$6,515	$33,548
144	CITY OF PLEASANTON	D-15 RUNNYMEDE CT	141045	1993	5		4	$270,325	$61,595	$331,920
145	CITY OF PLEASANTON	D-10 GULFSTREAM ST	141040	2085	5		2	$43,252	$10,220	$53,472
146	MOHR SCHOOL	3300 DENNIS DR	144294	1136	3		2	$43,252	$10,220	$53,472
147	AMARAL PARK	N SD STONERIDGE GUZM	142689	1542	4		1	$13,629	$3,180	$16,809
148	LAS POSITAS GHOA	30 W LAS POSITAS 30	118665	1665	4		1.5	$27,033	$6,515	$33,548
149					0			$0	$0	$0
150	MOLLER RANCH HOA	0000 HIGH CREST CT	143633	2513	6		1	$13,629	$3,180	$16,809
151	MOLLER RANCH BLVD		142692	2587	6		1	$13,629	$3,180	$16,809
152	MOLLER PARK	H-34 MOLLER PARK	141168	4944	11		4	$270,325	$61,595	$331,920
153	STONERIDGE HOA INC	IVY CT	105337	3030	7		2	$43,252	$10,220	$53,472
154	STONERIDGE HOA INC	OAKDALE CT	105338	1482	3		1.5	$27,033	$6,515	$33,548
155	STONERIDGE HOA INC	VALLEY VIEW CT	105327	6052	14		1.5	$27,033	$6,515	$33,548
156	STONERIDGE HOA INC	5101 WILLOWVIEW CT	105351	3695	8		1.5	$27,033	$6,515	$33,548
157	LYDIKSEN SCHOOL	7700 HIGHLAND OAKS DR	105853	1596	4		2	$43,252	$10,220	$53,472
158	HIGHLAND OAKS IMP. ASSOC.	4530 SANDLEWOOD DR	106182	1920	4		2	$43,252	$10,220	$53,472
159	LYDIKSEN SCHOOL	SANDLEWOOD DR	106287	7272	17		2	$43,252	$10,220	$53,472
160	MUIRWOOD COMM. PARK	H-36 MUIRWOOD PARK	141170	2412	6		1.5	$27,033	$6,515	$33,548
161	MUIRWOOD COMM. PARK	H-35 MUIRWOOD PARK TENNIS	141169	12925	30		4	$270,325	$61,595	$331,920
162	VAL VISTA PARK	G-19 VAL VISTA PARK\PAYNE	141129	6692	15		3	$94,614	$21,890	$116,504
163	HACIENDA OWN ASSOCIATION	HOPYARD RD	102164	7773	18		1.5	$27,033	$6,515	$33,548
164	BRITTANIA V	4125 HOPYARD RD	146332	1413	3		1.5	$27,033	$6,515	$33,548
165	DONLON SCHOOL	DORMAN RD	102645	15740	36		3	$94,614	$21,890	$116,504
166	HACIENDA OWN ASSOCIATION	HOPYARD RD	102215	1071	2		1.5	$27,033	$6,515	$33,548
167	HACIENDA OWN ASSOCIATION	HOPYARD RD	102161	4044	9		1.5	$27,033	$6,515	$33,548
168	CHAWIN PROP	3825 HOPYARD RD	102327	6291	14		2	$43,252	$10,220	$53,472
169	CHAWIN PROP	3875 HOPYARD RD	102143	4767	11		2	$43,252	$10,220	$53,472
170	LAS POSITAS C E I C PARTNERS	5994 W LAS POSITAS	135716	7977	18		2	$43,252	$10,220	$53,472
171	RED BEAR INC	5955 CORONADO LN	137438	1176	3		1	$13,629	$3,180	$16,809
172	BRADSHAW INC	5959 W LAS POSITAS	102228	1933	4		2	$43,252	$10,220	$53,472
173	A T & T	4480 WILLOW RD	102200	4260	10		1.5	$27,033	$6,515	$33,548
174	REYNOLDS & BROWN	4440 WILLOW RD	102313	2694	6		1.5	$27,033	$6,515	$33,548
175	CALIF PROPT O B ONE CORP	4457 WILLOW RD	145485	5725	13		2	$43,252	$10,220	$53,472
176	VANSTAR	5964 W LAS POSITAS	102207	4758	11		1.5	$27,033	$6,515	$33,548
177	HACIENDA OWN ASSOCIATION	W LAS POSITAS	102173	3107	7		1.5	$27,033	$6,515	$33,548
178	HACIENDA OWN ASSOCIATION	HACIENDA DR (So.)	102274	3653	8		2	$43,252	$10,220	$53,472
179	N P I D	HACIENDA DR (So.)	102276	6639	15		2	$43,252	$10,220	$53,472
180	WILLOW ROAD ASSOCIATES	4464 WILLOW RD	139862	2390	5		1.5	$27,033	$6,515	$33,548
181	G E PLASTICS P93163000	4160 HACIENDA DR	102310	3320	8		2	$43,252	$10,220	$53,472
182	CHAMBERLIN ASSOCIATES	5880 W LAS POSITAS	102252	5277	12		2	$43,252	$10,220	$53,472
183	PAC BELL COMMUNICATIONS	5850 W LAS POSITAS	141227	2111	5		1.5	$27,033	$6,515	$33,548
184	HACIENDA OWN ASSOCIATION	GIBRALTAR DR	102170	4856	11		1.5	$27,033	$6,515	$33,548
185	WRC PROP - A DEL	4141 HACIENDA DR.	102190	1902	4		1.5	$27,033	$6,515	$33,548
186	CALIF PROP O B ONE CORP	4141 HACIENDA DR	145482	5566	13		1.5	$27,033	$6,515	$33,548
187	TOP CON LASER SYSTEMS	5758 W LAS POSITAS	141849	4188	10		1.5	$27,033	$6,515	$33,548
188	HACIENDA OWN ASSOCIATION	W LAS POSITAS	102171	4606	11		1.5	$27,033	$6,515	$33,548
189	HACIENDA PARK ASSOC	5731 W LAS POSITAS	102302	1284	3		1.5	$27,033	$6,515	$33,548
190	HACIENDA PARKS ASSOC	5667 GIBRALTAR DR	143535	3643	8		2	$43,252	$10,220	$53,472
191	HEWLETT PACKARD	5729 W LAS POSITAS	102305	5713	13		1.5	$27,033	$6,515	$33,548
192	HEWLETT PACKARD	5725 W LAS POSITAS	102304	5650	13		1.5	$27,033	$6,515	$33,548
193	ALEXANDER & FRENTZEN	5724 W LAS POSITAS	102151	6066	14		1.5	$27,033	$6,515	$33,548
194	VERONA H O A	000 BELLEZA DR	136822	2481	6		1.5	$27,033	$6,515	$33,548
195	VERONA H O A	000 BELLEZA DR	137009	5179	12		1.5	$27,033	$6,515	$33,548
196	VERONA H O A	000 BELLEZA DR	137040	2750	6		2	$43,252	$10,220	$53,472
197	PLEASANTON SPORTS & REC. PARK	E-37 SPORTS PARK @ GLENDA	141104	77101	177		4	$270,325	$61,595	$331,920
198	WOODTHRUSH PARK	E-28 WOODTHRUSH PARK	141095	4292	10		2	$43,252	$10,220	$53,472
199	SUTTERGATE PARK	E-27 SUTTERGATE PARK	141094	3546	8		2	$43,252	$10,220	$53,472
200	BELVEDERE H O A	DIAVILA AVE	134489	2474	6		1.5	$27,033	$6,515	$33,548
201	BELVEDERE H O A	MILANI AVE	134486	2733	6		1.5	$27,033	$6,515	$33,548
202	ST ELIZABETH SETON MISSION	4001 STONEBRIDGE DR	118792	4330	10		1.5	$27,033	$6,515	$33,548
203	NIELSEN PARK	C-31 NIELSON PARK	141021	8327	19		2	$43,252	$10,220	$53,472
204	GATEWOOD APTS	3998 STONERIDGE DR	118797	2741	6		2	$43,252	$10,220	$53,472
205	GATEWOOD APTS	3982 STONERIDGE DR	118639	4793	11		2	$43,252	$10,220	$53,472
206	GATEWOOD APTS	3922 STONERIDGE DR	118634	3732	9		2	$43,252	$10,220	$53,472
207	COMMUNITY ASSOCIATION MANAGEMENT	STONE POINTE WAY	118922	3413	8		2	$43,252	$10,220	$53,472
208	COMMUNITY ASSOCIATION MANAGEMENT	ROSE ROCK CIR	118974	2771	6		1.5	$27,033	$6,515	$33,548
209	CITY OF PLEASANTON	C-26 4231 WAYCROSS	141016	1282	3		1.5	$27,033	$6,515	$33,548
210	CITY OF PLEASANTON	C-30 MOHR AVE	141020	937	2		1	$13,629	$3,180	$16,809

Appendix C
Customer List (Ungrouped Meters)

ID	Customer Name	Address	Account	Demand (HCF)	Demand (AFY)		Meter Size	Zone 7	Pleasanton	Total
211	ROSE PARK COMMUNITY ASSOC	MOHR AVE	118512	780	2		1.5	$27,033	$6,515	$33,548
212	ROSE PARK COMMUNITY ASSOC	MAGNOLIA CIR	118495	1243	3		1.5	$27,033	$6,515	$33,548
213	ROSE PARK COMMUNITY ASSOC	HOLLY CIR	118494	973	2		1.5	$27,033	$6,515	$33,548
214	ROSE PARK COMMUNITY ASSOC	POPPYBANK CT	118422	1632	4		2	$43,252	$10,220	$53,472
215	CITY OF PLEASANTON	H-12 W L P @ LAKEWOOD	141146	1463	3		2	$43,252	$10,220	$53,472
216	FOOTHILL HIGH SCHOOL	4375 FOOTHILL RD	108001	2437	6		4	$270,325	$61,595	$331,920
217	CITY OF PLEASANTON	FOOTHILL RD	143159	1903	4		1	$13,629	$3,180	$16,809
218	BROOKFIELD TOWNHOMES	AMBERWOOD CIR	107742	3151	7		2	$43,252	$10,220	$53,472
219	BROOKFIELD TOWNHOMES	AMBERWOOD CIR	107735	2652	6		2	$43,252	$10,220	$53,472
220	MEADOWLARK PARK	H-7 FOOTHILL KNOLLS	141140	5164	12		2	$43,252	$10,220	$53,472
221	DEL PRADO CABANA CLUB	PASEO SANTA CRUZ	128703	1486	3		2	$43,252	$10,220	$53,472
222	DEL PRADO PARK	E-46 DEL PRADO PARK	141113	7492	17		2	$43,252	$10,220	$53,472
223	CITY OF PLEASANTON	E-43 VALLEY\HANSEN	141110	1686	4		1.5	$27,033	$6,515	$33,548
224	VALLEY TRAILS PARK	G-8 PLATT CT S	141122	6774	16		3	$94,614	$21,890	$116,504
225	VALLEY TRAILS PARK	G-12 CARLSBAD CT	141123	4371	10		2	$43,252	$10,220	$53,472
226	CITY OF PLEASANTON	E-40 ARTHUR @ HOPYARD	141107	1947	4		1.5	$27,033	$6,515	$33,548
227	PLEASANTON SPORTS & REC. PARK	E-32 HOPYARD @ SPORTS PK	141099	18636	43		4	$270,325	$61,595	$331,920
228	HACIENDA OWN ASSOCIATION	HOPYARD RD	102162	4421	10		1.5	$27,033	$6,515	$33,548
229	HACIENDA OWN ASSOCIATION	HOPYARD RD	104502	1195	3		1.5	$27,033	$6,515	$33,548
230	PLEAS. TENNIS & COMM. PARK	E-42 VALLEY\ PAS SAN CRUZ	141109	1375	3		1.5	$27,033	$6,515	$33,548
231	PLEAS. TENNIS & COMM. PARK	E-44 VALLEY \ PAS SAN CRUZ	141111	1673	4		1.5	$27,033	$6,515	$33,548
232	PLEAS. TENNIS & COMM. PARK	E-45 VALLEY\PAS SAN CRUZ	141112	2375	5		1.5	$27,033	$6,515	$33,548
233	HANSEN PARK	E-50 BLK HANSEN ON CALLE	141117	4096	9		2	$43,252	$10,220	$53,472
234	HANSEN PARK	E-49 BLACK - HANSEN PARK	141116	3887	9		2	$43,252	$10,220	$53,472
235	CASA DE CALAFIA	5448 BLACK AVE	130333	1256	3		1.5	$27,033	$6,515	$33,548
236	WALNUT GROVE SCHOOL	5199 BLACK AVE	122653	4839	11		3	$94,614	$21,890	$116,504
237	ALDERWOOD ASSOC	HARVEST RD	126202	1368	3		1	$13,629	$3,180	$16,809
238	WALNUT GROVE PARK	E-16 VALLEY @ NORTHWAY	141083	5711	13		4	$270,325	$61,595	$331,920
239	HARVEST SCHOOL	4900 VALLEY AVE	125934	19046	44		3	$94,614	$21,890	$116,504
240	WOODLAND VILLAS	4306 VALLEY AVE	138964	2884	7		2	$43,252	$10,220	$53,472
241	WOODLAND VILLAS	4330 VALLEY AVE	138965	3800	9		2	$43,252	$10,220	$53,472
242	WELLINGTON HOA		129945	2047	5		2	$43,252	$10,220	$53,472
243	TRINITY LUTHERAN CHURCH	GOLDEN RD	130049	1233	3		1.5	$27,033	$6,515	$33,548
244	HARVEST PARK	E-5 HARVEST PARK	141072	2093	5		3	$94,614	$21,890	$116,504
245	HARVEST PARK	E-17 HARVEST PARK	141084	3546	8		2	$43,252	$10,220	$53,472
246	ORLOFF PARK	C-29 ELLIOTT CIR	141019	5117	12		2	$43,252	$10,220	$53,472
247	ORLOFF PARK	C-28 ORLOFF PARK	141018	5568	13		2	$43,252	$10,220	$53,472
248	AMADOR PARK	E-19 AMADOR PARK	141086	109	0	109	1.5	$27,033	$6,515	$33,548
249	AMADOR PARK	E-20 AMADOR PARK	141087	6560	15		1.5	$27,033	$6,515	$33,548
250	AMADOR PARK	VALLEY AVE	145520	2395	5		1.5	$27,033	$6,515	$33,548
251	CITY OF PLEASANTON	E-12 PRE-SCHOOL PARK	141079	1692	4		1.5	$27,033	$6,515	$33,548
252	ALISAL SCHOOL	1454 SANTA RITA RD	117719	5633	13		2	$43,252	$10,220	$53,472
253	AMADOR VALLEY HIGH SCHOOL	1155 SANTA RITA RD	115753	8469	19		4	$270,325	$61,595	$331,920
254	AMADOR VALLEY HIGH SCHOOL	1155 SANTA RITA RD	115751	20154	46		3	$94,614	$21,890	$116,504
255	TRIDENT ASSOCIATES	VALLEY AVE	116049	1606	4		1	$13,629	$3,180	$16,809
256	CUPERTINO CAPITAL	1020 SERPENTINE LN	115908	995	2		1.5	$27,033	$6,515	$33,548
257	THE VOIT COMPANIES	1279 QUARRY LN	115893	990	2		1	$13,629	$3,180	$16,809
258	UTILITY VAULT	3786 VALLEY AVE	115998	1156	3		2	$43,252	$10,220	$53,472
259	VALLEY BUS CTR	3942 VALLEY AVE	139209	2361	5		1.5	$27,033	$6,515	$33,548
260	FUJITA CALIF PARTNERS IV	1257 QUARRY LN	116093	1770	4		2	$43,252	$10,220	$53,472
261	VALLEY PARKS ASSOC	1024 SERPENTINE LN	143945	902	2		1.5	$27,033	$6,515	$33,548
262	FUJITA CALIF PARTNERS IV	1233 QUARRY LN	116068	1852	4		2	$43,252	$10,220	$53,472
263	JANE & CHRIS STUDZINSKI	1236 QUARRY LN	142889	945	2		1	$13,629	$3,180	$16,809
264	THE VOIT COMPANIES	1072 SERPENTINE LN	115902	1828	4		1	$13,629	$3,180	$16,809
265	THE VOIT COMPANIES	1220 QUARRY LN	115900	1272	3		1	$13,629	$3,180	$16,809
266	CITY OF PLEASANTON	C-6 VALLEY\BOULDER	140996	958	2		1.5	$27,033	$6,515	$33,548
267	CITY OF PLEASANTON	C-16 FIRE TRAINING	141006	1184	3		1	$13,629	$3,180	$16,809
268	AUF DER MAUR F	STANLEY BLVD	116065	887	2		1	$13,629	$3,180	$16,809
269	DAVIDEN HOMES	8101 REGENCY DR.	142617	6048	14		2	$43,252	$10,220	$53,472
270	MEADOWLARK PARK	FOOTHILL KNOLLS PARK	141345	2418	6		1.5	$27,033	$6,515	$33,548
271	ALVISO ADOBE PARK	FOOTHILL RD	143994	2638	6		1	$13,629	$3,180	$16,809
272	LAGUNA OAKS PLEASANTON HOA	LYLEWOOD DR	143105	1596	4		1.5	$27,033	$6,515	$33,548
273	CITY OF PLEASANTON	0000 LYLEWOOD DR	143995	1705	4		1	$13,629	$3,180	$16,809
274	WINDSOR HOA	MEADOWLARK DR	107832	3404	8		1	$13,629	$3,180	$16,809
275	CITY OF PLEASANTON	TAPESTRY WAY	135747	1816	4		1.5	$27,033	$6,515	$33,548
276	CITY OF PLEASANTON	TAPESTRY CT	135748	2001	5		1.5	$27,033	$6,515	$33,548
277	WINDSOR HOA	TAPESTRY WAY	107834	3098	7		1.5	$27,033	$6,515	$33,548
278	HAYWARD CA PM GROUP	6101 PASEO SANTA CRUZ	128692	3088	7		1.5	$27,033	$6,515	$33,548
279	PARKWAY PROP	6940 KOLL CTR PKWY	107991	4460	10		2	$43,252	$10,220	$53,472
280	ASSOC PROCESS CONTROLS	7150 KOLL CTR PKWY	108005	1564	4		2	$43,252	$10,220	$53,472
281	PARKWAY PROP	6654 KOLL CTR PKWY	107805	3677	8		2	$43,252	$10,220	$53,472

Appendix C
Customer List (Ungrouped Meters)

ID	Customer Name	Address	Account	Demand (HCF)	Demand (AFY)		Meter Size	Zone 7	Pleasanton	Total
282	PARKWAY PROP	6601 KOLL CTR PKWY	107806	4698	11		2	$43,252	$10,220	$53,472
283	PARKWAY PROP	7011 KOLL CTR PKWY	107808	23278	53		2	$43,252	$10,220	$53,472
284	PARKWAY PROP	KOLL CENTER PKWY	107790	5457	13		1.5	$27,033	$6,515	$33,548
285	PARKWAY PROP	7020 KOLL CENTER PKWY	107791	3252	7		2	$43,252	$10,220	$53,472
286	NISSAN MOTOR CORP.		107798	2818	6		2	$43,252	$10,220	$53,472
287	N C R- A / R -WHO-3	6870 KOLL CTR PKWY	107801	2308	5		2	$43,252	$10,220	$53,472
288	PARKWAY PROP	7139 KOLL CTR PKWY	107794	1347	3		1.5	$27,033	$6,515	$33,548
289	PARKWAY PROP	7133 KOLL CTR PKWY	107796	2309	5		1.5	$27,033	$6,515	$33,548
290	PARKWAY PROP	KOLL CENTER PKWY	107789	4474	10		3	$94,614	$21,890	$116,504
291	PARKWAY PROP	6830 KOLL CENTER PKWY	107787	21684	50		3	$94,614	$21,890	$116,504
292	PLAZA DEL VALLE	DEL VALLEY PKWY	130258	1316	3		1	$13,629	$3,180	$16,809
293	ST JOHN CT H O A	553 ST JOHN ST	111257	1223	3		2	$43,252	$10,220	$53,472
294	CITY OF PLEASANTON	A-29 MAIN ST PARK	140959	884	2		1.5	$27,033	$6,515	$33,548
295	BARONE'S	475 ST JOHN ST	137476	1232	3		0.625	$5,407	$1,305	$6,712
296	EDMUND S GIL	779 ROSE AVE	111500	1262	3		0.625	$5,407	$1,305	$6,712
297	CITY OF PLEASANTON	A-31 PETERS ST\PARK	140961	1276	3		1.5	$27,033	$6,515	$33,548
298	CALIFORNIA REFLECTIONS	000 SHORE DR	136389	1496	3		1	$13,629	$3,180	$16,809
299	CALIFORNIA REFLECTIONS	000 PROMENADE WAY	136388	1120	3		1	$13,629	$3,180	$16,809
300	PLSTN CAB SHOP	57 CALIFORNIA AVE	115965	1217	3		1	$13,629	$3,180	$16,809
301	KOTTINGER VILLAGE PARK	B-15 KOTTINGER PARK WEST	140978	1998	5		2	$43,252	$10,220	$53,472
302	KOTTINGER PARK	B-17 KOTTINGER PARK	140980	3937	9		2	$43,252	$10,220	$53,472
303	KOTTINGER PARK	B-18 KOTTINGER PARK	140981	3328	8		2	$43,252	$10,220	$53,472
304	KOTTINGER PARK	B-20 KOTTINGER PARK	140983	3159	7		2	$43,252	$10,220	$53,472
305	KOTTINGER PARK	B-21 KOTTINGER PARK	140984	0	0		2	$43,252	$10,220	$53,472
306	AUF DER MAUR APTS	3955 VINEYARD AVE	114433	2477	6		2	$43,252	$10,220	$53,472
307	MCKINLEY PARK	AMARAL PARK S W GUSM	145996	6917	16		2	$43,252	$10,220	$53,472
308	HARRIS REALTY	VINE ST	114163	1181	3		1	$13,629	$3,180	$16,809
309	ASSOCIATION	VINEYARD PL	113980	2188	5		1.5	$27,033	$6,515	$33,548
310	VALLEY VIEW SCHOOL	480 ADAMS WAY	114230	5691	13		2	$43,252	$10,220	$53,472
311	KOTTINGER PARK	B-27 KOTTINGER PARK	140990	1526	4		2	$43,252	$10,220	$53,472
312	ARROYO VILLAGE H O A	MAVIS DR	114026	493	1		0.625	$5,407	$1,305	$6,712
313	HAYWARD CA PM GROUP	3574 VINEYARD AVE	114068	2643	6		1.5	$27,033	$6,515	$33,548
314	TAWNY PARK	B-25 TAWNY PARK	140988	5577	13		2	$43,252	$10,220	$53,472
315	VINTAGE TERRACE	CONCORD PL	112915	2923	7		1.5	$27,033	$6,515	$33,548
316	PALOMINO PLACE H O A	PALOMINO DR	113956	1651	4		0.625	$5,407	$1,305	$6,712
317	SHADOW CLIFFS HOA	HALF DOME DR	118301	1986	5		0.625	$5,407	$1,305	$6,712
318	SHADOW CLIFFS HOA	GRAPEVINE DR	118175	891	2		1.5	$27,033	$6,515	$33,548
319	SHADOW CLIFFS HOA	WHITNEY DR	118298	3189	7		1.5	$27,033	$6,515	$33,548
320	GOLDEN EAGLE LUX HOMES	VILLA LOOP 2	135371	2275	5		1.5	$27,033	$6,515	$33,548
321	GOLDEN EAGLE LUX HOMES	VILLA LOOP	110071	9529	22		2	$43,252	$10,220	$53,472
322	GOLDEN EAGLE LUX HOMES	KEMPER CT	110042	1201	3		1.5	$27,033	$6,515	$33,548
323	GOLDEN EAGLE LUX HOMES	RIVERIA/SPYGLASS	110260	8775	20		2	$43,252	$10,220	$53,472
324	GOLDEN EAGLE LUX HOMES	000 VILLA LOOP	138162	7228	17		2	$43,252	$10,220	$53,472
325	HULS AMERICA	5555 SUNOL BLVD	110161	2159	5		2	$43,252	$10,220	$53,472
326	PROFICIENT FOOD CO	5678 SUNOL BLVD	110157	3690	8		2	$43,252	$10,220	$53,472
327	CENTENNIAL PARK & SENIOR CENTER	A-14 SENIOR CTR	140944	11036	25		3	$94,614	$21,890	$116,504
328	T M P OAKHILLS	5420 SUNOL BLVD	110864	1848	4		1	$13,629	$3,180	$16,809
329	T M P OAKHILLS	5420 SUNOL BLVD	110865	2112	5		1	$13,629	$3,180	$16,809
330	CITY OF PLEASANTON	A-13 SUNOL BLVD	140943	1068	2		2	$43,252	$10,220	$53,472
331	PLEASANTON MIDDLE SCHOOL	5101 CASE AVE	110047	10338	24		2	$43,252	$10,220	$53,472
332	PLEASANTON MIDDLE SCHOOL	5101 CASE AVE	110046	11897	27		2	$43,252	$10,220	$53,472
333	THE PROMENADE APTS	0000 CASE AVE	146001	1410	3		2	$43,252	$10,220	$53,472
334	THE PROMENADE APTS	0000 CASE AVE IRR	145998	2253	5		2	$43,252	$10,220	$53,472
335	RIDGEVIEW COMMONS	CASE AVE	110249	7702	18		3	$94,614	$21,890	$116,504
336	BRADDOCK & LOGAN	4800 BERNAL AVE	110044	3622	8		1.5	$27,033	$6,515	$33,548
337	BRADDOCK & LOGAN	4872 BERNAL AVE	110043	6171	14		1.5	$27,033	$6,515	$33,548
338	CITY OF PLEASANTON	A-23 BERNAL AVE	140953	1115	3		1.5	$27,033	$6,515	$33,548
339	CITY OF PLEASANTON	A-2 LIBRARY	140932	3014	7		2	$43,252	$10,220	$53,472
340	CITY OF PLEASANTON	A-11 4950 BERNAL AVE	140941		0		1	$13,629	$3,180	$16,809
341	CITY OF PLEASANTON	A-8 POLICE STATION	140938	1309	3		1	$13,629	$3,180	$16,809
342	CITY OF PLEASANTON	A-5 CIVIC CENTER	140935	1301	3		1.5	$27,033	$6,515	$33,548
343	PLEASANTON UNIFIED	4750 FIRST AVE	114942	2118	5		3	$94,614	$21,890	$116,504
344	CITY OF PLEASANTON	4780 FIRST ST.	140957	1920	4		3	$94,614	$21,890	$116,504
345	BRENTWOOD HOLDING CO	MONACO DR	110983	1874	4		1.5	$27,033	$6,515	$33,548
346	ULYSSES EARLY	4625 FIRST ST	135199	897	2		1	$13,629	$3,180	$16,809
347	PLSTN HILLS H O A	MONACO DR	110991	1869	4		1.5	$27,033	$6,515	$33,548
348	PLSTN HILLS H O A	PUERTO VALLARTA	111051	1322	3		1.5	$27,033	$6,515	$33,548
349	ST AUGUSTINE CHURCH	3999 BERNAL AVE	115454	3342	8		1	$13,629	$3,180	$16,809
350	KOTTINGER RANCH HOA	BERNAL AVE	115455	1374	3		2	$43,252	$10,220	$53,472
351	KOTTINGER RANCH HOA	GARIBALDI PL	115607	2194	5		1.5	$27,033	$6,515	$33,548
352	KOTTINGER RANCH HOA	HEARST DR	115458	4660	11		2	$43,252	$10,220	$53,472

Appendix C
Customer List (Ungrouped Meters)

ID	Customer Name	Address	Account	Demand (HCF)	Demand (AFY)	Meter Size	Zone 7	Pleasanton	Total
353	KOTTINGER RANCH HOA	HEARST DR	115457	2416	6	2	$43,252	$10,220	$53,472
354	KOTTINGER RANCH HOA	1201 HEARST DR	115609	2709	6	1.5	$27,033	$6,515	$33,548
355	VINTAGE HILLS SCHOOL	1125 CONCORD ST	113744	10231	23	2	$43,252	$10,220	$53,472
356	VINTAGE HILLS PARK	B-24 VINTAGE HILLS PARK	140987	5006	11	2	$43,252	$10,220	$53,472
357	VINTAGE HILLS	MATARO CT	113487	3621	8	1.5	$27,033	$6,515	$33,548
358	VINTAGE HILLS	NAVALLE CT	113583	2521	6	2	$43,252	$10,220	$53,472
359	EARL RIGGS	000 LUPINE CT	142774	1367	3	0.625	$5,407	$1,305	$6,712
360	KAISER CENTER DRWG NORTH	6177 SUNOL BLVD	110148	24782	57	6	$540,650	$123,565	$664,215
361	KAISER CENTER DRWG SOUTH	6177 SUNOL BLVD	110329	14765	34	6	$540,650	$123,565	$664,215
362	OAK TREE FARMS	000 WAR GLORY & MARES CT	140029	5547	13	1	$13,629	$3,180	$16,809
363	OAK TREE FARMS	000 WAR GLORY & MARES CT	140030	6292	14	1	$13,629	$3,180	$16,809
364	SIGNATURE PROPERTIES	000 ZENATO PL	137352	1837	4	2	$43,252	$10,220	$53,472
365	RUBY HILL OWNERS ASSOC	0000 W RUBY HILL @ FORENZA	141523	5600	13	2	$43,252	$10,220	$53,472
366	SIGNATURE PROPERTIES	000 RUBY HILL BLVD	135389	4896	11	2	$43,252	$10,220	$53,472
367	SIGNATURE PROPERTIES	0000 W RUBY HILL DR	139288	2361	5	1.5	$27,033	$6,515	$33,548
368	RUBY HILL OWNERS ASSOC	000 RUBY HILL DR	141524	3788	9	2	$43,252	$10,220	$53,472
369	SIGNATURE PROPERTIES	2900 E RUBY HILL DR	140448	11898	27	1.5	$27,033	$6,515	$33,548
370	SIGNATURE PROPERTIES	0000 E RUBY HILL @ ROSSO	138463	1744	4	1.5	$27,033	$6,515	$33,548
371	SIGNATURE PROPERTIES	0000 E. RUBY HILL @MONTORI	139423	3594	8	2	$43,252	$10,220	$53,472
372	PLEASANTON G.C. (FUTURE)	SOUTH PLEASANTON			350	6	$540,650	$123,565	$664,215
373	RUBY HILLS GOLF COURSE	RUBY HILLS			350	6	$540,650	$123,565	$664,215
376	PLANNED G.C. (CITY OF SF)				395	6	$540,650	$123,565	$664,215
				TOTAL	4642		$18,421,761	$4,314,400	$22,736,161
						Average Connection Fee Per AF of use			$4,898
		TOTAL, CUSTOMERS > 7 AFY ONLY			4161				
POTENTIAL FUTURE CUSTOMERS									
374	COUNTY F.G. - DRIVING RANGE				35				
375	COUNTY F.G. - PLSNTN FAIRWAYS G.C.				175				
377	CASTLEWOOD G.C. (UPPER)				350				
378	CASTLEWOOD G.C. (LOWER)				350				
		TOTAL, POTENTIAL FUTURE CUSTOMERS			910				
		TOTAL, ALL CUSTOMERS			5552				
		TOTAL, ALL CUSTOMERS > 7 AFY ONLY			5071				

APPENDIX D ◦ CUSTOMER LIST (GROUPED METERS)

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
1	(CLOSED)	139578	1348	3
2	HOLIDAY INN	105198	3712	9
3	CITY OF PLEASANTON	141167	2412	6
4	SAFEWAY INC (VEN #036535)	139971	1541	4
5	WYNDHAM HOTELS & RESORTS	139504	5098	12
6	ARNOLDS HOME FURNITURE	136500	1500	3
7	AMERICA SAVINGS BANK	105119	1204	3
8	SPECTRUM INTERESTS	105126	3019	7
9	SHELL RIDGE MGMT CO	105125	1167	3
10	J K L CORP	105149	1980	5
11	NORDSTROM'S	105157	1310	3
12	J C PENNEYS	105142	2862	7
13	MACY'S WEST, INC	105132	1390	3
14	TAUBMAN	105137	1484	3
15	SEARS # 1019	141205	2569	6
16	MACY'S ACCTG DEPT	105135	2335	5
17	ACF PROPERTY MGMT	105114	5362	12
18	THE PERMANENTE MED GROUP, INC	105129	9576	22
19	P C A STONERIDGE ASSOC L.P.	105188	12544	29
24	WELLS FARGO #9832-98	105205	4944	11
25	STONERIDGE APTS	105110	4340	10
26	I & G STONERIDGE INC	143082	4859	11
27	GOLD CREEK HOA	105368	6243	14
29	STONERIDGE HOA INC	105370	30005	69
33	THE GABLES HOA	105374	7475	17
34	CLUBSPORT OF PLEASANTON	104589	5068	12
35	PLEASANTON HILTON	140764	8803	20
37	CITY OF PLEASANTON	141158	1997	5
38	DELTA PROPERTIES	144889	1656	4
39	REYNOLDS & BROWN	104491	22222	51
40	PLSTN PARK ASSOC	104490	9635	22
47	ULTRA DATA CORP	143578	1066	2
48	MEYERS ASSOC	104508	48243	111
54	PROVIDIAN BANCORP	136368	4071	9
55	HOME DEPOT #629	104613	2110	5
56	HOME DEPOT #629	104616	751	2
57	EDWARD PIKE CO	144820	1157	3
58	THORATEC LABORATORIES	146054	1217	3
59	SPIEKER PARTNERS	105122	2297	5
60	HACIENDA MOTOR LTD	102158	4190	10
61	PLEASANTON PROPERTY	102298	1747	4
62	HACIENDA OWN ASSOCIATION	102272	2736	6
63	HACIENDA OWN ASSOCIATION	102308	1087	2
64	HOPYARD SHELL	138845	898	2
65	HACIENDA OWN ASSOCIATION	102160	4133	9
66	R F S INCORP (FOUR POINTS HOTEL)	144178	11878	27
69	MARRIOT	102242	3084	7
70	HACIENDA OWN ASSOCIATION	102159	4645	11
71	GIBSON SPENO MANAGEMENT COMPAN	102289	2097	5

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
72	HERALD ACCTS PAYABLE	102342	949	2
73	HACIENDA OWN ASSOCIATION	102168	3131	7
74	HACIENDA VENTURE	104669	2420	6
75	U S POST OFFICE	102226	980	2
76	PARK PLAZA ASSOC.	143559	3907	9
77	EARLY LEARNING INST	102244	1210	3
78		104662	885	2
79	CALIF PROPT O B ONE CORP	145483	2136	5
80	DUTRA REALTY ENTERPRISES	102322	6339	15
81	GIBSON SPENO MANAGEMENT COMPAN	102324	7534	17
82	HACIENDA PARK ASSOC	102218	5405	12
83	HACIENDA OWN ASSOCIATION	102178	1348	3
84	PACIFIC BELL MOBILE SERICES	143272	4654	11
85	GOLDEN GRAIN CO	102216	4509	10
86	BRITANNIA HACIENDA	102239	2496	6
87	BRITANNIA HACIENDA	102347	4879	11
88	B A R T	144557	4584	11
89	POSITIVE COMMUNICATIONS	135847	2238	5
90	HACIENDA VENTURE	104670	3545	8
91	SIGNATURE PROPERTIES	145604	3364	8
92	SIENA H O A	138789	6601	15
93	UNISOURCE	138686	12287	28
94	THE VOIT COMPANIES	139956	9420	22
95	THE VOIT COMPANIES	139957	11284	26
96	CALIF PROPT O B ONE CORP	145490	10405	24
97	BOERINGER MANNHEIM	144296	2892	7
98	REMEDY CORPORATION	144839	2339	5
99	NELLCOR	102189	3984	9
100	BRITANNIA HACIENDA	143835	2194	5
101	HACIENDA OWN ASSOCIATION	102174	4027	9
102	HACIENDA OWN ASSOCIATION	102169	5198	12
103	SIGNATURE PROPERTIES	144292	2472	6
104	VALENCIA H O A	138790	2268	5
105	HACIENDA OWNERS ASSOCIATION	145246	6391	15
106	PAINEWEBBER MORTAGE	102221	7025	16
107	SUNOL CENTER ASSOCIATES	102146	4653	11
108	COUNTY OF ALAMEDA	102182	3558	8
109	BRITANNIA HACIENDA I I I	141894	3391	8
110	WAL-MART # 1-2161	139906	7009	16
111	EXCELL REALTY TRUST INC	138704	6371	15
112	CARRAMERICA REALTY CORPORATION	144207	48794	112
113	VALLEY CARE HOSPITAL	102309	8058	18
114	VALLEYCARE HOSPITAL CORP	102329	19639	45
117	LAS POSITAS GHOA 5	118648	14234	33
118	SANTA RITA SQUARE	133466	1401	3
122	SPRINGHOUSE APTS	136736	17400	40
123	SPIEKER PARTNERS	118736	2034	5
124	SPIEKER PARTNERS	118735	4262	10
125	VAL STROUGH	118670	964	2

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
126	TOKAI CREDIT CORP	118800	3491	8
127	EASTBAY B M W	118742	1675	4
128	SPIEKER PARTNERS	118679	4172	10
129	SPIEKER PARTNERS	118680	3212	7
130	HACIENDA OWN ASSOC	118702	2244	5
131	SPIEKER PARTNERS	118750	3231	7
132	SPIEKER PARTNERS	118790	3068	7
133	COMMUNITY ASSOCIATION MGMT	120169	4132	9
135	CITY OF PLEASANTON	141059	1210	3
136	PLEASANTON CABANA CLUB	119465	3840	9
137	CAL TRANS - D O 4	118796	2920	7
138	SANTA RITA SHELL	118717	1478	3
139	PIMLICO PLAZA	118708	1068	2
140	MC DONALDS CORP	118631	2423	6
141	FAIRLAND PK ASSOC	119299	2761	6
142	PLEASANT VILLAGE ASSOC	118767	993	2
143	FAIRLANDS PARK HOA	118862	2405	6
144	CITY OF PLEASANTON	141045	1993	5
145	CITY OF PLEASANTON	141040	2085	5
146	MOHR SCHOOL	144294	1136	3
147	AMARAL PARK	142689	1542	4
149			0	0
150	MOLLER RANCH HOA	143633	2513	6
151	MOLLER RANCH BLVD	142692	2587	6
152	MOLLER PARK	141168	4944	11
157	LYDIKSEN SCHOOL	105853	8868	20
158	HIGHLAND OAKS IMP. ASSOC.	106182	1920	4
160	MUIRWOOD COMM. PARK	141170	15337	35
162	VAL VISTA PARK	141129	6692	15
163	HACIENDA OWN ASSOCIATION	102164	7773	18
164	BRITTANIA V	146332	1413	3
165	DONLON SCHOOL	102645	15740	36
166	HACIENDA OWN ASSOCIATION	102215	1071	2
167	HACIENDA OWN ASSOCIATION	102161	4044	9
168	CHAWIN PROP	102327	11058	25
170	LAS POSITAS C E I C PARTNERS	135716	7977	18
171	RED BEAR INC	137438	1176	3
172	BRADSHAW INC	102228	1933	4
173	A T & T	102200	4260	10
174	REYNOLDS & BROWN	102313	2694	6
175	CALIF PROPT O B ONE CORP	145485	5725	13
176	VANSTAR	102207	4758	11
177	HACIENDA OWN ASSOCIATION	102173	3107	7
178	HACIENDA OWN ASSOCIATION	102274	3653	8
179	N P I D	102276	6639	15
180	WILLOW ROAD ASSOCIATES	139862	2390	5
181	G E PLASTICS P93163000	102310	3320	8
182	CHAMBERLIN ASSOCIATES	102252	5277	12
183	PAC BELL COMMUNICATIONS	141227	2111	5

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
184	HACIENDA OWN ASSOCIATION	102170	4856	11
185	WRC PROP - A DEL	102190	1902	4
186	CALIF PROP O B ONE CORP	145482	5566	13
187	TOP CON LASER SYSTEMS	141849	4188	10
188	HACIENDA OWN ASSOCIATION	102171	4606	11
189	HACIENDA PARK ASSOC	102302	1284	3
190	HACIENDA PARKS ASSOC	143535	3643	8
191	HEWLETT PACKARD	102305	11363	26
193	ALEXANDER & FRENTZEN	102151	6066	14
194	VERONA H O A	136822	10410	24
197	PLEASANTON SPORTS & REC. PARK	141104	77101	177
198	WOODTHRUSH PARK	141095	4292	10
199	SUTTERGATE PARK	141094	3546	8
200	BELVEDERE H O A	134489	5207	12
202	ST ELIZABETH SETON MISSION	118792	4330	10
203	NIELSEN PARK	141021	8327	19
204	GATEWOOD APTS	118797	11266	26
207	COMMUNITY ASSOCIATION MANAGEMEI	118922	6184	14
209	CITY OF PLEASANTON	141016	1282	3
210	CITY OF PLEASANTON	141020	937	2
211	ROSE PARK COMMUNITY ASSOC	118512	4628	11
215	CITY OF PLEASANTON	141146	1463	3
216	FOOTHILL HIGH SCHOOL	108001	2437	6
217	CITY OF PLEASANTON	143159	1903	4
218	BROOKFIELD TOWNHOMES	107742	5803	13
220	MEADOWLARK PARK	141140	7582	17
221	DEL PRADO CABANA CLUB	128703	1486	3
222	DEL PRADO PARK	141113	7492	17
223	CITY OF PLEASANTON	141110	1686	4
224	VALLEY TRAILS PARK	141122	11145	26
226	CITY OF PLEASANTON	141107	1947	4
227	PLEASANTON SPORTS & REC. PARK	141099	18636	43
228	HACIENDA OWN ASSOCIATION	102162	4421	10
229	HACIENDA OWN ASSOCIATION	104502	1195	3
230	PLEAS. TENNIS & COMM. PARK	141109	5423	12
233	HANSEN PARK	141117	7983	18
235	CASA DE CALAFIA	130333	1256	3
236	WALNUT GROVE SCHOOL	122653	4839	11
237	ALDERWOOD ASSOC	126202	1368	3
238	WALNUT GROVE PARK	141083	5711	13
239	HARVEST SCHOOL	125934	19046	44
240	WOODLAND VILLAS	138964	6684	15
242	WELLINGTON HOA	129945	2047	5
243	TRINITY LUTHERAN CHURCH	130049	1233	3
244	HARVEST PARK	141072	5642	13
246	ORLOFF PARK	141019	10685	25
248	AMADOR PARK	141086	9064	21
251	CITY OF PLEASANTON	141079	1692	4
252	ALISAL SCHOOL	117719	5633	13

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
253	AMADOR VALLEY HIGH SCHOOL	115753	28623	66
255	TRIDENT ASSOCIATES	116049	1606	4
256	CUPERTINO CAPITAL	115908	995	2
257	THE VOIT COMPANIES	115893	990	2
258	UTILITY VAULT	115998	1156	3
259	VALLEY BUS CTR	139209	2361	5
260	FUJITA CALIF PARTNERS IV	116093	3622	8
261	VALLEY PARKS ASSOC	143945	902	2
263	JANE & CHRIS STUDZINSKI	142889	945	2
264	THE VOIT COMPANIES	115902	1828	4
265	THE VOIT COMPANIES	115900	1272	3
266	CITY OF PLEASANTON	140996	958	2
267	CITY OF PLEASANTON	141006	1184	3
268	AUF DER MAUR F	116065	887	2
269	DAVIDEN HOMES	142617	6048	14
271	ALVISO ADOBE PARK	143994	2638	6
272	LAGUNA OAKS PLEASANTON HOA	143105	1596	4
273	CITY OF PLEASANTON	143995	1705	4
274	WINDSOR HOA	107832	6502	15
275	CITY OF PLEASANTON	135747	1816	4
276	CITY OF PLEASANTON	135748	2001	5
278	HAYWARD CA PM GROUP	128692	3088	7
279	PARKWAY PROP	107991	74636	171
280	ASSOC PROCESS CONTROLS	108005	1564	4
286	NISSAN MOTOR CORP.	107798	2818	6
287	N C R- A / R -WHO-3	107801	2308	5
292	PLAZA DEL VALLE	130258	1316	3
293	ST JOHN CT H O A	111257	1223	3
294	CITY OF PLEASANTON	140959	884	2
295	BARONE'S	137476	1232	3
296	EDMUND S GIL	111500	1262	3
297	CITY OF PLEASANTON	140961	1276	3
298	CALIFORNIA REFLECTIONS	136389	1496	3
299	CALIFORNIA REFLECTIONS	136388	1120	3
300	PLSTN CAB SHOP	115965	1217	3
301	KOTTINGER VILLAGE PARK	140978	1998	5
302	KOTTINGER PARK	140980	11950	27
306	AUF DER MAUR APTS	114433	2477	6
307	MCKINLEY PARK	145996	6917	16
308	HARRIS REALTY	114163	1181	3
309	ASSOCIATION	113980	2188	5
310	VALLEY VIEW SCHOOL	114230	5691	13
312	ARROYO VILLAGE H O A	114026	493	1
313	HAYWARD CA PM GROUP	114068	2643	6
314	TAWNY PARK	140988	5577	13
315	VINTAGE TERRACE	112915	2923	7
316	PALOMINO PLACE H O A	113956	1651	4
317	SHADOW CLIFFS HOA	118301	6066	14
320	GOLDEN EAGLE LUX HOMES	135371	29008	67

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
325	HULS AMERICA	110161	2159	5
326	PROFICIENT FOOD CO	110157	3690	8
327	CENTENNIAL PARK & SENIOR CENTER	140944	11036	25
328	T M P OAKHILLS	110864	3960	9
330	CITY OF PLEASANTON	140943	1068	2
331	PLEASANTON MIDDLE SCHOOL	110047	22235	51
333	THE PROMENADE APTS	146001	3663	8
335	RIDGEVIEW COMMONS	110249	7702	18
336	BRADDOCK & LOGAN	110044	9793	22
338	CITY OF PLEASANTON	140953	1115	3
339	CITY OF PLEASANTON	140932	3014	7
340	CITY OF PLEASANTON	140941	0	0
341	CITY OF PLEASANTON	140938	1309	3
342	CITY OF PLEASANTON	140935	1301	3
343	PLEASANTON UNIFIED	114942	2118	5
344	CITY OF PLEASANTON	140957	1920	4
345	BRENTWOOD HOLDING CO	110983	1874	4
346	ULYSSES EARLY	135199	897	2
347	PLSTN HILLS H O A	110991	3191	7
349	ST AUGUSTINE CHURCH	115454	3342	8
350	KOTTINGER RANCH HOA	115455	13353	31
355	VINTAGE HILLS SCHOOL	113744	10231	23
356	VINTAGE HILLS PARK	140987	5006	11
357	VINTAGE HILLS	113487	6142	14
359	EARL RIGGS	142774	1367	3
360	KAISER CENTER DRWG NORTH	110148	39547	91
362	OAK TREE FARMS	140029	11839	27
364	SIGNATURE PROPERTIES	137352	1837	4
365	RUBY HILL OWNERS ASSOC	141523	9388	22
366	SIGNATURE PROPERTIES	135389	7257	17
369	SIGNATURE PROPERTIES	140448	17236	40
372	PLEASANTON G.C. (FUTURE)			350
373	RUBY HILLS GOLF COURSE			350
376	PLANNED G.C. (CITY OF SF)			395
			TOTAL	**4642**
		TOTAL < 7 AFY	**481**	
		TOTAL 7-10 AFY	**393**	
		TOTAL 11-25 AFY	**1120**	
		TOTAL 26-50 AFY	**588**	
		TOTAL >50 AFY	**2060**	
		TOTAL, CUSTOMERS > 7 AFY ONLY		**4161**
POTENTIAL FUTURE CUSTOMERS				
374	COUNTY F.G. - DRIVING RANGE			35
375	COUNTY F.G. - PLSNTN FAIRWAYS G.C.			175

Appendix D
Customer List (Grouped Meters)

Customer Number	Customer Name	Account	Demand (HCF)	Demand (AFY)
377	CASTLEWOOD G.C. (UPPER)			350
378	CASTLEWOOD G.C. (LOWER)			350
			TOTAL, POTENTIAL FUTURE CUSTOMERS	**910**
			TOTAL, ALL CUSTOMERS	**5552**
			TOTAL, ALL CUSTOMERS > 7 AFY ONLY	**5071**

APPENDIX E • DEMAND CLUSTERS

Appendix E
Demand Clusters

Demand Cluster Number	H20Net Demand Node	Customers	Average (AFY)	Peak Day (GPM)	Peak Delivery (GPM)	Demand Type		Scenario 1			Salt Zone		
						Day	Night	A	B	C	0%	50%	100%
1	6	5, 12, 19, 24, 25	68	106	254	N	Y	Y	Y	Y		X	
2	8	8, 17, 18, 26	52	81	195	N	Y	Y	Y	Y		X	
3		27, 152	26	40	96	N	Y						
4	10	29, 33	86	133	320	N	Y	Y	Y	Y		X	
5	12	157, 160	56	86	207	N	Y	Y	Y	Y		X	
6		218	13	21	50	N	Y						
8		220, 269	31	48	116	N	Y						
10		274	15	23	56	N	Y						
11		320	67	103	248	N	Y						
12		378 (golf course)	350	543	543	Y	Y						
13		377 (golf course)	350	543	543	Y	Y						
14		34, 35	32	49	118	N	Y						
18	16	162, 165	51	80	192	N	Y	Y	Y	Y		X	
17	18	48, 54	120	186	447	N	Y	Y	Y	Y		X	
15	20	39, 40	73	113	272	N	Y	Y	Y	Y		X	
16	22	60, 65, 66, 69, 70	64	99	239	N	Y	Y	Y	Y		X	
52	24	80, 81, 163	50	77	185	N	Y	Y	Y	Y		X	
47	26	73, 76, 82, 84, 88	50	77	185	N	Y	Y	Y	Y		X	
48	34	93 - 97	106	165	395	N	Y	Y	Y	Y		X	
22		222	17	27	64	N	Y						
49	36	90, 91, 92, 105	46	71	170	N	Y	Y	Y	Y		X	
50	40	110, 111	31	48	114	N	Y	Y	Y	Y		X	
51	42	112	112	174	417	N	Y	Y	Y	Y		X	
26		336, 339	29	46	109	N	Y						
60	44	124, 126, 128, 129, 131, 132, 137	56	87	208	N	Y	Y	Y	Y		X	
28		327	25	39	94	N	Y						
29		326, 328	18	27	65	N	Y						
55	48	101, 102, 106, 107	48	74	179	N	Y	Y	Y	Y		X	
63	50	108, 109	16	25	59	N	Y	Y	Y	Y			X
32		362	27	42	101	N	Y						
33		347	7	11	27	N	Y						
57	54	191, 193, 194	64	99	238	N	Y	Y	Y	Y			X
35		307, 310	29	45	108	N	Y						

Appendix E
Demand Clusters

Demand Cluster Number	H20Net Demand Node	Customers	Average (AFY)	Peak Day (GPM)	Peak Delivery (GPM)	Demand Type		Scenario 1			Salt Zone		
						Day	Night	A	B	C	0%	50%	100%
36		302	27	43	102	N	Y						
37		349	8	12	29	N	Y						
38		350, 355	54	84	201	N	Y						
39		356, 357	26	40	95	N	Y						
40		315	7	10	25	N	Y						
64	56	122	40	62	149	N	Y	Y	Y	Y			X
65	58	199, 200	20	31	75	N	Y	Y	Y	Y			X
62	60	113, 114, 117	96	149	358	N	Y	Y	Y	Y			X
66	62	202, 203, 204, 207	69	107	257	N	Y	Y	Y	Y			X
20	74	224	26	40	95	N	Y	Y	Y	Y			X
19	76	167, 168, 170	53	82	197	N	Y	Y	Y	Y			X
58	78	197	177	274	658	N	Y	Y	Y	Y			X
21	80	227, 228, 230	65	101	243	N	Y	Y	Y	Y			X
68	82	238-240	72	112	269	N	Y	N	N	Y			X
72	86	248, 252	34	52	126	N	Y	N	N	Y			X
75	88	253	66	102	244	N	Y	N	N	Y			X
53		85, 87, 173, 175	44	69	165	N	Y						
54		99, 178, 179, 184	44	68	163	N	Y						
24	100	279	171	266	637	N	Y	N	Y	Y			X
56		186, 187, 188, 190	41	64	154	N	Y						
23	102	374	35	54	130	N	Y	N	Y	Y			X
25	106	376 (San Francisco G.C.)	395	612	612	Y	Y	N	Y	Y			X
59		176, 177, 181, 182	38	59	141	N	Y						
27	110	331, 333, 335	77	120	287	N	Y	N	Y	Y		X	
61		133, 136	18	28	68	N	Y						
30	114	360	91	141	338	N	Y	N	Y	Y		X	
41	140	314	13	20	48	N	Y	N	N	Y		X	
42	142	317	14	22	52	N	Y	N	N	Y		X	
43	150	365, 366	38	59	142	N	Y	N	N	Y			X
67		198	10	15	37	N	Y						
44	154	369	40	61	147	N	Y	N	N	Y			X
69		246	25	38	91	N	Y						
70		211	11	16	40	N	Y						
71		236	11	17	41	N	Y						

Appendix E
Demand Clusters

Demand Cluster Number	H20Net Demand Node	Customers	Average (AFY)	Peak Day (GPM)	Peak Delivery (GPM)	Demand Type		Scenario 1			Salt Zone		
						Day	Night	A	B	C	0%	50%	100%
46	156	373 (Ruby Hills G.C.)	350	543	543	Y	Y	N	N	Y			X
73		260	8	13	31	N	Y						
74		244	13	20	48	N	Y						
31	162	372 (Pleasanton G.C.)	350	543	543	Y	Y	N	Y	Y	X		
76		375 (golf course)	175	271	271	Y	Y						
77		278	7	11	26	N	Y						
78		233	18	28	68	N	Y						
79		2	9	13	32	N	Y						
Plant Res.						Y	N	Y	Y	Y			
G.C. Res.						Y	N	N	N	Y			
Totals			**5071**	**7860**	**14590**								
Peak Day Factor:			2.5										
Peak Delivery Factor:			2.4										

APPENDIX F • PEAK DAY, DAY DELIVERY, AND NIGHT DELIVERY RECYCLED WATER DEMANDS

Appendix F
Day and Night Delivery Demands
Scenario A

Demand Cluster Number	H20Net Demand Node	Customers	Average Demand (AFY)	Peak Day Demand (GPM)	Day Delivery Demand (GPM)	Night Delivery Demand (GPM)	Average Demand In Salt Zone (AFY) 0%	50%	100%
1	6	5, 12, 19, 24, 25	68	106		254		68	
2	8	8, 17, 18, 26	52	81		195		52	
4	10	29, 33	86	133		320		86	
5	12	157, 160	56	86		207		56	
18	16	162, 165	51	80		192		51	
17	18	48, 54	120	186		447		120	
15	20	39, 40	73	113		272		73	
16	22	60, 65, 66, 69, 70	64	99		239		64	
52	24	80, 81, 163	50	77		185		50	
47	26	73, 76, 82, 84, 88	50	77		185		50	
48	34	93 - 97	106	165		395		106	
49	36	90, 91, 92, 105	46	71		170		46	
50	40	110, 111	31	48		114		31	
51	42	112	112	174		417		112	
60	44	124, 126, 128, 129, 131, 132, 137	56	87		208		56	
55	48	101, 102, 106, 107	48	74		179		48	
63	50	108, 109	16	25		59			16
57	54	191, 193, 194	64	99		238			64
64	56	122	40	62		149			40
65	58	199, 200	20	31		75			20
62	60	113, 114, 117	96	149		358			96
66	62	202, 203, 204, 207	69	107		257			69
20	74	224	26	40		95			26
19	76	167, 168, 170	53	82		197			53
58	78	197	177	274		658			177
21	80	227, 228, 230	65	101		243			65
Totals			**1695**	**2628**	**2628**	**6307**	**0**	**1069**	**626**

Appendix F
Day and Night Delivery Demands
Scenario B

Demand Cluster Number	H20Net Demand Node	Customers	Average Demand (AFY)	Peak Day Demand (GPM)	Day Delivery Demand (GPM)	Night Delivery Demand (GPM)	Average Demand In Salt Zone (AFY) 0%	50%	100%
1	6	5, 12, 19, 24, 25	68	106		254		68	
2	8	8, 17, 18, 26	52	81		195		52	
4	10	29, 33	86	133		320		86	
5	12	157, 160	56	86		207		56	
18	16	162, 165	51	80		192		51	
17	18	48, 54	120	186		447		120	
15	20	39, 40	73	113		272		73	
16	22	60, 65, 66, 69, 70	64	99		239		64	
52	24	80, 81, 163	50	77		185		50	
47	26	73, 76, 82, 84, 88	50	77		185		50	
48	34	93 - 97	106	165		395		106	
49	36	90, 91, 92, 105	46	71		170		46	
50	40	110, 111	31	48		114		31	
51	42	112	112	174		417		112	
60	44	124, 126, 128, 129, 131, 132, 137	56	87		208		56	
55	48	101, 102, 106, 107	48	74		179		48	
63	50	108, 109	16	25		59			16
57	54	191, 193, 194	64	99		238			64
64	56	122	40	62		149			40
65	58	199, 200	20	31		75			20
62	60	113, 114, 117	96	149		358			96
66	62	202, 203, 204, 207	69	107		257			69
20	74	224	26	40		95			26
19	76	167, 168, 170	53	82		197			53
58	78	197	177	274		658			177
21	80	227, 228, 230	65	101		243			65
24	100	279	171	266		637			171
23	102	374	35	54		130			35
25	106	376 (San Francisco G.C.)	395	612	612	612			395
27	110	331, 333, 335	77	120		287		77	
30	114	360	91	141		338		91	
31	162	372 (Pleasanton G.C.)	350	543	543	543	350		
Totals			**2815**	**4363**	**5518**	**8854**	**350**	**1237**	**1228**

Appendix F
Day and Night Delivery Demands
Scenario C

Demand Cluster Number	H20Net Demand Node	Customers	Average Demand (AFY)	Peak Day Demand (GPM)	Day Delivery Demand (GPM)	Night Delivery Demand (GPM)	Average Demand In Salt Zone (AFY) 0%	50%	100%
1	6	5, 12, 19, 24, 25	68	106		254		68	
2	8	8, 17, 18, 26	52	81		195		52	
4	10	29, 33	86	133		320		86	
5	12	157, 160	56	86		207		56	
18	16	162, 165	51	80		192		51	
17	18	48, 54	120	186		447		120	
15	20	39, 40	73	113		272		73	
16	22	60, 65, 66, 69, 70	64	99		239		64	
52	24	80, 81, 163	50	77		185		50	
47	26	73, 76, 82, 84, 88	50	77		185		50	
48	34	93 - 97	106	165		395		106	
49	36	90, 91, 92, 105	46	71		170		46	
50	40	110, 111	31	48		114		31	
51	42	112	112	174		417		112	
60	44	124, 126, 128, 129, 131, 132, 137	56	87		208		56	
55	48	101, 102, 106, 107	48	74		179		48	
63	50	108, 109	16	25		59			16
57	54	191, 193, 194	64	99		238			64
64	56	122	40	62		149			40
65	58	199, 200	20	31		75			20
62	60	113, 114, 117	96	149		358			96
66	62	202, 203, 204, 207	69	107		257			69
20	74	224	26	40		95			26
19	76	167, 168, 170	53	82		197			53
58	78	197	177	274		658			177
21	80	227, 228, 230	65	101		243			65
68	82	238-240	72	112		269			72
72	86	248, 252	34	52		126			34
75	88	253	66	102		244			66
24	100	279	171	266		637			171
23	102	374	35	54		130			35
25	106	376 (San Francisco G.C.)	395	612	612	612			395
27	110	331, 333, 335	77	120		287		77	
30	114	360	91	141		338		91	
41	140	314	13	20		48		13	
42	142	317	14	22		52		14	
43	150	365, 366	38	59		142			38
44	154	369	40	61		147			40
46	156	373 (Ruby Hills G.C.)	350	543	543	543			350
31	162	372 (Pleasanton G.C.)	350	543	543	543	350		
Plant Res.					4442				
G.C. Res.					892				
Totals			**3441**	**5333**	**7031**	**10424**	**350**	**1264**	**1827**

APPENDIX G • HYDRAULIC MODEL OUTPUT

Nodes, Scenario 1A - Night, 4/1/98, 5:00 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
2	Junction	0.00	330.00	593.97	114.38
4	Junction	0.00	341.00	554.72	92.60
6	Junction	256.68	338.00	541.77	88.29
8	Junction	193.44	349.00	548.65	86.51
10	Junction	319.92	355.00	522.16	72.43
12	Junction	204.60	338.00	509.30	74.22
16	Junction	189.72	322.00	559.44	102.88
18	Junction	446.40	323.00	551.58	99.04
20	Junction	271.56	323.00	536.50	92.51
22	Junction	238.08	320.00	537.38	94.19
24	Junction	186.00	321.00	541.92	95.72
26	Junction	186.00	324.00	534.48	91.20
28	Junction	0.00	320.00	545.92	97.89
30	Junction	0.00	322.00	539.83	94.39
32	Junction	0.00	327.00	532.61	89.09
34	Junction	398.04	328.00	517.75	82.22
36	Junction	171.12	331.00	506.74	76.15
38	Junction	0.00	332.00	496.60	71.32
40	Junction	115.32	333.00	486.98	66.72
42	Junction	416.64	340.00	474.24	58.17
44	Junction	208.32	343.00	463.84	52.36
46	Junction	0.00	323.00	563.54	104.22
48	Junction	178.56	329.00	526.08	85.40
50	Junction	431.52	334.00	517.34	79.44
52	Junction	0.00	334.00	515.21	78.52
54	Junction	238.08	330.00	510.88	78.38
56	Junction	148.80	338.00	501.63	70.90
58	Junction	74.40	340.00	490.17	65.07
60	Junction	357.12	340.00	473.30	57.76
62	Junction	256.68	343.00	476.92	58.03
70	Junction	0.00	320.00	502.58	79.11
72	Junction	0.00	320.00	505.00	80.16
74	Junction	96.72	320.00	509.16	81.97
76	Junction	193.44	320.00	516.10	84.97
78	Junction	658.44	328.00	470.25	61.64
80	Junction	241.80	321.00	499.17	77.20
128	Junction	0.00	348.00	516.74	73.12
168	Junction	0.00	330.00	596.60	115.52
1001	Tank	-6677.40	330.00	330.00	0.00

a WWTP Pump
@ 45 HP

Links, Scenario 1A - Night, 4/1/98, 5:00 pm

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
1	Pipe	24.00	6677.40	4.74	2.92
3	Pipe	8.00	974.64	6.22	17.42
5	Pipe	6.00	256.68	2.91	5.98
7	Pipe	8.00	717.96	4.58	9.89
9	Pipe	6.00	524.52	5.95	22.45
13	Pipe	16.00	5702.76	9.10	15.70
15	Pipe	8.00	717.96	4.58	9.89
17	Pipe	6.00	271.56	3.08	6.63
19	Pipe	6.00	189.72	2.15	3.41
21	Pipe	16.00	4795.08	7.65	11.39
23	Pipe	6.00	238.08	2.70	5.20
25	Pipe	16.00	3366.60	5.37	5.92
27	Pipe	16.00	3180.60	5.08	5.33
29	Pipe	6.00	186.00	2.11	3.29
31	Pipe	16.00	2994.60	4.78	4.76
33	Pipe	10.00	1309.44	5.35	10.15
35	Pipe	8.00	911.40	5.82	15.39
37	Pipe	8.00	740.28	4.73	10.47
39	Pipe	8.00	740.28	4.73	10.47
41	Pipe	8.00	624.96	3.99	7.65
43	Pipe	6.00	208.32	2.36	4.06
45	Pipe	12.00	1685.16	4.78	6.67
47	Pipe	12.00	1506.60	4.27	5.42
49	Pipe	12.00	1075.08	3.05	2.90
51	Pipe	6.00	238.08	2.70	5.20
53	Pipe	8.00	837.00	5.34	13.14
55	Pipe	8.00	688.20	4.39	9.15
57	Pipe	6.00	357.12	4.05	11.02
59	Pipe	6.00	256.68	2.91	5.98
67	Pipe	6.00	-241.80	2.74	5.35
69	Pipe	10.00	-900.24	3.68	5.07
71	Pipe	10.00	-996.96	4.07	6.13
73	Pipe	8.00	658.44	4.20	8.43
75	Pipe	6.00	241.80	2.74	5.35
125	Pipe	10.00	1190.40	4.86	8.51
129	Pipe	6.00	204.60	2.32	3.93
131	Pipe	6.00	204.60	2.32	3.93
2001	Pump	0.00	6677.40	0.00	-266.60

Nodes, Scenario 1B - Night, 4/1/98, 3:10 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
2	Junction	0.00	330.00	610.77	121.66
4	Junction	0.00	341.00	571.52	99.88
6	Junction	256.68	338.00	558.57	95.57
8	Junction	193.44	349.00	565.45	93.79
10	Junction	319.92	355.00	538.96	79.71
12	Junction	204.60	338.00	526.10	81.50
16	Junction	189.72	322.00	547.43	97.68
18	Junction	446.40	323.00	539.56	93.84
20	Junction	271.56	323.00	524.49	87.30
22	Junction	238.08	320.00	504.97	80.15
24	Junction	186.00	321.00	509.51	81.68
26	Junction	186.00	324.00	502.07	77.16
28	Junction	0.00	320.00	513.50	83.85
30	Junction	0.00	322.00	507.42	80.34
32	Junction	0.00	327.00	500.20	75.05
34	Junction	398.04	328.00	485.34	68.17
36	Junction	171.12	331.00	474.33	62.11
38	Junction	0.00	332.00	464.18	57.27
40	Junction	115.32	333.00	454.57	52.68
42	Junction	416.64	340.00	441.83	44.12
44	Junction	208.32	343.00	431.42	38.31
46	Junction	0.00	323.00	551.52	99.02
48	Junction	178.56	329.00	493.67	71.35
50	Junction	431.52	334.00	484.92	65.40
52	Junction	0.00	334.00	482.79	64.47
54	Junction	238.08	330.00	478.47	64.33
56	Junction	148.80	338.00	469.22	56.86
58	Junction	74.40	340.00	457.76	51.02
60	Junction	357.12	340.00	440.89	43.72
62	Junction	256.68	343.00	444.51	43.98
70	Junction	0.00	320.00	499.53	77.79
72	Junction	0.00	320.00	501.32	78.57
74	Junction	96.72	320.00	502.96	79.28
76	Junction	193.44	320.00	505.35	80.31
78	Junction	658.44	328.00	466.57	60.04
80	Junction	241.80	321.00	497.01	76.26
96	Junction	0.00	327.00	473.66	63.55
98	Junction	0.00	330.00	477.77	64.03
100	Junction	636.12	325.00	461.38	59.09
102	Junction	130.20	325.00	480.29	67.29
104	Junction	0.00	327.00	466.95	60.64
106	Junction	612.25	321.00	455.88	58.44
108	Junction	0.00	320.00	441.04	52.45
110	Junction	286.44	326.00	426.99	43.76
112	Junction	0.00	357.00	431.19	32.15
114	Junction	338.52	360.00	427.25	29.14
128	Junction	0.00	348.00	533.54	80.40
158	Junction	0.00	418.00	426.00	3.47
162	Junction	465.00	420.00	423.64	1.58
168	Junction	0.00	330.00	615.48	123.70
1001	Tank	-9145.93	330.00	330.00	0.00

• P.S. @ 660 ft

• No reservoir at the gate count

Links, Scenario 1B - Night, 4/1/98, 3:10 pm

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
1	Pipe	24.00	9145.93	6.49	5.23
3	Pipe	8.00	974.64	6.22	17.42
5	Pipe	6.00	256.68	2.91	5.98
7	Pipe	8.00	717.96	4.58	9.89
9	Pipe	6.00	524.52	5.95	22.45
13	Pipe	16.00	8171.29	13.04	30.57
15	Pipe	8.00	717.96	4.58	9.89
17	Pipe	6.00	271.56	3.08	6.63
19	Pipe	6.00	189.72	2.15	3.41
21	Pipe	16.00	7263.61	11.59	24.58
23	Pipe	6.00	238.08	2.70	5.20
25	Pipe	16.00	3366.60	5.37	5.92
27	Pipe	16.00	3180.60	5.08	5.33
29	Pipe	6.00	186.00	2.11	3.29
31	Pipe	16.00	2994.60	4.78	4.76
33	Pipe	10.00	1309.44	5.35	10.15
35	Pipe	8.00	911.40	5.82	15.39
37	Pipe	8.00	740.28	4.73	10.47
39	Pipe	8.00	740.28	4.73	10.47
41	Pipe	8.00	624.96	3.99	7.65
43	Pipe	6.00	208.32	2.36	4.06
45	Pipe	12.00	1685.16	4.78	6.67
47	Pipe	12.00	1506.60	4.27	5.42
49	Pipe	12.00	1075.08	3.05	2.90
51	Pipe	6.00	238.08	2.70	5.20
53	Pipe	8.00	837.00	5.34	13.14
55	Pipe	8.00	688.20	4.39	9.15
57	Pipe	6.00	357.12	4.05	11.02
59	Pipe	6.00	256.68	2.91	5.98
67	Pipe	16.00	-2710.33	4.32	3.96
69	Pipe	20.00	-3368.77	3.44	2.00
71	Pipe	20.00	-3465.49	3.54	2.11
73	Pipe	8.00	658.44	4.20	8.43
75	Pipe	16.00	2710.33	4.32	3.96
93	Pipe	12.00	-1702.21	4.83	6.79
95	Pipe	6.00	353.03	4.01	10.77
97	Pipe	16.00	-2055.24	3.28	2.37
99	Pipe	6.00	283.09	3.21	7.15
101	Pipe	12.00	1702.21	4.83	6.79
103	Pipe	12.00	1702.21	4.83	6.79
105	Pipe	10.00	1089.96	4.45	7.23
107	Pipe	6.00	286.44	3.25	7.32
109	Pipe	10.00	803.52	3.28	4.11
111	Pipe	6.00	338.52	3.84	9.98
125	Pipe	20.00	3658.93	3.74	2.33
127	Pipe	16.00	2468.53	3.94	3.33
129	Pipe	6.00	204.60	2.32	3.93
131	Pipe	6.00	204.60	2.32	3.93
161	Pipe	10.00	465.00	1.90	1.49
167	Pipe	10.00	465.00	1.90	1.49
2001	Pump	0.00	9145.93	0.00	-285.48

Nodes, Scenario 1B - Day, 4/1/98, 4:30 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
2	Junction	0.00	330.00	476.80	63.61
4	Junction	0.00	341.00	476.80	58.84
6	Junction	0.00	338.00	476.80	60.14
8	Junction	0.00	349.00	476.80	55.38
10	Junction	0.00	355.00	476.80	52.78
12	Junction	0.00	338.00	476.80	60.14
16	Junction	0.00	322.00	475.41	66.47
18	Junction	0.00	323.00	475.41	66.04
20	Junction	0.00	323.00	475.41	66.04
22	Junction	0.00	320.00	474.30	66.86
24	Junction	0.00	321.00	474.30	66.43
26	Junction	0.00	324.00	474.30	65.13
28	Junction	0.00	320.00	474.30	66.86
30	Junction	0.00	322.00	474.30	65.99
32	Junction	0.00	327.00	474.30	63.83
34	Junction	0.00	328.00	474.30	63.39
36	Junction	0.00	331.00	474.30	62.09
38	Junction	0.00	332.00	474.30	61.66
40	Junction	0.00	333.00	474.30	61.23
42	Junction	0.00	340.00	474.30	58.19
44	Junction	0.00	343.00	474.30	56.89
46	Junction	0.00	323.00	475.41	66.04
48	Junction	0.00	329.00	474.30	62.96
50	Junction	0.00	334.00	474.30	60.79
52	Junction	0.00	334.00	474.30	60.79
54	Junction	0.00	330.00	474.30	62.53
56	Junction	0.00	338.00	474.30	59.06
58	Junction	0.00	340.00	474.30	58.19
60	Junction	0.00	340.00	474.30	58.19
62	Junction	0.00	343.00	474.30	56.89
70	Junction	0.00	320.00	472.66	66.15
72	Junction	0.00	320.00	472.98	66.29
74	Junction	0.00	320.00	473.18	66.37
76	Junction	0.00	320.00	473.46	66.49
78	Junction	0.00	328.00	472.98	62.82
80	Junction	0.00	321.00	472.20	65.52
96	Junction	0.00	327.00	466.13	60.28
98	Junction	0.00	330.00	467.89	59.75
100	Junction	0.00	325.00	468.15	62.03
102	Junction	0.00	325.00	468.60	62.22
104	Junction	0.00	327.00	463.25	59.04
106	Junction	612.25	321.00	458.51	59.58
108	Junction	0.00	320.00	455.44	58.69
110	Junction	0.00	326.00	455.44	56.09
112	Junction	0.00	357.00	451.87	41.11
114	Junction	0.00	360.00	451.87	39.81
128	Junction	0.00	348.00	476.80	55.81
158	Junction	0.00	418.00	446.68	12.43
162	Junction	465.00	420.00	444.32	10.54
168	Junction	0.00	330.00	476.89	63.65
1001	Tank	-1077.25	330.00	330.00	0.00

@ WWTP P.S
@ 40 HP

= 1 lb reserve
at all times

Links, Scenario 1B - Day, 4/1/98, 4:30 pm

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
1	Pipe	24.00	1077.25	0.76	0.10
3	Pipe	8.00	0.00	0.00	0.00
5	Pipe	6.00	0.00	0.00	0.00
7	Pipe	8.00	0.00	0.00	0.00
9	Pipe	6.00	0.00	0.00	0.00
13	Pipe	16.00	1077.25	1.72	0.72
15	Pipe	8.00	0.00	0.00	0.00
17	Pipe	6.00	0.00	0.00	0.00
19	Pipe	6.00	0.00	0.00	0.00
21	Pipe	16.00	1077.25	1.72	0.72
23	Pipe	6.00	0.00	0.00	0.00
25	Pipe	16.00	0.00	0.00	0.00
27	Pipe	16.00	0.00	0.00	0.00
29	Pipe	6.00	0.00	0.00	0.00
31	Pipe	16.00	0.00	0.00	0.00
33	Pipe	10.00	0.00	0.00	0.00
35	Pipe	8.00	0.00	0.00	0.00
37	Pipe	8.00	0.00	0.00	0.00
39	Pipe	8.00	0.00	0.00	0.00
41	Pipe	8.00	0.00	0.00	0.00
43	Pipe	6.00	0.00	0.00	0.00
45	Pipe	12.00	0.00	0.00	0.00
47	Pipe	12.00	0.00	0.00	0.00
49	Pipe	12.00	0.00	0.00	0.00
51	Pipe	6.00	0.00	0.00	0.00
53	Pipe	8.00	0.00	0.00	0.00
55	Pipe	8.00	0.00	0.00	0.00
57	Pipe	6.00	0.00	0.00	0.00
59	Pipe	6.00	0.00	0.00	0.00
67	Pipe	16.00	-1077.25	1.72	0.72
69	Pipe	20.00	-1077.25	1.10	0.24
71	Pipe	20.00	-1077.25	1.10	0.24
73	Pipe	8.00	0.00	0.00	0.00
75	Pipe	16.00	1077.25	1.72	0.72
93	Pipe	12.00	-1077.25	3.06	2.91
95	Pipe	6.00	-37.73	0.43	0.17
97	Pipe	16.00	-1039.52	1.66	0.67
99	Pipe	6.00	37.73	0.43	0.17
101	Pipe	12.00	1077.25	3.06	2.91
103	Pipe	12.00	1077.25	3.06	2.91
105	Pipe	10.00	465.00	1.90	1.49
107	Pipe	6.00	0.00	0.00	0.00
109	Pipe	10.00	465.00	1.90	1.49
111	Pipe	6.00	0.00	0.00	0.00
125	Pipe	20.00	1077.25	1.10	0.24
127	Pipe	16.00	1077.25	1.72	0.72
129	Pipe	6.00	0.00	0.00	0.00
131	Pipe	6.00	0.00	0.00	0.00
161	Pipe	10.00	465.00	1.90	1.49
167	Pipe	10.00	465.00	1.90	1.49
2001	Pump	0.00	1077.25	0.00	-146.89

Nodes, Scenario 1C - Night, 3/31/98, 5:10 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
2	Junction	0.00	330.00	600.02	117.00
4	Junction	0.00	341.00	560.76	95.22
6	Junction	256.68	338.00	547.81	90.91
8	Junction	193.44	349.00	554.70	89.13
10	Junction	319.92	355.00	528.21	75.05
12	Junction	204.60	338.00	515.34	76.84
16	Junction	189.72	322.00	531.94	90.96
18	Junction	446.40	323.00	524.07	87.12
20	Junction	271.56	323.00	509.00	80.59
22	Junction	238.08	320.00	486.05	71.95
24	Junction	186.00	321.00	490.59	73.48
26	Junction	186.00	324.00	483.15	68.96
28	Junction	0.00	320.00	494.58	75.65
30	Junction	0.00	322.00	488.50	72.14
32	Junction	0.00	327.00	481.28	66.85
34	Junction	398.04	328.00	466.42	59.98
36	Junction	171.12	331.00	455.41	53.91
38	Junction	0.00	332.00	445.26	49.08
40	Junction	115.32	333.00	435.65	44.48
42	Junction	416.64	340.00	422.91	35.93
44	Junction	208.32	343.00	412.50	30.12
46	Junction	0.00	323.00	536.03	92.31
48	Junction	178.56	329.00	474.75	63.15
50	Junction	431.52	334.00	466.01	57.20
52	Junction	0.00	334.00	463.87	56.27
54	Junction	238.08	330.00	459.55	56.13
56	Junction	148.80	338.00	450.30	48.66
58	Junction	74.40	340.00	438.84	42.83
60	Junction	357.12	340.00	421.97	35.52
62	Junction	256.68	343.00	425.59	35.79
70	Junction	0.00	320.00	477.89	68.41
72	Junction	0.00	320.00	480.13	69.38
74	Junction	96.72	320.00	482.10	70.24
76	Junction	193.44	320.00	484.94	71.47
78	Junction	658.44	328.00	445.38	50.86
80	Junction	241.80	321.00	474.74	66.61
82	Junction	267.84	335.00	656.17	139.16
84	Junction	0.00	342.00	637.09	127.86
86	Junction	163.68	344.00	620.11	119.64
88	Junction	416.64	350.00	606.33	111.07
96	Junction	0.00	327.00	469.48	61.74
98	Junction	0.00	330.00	469.58	60.48
100	Junction	636.12	325.00	452.31	55.16
102	Junction	130.20	325.00	470.06	62.85
104	Junction	0.00	327.00	469.33	61.67
106	Junction	612.25	321.00	469.07	64.16
108	Junction	0.00	320.00	469.10	64.61
110	Junction	286.44	326.00	455.05	55.92
112	Junction	0.00	357.00	469.41	48.71
114	Junction	338.52	360.00	465.46	45.69
128	Junction	0.00	348.00	522.79	75.74

• WWTP Pump @ 660 HP

• Valley B.S. @ 100 HP

• [illegible] B.S. [illegible] HP

• Golf course reservoir @ [illegible]

Nodes, Scenario 1C - Night, 3/31/98, 5:10 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
130	Junction	0.00	349.00	593.15	105.79
132	Junction	18.60	364.00	580.24	93.70
134	Junction	0.00	380.00	562.26	78.97
136	Junction	0.00	376.00	543.29	72.49
138	Junction	0.00	366.00	536.16	73.73
140	Junction	48.36	368.00	525.86	68.40
142	Junction	52.08	410.00	516.83	46.29
144	Junction	0.00	424.00	698.87	119.10
146	Junction	0.00	446.00	653.18	89.77
148	Junction	0.00	404.00	620.14	93.65
150	Junction	40.92	416.00	616.18	86.74
152	Junction	0.00	436.00	598.03	70.21
154	Junction	100.44	440.00	597.53	68.26
156	Junction	465.00	526.00	545.41	8.41
158	Junction	0.00	418.00	470.72	22.84
162	Junction	465.00	420.00	463.73	18.95
164	Junction	0.00	321.00	404.77	36.30
166	Junction	0.00	410.00	712.56	131.10
168	Junction	0.00	330.00	605.06	119.18
172	Junction	0.00	364.00	580.24	93.70
1001	Tank	-9492.40	330.00	330.00	0.00
1002	Tank	-1227.09	475.00	475.00	0.00

Links, Scenario 1C - Night, 3/31/98, 5:10 p

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
1	Pipe	24.00	9492.40	6.73	5.60
3	Pipe	8.00	974.64	6.22	17.42
5	Pipe	6.00	256.68	2.91	5.98
7	Pipe	8.00	717.96	4.58	9.89
9	Pipe	6.00	524.52	5.95	22.45
13	Pipe	16.00	8517.76	13.59	33.01
15	Pipe	8.00	717.96	4.58	9.89
17	Pipe	6.00	271.56	3.08	6.63
19	Pipe	6.00	189.72	2.15	3.41
21	Pipe	16.00	7610.09	12.14	26.80
23	Pipe	6.00	238.08	2.70	5.20
25	Pipe	16.00	3366.60	5.37	5.92
27	Pipe	16.00	3180.60	5.08	5.33
29	Pipe	6.00	186.00	2.11	3.29
31	Pipe	16.00	2994.60	4.78	4.76
33	Pipe	10.00	1309.44	5.35	10.15
35	Pipe	8.00	911.40	5.82	15.39
37	Pipe	8.00	740.28	4.73	10.47
39	Pipe	8.00	740.28	4.73	10.47
41	Pipe	8.00	624.96	3.99	7.65
43	Pipe	6.00	208.32	2.36	4.06
45	Pipe	12.00	1685.16	4.78	6.67
47	Pipe	12.00	1506.60	4.27	5.42
49	Pipe	12.00	1075.08	3.05	2.90
51	Pipe	6.00	238.08	2.70	5.20
53	Pipe	8.00	837.00	5.34	13.14
55	Pipe	8.00	688.20	4.39	9.15
57	Pipe	6.00	357.12	4.05	11.02
59	Pipe	6.00	256.68	2.91	5.98
67	Pipe	16.00	-3056.81	4.88	4.95
69	Pipe	20.00	-3715.25	3.79	2.40
71	Pipe	20.00	-3811.97	3.89	2.51
73	Pipe	8.00	658.44	4.20	8.43
75	Pipe	16.00	3056.81	4.88	4.95
77	Pipe	10.00	1573.56	6.43	14.27
79	Pipe	10.00	1305.72	5.33	10.10
81	Pipe	10.00	1305.72	5.33	10.10
83	Pipe	10.00	1142.04	4.67	7.88
93	Pipe	16.00	-475.13	0.76	0.16
95	Pipe	6.00	362.85	4.12	11.35
97	Pipe	16.00	-837.98	1.34	0.45
99	Pipe	6.00	273.27	3.10	6.71
101	Pipe	16.00	475.13	0.76	0.16
103	Pipe	16.00	475.13	0.76	0.16
105	Pipe	16.00	-137.12	0.22	0.02
107	Pipe	6.00	286.44	3.25	7.32
109	Pipe	16.00	-423.56	0.68	0.13
111	Pipe	6.00	338.52	3.84	9.98
125	Pipe	20.00	4005.41	4.09	2.75
127	Pipe	16.00	1241.45	1.98	0.93
129	Pipe	6.00	204.60	2.32	3.93
131	Pipe	6.00	204.60	2.32	3.93

Links, Scenario 1C - Night, 3/31/98, 5:10 p

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
133	Pipe	8.00	725.40	4.63	10.08
135	Pipe	8.00	725.40	4.63	10.08
137	Pipe	8.00	706.80	4.51	9.61
139	Pipe	8.00	706.80	4.51	9.61
141	Pipe	8.00	706.80	4.51	9.61
143	Pipe	8.00	706.80	4.51	9.61
145	Pipe	8.00	658.44	4.20	8.43
147	Pipe	8.00	606.36	3.87	7.23
149	Pipe	8.00	606.36	3.87	7.23
151	Pipe	8.00	606.36	3.87	7.23
153	Pipe	8.00	606.36	3.87	7.23
155	Pipe	8.00	565.44	3.61	6.36
157	Pipe	6.00	100.44	1.14	1.05
159	Pipe	6.00	465.00	5.28	17.96
161	Pipe	16.00	-762.08	1.22	0.38
163	Pipe	12.00	-1227.09	3.48	3.70
167	Pipe	8.00	465.00	2.97	4.42
168	Pipe	8.00	725.40	4.63	10.08
2001	Pump	0.00	9492.40	0.00	-275.06
2002	Pump	0.00	1573.56	0.00	-251.40
2003	Pump	0.00	606.36	0.00	-195.73

Nodes, Scenario 1C - Day, 3/31/98, 5:25 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
2	Junction	0.00	330.00	557.14	98.42
4	Junction	0.00	341.00	557.14	93.65
6	Junction	0.00	338.00	557.14	94.95
8	Junction	0.00	349.00	557.14	90.19
10	Junction	0.00	355.00	557.14	87.59
12	Junction	0.00	338.00	557.14	94.95
16	Junction	0.00	322.00	550.85	99.16
18	Junction	0.00	323.00	550.85	98.73
20	Junction	0.00	323.00	550.85	98.73
22	Junction	0.00	320.00	545.83	97.85
24	Junction	0.00	321.00	545.83	97.42
26	Junction	0.00	324.00	545.83	96.12
28	Junction	0.00	320.00	545.83	97.85
30	Junction	0.00	322.00	545.83	96.98
32	Junction	0.00	327.00	545.83	94.82
34	Junction	0.00	328.00	545.83	94.39
36	Junction	0.00	331.00	545.83	93.09
38	Junction	0.00	332.00	545.83	92.65
40	Junction	0.00	333.00	545.83	92.22
42	Junction	0.00	340.00	545.83	89.19
44	Junction	0.00	343.00	545.83	87.89
46	Junction	0.00	323.00	550.85	98.73
48	Junction	0.00	329.00	545.83	93.95
50	Junction	0.00	334.00	545.83	91.79
52	Junction	0.00	334.00	545.83	91.79
54	Junction	0.00	330.00	545.83	93.52
56	Junction	0.00	338.00	545.83	90.05
58	Junction	0.00	340.00	545.83	89.19
60	Junction	0.00	340.00	545.83	89.19
62	Junction	0.00	343.00	545.83	87.89
70	Junction	0.00	320.00	538.39	94.63
72	Junction	0.00	320.00	539.86	95.26
74	Junction	0.00	320.00	540.76	95.65
76	Junction	0.00	320.00	541.99	96.19
78	Junction	0.00	328.00	539.86	91.80
80	Junction	0.00	321.00	536.32	93.30
82	Junction	0.00	335.00	529.00	84.06
84	Junction	0.00	342.00	526.18	79.81
86	Junction	0.00	344.00	523.67	77.85
88	Junction	0.00	350.00	521.06	74.12
96	Junction	0.00	327.00	521.82	84.42
98	Junction	0.00	330.00	523.15	83.69
100	Junction	0.00	325.00	523.94	86.20
102	Junction	0.00	325.00	525.33	86.80
104	Junction	0.00	327.00	519.65	83.48
106	Junction	612.25	321.00	516.08	84.53
108	Junction	0.00	320.00	513.83	83.99
110	Junction	0.00	326.00	513.83	81.39
112	Junction	0.00	357.00	511.19	66.81
114	Junction	0.00	360.00	511.19	65.51
128	Junction	0.00	348.00	557.14	90.62

• WWTP Pump @ 140 HP

• Valley P.S. @ 0 HP

• Vineyard P.S. @ 30 HP

• Sol. course [illegible] at 505 ft.

Nodes, Scenario 1C - Day, 3/31/98, 5:25 pm

ID	Type	Demand (gpm)	Elevation (ft)	Grade (ft)	Pressure (psi)
130	Junction	0.00	349.00	515.28	72.05
132	Junction	0.00	364.00	509.62	63.10
134	Junction	0.00	380.00	501.33	52.57
136	Junction	0.00	376.00	492.60	50.52
138	Junction	0.00	366.00	489.32	53.43
140	Junction	0.00	368.00	484.57	50.51
142	Junction	0.00	410.00	479.83	30.26
144	Junction	0.00	424.00	726.68	131.15
146	Junction	0.00	446.00	698.74	109.51
148	Junction	0.00	404.00	678.53	118.95
150	Junction	0.00	416.00	676.10	112.70
152	Junction	0.00	436.00	663.47	98.56
154	Junction	0.00	440.00	663.47	96.83
156	Junction	465.00	526.00	610.85	36.76
158	Junction	0.00	418.00	507.37	38.72
162	Junction	465.00	420.00	500.38	34.83
164	Junction	0.00	321.00	529.00	90.13
166	Junction	0.00	410.00	735.05	140.85
168	Junction	0.00	330.00	557.54	98.59
172	Junction	0.00	364.00	509.62	63.10
1001	Tank	-2434.01	330.00	330.00	0.00
1002	Tank	891.74	505.00	505.00	0.00

Links, Scenario 1C - Day, 3/31/98, 5:25 pm

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
1	Pipe	24.00	2434.01	1.73	0.45
3	Pipe	8.00	0.00	0.00	0.00
5	Pipe	6.00	0.00	0.00	0.00
7	Pipe	8.00	0.00	0.00	0.00
9	Pipe	6.00	0.00	0.00	0.00
13	Pipe	16.00	2434.01	3.88	3.24
15	Pipe	8.00	0.00	0.00	0.00
17	Pipe	6.00	0.00	0.00	0.00
19	Pipe	6.00	0.00	0.00	0.00
21	Pipe	16.00	2434.00	3.88	3.24
23	Pipe	6.00	0.00	0.00	0.00
25	Pipe	16.00	0.01	0.00	0.00
27	Pipe	16.00	0.01	0.00	0.00
29	Pipe	6.00	0.00	0.00	0.00
31	Pipe	16.00	0.01	0.00	0.00
33	Pipe	10.00	0.00	0.00	0.00
35	Pipe	8.00	0.00	0.00	0.00
37	Pipe	8.00	0.00	0.00	0.00
39	Pipe	8.00	0.00	0.00	0.00
41	Pipe	8.00	0.00	0.00	0.00
43	Pipe	6.00	0.00	0.00	0.00
45	Pipe	12.00	0.01	0.00	0.00
47	Pipe	12.00	0.01	0.00	0.00
49	Pipe	12.00	0.00	0.00	0.00
51	Pipe	6.00	0.00	0.00	0.00
53	Pipe	8.00	0.00	0.00	0.00
55	Pipe	8.00	0.00	0.00	0.00
57	Pipe	6.00	0.00	0.00	0.00
59	Pipe	6.00	0.00	0.00	0.00
67	Pipe	16.00	-2433.99	3.88	3.24
69	Pipe	20.00	-2433.99	2.49	1.09
71	Pipe	20.00	-2433.99	2.49	1.09
73	Pipe	8.00	0.00	0.00	0.00
75	Pipe	16.00	2433.99	3.88	3.24
77	Pipe	10.00	465.00	1.90	1.49
79	Pipe	10.00	465.00	1.90	1.49
81	Pipe	10.00	465.00	1.90	1.49
83	Pipe	10.00	465.00	1.90	1.49
93	Pipe	16.00	-1968.99	3.14	2.19
95	Pipe	6.00	-68.88	0.78	0.52
97	Pipe	16.00	-1900.11	3.03	2.05
99	Pipe	6.00	68.88	0.78	0.52
101	Pipe	16.00	1968.99	3.14	2.19
103	Pipe	16.00	1968.99	3.14	2.19
105	Pipe	16.00	1356.74	2.16	1.10
107	Pipe	6.00	0.00	0.00	0.00
109	Pipe	16.00	1356.74	2.16	1.10
111	Pipe	6.00	0.00	0.00	0.00
125	Pipe	20.00	2433.99	2.49	1.09
127	Pipe	16.00	1968.99	3.14	2.19
129	Pipe	6.00	0.00	0.00	0.00

Links, Scenario 1C - Day, 3/31/98, 5:25 pm

ID	Type	Diameter (in)	Flow (gpm)	Velocity (ft/sec)	Headloss (ft/kft)
131	Pipe	6.00	0.00	0.00	0.00
133	Pipe	8.00	465.00	2.97	4.42
135	Pipe	8.00	465.00	2.97	4.42
137	Pipe	8.00	465.00	2.97	4.42
139	Pipe	8.00	465.00	2.97	4.42
141	Pipe	8.00	465.00	2.97	4.42
143	Pipe	8.00	465.00	2.97	4.42
145	Pipe	8.00	465.00	2.97	4.42
147	Pipe	8.00	465.00	2.97	4.42
149	Pipe	8.00	465.00	2.97	4.42
151	Pipe	8.00	465.00	2.97	4.42
153	Pipe	8.00	465.00	2.97	4.42
155	Pipe	8.00	465.00	2.97	4.42
157	Pipe	6.00	0.00	0.00	0.00
159	Pipe	6.00	465.00	5.28	17.96
161	Pipe	16.00	1356.74	2.16	1.10
163	Pipe	12.00	891.74	2.53	2.05
167	Pipe	8.00	465.00	2.97	4.42
168	Pipe	8.00	465.00	2.97	4.42
2001	Pump	0.00	2434.01	0.00	-227.54
2002	Pump	0.00	465.00	0.00	-0.00
2003	Pump	0.00	465.00	0.00	-255.22

APPENDIX H • DETAILED COST OPINIONS

PRELIMINARY CONSTRUCTION COST OPINION
PLEASANTON RECYCLED WATER PROJECT
SCENARIO A (250 mg/L Salt Mitigation)
(4/29/98)

Capital Construction Item	Unit Cost	Description		Capital Cost (M$)	Annual Cost ($M/Yr) Amortized Capital (a)	Annual Cost ($M/Yr) O & M (b)
New Pipeline:						
24-inch	$140/LF	900	LF	0.13	0.01	0.0003
20-inch	$120/LF	0	LF	0.00	0.00	0.0000
16-inch	$100/LF	6,100	LF	0.61	0.04	0.0012
12-nch	$90/LF	3,300	LF	0.30	0.02	0.0006
10-inch	$72/LF	6,900	LF	0.50	0.03	0.0010
8-inch	$60/LF	14,800	LF	0.89	0.06	0.0018
6-inch	$50/LF	21,600	LF	1.08	0.07	0.0022
	Total	53,600	Subtotal	3.50	0.22	0.0070
Pump Stations:						
DSRSD WWTP PS	$2100/h.p.	600	h.p.	1.26	0.09	0.1383
			Subtotal	1.26	0.09	0.1383
Storage Reservoirs:						
DSRSD WWTP Reservoir	$0.60/Gallon	2.5	MG	1.50	0.10	0.0030
			Subtotal	1.50	0.10	0.0030
Additional Capital Costs:						
User Retrofits (Less than 20 AFY)	$10,000/User	63	users	0.63	0.05	0.0000
User Retrofits (20 AFY to 50 AFY)	$25,000/User	6	users	0.15	0.01	0.0000
User Retrofits (Greater than 50 AFY)	$100,000/User	2	users	0.20	0.01	0.0000
Retrofit Engineering and Permitting	$10,000/Retrofit	71	retrofits	0.71	0.05	0.0000
			Subtotal	1.69	0.12	0.0000
Title 22 Facility Costs:						
DSRSD WWTP Reclamation Facility (c)	0.8	3.8	mgd	3.04	0.22	0.1140
			Subtotal	3.04	0.22	0.1140
			Total Capital Cost	10.99	0.75	0.2623
			Escalate To Mid-Point of Construction (d)	11.26	0.77	
			Engineering/Administrative Cost (12%)	1.35	0.09	
			Construction Management Cost (15%)	1.69	0.12	
			Subtotal	14.30	0.98	0.2623
			Contingency	2.86 (20%)	0.20 (20%)	0.07 (25%)
			Facilities Capital Cost	17.16	1.17	0.33

Unit Cost

Total Annual Facilities Cost 1.50 M$/Yr 886 $/AF

Annual Recycled Water Deliveries (e):

Salt Mitigation Zone 0%	0	AFY
Salt Mitigation Zone 50%	1,069	AFY
Salt Mitigation Zone 100%	626	AFY
Total Annual Deliveries	**1,695**	AFY

Salt Mitigation Costs (f):

0% Salt Mitigation Zone Costs	0.00
50% Salt Mitigation Zone Costs	0.07
100% Salt Mitigation Zone Costs	0.09
Total Annual Project Cost	**1.66 M$/Yr**

979 $/AF

(a) Pipeline and Reservoir Capital Costs are Amortized over 50 Years at 6% Interest. All other Capital Costs are Amoritzed over 30 Years at 6% Interest.
(b) Pipeline and Reservoir O&M Costs are assumed at 0.2% of Capital Costs. Pump Station O&M Costs are assumed at 2% of Capital Cost plus $20,000/Yr Labor plus a $0.095/KW-Hr Pumping Power Cost.
(c) Reference DSRSD/DERWA Treatment Facilities Master Plan February 1999
Assumed Capital Cost = $800,000 per mgd of capacity.
Assumed O&M Cost = 30,000 per mgd of capacity
(d) Assumes 2.5% annual escalation and a 24 month construction period.
(e) Deliveries tabulated for each salt mitigation zone.
(f) Salt mitigation costs based on 250 mg/l removed at $400 /T.

PRELIMINARY CONSTRUCTION COST OPINION
PLEASANTON RECYCLED WATER PROJECT
SCENARIO B (250 mg/L Salt Mitigation)
(4/29/98)

Capital Construction Item	Unit Cost	Description		Capital Cost (M$)	Annual Cost ($M/Yr) Amortized Capital (a)	Annual Cost ($M/Yr) O & M (b)
New Pipeline:						
24-inch	$140/LF	900 LF		0.13	0.01	0.0003
20-inch	$120/LF	5,500 LF		0.66	0.04	0.0013
16-inch	$100/LF	13,200 LF		1.32	0.08	0.0026
12-nch	$90/LF	6,600 LF		0.59	0.04	0.0012
10-inch	$72/LF	21,200 LF		1.53	0.10	0.0031
8-inch	$60/LF	19,100 LF		1.15	0.07	0.0023
6-inch	$50/LF	27,000 LF		1.35	0.09	0.0027
	Total	93,500	Subtotal	6.72	0.43	0.0134
Pump Stations:						
DSRSD WWTP PS	$1790/h.p.	875 b.p.		1.57	0.11	0.1871
			Subtotal	1.57	0.11	0.1871
Storage Reservoirs:						
DSRSD WWTP Reservoir	$0.60/Gallon	4 MG		2.40	0.15	0.0048
			Subtotal	2.40	0.15	0.0048
Additional Capital Costs:						
User Retrofits (Less than 20 AFY)	$10,000/User	66 users		0.66	0.05	0.0000
User Retrofits (20 AFY to 50 AFY)	$25,000/User	8 users		0.20	0.01	0.0000
User Retrofits (Greater than 50 AFY)	$100,000/User	4 users		0.40	0.03	0.0000
Retrofit Engineering and Permitting	$10,000/Retrofit	78 retrofits		0.78	0.06	0.0000
			Subtotal	2.04	0.15	0.0000
Title 22 Facility Costs:						
DSRSD WWTP Reclamation Facility (c)	0.8	5.9 mgd		4.72	0.34	0.1770
			Subtotal	4.72	0.34	0.1770
			Total Capital Cost	17.45	1.18	0.3824

Escalate To Mid-Point of Construction (d)	17.88		1.21				
Engineering/Administrative Cost (12%)	2.15		0.15				
Construction Management Cost (15%)	2.68		0.18				
Subtotal	22.71		1.54		0.3824		
Contingency	4.54	(20%)	0.31	(20%)	0.10	(25%)	
Facilities Capital Cost	27.26		1.85		0.48		Unit Cost
Total Annual Facilities Cost					2.33 M$/Yr		826 $/AF

Annual Recycled Water Deliveries (e):			Salt Mitigation Costs (f):		
Salt Mitigation Zone 0%	350	AFY	0% Salt Mitigation Zone Costs	0.00	
Salt Mitigation Zone 50%	1,237	AFY	50% Salt Mitigation Zone Costs	0.08	
Salt Mitigation Zone 100%	1,228	AFY	100% Salt Mitigation Zone Costs	0.17	
Total Annual Deliveries	2,815	AFY	Total Annual Project Cost	2.58 M$/Yr	915 $/AF

(a) Pipeline and Reservoir Capital Costs are Amortized over 50 Years at 6% Interest. All other Capital Costs are Amoritzed over 30 Years at 6% Interest.
(b) Pipeline and Reservoir O&M Costs are assumed at 0.2% of Capital Costs. Pump Station O&M Costs are assumed at 2% of Capital Cost plus $20,000/Yr Labor plus a $0.095/KW-Hr Pumping Power Cost.
(c) Reference DSRSD/DERWA Treatment Facilities Master Plan February 1999
Assumed Capital Cost = $800,000 per mgd of capacity.
Assumed O&M Cost = 30,000 per mgd of capacity
(d) Assumes 2.5% annual escalation and a 24 month construction period.
(e) Deliveries tabulated for each salt mitigation zone.
(f) Salt mitigation costs based on 250 mg/l removed at $400 /T.

PRELIMINARY CONSTRUCTION COST OPINION
PLEASANTON RECYCLED WATER PROJECT
SCENARIO C (250 mg/L Salt Mitigation)
(4/29/98)

Capital Construction Item	Unit Cost	Description	Capital Cost (M$)	Annual Cost ($M/Yr) Amortized Capital (a)	Annual Cost ($M/Yr) O & M (b)
New Pipeline:					
24-inch	$140/LF	900 LF	0.13	0.01	0.0003
20-inch	$120/LF	5,500 LF	0.66	0.04	0.0013
16-inch	$100/LF	24,400 LF	2.44	0.15	0.0049
12-nch	$90/LF	4,500 LF	0.41	0.03	0.0008
10-inch	$72/LF	11,700 LF	0.84	0.05	0.0017
8-inch	$60/LF	41,800 LF	2.51	0.16	0.0050
6-inch	$50/LF	30,400 LF	1.52	0.10	0.0030
	Total	119,200 Subtotal	8.50	0.54	0.0170
Pump Stations:					
DSRSD WWTP PS	$1790/h.p.	875 b.p.	1.57	0.11	0.1871
Valley PS	$4400/h.p.	150 b.p.	0.66	0.05	0.0565
Vineyard Ps	$4800/h.p.	50 b.p.	0.24	0.02	0.0326
		Subtotal	2.47	0.18	0.2762
Storage Reservoirs:					
DSRSD WWTP Reservoir	$0.60/Gallon	4 MG	2.40	0.15	0.0048
Golf Course Reservoir	$0.60/Gallon	1 MG	0.60	0.04	0.0012
		Subtotal	3.00	0.19	0.0060
Additional Capital Costs:					
User Retrofits (Less than 20 AFY)	$10,000/User	76 users	0.76	0.06	0.0000
User Retrofits (20 AFY to 50 AFY)	$25,000/User	11 users	0.28	0.02	0.0000
User Retrofits (Greater than 50 AFY)	$100,000/User	6 users	0.60	0.04	0.0000
Retrofit Engineering and Permitting	$10,000/Retrofit	93 retrofits	0.93	0.07	0.0000
		Subtotal	2.57	0.19	0.0000
Title 22 Facility Costs:					
DSRSD WWTP Reclamation Facility (c)	0.8	7.3 mgd	5.84	0.42	0.2190
		Subtotal	5.84	0.42	0.2190
		Total Capital Cost	22.37	1.52	0.5182
	Escalate To Mid-Point of Construction (d)		22.93	1.56	
	Engineering/Administrative Cost (12%)		2.75	0.19	
	Construction Management Cost (15%)		3.44	0.23	
		Subtotal	29.12	1.98	0.5182
		Contingency	5.82 (20%)	0.40 (20%)	0.13 (25%)
		Facilities Capital Cost	34.95	2.37	0.65

Total Annual Facilities Cost	3.02 M$/Yr		Unit Cost
		878	$/AF

Annual Recycled Water Deliveries (e):		
Salt Mitigation Zone 0%	350	AFY
Salt Mitigation Zone 50%	1,264	AFY
Salt Mitigation Zone 100%	1,827	AFY
Total Annual Deliveries	**3,441**	AFY

Salt Mitigation Costs (f):	
0% Salt Mitigation Zone Costs	0.00
50% Salt Mitigation Zone Costs	0.09
100% Salt Mitigation Zone Costs	0.25
Total Annual Project Cost	3.35 M$/Yr
	975 $/AF

(a) Pipeline and Reservoir Capital Costs are Amortized over 50 Years at 6% Interest. All other Capital Costs are Amortized over 30 Years at 6% Interest.
(b) Pipeline and Reservoir O&M Costs are assumed at 0.2% of Capital Costs. Pump Station O&M Costs are assumed at 2% of Capital Cost plus $20,000/Yr Labor plus a $0.095/KW-Hr Pumping Power Cost.
(c) Reference DSRSD/DERWA Treatment Facilities Master Plan February 1999
Assumed Capital Cost = $800,000 per mgd of capacity.
Assumed O&M Cost = 30,000 per mgd of capacity
(d) Assumes 2.5% annual escalation and a 24 month construction period.
(e) Deliveries tabulated for each salt mitigation zone.
(f) Salt mitigation costs based on 250 mg/l removed at $400 /T.

PRELIMINARY CONSTRUCTION COST OPINION
PLEASANTON RECYCLED WATER PROJECT
SCENARIO A (600 mg/L Salt Mitgation)
(4/29/98)

Capital Construction Item	Unit Cost	Description	Capital Cost (M$)	Annual Cost ($M/Yr) Amortized Capital (a)	Annual Cost ($M/Yr) O & M (b)
New Pipeline:					
24-inch	$140/LF	900 LF	0.13	0.01	0.0003
20-inch	$120/LF	0 LF	0.00	0.00	0.0000
16-inch	$100/LF	6,100 LF	0.61	0.04	0.0012
12-inch	$90/LF	3,300 LF	0.30	0.02	0.0006
10-inch	$72/LF	6,900 LF	0.50	0.03	0.0010
8-inch	$60/LF	14,800 LF	0.89	0.06	0.0018
6-inch	$50/LF	21,600 LF	1.08	0.07	0.0022
	Total	53,600 Subtotal	3.50	0.22	0.0070
Pump Stations:					
DSRSD WWTP PS	$2100/h.p.	600 h.p.	1.26	0.09	0.1383
		Subtotal	1.26	0.09	0.1383
Storage Reservoirs:					
DSRSD WWTP Reservoir	$0.60/Gallon	2.5 MG	1.50	0.10	0.0030
		Subtotal	1.50	0.10	0.0030
Additional Capital Costs:					
User Retrofits (Less than 20 AFY)	$10,000/User	63 users	0.63	0.05	0.0000
User Retrofits (20 AFY to 50 AFY)	$25,000/User	6 users	0.15	0.01	0.0000
User Retrofits (Greater than 50 AFY)	$100,000/User	2 users	0.20	0.01	0.0000
Retrofit Engineering and Permitting	$10,000/Retrofit	71 retrofits	0.71	0.05	0.0000
		Subtotal	1.69	0.12	0.0000
Title 22 Facility Costs:					
DSRSD WWTP Reclamation Facility (	0.8	3.8 mgd	3.04	0.22	0.1140
		Subtotal	3.04	0.22	0.1140
		Total Capital Cost	10.99	0.75	0.2623
		Escalate To Mid-Point of Construction (d)	11.26	0.77	
		Engineering/Administrative Cost (12%)	1.35	0.09	
		Construction Management Cost (15%)	1.69	0.12	
		Subtotal	14.30	0.98	0.2623
		Contingency	2.86 (20%)	0.20 (20%)	0.07 (25%)
		Facilities Capital Cost	17.16	1.17	0.33

Total Annual Facilities Cost	1.50 M$/Yr		Unit Cost 886 $/AF

Annual Recycled Water Deliveries (e):		Salt Mitigation Costs (f):	
Salt Mitigation Zone 0%	0 AFY	0% Salt Mitigation Zone Costs	0.00
Salt Mitigation Zone 50%	1,069 AFY	50% Salt Mitigation Zone Costs	0.17
Salt Mitigation Zone 100%	626 AFY	100% Salt Mitigation Zone Costs	0.20
Total Annual Deliveries	1,695 AFY	Total Annual Project Cost	1.88 M$/Yr — 1,109 $/AF

(a) Pipeline and Reservoir Capital Costs are Amortized over 50 Years at 6% Interest. All other Capital Costs are Amortized over 30 Years at 6% Interest.
(b) Pipeline and Reservoir O&M Costs are assumed at 0.2% of Capital Costs. Pump Station O&M Costs are assumed at 2% of Capital Cost plus $20,000/Yr Labor plus a $0.095/KW-Hr Pumping Power Cost.
(c) Reference DSRSD/DERWA Treatment Facilities Master Plan February 1999
Assumed Capital Cost = $800,000 per mgd of capacity.
Assumed O&M Cost = 30,000 per mgd of capacity
(d) Assumes 2.5% annual escalation and a 24 month construction period.
(e) Deliveries tabulated for each salt mitigation zone.
(f) Salt mitigation costs based on 600 mg/l removed at $400 /T.

PRELIMINARY CONSTRUCTION COST OPINION
PLEASANTON RECYCLED WATER PROJECT
SCENARIO B (600 mg/L Salt Mitgation)
(4/29/98)

Capital Construction Item	Unit Cost	Description	Capital Cost (M$)	Annual Cost ($M/Yr) Amortized Capital (a)	Annual Cost ($M/Yr) O & M (b)
New Pipeline:					
24-inch	$140/LF	900 LF	0.13	0.01	0.0003
20-inch	$120/LF	5,500 LF	0.66	0.04	0.0013
16-inch	$100/LF	13,200 LF	1.32	0.08	0.0026
12-nch	$90/LF	6,600 LF	0.59	0.04	0.0012
10-inch	$72/LF	21,200 LF	1.53	0.10	0.0031
8-inch	$60/LF	19,100 LF	1.15	0.07	0.0023
6-inch	$50/LF	27,000 LF	1.35	0.09	0.0027
	Total	93,500 Subtotal	6.72	0.43	0.0134
Pump Stations:					
DSRSD WWTP PS	$1790/h.p.	875 h.p.	1.57	0.11	0.1871
		Subtotal	1.57	0.11	0.1871
Storage Reservoirs:					
DSRSD WWTP Reservoir	$0.60/Gallon	4 MG	2.40	0.15	0.0048
		Subtotal	2.40	0.15	0.0048
Additional Capital Costs:					
User Retrofits (Less than 20 AFY)	$10,000/User	66 users	0.66	0.05	0.0000
User Retrofits (20 AFY to 50 AFY)	$25,000/User	8 users	0.20	0.01	0.0000
User Retrofits (Greater than 50 AFY)	$100,000/User	4 users	0.40	0.03	0.0000
Retrofit Engineering and Permitting	$10,000/Retrofit	78 retrofits	0.78	0.06	0.0000
		Subtotal	2.04	0.15	0.0000
Title 22 Facility Costs:					
DSRSD WWTP Reclamation Facility (	0.8	5.9 mgd	4.72	0.34	0.1770
		Subtotal	4.72	0.34	0.1770
		Total Capital Cost	17.45	1.18	0.3824
	Escalate To Mid-Point of Construction (d)		17.88	1.21	
	Engineering/Administrative Cost (12%)		2.15	0.15	
	Construction Management Cost (15%)		2.68	0.18	
		Subtotal	22.71	1.54	0.3824
		Contingency	4.54 (20%)	0.31 (20%)	0.10 (25%)
		Facilities Capital Cost	27.26	1.85	0.48

		Total Annual Facilities Cost	2.33 M$/Yr
			Unit Cost: 826 $/AF
Annual Recycled Water Deliveries (e):		Salt Mitigation Costs (f):	
Salt Mitigation Zone 0%	350 AFY	0% Salt Mitigation Zone Costs	0.00
Salt Mitigation Zone 50%	1,237 AFY	50% Salt Mitigation Zone Costs	0.20
Salt Mitigation Zone 100%	1,228 AFY	100% Salt Mitigation Zone Costs	0.40
Total Annual Deliveries	2,815 AFY	Total Annual Project Cost	2.93 M$/Yr
			1,040 $/AF

(a) Pipeline and Reservoir Capital Costs are Amortized over 50 Years at 6% Interest. All other Capital Costs are Amortized over 30 Years at 6% Interest.
(b) Pipeline and Reservoir O&M Costs are assumed at 0.2% of Capital Costs. Pump Station O&M Costs are assumed at 2% of Capital Cost plus $20,000/Yr Labor plus a $0.095/KW-Hr Pumping Power Cost.
(c) Reference DSRSD/DERWA Treatment Facilities Master Plan February 1999
Assumed Capital Cost = $800,000 per mgd of capacity.
Assumed O&M Cost = 30,000 per mgd of capacity
(d) Assumes 2.5% annual escalation and a 24 month construction period.
(e) Deliveries tabulated for each salt mitigation zone.
(f) Salt mitigation costs based on 600 mg/l removed at $400 /T.

PRELIMINARY CONSTRUCTION COST OPINION
PLEASANTON RECYCLED WATER PROJECT
SCENARIO C (600 mg/L Salt Mitgation)
(4/29/98)

Capital Construction Item	Unit Cost	Description	Capital Cost (M$)	Annual Cost ($M/Yr) Amortized Capital (a)	Annual Cost ($M/Yr) O & M (b)
New Pipeline:					
24-inch	$140/LF	900 LF	0.13	0.01	0.0003
20-inch	$120/LF	5,500 LF	0.66	0.04	0.0013
16-inch	$100/LF	24,400 LF	2.44	0.15	0.0049
12-nch	$90/LF	4,500 LF	0.41	0.03	0.0008
10-inch	$72/LF	11,700 LF	0.84	0.05	0.0017
8-inch	$60/LF	41,800 LF	2.51	0.16	0.0050
6-inch	$50/LF	30,400 LF	1.52	0.10	0.0030
	Total	119,200 Subtotal	8.50	0.54	0.0170
Pump Stations:					
DSRSD WWTP PS	$1790/h.p.	875 h.p.	1.57	0.11	0.1871
Valley PS	$4400/h.p.	150 h.p.	0.66	0.05	0.0565
Vineyard Ps	$4800/h.p.	50 h.p.	0.24	0.02	0.0326
		Subtotal	2.47	0.18	0.2762
Storage Reservoirs:					
DSRSD WWTP Reservoir	$0.60/Gallon	4 MG	2.40	0.15	0.0048
Golf Course Reservoir	$0.60/Gallon	1 MG	0.60	0.04	0.0012
		Subtotal	3.00	0.19	0.0060
Additional Capital Costs:					
User Retrofits (Less than 20 AFY)	$10,000/User	76 users	0.76	0.06	0.0000
User Retrofits (20 AFY to 50 AFY)	$25,000/User	11 users	0.28	0.02	0.0000
User Retrofits (Greater than 50 AFY)	$100,000/User	6 users	0.60	0.04	0.0000
Retrofit Engineering and Permitting	$10,000/Retrofit	93 retrofits	0.93	0.07	0.0000
		Subtotal	2.57	0.19	0.0000
Title 22 Facility Costs:					
DSRSD WWTP Reclamation Facility (	0.8	7.3 mgd	5.84	0.42	0.2190
		Subtotal	5.84	0.42	0.2190
		Total Capital Cost	22.37	1.52	0.5182
		Escalate To Mid-Point of Construction (d)	22.93	1.56	
		Engineering/Administrative Cost (12%)	2.75	0.19	
		Construction Management Cost (15%)	3.44	0.23	
		Subtotal	29.12	1.98	0.5182
		Contingency	5.82 (20%)	0.40 (20%)	0.13 (25%)
		Facilities Capital Cost	34.95	2.37	0.65

Total Annual Facilities Cost	3.02 M$/Yr	Unit Cost	878 $/AF

Annual Recycled Water Deliveries (e):	
Salt Mitigation Zone 0%	350 AFY
Salt Mitigation Zone 50%	1,264 AFY
Salt Mitigation Zone 100%	1,827 AFY
Total Annual Deliveries	3,441 AFY

Salt Mitigation Costs (f):	
0% Salt Mitigation Zone Costs	0.00
50% Salt Mitigation Zone Costs	0.21
100% Salt Mitigation Zone Costs	0.60
Total Annual Project Cost	3.82 M$/Yr

1,111 $/AF

(a) Pipeline and Reservoir Capital Costs are Amortized over 50 Years at 6% Interest. All other Capital Costs are Amortized over 30 Years at 6% Interest.
(b) Pipeline and Reservoir O&M Costs are assumed at 0.2% of Capital Costs. Pump Station O&M Costs are assumed at 2% of Capital Cost plus $20,000/Yr Labor plus a $0.095/KW-Hr Pumping Power Cost.
(c) Reference DSRSD/DERWA Treatment Facilities Master Plan February 1999
Assumed Capital Cost = $800,000 per mgd of capacity.
Assumed O&M Cost = 30,000 per mgd of capacity
(d) Assumes 2.5% annual escalation and a 24 month construction period.
(e) Deliveries tabulated for each salt mitigation zone.

APPENDIX I • SUMMARY OF POTENTIAL WASTEWATER SUPPLY AT HIGH-END OF BUILDOUT FLOWS

Table I-1
Summary of Potential Wastewater Supply at Build-Out[a]

Source	Projected Monthly Wastewater Flows in Acre-Feet[b]												Total (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Pleasanton[c]	1,112	1,137	1,153	1,015	996	1,003	963	947	965	969	972	1,021	**12,253**
DSRSD	1,031	1,054	1,069	941	924	930	893	878	894	898	901	946	**11,359**
ASR	0	0	0	149	222	298	331	284	216	0	0	0	**1,500**
Total	2,143	2,191	2,222	2,105	2,142	2,231	2,187	2,109	2,075	1,867	1,873	1,967	**25,112**

[a] Reference: San Ramon Valley Recycled Water Program, Facilities Plan, Montgomery Watson, 1996.

[b] Projected Monthly wastewater flows are distributed based on current variations in monthly flow. Monthly flow is the sum of average dry weather (ADW) flow plus total infiltration and inflow (I/I) for that month.

[c] Buildout flows are based on an ADW flow of 10.3 mgd (11,500 AFY), plus allowances for I/I. 10.3 mgd is the maximum allowable ADWflow for Pleasanton for the LAVWMA project expansion.

Figure I-1
Build-Out Wastewater Flows (Maximum Values)
Pleasanton Recycled Water Scenario A

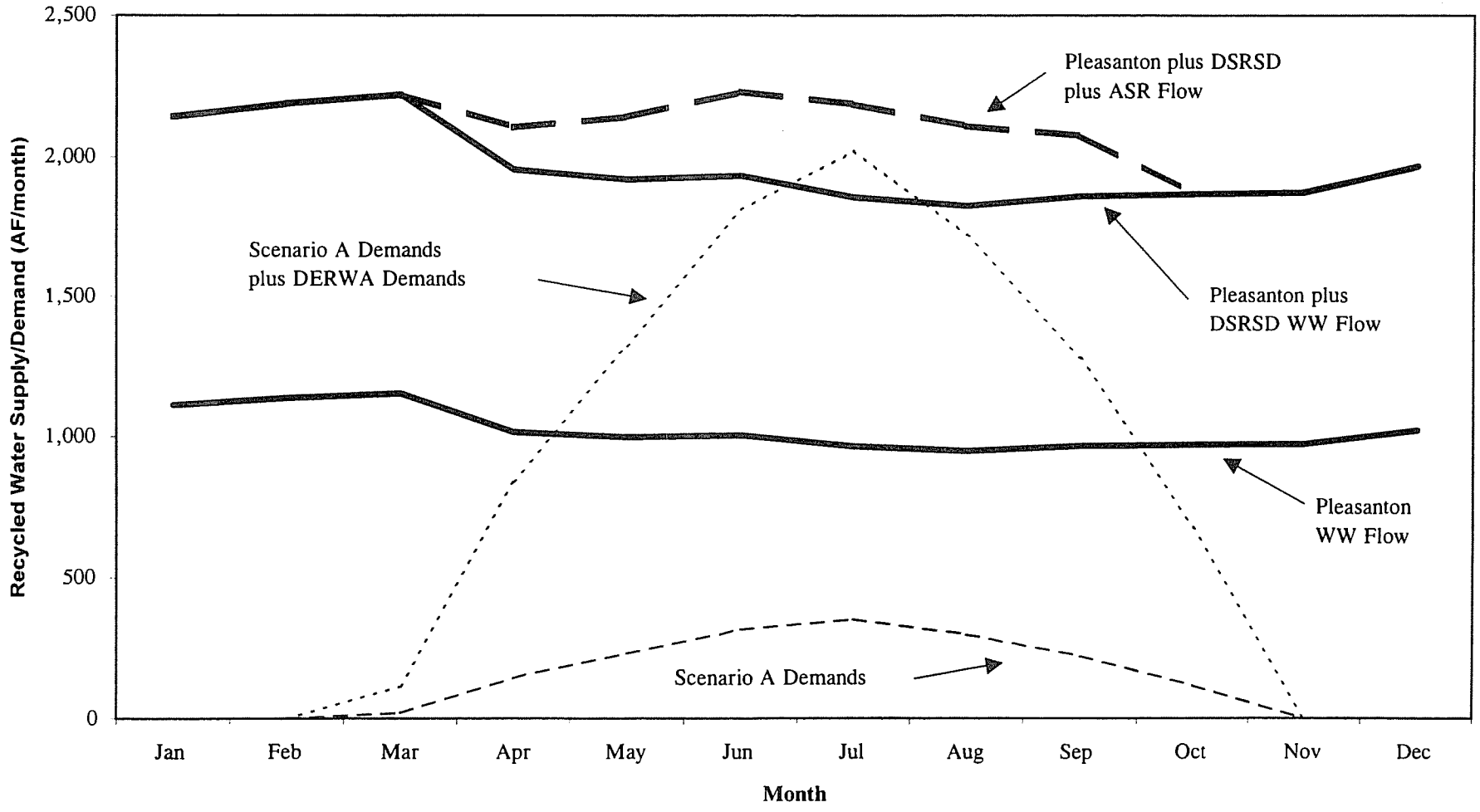


Figure I-2
Build-Out Wastewater Flows (Maximum Values)
Pleasanton Recycled Water Scenario B

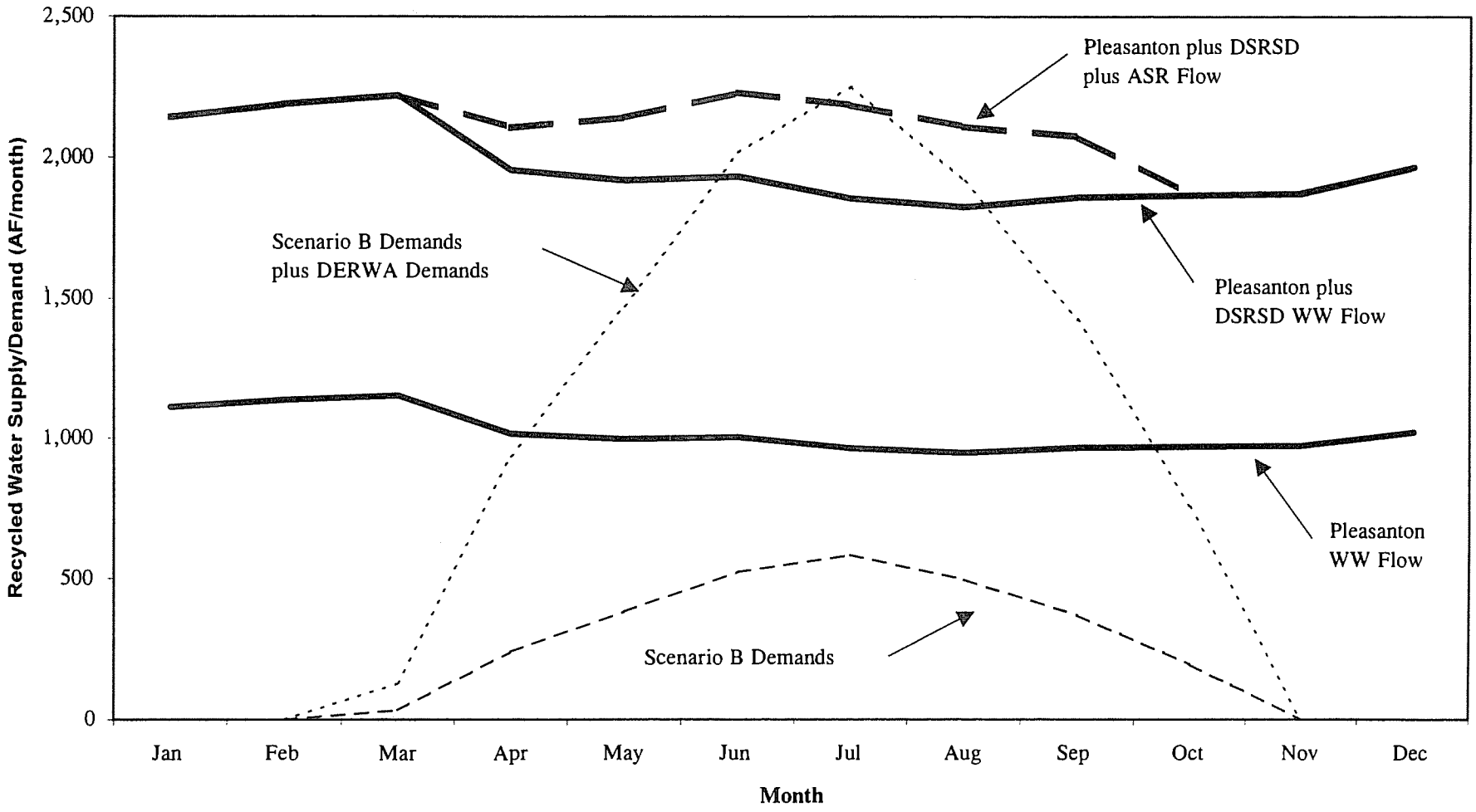
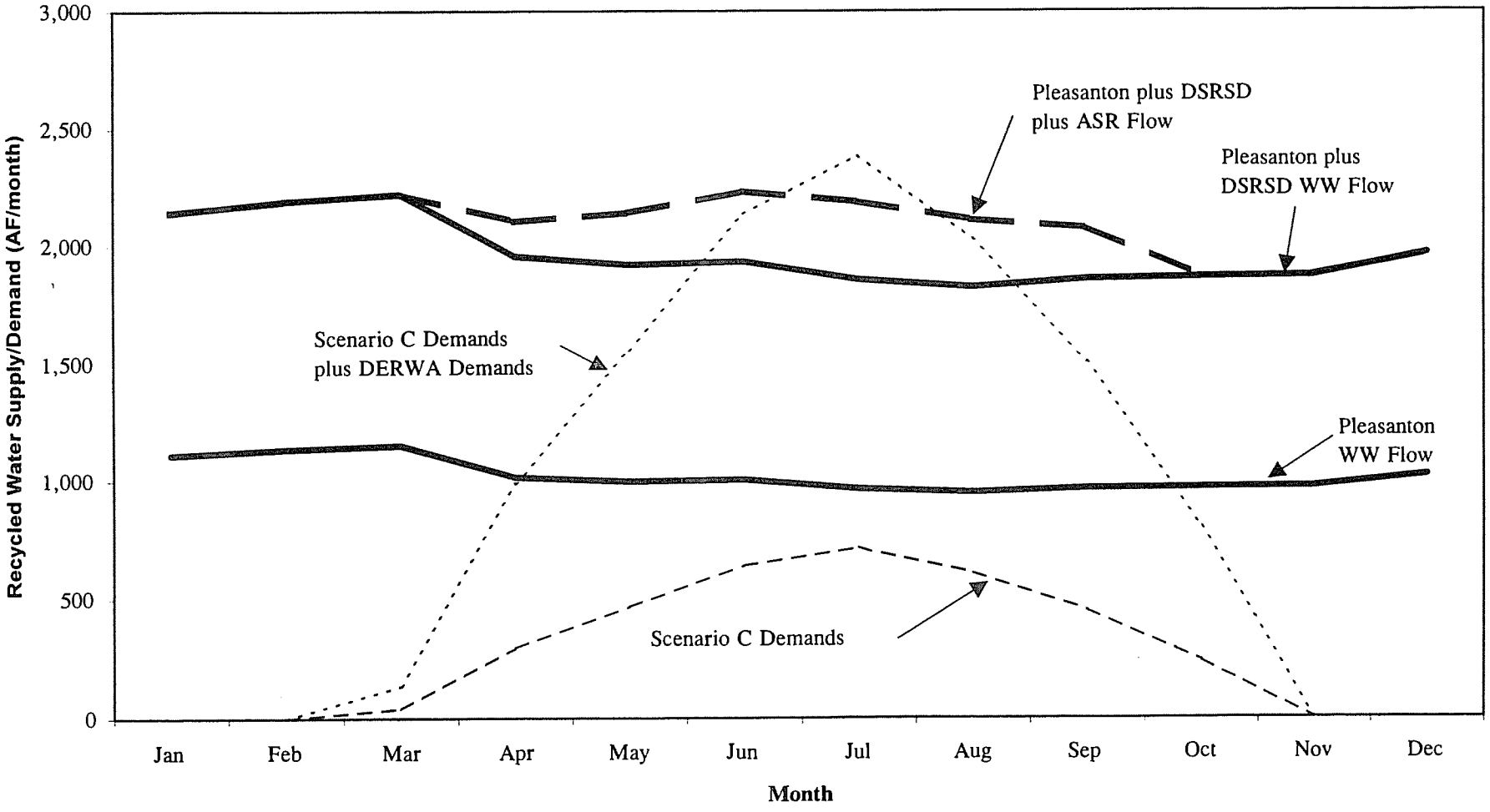


Figure I-3
Build-Out Wastewater Flows (Maximum Values)
Pleasanton Recycled Water Scenario C



APPENDIX J • AGENCY PRICING AND RETROFIT POLICIES

APPENDIX J – AGENCY PRICING AND RETROFIT POLICIES

Appendix J – Agency Pricing and Retrofit Policies

East Bay Municipal Utility District

The District identifies customers within established "Water Reuse Zones" and then assesses the feasibility of providing recycled water to these customers. If recycled water service is determined to be feasible from an engineering and an economical perspective, then customers may be required to retrofit their irrigation system to accommodate recycled water. EBMUD charges customers the prevailing potable water rate for recycled water. EBMUD will pay the reasonable capital costs of retrofitting the irrigation systems of customers required to connect to recycled water service. Customers requesting recycled water service, but not required by EBMUD to receive this service, will be required to pay the full capital cost of retrofitting their irrigation systems.

West Basin Municipal Water District (Los Angeles County)

West Basin Municipal Water District wholesales recycled water to local retailers. West Basin amortized capital facility costs over 20 years and added operation/maintenance costs to determine overall annual costs. These costs include line items for future improvements and distribution system expansions. After adjustment for revenues from three large industrial customers that receive water treated to meet their industrial cooling requirements, the annual delivery cost is approximately $540/AF. However, West Basin receives a rebate from the Metropolitan Water District of $260/AF of recycled water distributed. Thus, the wholesale rate charged to the retailers is $280/AF. In comparison, West Basin's wholesale rate for non-interruptible, ready to serve potable water is $528/AF.

Retail rates set by the local retailers in West Basin are typically between 40-percent and 80-percent of the potable rates.

West Basin offers a financing system for customers that require on-site modifications to their irrigation systems (retrofits) in order to use recycled water. West Basin finances the engineering and construction costs of the retrofit as a loan. If desired by the customer, West Basin provides the contractor as well. Through the water retailers, the customer is charged the potable water rate. The difference between the potable water rate and the recycled water rate is passed along to West Basin as payment of principal and interest on the "loan." After the financed portion is paid, the customer is charged the lower recycled water rate. In general, these retrofits are financed if the payback period is 10 years or less, at a nominal rate of interest.

City of San Diego

The City conducted a feasibility study and identified potential customers within the city. The City of San Diego implemented an incentive program that pays for the entire user

retrofit construction cost. The city charges a recycled water retail rate of 90-percent of the potable rate.

City of Escondido (San Diego County)

The City of Escondido instituted a recycled water rate at 80-percent of the potable rate. For customers that require retrofit construction of their on-site irrigation or potable water systems, the city implemented a financing plan similar to West Basin's.

Moulton Niguel Water District (Orange County)

Moulton Niguel charges a retail recycled water rate of 80-percent of their potable water rate. The district requires customers to administer their own retrofits. However, the district would provide retrofit loans to customers at an interest rate of 6-percent.