

## Chapter 7

# RECOMMENDED RECYCLED WATER PORTFOLIO

### 7.1 Introduction

After an evaluation of the recycled water concepts described in Chapter 6 with City staff, a recommended recycled water portfolio was developed. The recommended recycled water portfolio outlined at the end of Chapter 6 combines components of Concepts 1, 2, 3, 4, and 5 to provide a diversified recycled water demand portfolio while maximizing the City's return on investment of the tertiary treatment facility.

A second workshop with the City was held to review and finalize the recommended program. This chapter provides details of the final recommended recycled water portfolio including the project components, recycled water demands, costs, and implementation schedule.

### 7.2 Planning Criteria

Planning criteria and assumptions for this recommended program are the same as those outlined in Chapter 6. As this program combines aspects of several of the recycled water concepts described in Chapter 6, slight changes to the pipeline route and sizing were made to minimize overall required length and pump station capacity. Additionally, a few of the customer implementation timeframes were shifted to accommodate the increased demand.

It should be noted that several of the criteria listed in Chapter 6 and used for the recommended recycled water portfolio represent conservative planning assumptions. During more detailed design, and as the commitment of potential customers becomes more certain, these planning and evaluation criteria may be further refined.

### 7.3 Recommended Portfolio

The recommended recycled water portfolio is divided into three phases: immediate, near, and long term which build upon each other. Additionally, a distant phase is mentioned but is not included in the recommended portfolio at this time. The distant phase would include customers further out than the long term phase, such as those in the far northeast area of the City or those near the prison facilities.

The recommended portfolio includes a variety of beneficial recycled water uses including agricultural irrigation, urban irrigation, industrial reuse, and downstream diversions of Easterly WWTP discharges. No additional treatment components are required to implement this portfolio.

This program includes seventeen customer sites in the eastern area of Vacaville including the Urban Growth Boundary, Sphere of Influence, and agricultural areas outside the City limits and outside SID jurisdiction. In addition to these customer sites, this program also includes the formulation of agreements with, and downstream diversions of tertiary effluent to, downstream entities.

The following sections describe the customers, project components, and demands of the recommended program.

### 7.3.1 Customers & Phases

The recommended recycled water program combines recycled water concepts from Chapter 6, resulting in higher customer demands in each phase compared to the individual recycled water concepts. Maintaining the customer implementation phasing outlined in Chapter 6 would result in periods when customer demands are larger than Easterly WWTP supply. This supply deficiency would otherwise occur during the near term phase. Refinements to the implementation phases described earlier are necessary to balance supply and demand and include shifting two agriculture sites (17G and 17H) from the near to the long term phase. In addition to balancing flows, this also reduces the early capital expenditures required for new pipelines.

Downstream diversion customers outside Solano County are planned to come online in the immediate term phase and can continue through all phases. Downstream diversion customers within Solano County are slated to come online in the near term phase and continue into the long term phase. For a discussion of potential downstream entities, see Chapter 5.

Customers in the distant phase, including the, Gibson Canyon Creek WWTP, and the three industrial business parks west of I-5 (Airport Business Park, Vacaville Golden Hills Business Park, and Interchange Business Park) are not included in the recycled water portfolio at this time, but may be considered in the future as City conditions and water supply needs change. Also sites such as the prison facilities and its nearby parks, not included in this study, would be considered distant term based on the timing of infrastructure.

Table 7.1 summarizes the customers in each implementation phase.

### 7.3.2 Status of Customer Commitments

As described in Chapter 5, outreach efforts were conducted to determine potential customers' interest level in participating in the recycled water program. Table 7.2 summarizes the customers in the recommended recycled water portfolio and their current status of their commitment to participate. Some customers have a requirement to use recycled water in their developments as stated in the respective Specific Plans, some have reached out to the City, and others who were contacted have either verbally or in writing expressed interest.

As described in the General Plan, the City is committed to the conservation and management of natural resources. As part of this effort, the City has specific goals and actions related to promoting water conservation. The General Plan specifies that whenever possible, the City will use recycled or non-potable water for irrigation in landscaped areas and that the city will continue to pursue the development of infrastructure for distribution of recycled water for non-potable water uses. It was therefore assumed that City operated facilities and developments will be committed to using recycled water.

Table 7.1 Recycled Water Customers by Phase

Phase	Customer ID	Customers
Immediate	1	New City Athletic Fields
	3	Vanden Meadows Development
	4	Southtown Development
	5	Southtown Commons / Moody
	7	Roberts Ranch
	8	Brighton Landing
	9	The Farm at Alamo Creek
		Downstream Diversions outside Solano County
Near	2	Cypress Lakes Golf Course
	6	East of Leisure Town Road Development (South)
	10	East of Leisure Town Road Development (North)
	11	Green Tree Development
	17C	Agricultural Customer
		Downstream Diversions in and outside Solano County
Long	13	North Village Development
	15	Genentech
	16A	Vaca Valley Business Park (excluding Genentech)
	17G	Agricultural Customer
	17H	Agricultural Customer
		Downstream Diversions in and outside Solano County
Distant <sup>(1)</sup>	14	Gibson Canyon Creek WWTP Development
	16B	Airport Business Park
	16C	Vacaville Golden Hills Business Park
	16D	Interchange Business Park

Notes:

(1) Customers in distant phase are not included in the recommended recycled water program.

Table 7.2 Status of Customer Commitment

Type of Use	ID	Customers	Status of Commitment
Urban Irrigation	1	New City Athletic Fields	City facility
	2	Cypress Lakes Golf Course	Strong interest
	3	Vanden Meadows Development	Required in Specific Plan
	4	Southtown Development	RW lines specified in Site Plans
	5	Southtown Commons / Moody	City development
	6	East of Leisure Town Road Development (South)	City development
	7	Roberts Ranch	Required in Specific Plan
	8	Brighton Landing	Required in Specific Plan
	9	The Farms Development	Specific Plan awaiting approval
	10	East of Leisure Town Road Development (North)	City development
	11	Green Tree Development	Private owner has requested City amend General Plan to allow development. Commitment unknown??
	13	North Village Development	Required in Specific Plan
	Industrial	15	Genentech
16A		Vaca Valley Business Park (excluding Genentech)	Potential interest
Direct Agriculture	17C	Agricultural Customer	Farmers have contacted the City
	17G	Agricultural Customer	Farmers have contacted the City
	17H	Agricultural Customer	Farmers have contacted the City
Downstream Diversion		Entities outside Solano County	Commitment unknown
		Entities within Solano County	Commitment unknown

Note:

(1) See Appendix D for survey responses.

### 7.3.3 Pipeline Routing

The recommended recycled water distribution system includes two pipeline branches. One branch extends southeast of Easterly WWTP to serve the planned athletic fields adjacent to Easterly WWTP, some direct agricultural parcels, and Cypress Lakes Golf Course. The other branch extends west from Easterly WWTP and then branches to both the north and the south along Leisure Town Rd. This northwest branch utilizes an abandoned sewer line to cross the railroad tracks between Fry Rd. and Elmira Rd. This branch serves urban irrigation customers in new developments along Leisure Town Rd. and a few industrial reuse customers in the Vaca Valley Business Park located between I-80 and I-505. Implementation of the distribution pipelines is phased into immediate, near, and long terms.

### 7.3.3.1 Existing Recycled Water Lines

The recommended route and customer sites can be seen in Figure 7.1. Solid purple lines represent existing recycled water pipelines and dotted lines represent new pipelines as part of this program. Shaded areas represent customer parcels. The various colors of parcel shading and pipelines correspond to the different implementation phases. The various fill patterns in each parcel correspond to the type of recycled water reuse that will be implemented. Distant term parcels are included on the map and shown shaded gray, but are not included in the program.

### 7.3.3.2 Pipeline Phasing

As the map shows, each phase of the pipeline builds upon the previous phase. The immediate phase lines were therefore sized to accommodate flows associated with the long term demands. An exception to this design plan is the stretch of pipe along Leisure Town Rd adjacent to Site 8, Brighton Landing. The existing recycled water pipeline along this stretch has a diameter of eight inches which is sufficient to serve immediate and near term demands. Once the long term customers are added to the system, the demand increase results in significantly higher friction losses requiring a larger diameter pipe. Rather than replacing the existing line when long term customers are added, it is recommended to continue utilizing the existing line and install a parallel twelve-inch line to help mitigate head loss. This is shown as the blue dotted line adjacent to Site 8 in Figure 7.1.

### 7.3.3.3 Downstream Diversions

Downstream diversions will be conveyed under the current Easterly WWTP discharge operations in which effluent is discharged from Easterly WWTP to Old Alamo Creek. As Easterly WWTP already has the infrastructure to deliver effluent to Old Alamo Creek, it is assumed that no additional pipelines or other infrastructure components are needed to convey the allocated downstream diversions to customers both within and outside of Solano County.

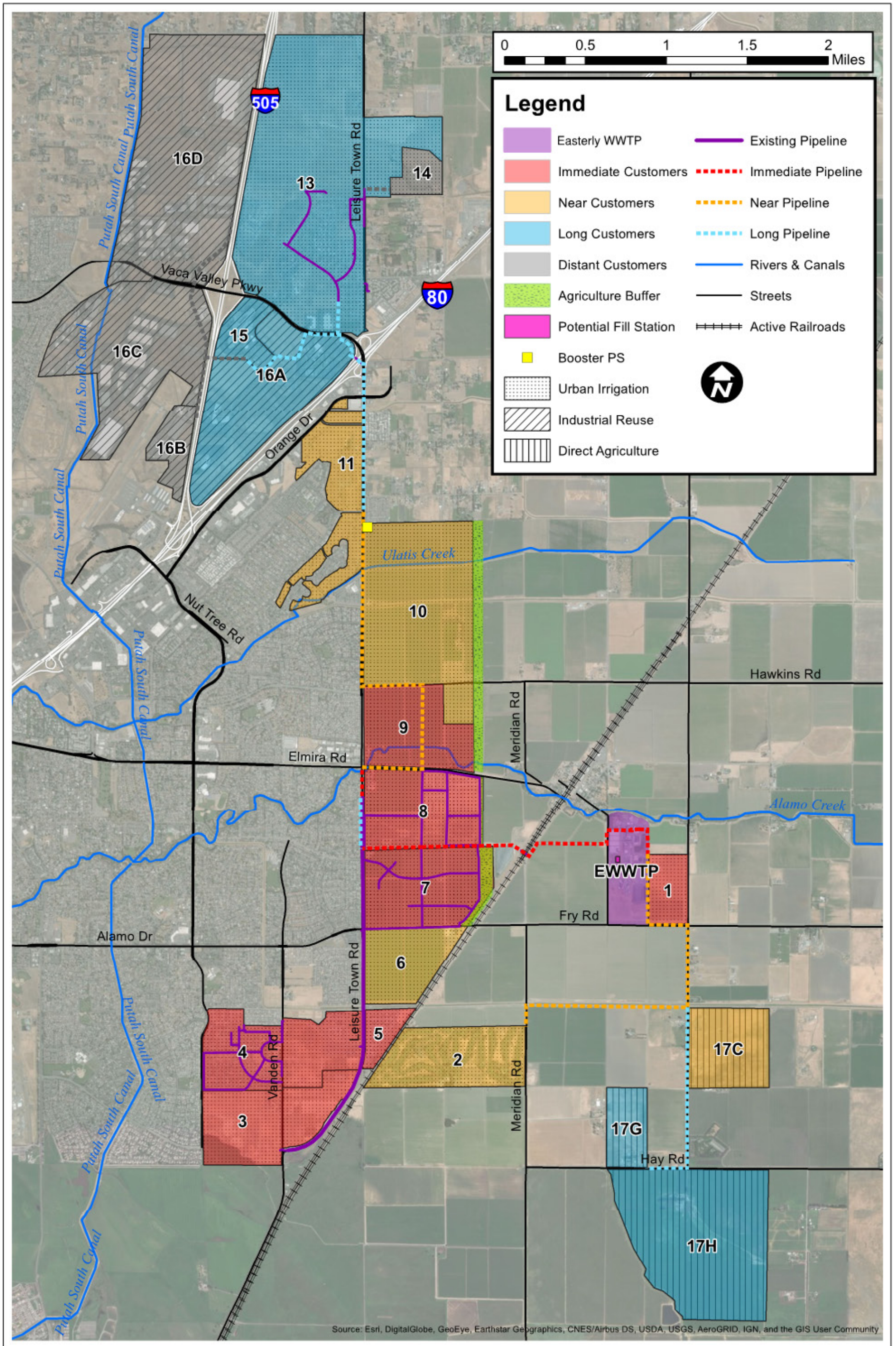
### 7.3.3.4 Recycled Water Filling Station

Figure 7.1 also shows a potential recycled water truck filling station located at Easterly WWTP. The filling station would tie in to the 3W system at the plant and require limited additional infrastructure. This filling station would provide recycled water for City services such as dust control, street cleaning, sewer flushing, and use in construction, among others. This would provide a community benefit and help the City defer water costs. There would also be potential to expand access to the truck filling station to other commercial entities within the City and possibly to the general public. The exact site of the filling station at Easterly WWTP is to be determined, but would be located such that interaction with other plant traffic would be minimized and it would not disrupt any part of plant operations.

### 7.3.3.5 Overall Pipeline Components

Table 7.3 provides a detailed summary of the pipe sizes and diameters needed for each phase of the project. Both the total pipe length (including existing lines) and the length of new pipe required are shown. Overall the distribution system is approximately 13.8 miles long and requires roughly 10.6 miles of new pipelines.

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Note: Customer site ID numbers shown on map correspond to the customer IDs listed in Table 7.1.

Figure 7.1 Recommended Recycled Water Program Map

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Table 7.3 Recommended Program Pipeline Lengths

Phase	Diameter (in)	Total Pipeline Length <sup>(1)</sup> (ft)	New Pipeline Length (ft)
Immediate	6	1,100	1,100
	8	6,100	0
	12	6,500	0
	14	1,000	1,000
	16	1,900	1,900
	18	7,400	7,400
	<b>Immediate Phase Total:</b>		<b>24,000</b>
Near	8	6,000	6,000
	14	12,400	12,400
	18	7,400	7,400
	<b>Near Phase Total:</b>		<b>25,800</b>
Long	6	4,400	4,400
	8	4,400	0
	12	8,900	8,900
	16	5,300	5,300
	<b>Long Phase Total:</b>		<b>23,000</b>
<b>Overall Total:</b>		<b>72,800</b>	<b>55,800</b>

Note:

(1) Length includes existing recycled water line lengths.

#### 7.3.4 Demands

Customer demands include urban and agricultural irrigation, industrial reuse, and downstream diversion demands. These types of uses are described in detail in Chapter 5. Except for downstream diversions, demands for each reuse type were determined using the methods described in Chapter 5. For the purposes of this study, it was assumed 1.5 million gallons per day (mgd) of effluent flow would be allocated to downstream diversions outside Solano County and 0.5 mgd would be allocated to downstream diversions within Solano County. To generate early revenues from entities outside the County, it was preferred to implement downstream diversions outside Solano County in the immediate term phase and diversions within Solano County in the near term phase.

Table 7.4 lists individual customer average day and peak day demands. Demands are assumed to continue without change from one phase into the following phase (e.g. all immediate term demands are included in the near and long term phases).

Table 7.4 Customer Demands by Phase

ID	Customers	Type of Use	Ave Day Demand (mgd)	Ave Day Demand (AFY)	Peak Day Demand (mgd)
<b>Immediate Term</b>					
1	New City Athletic Fields	Urb Irr <sup>(1)</sup>	0.10	110	0.29
3	Vanden Meadows Development	Urb Irr	0.09	100	0.26
4	Southtown Development	Urb Irr	0.12	130	0.33
5	Southtown Commons / Moody	Urb Irr	0.02	20	0.05
7	Roberts Ranch	Urb Irr	0.13	145	0.38
8	Brighton Landing	Urb Irr	0.10	115	0.30
9	The Farm at Alamo Creek	Urb Irr	0.11	125	0.32
	Downstream entities outside Solano County	DD <sup>(1)</sup>	1.50	1,680	1.5
<b>Immediate Term Subtotal:</b>			<b>2.17</b>	<b>2,425</b>	<b>3.43</b>
<b>Near Term</b>					
2	Cypress Lakes Golf Course	Urb Irr	0.30	340	0.88
6	East of Leisure Town Road Development (South)	Urb Irr	0.07	75	0.19
10	East of Leisure Town Road Development (North)	Urb Irr	0.22	245	0.63
11	Green Tree Development	Urb Irr	0.07	75	0.19
17C	Agricultural Customer	Direct Ag <sup>(1)</sup>	0.39	435	1.04
	Downstream entities within Solano County	DD	0.50	560	0.5
<b>Near Term Subtotal:</b>			<b>1.54</b>	<b>1,730</b>	<b>3.44</b>
<b>Cumulative:</b>			<b>3.71</b>	<b>4,150</b>	<b>6.86</b>
<b>Long Term</b>					
13	North Village	Urb Irr	0.60	670	1.92
15	Genentech	Industrial	0.14	150	0.14
16A	Vaca Valley Business Park (excluding Genentech)	Industrial	0.14	160	0.14
17G	Agricultural Customer	Direct Ag	0.20	220	0.53
17H	Agricultural Customer	Direct Ag	1.18	1,325	3.18
<b>Long Term Subtotal:</b>			<b>2.26</b>	<b>2,530</b>	<b>5.91</b>
<b>TOTAL:</b>			<b>5.97</b>	<b>6,680</b>	<b>12.77</b>

Notes:

(1) Urb Irr = Urban Irrigation, DD = Downstream Diversions, Direct Ag = Direct Agricultural Reuse

Table 7.5 presents annual demands of all customers categorized by the type of reuse. The annual demands shown are the additional demands for each phase, not cumulative demands.

The immediate term phase consists of urban irrigation and downstream diversion demands. In the near term, agricultural demands as well as additional urban irrigation and downstream diversion demands would be added to the system. In the long term, once the distribution system reaches the north eastern area of Vacaville, direct industrial demands would be included. Additional agricultural demands are also included in the long term phase.

Table 7.5 Annual Demand Summary by Reuse Type

Phase	Urban Irrigation (AFY)	Direct Agriculture (AFY)	Industrial (AFY)	Downstream Diversions (AFY)
Immediate	745	0	0	1,680
Near	730	435	0	560
Long	670	1,545	310	0
<b>Total</b>	<b>2,150</b>	<b>1,980</b>	<b>310</b>	<b>2,240</b>

Note:

(1) Demands shown are the additional demand per term, not the cumulative amount. Demands from previous phases carry into the following phases.

Figure 7.2 shows the average day demand for each month for each of the program phases along with the current and future ADWF. Future projections for effluent flows at the start of each phase were determined using the average population growth rate as described in Chapter 3. The 2016 average monthly effluent flow from Easterly WWTP is shown in the solid black line and the 2016 ADWF is shown in the dotted black line.

Vacaville has hot, dry summers and cool, wet winters. Urban irrigation and direct agricultural reuse customers therefore have seasonal demands which peak in the dry months from approximately April through October. Downstream entities were also assumed to only have seasonal demands. As Figure 7.2 shows, the majority of recycled water demands therefore occur during the peak irrigation season.

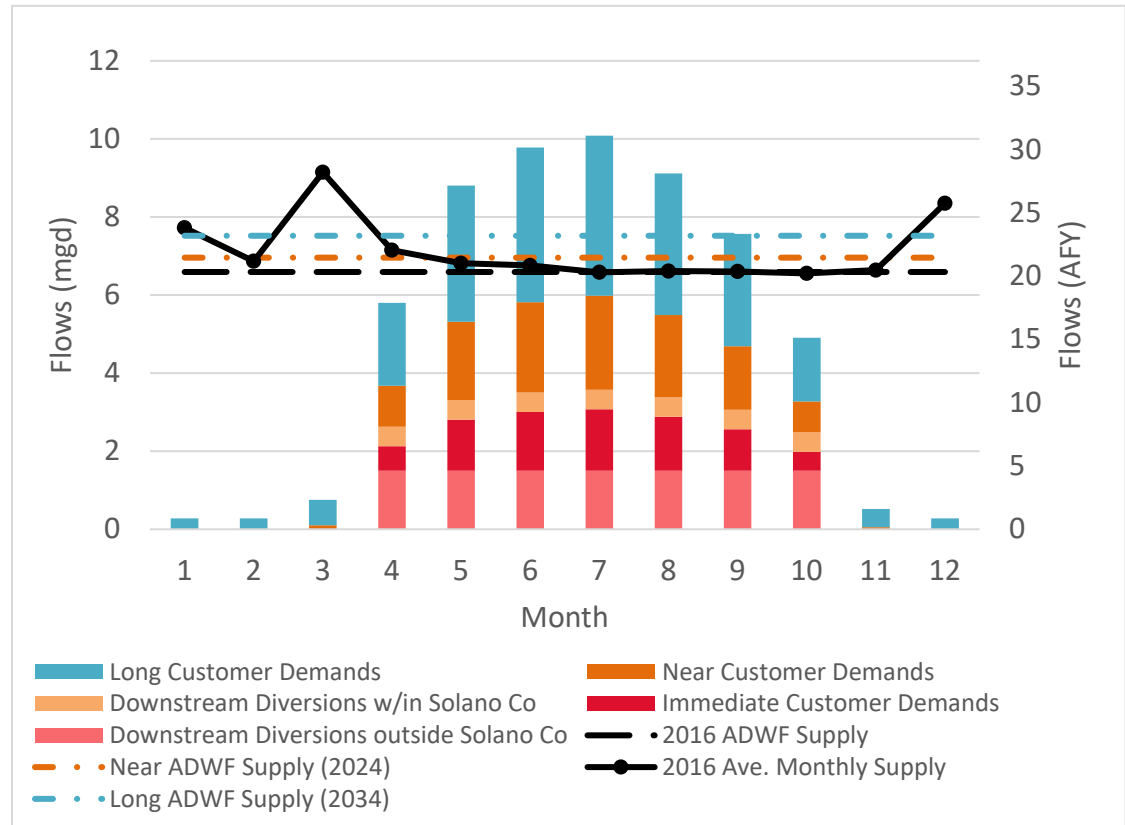


Figure 7.2 Average Day Monthly Demands

7.3.4.1 Demand Schedule

As described earlier, the season, time of day, and duration for each type of demand was assumed and is summarized in Table 7.6. The majority of demands are seasonal and therefore only needed during the irrigation season.

Table 7.6 Assumed Schedule of Demands

Phase	Urban Irrigation	Direct Agriculture	Industrial Reuse	Downstream Diversions
Irrigation Season (Apr – Sept)	8 hours/day	24 hours/day	24 hours/day	24 hours/day
Wet Season (Oct – Mar)			24 hours/day	

Spreading the direct agricultural demands evenly over the course of a day helps maximize the use of the pipeline network and minimize the amount of storage needed, but requires coordination of irrigation schedules amongst the agriculture land owners. If irrigation times are reduced, increasing peak demands, larger pipeline sizes and storage may be required (at increased capital cost).

The urban irrigation demands are assumed to be delivered for a duration of 8-hours overnight. With coordination and agreement between the various urban irrigation customers, it is possible that these demands could be spread out over a longer period of the night (12 hours) helping reduce the peak demand on the pumping system. This would potentially reduce the pump station size and pumping energy costs.

7.3.4.2 Potable Water Off-sets

Customer demands which off-set potable water uses (urban irrigation, direct agricultural reuse, and industrial reuse) have the potential to free up City potable water supplies for other uses. Two possible actions the City could take with regard to potable water off-sets are:

- Keep the current allocation of potable water and use these off-sets to supply other uses within the City.
- Sell a portion of their allocated potable water supply to entities outside the City.

Table 7.7 shows the potential potable water off-sets of the recommended program by phase.

Table 7.7 Potential Potable Water Off-sets

Phase	Ave Day Demand (mgd)	Ave Day Demand (AFY)
Immediate Term Subtotal:	0.67	745
Near Term Subtotal:	0.35	400
<b>Cumulative:</b>	<b>1.02</b>	<b>1,145</b>
Long Term Subtotal:	0.29	985
<b>Total:</b>	<b>1.31</b>	<b>2,130</b>

### 7.3.5 Pump Station

For the immediate and near term phases, a single pump station located at Easterly WWTP is recommended. It is assumed that the pump station, sized for maximum daily demand flows will serve both the northwest and southeast pipeline branches on a continuous basis. A total pump station power of approximately 70 hp would be needed in the immediate phase to deliver recycled water supplies to customers, and a total of approximately 170 hp would be needed in the near term. To minimize overall pumping energy costs, it is recommended to construct a booster pump station adjacent to the Green Tree Development (Customer 11) in the long term project phase to deliver recycled water flows to customers north of I-80. Recommended sizing for the pump stations is based on the criteria outlined in Chapter 6 and rounded to the nearest standard hp sizes. These sizes are presented in Table 7.8.

Table 7.8 Pump Station Sizing by Phase

Phase	Max Daily Demand (mgd)	Max Daily Demand (gpm)	Max Head (ft)	Elevation Served <sup>(1)</sup>	Primary Pump Station Power (hp) <sup>(2)</sup>	Booster Pump Station Power (hp)
Immediate	1.93	1,340	128	66 – 98	70	N/A
Imm + Near	4.86	3,370	136	66 – 98	70+100	N/A
Imm + Near + Long	8.85	6,140	240	66 – 98	70+100+500	125

Notes:

- (1) Based on Google Earth mapping of the pipeline routes. Elevation within customer parcels not evaluated. The elevation at Easterly WWTP is approximately 66 feet above mean sea level.
- (2) Assumes total pump efficiency of 70 percent; represents utilization under max day demand conditions (rounded up to sizing of pumps).

### 7.3.6 Storage

To determine if storage would be required at each phase, peak hour demands were compared with the available ADWF supply from Easterly WWTP. Peak hour demands were determined using the peaking factors and demand schedule assumptions for each type of recycled water use, outlined in Chapter 6. Storage was sized to meet peak hour demands and assumes that no back-to-back peak hour day conditions would occur.

It was assumed that storage units would be filled continually 24 hours a day and that the supply available would be the ADWF from the Easterly WWTP tertiary facility. In the immediate term, the supply was assumed equivalent to Easterly WWTP's 2016 ADWF of 6.69 mgd. This flow was projected to increase at the same rate as the City's population and was assumed to be 6.96 mgd in the near term, and 7.52 mgd in the long term.

Assuming two cells of the existing equalization basin at Easterly WWTP can be used for recycled water storage during the irrigation season with a combined volume of 3.5 MG, no additional storage capacity is needed in the immediate and near phases. Approximately 1.45 MG of new storage would be needed in the long term phase of this recommended program. This new storage would consist of an above ground steel storage tank and would be located either at or adjacent to the Easterly WWTP. The total peak hour demands and the volume of operational storage required at each phase are summarized in Table 7.9.

Table 7.9 Storage Requirements

Phase	Total Peak Hour Demand (mgd)	Total Required Storage (MG) <sup>(1)</sup>	New Storage Needed (MG) <sup>(2)</sup>
Immediate <sup>(3)</sup>	7.3	0.20	0
Near <sup>(4)</sup>	14.5	2.38	0
Long <sup>(4)</sup>	24.3	4.95	1.45

Notes:

- (1) Storage volumes are cumulative.
- (2) 3.5 MG storage assumed available at Easterly WWTP in existing equalization basin cells.
- (3) Assumes 1.5 mgd demand of seasonal downstream diversions outside Solano County
- (4) Assumes 1.5 mgd downstream diversions outside Solano County and 0.5 mgd downstream diversions within Solano County. Both of these are supplied seasonally.

### 7.3.7 Land Acquisition and Easements

Planning efforts were made to avoid the need for land acquisitions and easements. This included prioritizing pipeline routes along City roads and rights-of-way. Additionally, it was assumed that two cells of the existing equalization basins at Easterly WWTP could be used as storage in the immediate and near term phases, thereby requiring no land acquisition for storage. In the long term, additional storage capacity is assumed to be located on City owned land at or adjacent to Easterly WWTP.

### 7.4 Cost Estimate

Development of preliminary cost estimates were discussed in Chapter 6, and associated preliminary costs for the recommended recycled water portfolio are presented in Table 7.10. Project costs include the capital costs including mark-ups and contingencies that were outlined in Chapter 6. Project costs also include the costs associated with developing contracts and other legal documents for downstream diversions (\$100,000 for entities outside Solano County and \$25,000 for entities within Solano County). Project costs show the additional cost per phase, not the cumulative cost.

Table 7.10 also shows the annual operations and maintenance costs, the annualized total cost, and the unit costs per acre-foot of recycled water demand. These three costs are shown as the cumulative cost required in each phase (i.e. the near term annual operations and maintenance (O&M) costs includes the immediate term O&M costs). Detailed cost estimates of the recommended program is provided in Appendix F. A detailed financing plan and revenue program is presented in Chapter 8.

Table 7.10 Recommended Program Cost Summary

Phase	Project Cost <sup>(1)</sup>	Annual O&M	Annualized Total Cost <sup>(2)</sup>	Unit Cost <sup>(3)</sup> (\$/AF)
Immediate	\$6,652,000	\$31,500	\$464,100	\$290
Near	\$11,828,000	\$103,600	\$1,305,800	\$430
Long	\$21,565,000	\$396,000	\$3,001,000	\$540
<b>Overall:</b>	<b>\$40,045,000</b>	<b>\$396,000</b>	<b>\$3,001,000</b>	<b>\$540</b>

Notes:

- (1) Includes markups for legal, engineering, and design. Assumptions regarding costs are included in Chapter 6. Costs are not cumulative
- (2) Includes O&M and energy costs. Annualized costs are cumulative.
- (3) Assumes 1.5 mgd downstream diversions outside Solano County and 0.5 mgd within Solano County.

Components of the recycled water program involving developments within the City limits are potentially eligible for DIF funding. This would include the residential and commercial developments along Leisure Town Rd., but not the agricultural customers nor Cypress Lakes Golf Course.

Figure 7.3 shows approximated capital costs by phase of the recommended program along with the cumulative recycled water yield across project phases.

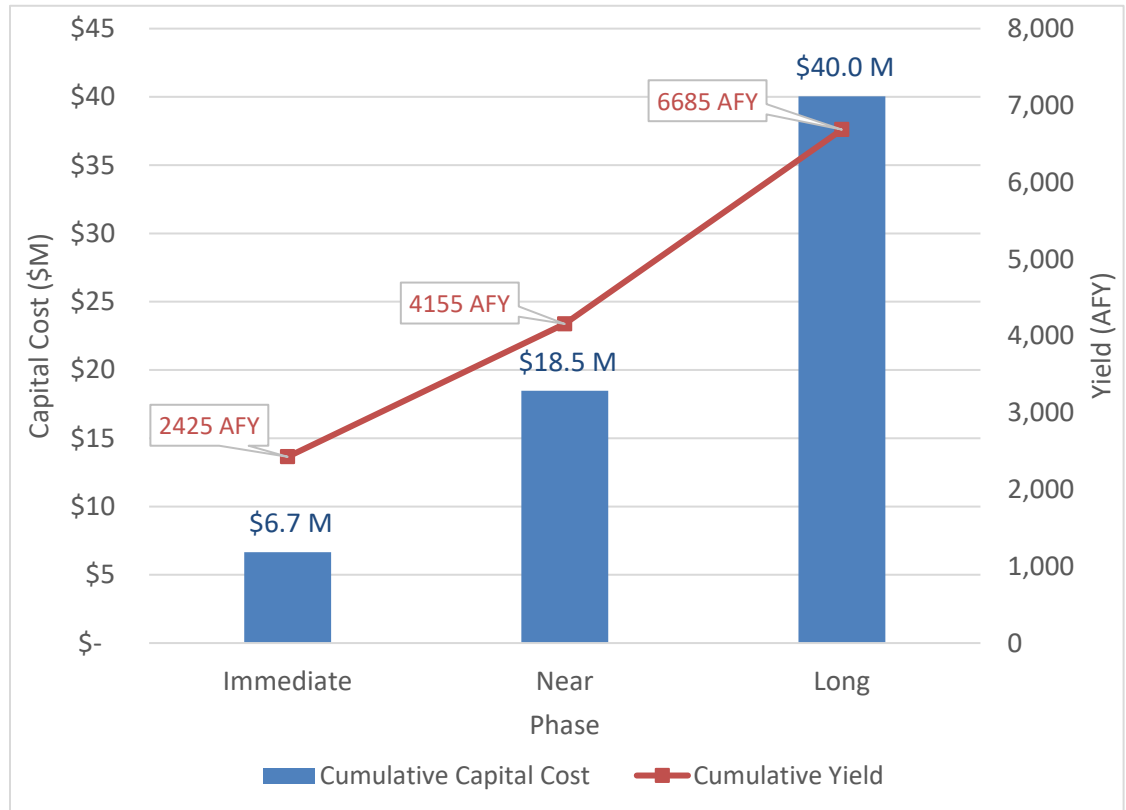


Figure 7.3 Cost by Phase

### 7.5 Implementation Plan

The City will need to address the following project components in implementing the recommended recycled water portfolio (listed in no specific order):

- Design and construct the recommended program.
- Receive firm commitments and agreements from sites to use recycled water OR implement a Mandatory Use Ordinance (see Appendix G for draft Mandatory Use Ordinance).
- Obtain permits and clearances from applicable regulatory agencies (Regional Water Quality Control Board [RWQCB], DDW, etc.). Also includes the RW Policy Salt/Nutrient Management Plan development (defined in Section 4.3.1.1).
- Conduct an environmental analysis (CEQA) for each phase and develop compliance documents.
- Conduct a Proposition 218 process.
- Adopt a resolution for recycled water use.

- Prepare a cost of service rate study.

An implementation schedule of the phases is shown in Figure 7.4.

### 7.5.1 Institutional Issues and Agreements Required for Recycled Water

Since the City of Vacaville, as a water retailer, is entitled to serve potable water to residential, commercial and industrial customers in its service area, it has the right to supply them with non-potable water for approved uses, as well. However, there are a number of issues that must be addressed related to the need to keep potable and non-potable systems separate and ensure its safe use. These rules, described in the SWRCB “Water Reclamation Requirements for Recycled Water Use” (WQ 2016-0068-DDW), are usually incorporated in recycled water permits. In certain cases, the City may also enter into customer agreements that stipulate additional conditions to clarify the roles and responsibilities of recycled water users. Also, before the City can supply recycled water to customers served by another retailer (e.g. SID), they must alter the service area boundaries or enter into a wholesaler agreement. Similarly, diversion agreements will be needed to supply recycled water for downstream diversions. These issues are explained further below.

#### 7.5.1.1 Recycled Water Permits

As the owner and operator of the recycled water project, the City will be the designated Recycled Water Program Administrator, responsible not only for treating the water to mandated standards but also for ensuring that all customers use recycled water correctly. As owner of the Easterly WWTP the City can operate and maintain the recycled water system but it must obtain the cooperation of recycled water customers to verify their compliance with “downstream” regulations. This compliance is most commonly obtained through recycled water permits issued to customers. These permits reference an adopted set of Rules and Regulations incorporating the State requirements and typically include restrictions on public contact, precautions to prevent leaks and cross-connections, and require the customer to receive site supervisor training in the use of recycled water. If the customer does not abide by the terms of the permit, it may specify penalties for failure to perform, including fines or termination of service. The Rules and Regulations also include design requirements and require the submittal of onsite recycled water system designs to the DDW for approval prior to construction. When recycled water is used in a managed residential development, the permit may require the Homeowner’s Association (HOA) to amend their bylaws to prohibit homeowners from maintaining the recycled water system in privately-owned areas.

Activity	Start of Immediate Term			Start of Near Term					Start of Long Term					Start of Distant Term									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
<b>Technical Design / Construction</b>																							
Immediate Phase			Plan/Pre-D <sup>(1)</sup>	Design	Bid/Construction																		
Near Phase								Plan/Pre-D	Design	Bid/Construction													
Long Phase															Plan/Pre-D	Design	Bid/Construction						
<b>Environmental Compliance</b>																							
CEQA Documentation																							
<b>Regulatory</b>																							
RWQCB/DDW Coordination																							
<b>Institutional</b>																							
Customer Agreements	N/A																						
Downstream Diversion Agreements		(2)																					
<b>Financial</b>																							
Financing/Prop 218																							
Funding (SRF/other)																							

Notes:  
 (1) Abbreviation for Pre-Design.  
 (2) Renew Downstream Diversion Agreements when necessary.  
 (2) As needed when customers sign-on to receive recycled water.

Figure 7.4 Recycled Water Program Implementation Schedule

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### 7.5.1.2 Customer Agreements

While a recycled water permit may be easily expanded to incorporate a variety of conditions, at a certain point it becomes more appropriate to execute a separate customer agreement, especially for non-regulatory or financial terms. For example, if the utility extends a pipe to a specific site it might require the customer to use recycled water for a minimum period of time or pay a share of the cost. In that case a separate customer agreement could specify those terms and conditions. The utility may even form a special assessment district so that the customer can recover a portion of the cost as other customers connect to the system. A customer agreement can also be developed to facilitate industrial use of recycled water. Unlike irrigation where water is applied intermittently, industrial customers depend upon an uninterrupted supply of water of consistent quality and pressure. To address this need, industrial customer agreements may specify minimum operating conditions, provide notification procedures when those conditions are not met, require the company to construct backup facilities, and limit the liability of the recycled water provider in case of service interruption. Customer agreements can also cover any financial concessions the utility offers to encourage recycled water use.

### 7.5.1.3 Downstream Diversion Agreements

At this phase of planning, specific downstream diversion customers have not been selected. As Chapter 5 describes, there are a wide variety of potential downstream diversion customers and therefore also a variety of agreement structures that could be formed. In general, the City and each entity would agree upon a fixed allocation of flow over a period of time for either a fixed or variable cost. In addition to the City and the downstream entity, the agreement may include other agencies such as a third party (if the downstream entity transfers an existing water right to the third party). The permits and requirements involved with each agreement will depend upon the downstream user(s) and type of use. Refer to Chapter 5 for further information on the types of downstream diversion customers and an overview on the contractual arrangements that would be formed with each.

Table 7.11 summarizes the typical terms and conditions that can be included in recycled water permits or stipulated in separate agreements with different types of recycled water customers. A more detailed description of the institutional issues and agreements required to reuse municipally treated effluent is provided in Appendix H.

Table 7.11 Recycled Water Customer Agreements

Type of Use	Customers	Type of Agreement Required	Agencies Involved <sup>(1)</sup>	Key Terms and Conditions
Urban Irrigation	City Parks	<ul style="list-style-type: none"> <li>Recycled Water Permit</li> </ul>	<ul style="list-style-type: none"> <li>City Departments (Public Works, Parks)</li> <li>CVRWQCB</li> </ul>	<ul style="list-style-type: none"> <li>Commitment to use</li> <li>Site supervisor training</li> <li>Reporting requirements</li> </ul>
	HOAs	<ul style="list-style-type: none"> <li>Amendment to HOA CCRs<sup>(2)</sup></li> <li>Recycled Water Permit</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>CVRWQCB</li> </ul>	<ul style="list-style-type: none"> <li>Maintenance restrictions</li> <li>Reporting requirements</li> </ul>
	Private Facilities (Golf Course)	<ul style="list-style-type: none"> <li>Recycled Water Permit</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>CVRWQCB</li> </ul>	<ul style="list-style-type: none"> <li>Site supervisor training</li> <li>Reporting requirements</li> </ul>
	Developments	<ul style="list-style-type: none"> <li>Recycled Water Permit</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>CVRWQCB</li> </ul>	<ul style="list-style-type: none"> <li>Design requirements</li> <li>Construction inspection</li> <li>Site supervisor training</li> </ul>
Industrial	Private Industries	<ul style="list-style-type: none"> <li>Customer Use Agreement</li> <li>Recycled Water Permit</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>CVRWQCB</li> </ul>	<ul style="list-style-type: none"> <li>Minimum quality, flow and pressure</li> <li>Liability limits, notification procedures</li> <li>Onsite storage, backup supply and cross-connection testing</li> </ul>
Direct Agriculture	Individual Agricultural Land Owners	<ul style="list-style-type: none"> <li>Customer Use Agreement</li> <li>Recycled Water Permit</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>CVRWQCB</li> </ul>	<ul style="list-style-type: none"> <li>Runoff prohibitions</li> <li>Minimum quality, flow and pressure</li> <li>Site supervisor training</li> </ul>
Downstream Diversion	Entities outside Solano County	<ul style="list-style-type: none"> <li>Water Supply Agreement</li> <li>Determined on a case-by-case basis</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>Downstream entities</li> <li>Potentially a third party</li> </ul>	<ul style="list-style-type: none"> <li>Water quantity</li> <li>Other terms dependent upon customer</li> </ul>
	Entities within Solano County	<ul style="list-style-type: none"> <li>Water Supply Agreement</li> <li>Determined on a case-by-case basis</li> </ul>	<ul style="list-style-type: none"> <li>City of Vacaville</li> <li>Downstream entities</li> <li>Potentially a third party</li> </ul>	<ul style="list-style-type: none"> <li>Water quantity</li> <li>Other terms dependent upon customer</li> </ul>

Notes:

- (1) To deliver recycled water to customers currently served by SID, the City will need to transfer service to the Vacaville service area or execute a wholesaler-retailer agreement with SID.
- (2) Covenants, Conditions, and Restrictions.

#### 7.5.1.4 Wholesaler-Retailer Agreements

As noted in Chapter 6, the City of Vacaville and SID have signed a non-compete agreement barring the City from serving SID agricultural customers. Nevertheless, it may be useful for the two utilities to develop a cooperative agreement to allow the use of recycled water throughout their service areas. One option would be for the City and SID to enter into a wholesaler-retailer agreement whereby the City sells water to SID at an agreed upon rate and SID distributes the water to its potable water customers. In that case, the City might be responsible for transmitting recycled water to the customer site through its distribution pipeline, and SID could be responsible for installing the meter and serving the customer. Alternatively, SID could adjust its service area to allow the City to serve both potable and recycled water to specific customers, or they could form a joint powers authority (JPA) for the purpose of serving recycled water to municipal, industrial and agricultural customers within their combined service areas. In all cases the parties would need to execute a separate agreement specifying these terms and conditions.

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